# Polling Place Changes and Political Participation: Evidence from North Carolina Presidential Elections, 2008-2016*

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**Abstract**

How is turnout affected by the decisions of partisan appointed election administrators to move Election Day polling places in closely contested presidential elections? We study the behavior of more than 2 million eligible voters across three presidential elections (2008-2016) in the swing state of North Carolina. Leveraging within-voter variation in polling place location change over time, we demonstrate that polling place changes reduce Election Day voting statewide on average, but that this effect is almost completely offset by substitution into early voting. This result obtains whether polling place changes increase or decrease travel costs, and regardless of voter characteristics. Our findings highlighting the importance of early voting and voting primes for mitigating the non-travel costs of polling place changes in high-salience elections.

**Keywords**: Voting; Election Administration; Political Participation

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The nature and quality of democracy is closely connected to questions of which members of the polity are able to participate in the electoral process (Keyssar, 2009). These questions are especially complex because the U.S. Constitution provides states with the ability to regulate the "time, manner, and place" of elections as a protection against the usurpation of state powers by the federal government. Scholars, however, have argued that this consequent state-level control of election administration has allowed elites to capture election administration processes and undermine voters' abilities to hold elites accountable (Cain, 2014, p. 172). Indeed, work on the impact of felon disenfranchisement laws (Gerber, Huber, Meredith, Biggers and Hendry, 2017), voter identification laws (Grimmer et al., 2018; Highton, 2017; Citrin, Green and Levy, 2014), early voting policies (Burden et al., 2017), registration windows (Burden et al., 2014; Hanmer, 2009; Leighley and Nagler, 2013), and variation in voting machines, operating hours and waiting times (Herron and Smith, 2016, 2015*a*; Highton, 2006; Stewart III and Ansolabehere, 2015; Pettigrew, 2017) have all demonstrated the importance of election administration decisions for political participation and electoral outcomes. In the battleground of contemporary disenfranchisement, it is these routine but fundamental aspects of voting that have become the front lines.

The decision of whether to alter the number or location of polling places represents one of these routine but absolutely fundamental decisions about the voter experience, and one that existing evidence suggests should be quite consequential. In light of the consistent empirical finding that voters are sensitive to changes in voting procedures (Downs, 1957; Wolfinger and Rosenstone, 1980; Powell, 1986; Highton, 2004), existing work suggests that voter turnout should be affected by polling place changes. Changing where voters vote introduces search costs to find the new polling place and may also affect how long it takes to travel to the polls(Brady and McNulty, 2011; Amos, Smith and Claire, 2017). Such changes may disrupt voting habits (Brody and Sniderman, 1977; Plutzer, 2002; Gerber, Green and Shachar, 2003) and create confusion among impacted voters.

To identify the effect of polling place changes on voter turnout, we assemble a balanced panel of more than 2 million eligible voters from the official state voter rolls of the swing-state of North Carolina across the 2008, 2012 and 2016 presidential elections. Focusing on changes in the same type of race eliminates the potential confounds that prior work introduces by comparing turnout across different types of races and candidates running (Yoder, 2018). Identifying the impact of polling place changes in presidential elections also highlights the potential for local-level decisions to affect national outcomes given the closeness of recent presidential elections in the state.

For each voter in each presidential election, we identify whether a voter votes and how (e.g. on Election Day or in-person early[1]). We also geolocate every voter and every polling place over time to identify whether a voter experienced a polling place change and the resulting impact on travel time to the polling place. Our stateside coverage allows us to estimate the effects of polling place changes in specific localities and also the average *state-wide* effect of polling place changes on turnout given the totality of changes being made across the state. Our ability to estimate voter-level panel specifications that hold the identity of voters fixed provides uniquely powerful leverage for identifying the effect of polling place changes on turnout, as well as whether the effects vary by the party in control of making the changes and voter-specific characteristics such as race, partisanship, the change in distance to polling place, and the availability of early voting.

We find that the impact of changes in polling place locations are far more complex than existing theory on the depressive turnout consequences of increased voting costs would predict. Polling place changes do indeed decrease Election Day voting by about -1.6 percentage points on average, but this effect is nearly perfectly offset by an *increase* in in-person early voting. The average

[1]We refer in the remainder of the paper to "early voting" in place of "in-person early voting" and distinguish this from early voting by mail (i.e. absentee voting) which we term "mail-in voting."

overall impact of a change in polling place location on turnout is therefore effectively null. We further find that changes in the distance voters must travel to reach their polling places impact patterns of substitution, but *not* overall turnout. Voters substitute from Election Day to early voting more when their polling place is moved substantially further away ($> 5$ minutes drive time), and less when their polling place is moved substantially closer ($> 5$ minutes closer). Furthermore, when we allow our effects to vary by important characteristics of voters and the availability of early voting, we find no meaningful differences in overall turnout. The effect of a polling place change on overall turnout does not vary for voters with lower material resources, racial minorities, or younger voters who have had less opportunity to develop a habit of voting. Overall, our results indicate that voters respond to changes in the costs associated with voting on Election Day by *substituting* into an alternative mode of voting, *not* by forgoing casting a ballot.

We find no net effects of polling place changes on turnout at the statewide level because voters vote early in response. However, in replicating the analysis at the county-level, we find considerable variation in the estimated effects of polling place changes on overall voter turnout. In fact, it is possible to find counties whose estimated effects vary both in magnitude and direction using the same specification and standard tests of statistical significance. When we correct the county-level statistical significance tests to account for the likelihood of finding spurious relationships due to multiple testing, however, the across-county differences become largely indistinguishable. These findings highlight the difficulty of interpreting existing studies that have focused on a specific jurisdiction due to data availability. Although our results broadly confirm existing findings, the county-level variation we identify reveals that this confirmation could not be expected ex ante.

The lack of an overall impact on turnout is perhaps surprising in light of theoretical claims about how polling place changes impact turnout, but there are a number of empirical and theoretical rationales for the statewide substitution effects that we identify. First, North Carolina voters receive an official county mailer advising them whenever their polling place changes, priming them to think about voting in advance of Election Day, and providing internet links to early voting information. These mailers, which are not uncommon in other states, not only reduce the search costs associated with both Election Day *and* early voting, but they also arguably prime voters to think about the election before Election Day similar to get-out-the-vote campaigns (Gerber and Green, 2000; Gerber, Green and Larimer, 2008; Arceneaux and Nickerson, 2009).

Our results are also consistent with those of Brady and McNulty (2011), but in the spirit of "normal" scientific advancement offer several substantial improvements on their design. First, where Brady and McNulty (2011) examine effects of polling place changes in a single gubernatorial recall election in a single county (Los Angeles), we examine behavioral patterns across an entire state and multiple elections. Insofar as we are concerned about how polling place changes may impact election outcomes by changing turnout, it is important to look beyond a single locality to identify the average statewide effect. This not only protects against possibly spurious relationships or the possibility of news reports spurring case selections (and thus inadvertently selecting on the dependent variable), but also because the average statewide effect is the relevant quantity for evaluating the overall impact of the polling place changes on turnout. Indeed, as noted above, we show that analyses of individual counties in North Carolina could easily lead to spurious conclusions that are not supported by a more systematic analysis. Indeed, this finding should be of interest to the entire election administration literature, where studies of voters in a single locality is the norm rather than the exception (Dyck and Gimpel, 2005; Gimpel and Schuknecht, 2003; Haspel and Knotts, 2005; Cantoni, 2016; Amos, Smith and Claire, 2017). We may also worry that voters in special elections (or even midterm elections) may be differentially motivated than voters in presidential elections and the effects of polling place changes that are identified using such elections may not generalize to a broader electorate.

Second, our data allows us to make a number of measurement improvements and evaluate less-studied heterogeneity by race. Our panel data allow us to eliminate movers from our analysis — that is, those who *select into* polling place changes, and who may therefore have very different behavior from non-movers who have their polling places changed by local officials. Our data also allow us to estimate changes in *travel time* to the polls, rather than simply geometric "as the crow flies" distance, which may obscure important road density and traffic variation. While some studies have looked at some dimensions of race and polling place changes (Amos, Smith and Claire, 2017), we are able to observe whether voters of different races — particularly black voters — in a state with a history of race-based disenfranchisement behaved differently in response to polling place changes. That we don't find important heterogeneity in our effects by race contributes to a literature on racial inequalities in participation (Verba, Schlozman and Brady, 1995; Anoll, 2018).

Finally, existing efforts to identify the impact of polling place changes on turnout have relied either on matching (e.g., Brady and McNulty (2011)) or parametric methods using statistical controls (e.g., Amos, Smith and Claire (2017)). These identification strategies are certainly defensible, but they rely on using observable characteristics to control for unobservable aspects that may also affect turnout. While such unobservables would also have to be correlated with polling place changes to matter, it is unknown whether the results are attenuated when using an identification strategy that relies on within-voter variation to estimate the effects of polling place changes on turnout. Our paper provides demonstrates that existing evidence is not a function of unobservable voter characteristics. Ultimately, our results are consistent with existing work. But in light of the replication crisis in the sciences (Open Science Collaboration, 2015; Camerer et al., 2018), the advancements in our research design, and the statewide high stakes context that we study, they still provide valuable knowledge about the consequences of polling place changes for turnout, a topic of substantial importance in the contemporary voter suppression wars (Roth, 2015).

Our results are also consistent with existing work on how voters respond to disruptions in their habit of voting (Meredith and Malhotra, 2011). If voters are risk averse and value voting, they may substitute into a less risky mode of voting (i.e. early voting) — where they have the time to search for information and overcome costs and errors — rather than risk not casting a ballot at all at an unfamiliar polling place. Indeed, scholars have noted that early voters tend to be highly cognitively engaged in the election context (Gronke and Toffey, 2008). That the elections we study are competitive high-salience presidential elections may also be crucial in motivating voters to overcome costs associated with polling place changes.

Our argument proceeds as follows. Section 1 draws on existing theory to elaborate our expectations about polling place changes and turnout. Section 2 describes the voter and polling place data that we've collected. Section 3 presents the identification strategy we employ to identify and evaluate the effects of polling place changes on turnout. In Section 3 we further estimate the average statewide effect of a polling place. Section 4 replicates the analysis for each of the 100 counties in North Carolina to demonstrate potentially problematic county-level heterogeneity for those studies that have examined patterns in a single county. After demonstrating the difficulty inherent in generalizing from county-level analyses, Section 5 returns to the state-level to examine whether the substitution effect we identify varies depending on the availability of early voting in the county or the voters' race. Finally, section 6 concludes.

# 1 The Potential Effects of Polling Place Changes

State and local officials in the US have enormous discretion in how they administer elections (White, Nathan and Faller, 2015). This discretion has the potential to impose significant costs on voters, and the large literature on political participation has long argued that *any* imposition of costs is likely to reduce participation (Downs, 1957; Wolfinger and Rosenstone, 1980; Powell, 1986; Highton, 2004).[2] The behavioral expectations of the impact of polling place changes are therefore exceptionally clear — changes in location and increased distance should depress turnout.

Following existing theoretical work, changing the location of a voter's polling place affects the costs of voting in at least two ways (Brady and McNulty, 2011). First, the simple fact of a moved polling place, even if there is no change in the time needed to travel to it, may be costly to voters. The change might impose psychological costs — confusion and habit disruption — and it may also generate search costs that require voters to expend resources seeking out information about where their polling place has moved to and how to travel to it (Brady and McNulty, 2011; Amos, Smith and Claire, 2017).

Second, changes to polling place locations almost always alter how long it takes most voters to travel to cast a ballot on Election Day. While confusion and habit disruption unequivocally increase voting costs, changing travel times do not (Brady and McNulty, 2011; Dyck and Gimpel, 2005; Gimpel and Schuknecht, 2003; Haspel and Knotts, 2005; Cantoni, 2016; Amos, Smith and Claire, 2017). For a given polling place change, some voters will find themselves closer to the new location, while others will find themselves farther away. We might expect, therefore, that those whose polling place is moved farther away may forgo casting a ballot due to the increased cost of traveling to the polls, while those whose polling place is moved closer may be *more* likely to turnout since their costs have been reduced. The relative impact of these two types of costs is theoretically unclear. However, others have found attempts to *increase* turnout in other realms of election administration have tended to mostly exacerbated existing inequalities (Berinsky, 2005) or make the process easier for current voters (Karp and Banducci, 2000).

We may also expect differences in the relative ability of different groups to overcome the costs associated with polling place changes. Voters with fewer material resources — lower income and minority voters, for example — might be less able to overcome increased costs to voting (Verba, Schlozman and Brady, 1995).[3] Alternatively, historical experiences with disenfranchisement, or other group norms (Anoll, 2018), may differentially motivate non-white voters to overcome the costs imposed by polling place changes to cast their ballot.

Relatedly, if the habit of voting matters substantially for voters, those with a longer or shorter history of voting may respond differently to a polling place change (Wolfinger and Rosenstone, 1980; Leighley and Nagler, 2013). On the one hand, younger voters may be less likely to vote than older voters because they have yet to develop a long habit of voting that spurs them to find ways around increased costs. On the other hand, their lack of extensive voting histories may result in higher expectation of costs and therefore more flexibility in the face of change. Given these (ambiguous) expectations, we examine both the average overall effects of a polling place change in addition to whether those effects are conditioned by the demographic characteristics of voters.

Although our panel covers two different partisan regimes of election administration appointments

[2]For a prominent example, voter registration requirements have been found to depress turnout (Wolfinger and Rosenstone, 1980; Powell, 1986; Highton, 2004; Hanmer, 2009; Leighley and Nagler, 2013).

[3]Although, racial differences in participation have declined since the 1980s (Leighley and Nagler, 2013; Fraga, 2016).

— changes made in 2012 were made by local administrators appointed by a Democratic administration and changes made in 2016 were made by Republican appointees[4] — there is actually little theoretical reason to expect that polling place changes made under each of these regimes would produce different *overall* turnout effects. If the effect of a polling place change is driven by the confusion and habit disruption of a *per se* change, the partisanship of administrators should not matter. If these *per se* costs can be offset by an increase or decrease in travel times to the polls, then local election administrators' choices might increase turnout for those moved closer to polling places, while decrease turnout for those moved further away. Yet, unless there is important heterogeneity in how partisan voters respond to a change, we would expect the depressive effect of being moved further from a polling place to offset the increased turnout of those moved closer. In evaluating heterogeneity in turnout effects by race (as well as income and age in an Appendix), we implicitly evaluate this potential heterogeneity.[5] Although some readers might be surprised by this claim given discussion of partisan voter suppression in the popular media, we think it's important to lay out this logic.

The literature on costs and participation would conclude that increasing the cost of casting a ballot should result in lower turnout. But the election administration policies of North Carolina may also exacerbate or counteract some of the increased costs associated with polling place changes. Most notably, voters have a choice between voting on Election Day or early.[6] If voters are risk averse, or value their vote highly, changing the costs of voting on Election Day by moving a polling place may induce voters to shift their mode of voting to early voting. Prior work has indeed found evidence that voters shift between modes of voting rather than forgo casting a ballot when there are changes in the procedures for a particular mode of voting (Michelson et al., 2012; Malhotra et al., 2011). Early voting also provides voters with more opportunities to contend with unexpected or confusing circumstances — voters have more flexibility in scheduling when they vote, more opportunities to successfully locate their early vote location, and more opportunities to return if they can't find parking or lines are long.

Another important feature of the North Carolina electoral landscape is the fact that County Board of Elections send out an informational mailer to all voters affected by a polling place change. The mailer provides voters with the address of their new polling place and links to websites with further information about early voting.[7] These mailers may help offset the search costs involved with finding the new polling place. Critically, they may also provide an important reminder to vote. In fact, voting primes are well-known to affect turnout (Gerber and Green, 2000; Gerber, Green and Larimer, 2008) and prior work suggests that reminders by election administrators can almost completely eliminate the negative consequences of certain election reforms (Burden et al., 2017; Bergman and Yates, 2011).[8]

[4]During the period that we study, three person county-boards of election are partisan. Two of the three officials may be from the same political party. Officials are chosen by the five person State Board of Election (SBOE), of which three members may be from the same party. The Governor, an obviously partisan position, appoints the SBOE members.

[5]In Appendix A we also show that while for some outcomes there are small differences in turnout under different partisan regimes, these are both extremely small (approximately half of one percentage point) and unfortunately confounded by the fact that there are other differences between the years besides partisan regime that may have played a role in participation.

[6]Mail-in voting is also possible, but rare. Voters who choose to vote early can vote at any early voting location in the county with no excuse. There is variation in the number of early voting locations between counties, but every county has to have at least one early voting location open for 100 total hours prior to Election Day.

[7]An example of a mailer from Wake County is provided in Appendix B.

[8]But see Meredith and Morse (2014) on the ineffectiveness of information provided to ex-felons eligible to vote for a counter example.

Comparing turnout in closely-contested presidential elections also creates uncertain expectations about the magnitude of the expected effects relative to extant work. On the one hand, the closeness of the election and the mobilization efforts of parties and outside groups may cause voters to be more enthusiastic and more attentive than usual — traits that may help them overcome the costs created by a polling place changes. On the other hand, because presidential elections involve less committed voters than midterm election voters, the effects of polling place changes in presidential elections may be more severe if casual voters are value voting less and are therefore less able to overcome the costs associated with a polling place change than motivated midterm voters.

# 2 Data on Voters, Votes, and Polling Places

To identify the effects of polling place changes on voters in North Carolina we collect individual-level data on every voter from the official state voter rolls between 2008 and 2016. We supplement this data with information on precinct boundaries and the location of nearly every polling place in the state for each election. Our choice of North Carolina is in part a function of the unique availability of comprehensive voter and polling place information, but it is also motivated by the ability to study the effect of polling place changes at the state level over several closely contested and highly-salient elections with national implications.

Our individual-level dataset comprises demographics, polling place assignments, and voting histories for 2,350,731 unique voters collected from snapshots of the North Carolina Voter Roll provided by North Carolina State Board of Election (NCSBE) between 2008 and 2016.[9] The voter file contains information on voter registration status, party registration, race, gender, and age which are then paired with records from the North Carolina State Board of Elections on how each voter voted (e.g., Election Day, mail-in, in-person early), if at all, in the three presidential elections.

We focus our analysis on a balanced panel of voters who are eligible to vote[10] in both 2008 and 2012.[11] Two years of eligibility are required as a first time voter cannot, by definition, experience a *change* in polling place location. Note, however, that as the ability to vote in 2012 may impact subsequent eligibility to vote, subsetting for voters who are *also* eligible in 2016 could potentially create bias due to selection after treatment.

The balanced panel we create allows us to track the behavior of *the same voters* over time to ensure that the effects we identify are a consequence of polling place changes rather than changes in the set of voters being analyzed. Removing compositional differences is especially important for comparing the effects of Democrat and Republican-controlled changes. Because we hold the set of voters being studied constant, we can be relatively confident that differences we observe during each of the two periods of partisan control are the results of differences in the nature of polling place changes, rather than changes in the composition of the electorate.

However, we recognize some may be concerned that we may have sacrificed too much in terms of representativeness in order to achieve panel balance. For these careful readers, we note that in

[9] More specifically, data was downloaded by the authors from the NCSBE data site `http://dl.ncsbe.gov/index.html` in November of 2017. Data for the 2016 presidential election comes from the November 8th, 2016 snapshot, data for the 2012 presidential election comes from the November 6th, 2012 snapshot, and data for the 2008 presidential election comes from the November 4th, 2008 snapshot.

[10] These eligible individuals are voters with voter status of "Active," "Temporary," or "Inactive." "Inactive" is a label used by the NCSBE for voters who have failed to vote in several past elections, and who *will be* (but are not yet) eligible for removal if they continue to not vote. Thus, our eligibility requirement is exceptionally inclusive.

[11] There are 4,434,125 voters in the voter rolls who meet this incredibly basic sample qualification.

Table 1: Our Sample Compared to Voter Roll-Eligible Voters

| Variable | Our Panel | Voter Rolls |
|---|---|---|
| *VotedAny* | 0.80 | 0.72 |
| *Movers* | 0.00 | 0.31 |
| *Age* | 57.02 | 50.49 |
| *Female* | 0.55 | 0.57 |
| *White* | 0.76 | 0.66 |
| *NonWhite* | 0.24 | 0.35 |
| *Republican* | 0.35 | 0.29 |
| *Democrat* | 0.44 | 0.39 |
| *Unaffiliated* | 0.21 | 0.23 |
| Sample | 4,681,792 | 12,860,588 |

*Notes:* The unit of analysis for all variables is the voter-election. Summary statistics are pooled means calculated for 2012 and 2016 — i.e. an individual voter enters once for 2012 and once for 2016. The Voter Rolls column includes voters who were eligible to vote in at least one of the three presidential elections in our sample.

addition to our full panel estimates, we also estimate the effect of polling places changes between 2008 and 2012 on 2012 turnout. As the primary subsetting applied to our panel is to restrict attention to people eligible to vote in both 2008 and 2012 who did not move, this analysis represents an estimate for very nearly the universe of individuals capable of experiencing an administrative polling place change between 2008 and 2012 and vote in 2012.[12] The only place this analysis falls short of estimating this effect on the universe of eligible individuals is in the exclusion of 393,174 voters who are removed for balance because they moved between 2012 and 2016, but did not move between 2008 and 2012. And as shown below, we find the same general patterns of behavior in these estimates as in our full panel results.

To identify the location of voters' residences in our panel, we geocode voter addresses using the `geocod.io` geocoding service[13], and we link voters to their precincts and Election Day polling places for the three presidential elections that we examine. Polling place locations were also geocoded using the `geocod.io` geocoding service and merged with shapefiles of election precinct boundaries.[14]

We also use this spatial information to exclude people who move between elections from our analysis. Focusing on stationary eligible voters ensures that the effects that we identify are not the consequence of self-selection into polling place changes, but are instead exclusively caused by the decisions of election administrators.[15]

Table 1 compares our panel to the set of all eligible voters according to the 2008-2016 voter

[12] A voter who was, for example, ineligible to vote in 2008 cannot, *by definition*, have experienced a change in their Election Day polling place from 2008 to 2012. Similarly, a voter who moved between 2008 and 2012 cannot be said to have experienced an *administrative* polling place change.

[13] This generates a total of 4,253,361 voters with usable geocodes — 95.9 of our eligible voter sample. Our definition of usability requires accurate geocoding scores in two sequential elections. The reasons for failed geocodes — e.g. typos in voter roll addresses — are likely to be idiosyncratic and unrelated to turnout decisions.

[14] See Appendix L for additional details of geocoding.

[15] This restriction generates our final sample of 2,350,731 unique individuals; 69.9% of all geocoded, eligible voters with polling places.

rolls. Our important panel restrictions alter our sample in predictable ways. Our sample is on average more white, more partisan (i.e., more likely to include registered Republicans and Democrats) and older than the universe of eligible voters in the voter rolls. These traits all correlate with political participation (Leighley and Nagler, 2013), and the turnout rate of our balanced panel is subsequently and unsurprisingly roughly 8 percentage points higher than the voter file. However, schoalrship on the relationship between voter mobility and voter turnout reassuringly finds estimated mobility effects that are roughly comparable to the turnout differences we observe between our panel and the voter roll (Squire, Wolfinger and Glass, 1987; Highton, 2000).

Overall, 17% of voters experienced a polling place change between 2008 and 2012 and 16% experienced a change between 2012 and 2016. Polling place changes can arise for one of two reasons: the location of a given precinct's polling place may be moved, or else a change in a precinct's boundary can move a voter from one precinct to another. Although most of the changes are due to re-precincting rather than adding or subtracting the number of polling places, by gathering data on both county-drawn precinct boundaries *and* polling place locations, we are identify the consequences of either change.

To illustrate the type of changes we examine, Figure 1 presents maps of the location of Election Day polling places in 2008 and 2012 (a) relative to those in 2012 and 2016 (b) for Precinct 22 in central Charlotte. Between 2008 and 2012, Democrats moved the polling place in Precinct 22 to a Census block with a higher-than-average percentage of black residents (Census block groups are shaded in the background according to their racial composition in the 2010 Census, with darker shades indicating a higher percentage of black residents). But in 2016, Republicans moved the location of the polling place back to a part of the precinct with a higher percentage of white voters. In our analysis, we use the richness of our data to examine how factors such as these — voters' race, or the partisan control of the local election boards — condition any effects that we find.

In addition to identifying whether a voter's polling place has changed between presidential elections, we are also able to measure how far voters have to travel to reach their polling place. We use Google Directions API to estimate how long it takes every voter to reach their polling place by car in minutes from the population-weighted centroid of their Census block at 10am on Election Day, Tuesday, November 6th, 2018.[16] Using estimated travel times is important because straight-line distance measures may mask substantial variation in actual travel times depending on road density and traffic congestion.[17]

Figure 2 plots the distribution of polling place changes in terms of the proximity between the old and new polling places (Plot (a)) and the change in predicted drive times between old and new polling place (Plot (b)). Most polling places experienced relatively small changes in their location — unsurprising, given the size of precincts and the availability of suitable alternative sites — and travel times did not systematically increase or decrease. In general, very few voters had their travel times changed by more than 5 minutes because of a polling place change.

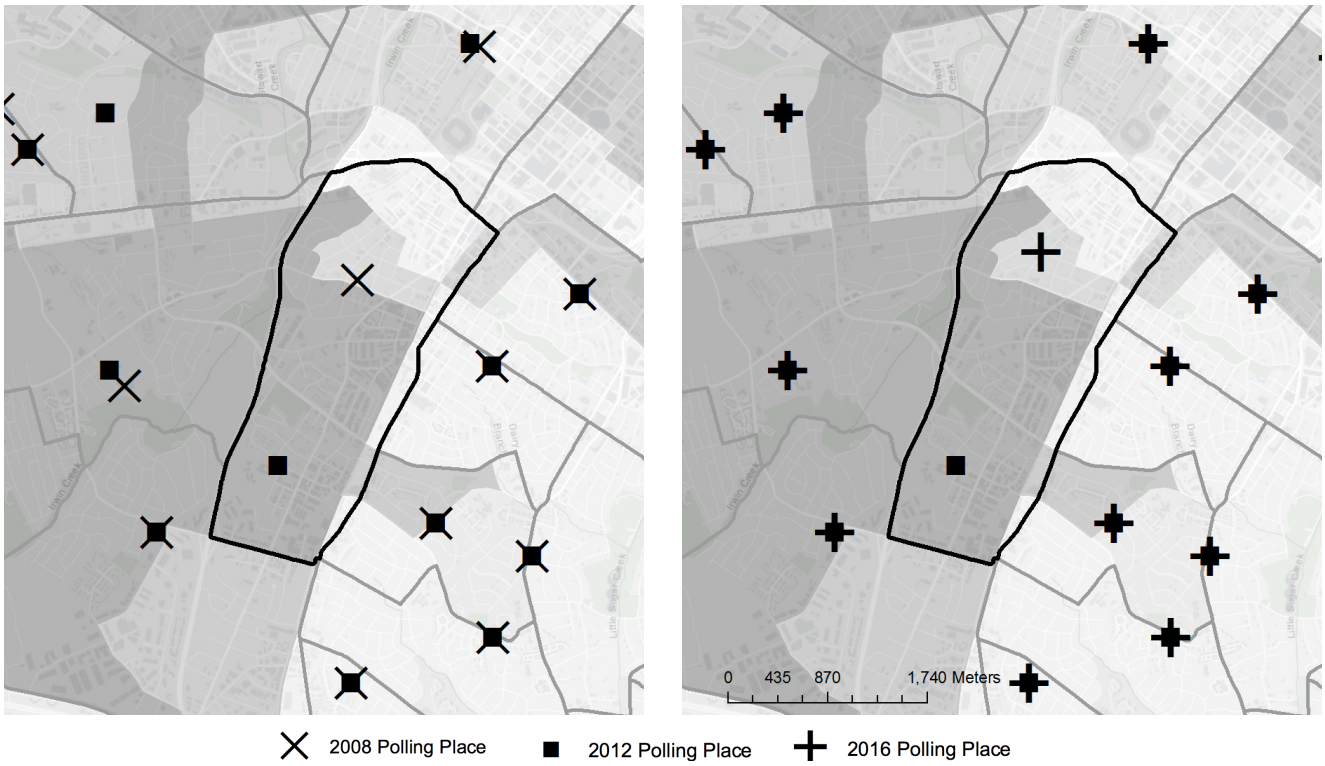
[16]Estimating travel times for census block centroids rather than for each voter's residence is necessary for financial and computational reasons. However, Census blocks are extremely small units, which minimizes measurement error. We use a future date because Google only provides travel time estimates for future dates.

[17]Even so, a limitation of using travel times by car is that it may still mask substantial variation in travel times using public transportation. As poor and minority voters are more likely to use public transportation to reach their polling place, we attempt to account for these differences by looking at heterogeneity in the effects of travel costs by race and income.

Figure 1: Polling places in Precinct #22, Charlotte, Mecklenburg county

(a) 2008 and 2012 (Democrats)

(b) 2012 and 2016 (Republicans)

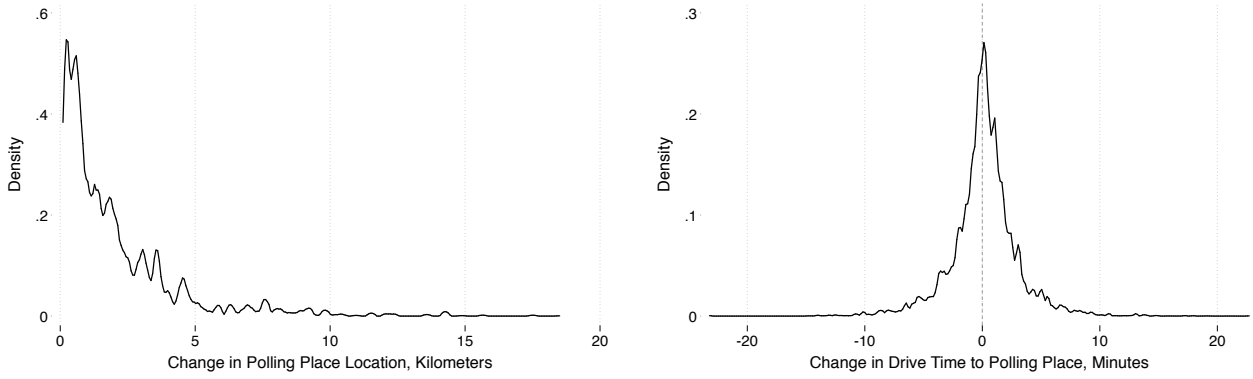



*Notes:* The above maps illustrate movement in polling place locations using the example of central Charlotte in Mecklenburg county. Map (a) presents the locations of polling places in 2008 (Xs) and 2012 (squares). Map (b) presents the locations of polling places in 2012 (squares) and 2016 (crosses). The background is shaded according to the racial composition of census block groups in the 2010 census with darker shades of gray indicating a higher percentage of black residents. Gray boundaries indicate 2016 precinct boundaries with precinct #22's boundary outlined in bold black.

Figure 2: Distribution of Distance of Polling Place Changes and Changes in Drive Time

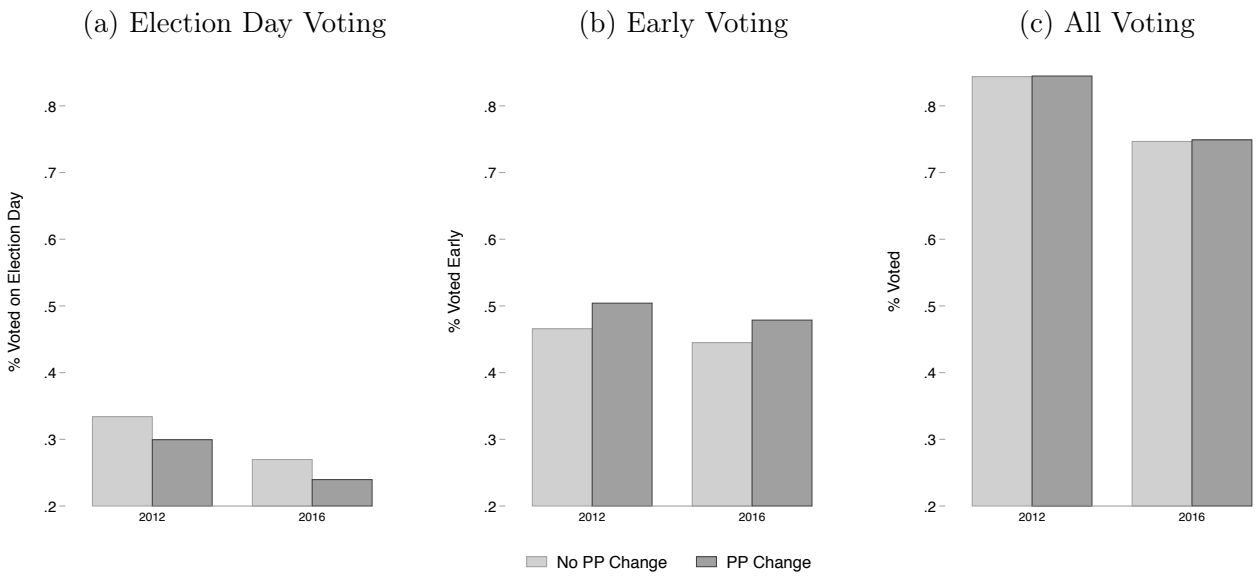
(a) Change in Distance Between Past and Current Polling Place Location

(b) Change in Drive Time to Polling Place




*Notes:* Plot (a) presents the distribution of the distance between a precinct's polling place location in a given election year relative to its location in the previous election year, conditional on a voters' polling place having moved. The data is pooled across 2012 and 2016. The unit of analysis in plot (a) is a voter-election; therefore, distance changes are weighted by the number of voters experiencing the change in a given year. Polling place changes can result from the movement of a given individual's polling place, or from a voter being moved into a new precinct by a precinct boundary change. Plot (b) presents the distribution of changes in drive time to a polling place for voters who experienced a polling place change. Note that some voters can experience a polling place change without a change in drive time. There are not qualitative differences in the distribution of changes for either of the measures between the two years. We present the separate years in Appendix H.

Figure 3: Impact of Polling Place Changes on Type of Turnout by Year




*Notes:* The bar plots present mean voter turnout by year by whether an individual experienced a polling place change relative to the previous presidential election year. Plot (a) presents the relationship for Election Day voting only, plot (b) presents the relationship for early voting, and plot (c) presents the relationship for all types of voting (total turnout). The residual category is absentee voting which represents a minuscule proportion of voting in North Carolina. Note that the y-axes are the same for each plot, but do not include zero to better visualize differences between categories and years.

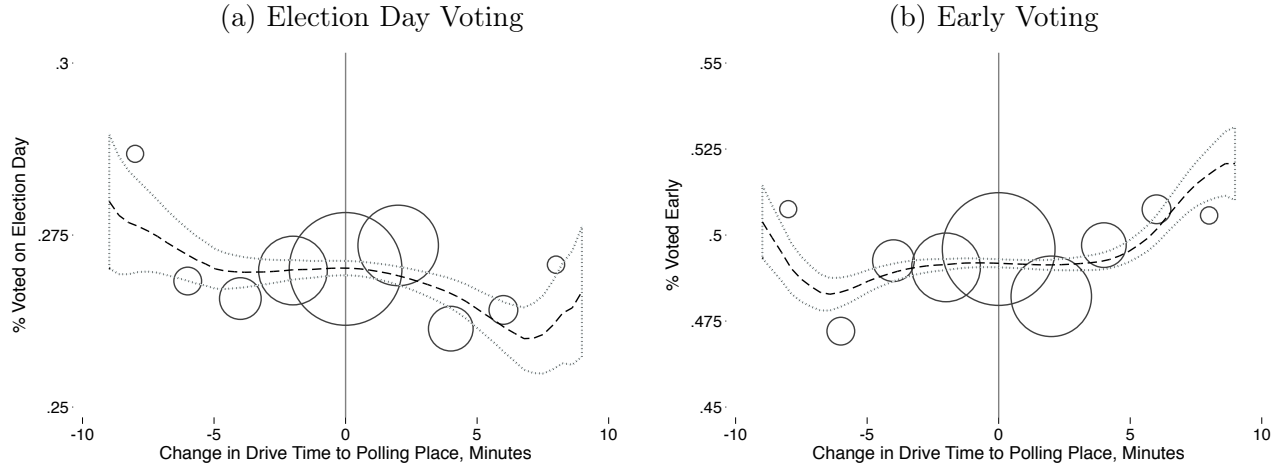
# 3 The Effect of Polling Place Changes on Turnout

We begin by considering the average effect of polling place location changes on overall turnout. We include controls for travel costs, which allows us differentiate between the impact of a change *per se* — which theory predicts should depress turnout either through search costs, confusion or habit disruption — and the additional impact of changes in travel times to the polls. We examine the effects for overall turnout, as well as the mode of turnout, focusing on Election Day and early turnout since changes to the cost of one mode (Election Day voting) may affect which mode voters choose, in addition to whether they turnout at all.

Figure 3 plot how polling place changes correspond with voter turnout for the 2012 and 2016 presidential elections. Plot (a) reveals that voters who experience a change in their polling place location are less likely to vote on Election Day — a decline that occurs regardless of whether the changes are made by Democrats (2012) or Republicans (2016). However, Plot (b) shows that early voting *increased* among affected voters such that the overall effects on turnout (Plot (c)) is effectively null. On average, the substitution effects between Election Day and early voting appear to be nearly completely offsetting, surprising given our strong theoretical priors on the negative costs associated with moving polling places.

To visualize how these relationships depend on travel time, Figure 4 plots the change in estimated drive time in minutes to the current year's polling place relative to the previous polling place for the Election Day voting (Plot (a)) and early voting (Plot (b)). The hollow circles denote the binned average turnout by voting mode for every 2 minute interval of drive time change. The results reveal only minimal effects of travel costs on voting, except at the extreme tails of travel time changes. But the small size of North Carolina precincts means that very few voters experience such sizable changes. At these tails Figure 4 indicates a lower likelihood of Election Day voting (and a higher likelihood of early voting) for those moved further from their polling place, while the

Figure 4: Relationship Between the Change in Driving Time to Polling Place and Type of Voting




*Notes:* The plots graph the change in drive time to polling place in minutes (closer,<0, or further, >0) from the previous presidential election year and the percentage of individuals voting early (Plot (a)), and on Election Day (Plot (b)). Plots are conditional on voters experiencing a polling place change in either 2012 or 2016. Hollow circles are binned averages of the outcome for every 2 minute interval of drive time change and they are sized relative to the population in the bin (excluding changes in drive times that are greater than the 99th percentile of drive time changes). The dashed line represents a local polynomial fit (bandwidth = 3) to all data for changes that within the 99th percentile. Note that the y-axis are different.

reverse is true for those moved closer. This indicates that substitution patterns are conditioned by how close or far a polling place is moved.

To better identify the impact of polling place changes on turnout requires controlling for factors associated with an individual's likelihood of voting and estimating the counterfactual of how voters would respond in the absence of a polling place change. Our panel of voters allows us to track how polling place changes affect the behavior of the same voters over time controlling for fixed *individual*-level differences that may affect the likelihood and method of voting in ways that are hard to otherwise control for. These fixed individual-level differences *also* control for fixed differences associated with neighborhoods, counties, and other geographic features. Furthermore, our large sample size allows us to control for differential *trends* over time in turnout by the fixed features of individuals, which helps alleviate concerns about time-varying omitted variable bias. Both of these features of our estimation substantially improve the inferential value of our estimates relative to existing work.

More formally, for voter $i$, during presidential election year $t$, we estimate the average effect of polling place changes on turnout using the following OLS specification:[18]

$$\begin{aligned} Pr(Vote_{i,t}) = \alpha_i + \gamma_t + \beta \Delta PollingPlace_{i,t} + \delta \Delta MuchFurther_{i,t} \\ + \lambda \Delta MuchCloser_{i,t} + \boldsymbol{\mu}(\boldsymbol{Race_i} \cdot Year_t) + \epsilon_{i,t} \end{aligned} \tag{1}$$

where $Pr(Vote_{i,t})$ is an indicator for whether a vote is cast, $\Delta PollingPlace_{i,t}$ is an indicator equal to 1 if voters experienced a change in the location of their polling place from the previous

[18]We use OLS to estimate a linear probability model (LPM) over logit or probit to increase interpretability, improve computation, and avoid the incidental parameters problem arising with the use of fixed effects in non-linear models such an a multinomial probit or logit. Moreover, it seems unlikely that the independence of irrelevant alternatives assumption would be satisfied if we were to predict the voting mode using a multinomial logit as the choice of mode almost certainly depends on the other options available. While it does not require the IIA assumption, estimating a multinomial probit with millions of observations (and fixed effects) is computationally challenging.

presidential election year, $\Delta MuchFurther_{i,c,t}$ is an indicator equal to 1 if a voter's polling place was moved more than 5 minutes drive time further from them, and $\Delta MuchCloser_{i,c,t}$ is an indicator equal to 1 if a voter's polling place was moved more than 5 minutes closer to them (the residual category contains voters whose polling place is moved less than 5 minutes closer *or* further; that is, voters with a small change in drive time, either positive or negative). Note that because we are comparing presidential elections, every voter in every precinct has the same top-of-the-ticket race in each election. ***Race*** is a vector of race indicators which we interact with year indicators to account for differential turnout trends over time amongst different races, $\alpha_i$ are individual fixed effects that capture level differences in the probability of voting for each individual in our sample, and $\gamma_t$ are year fixed effects that account for common shocks to individuals by year.[19] Finally, $\epsilon_{i,t}$ is the idiosyncratic error term. We (robustly) cluster our standard errors at the individual level to account for serial correlation and the hetereoskedasticity of errors in a linear probability model.

The coefficient $\beta$ estimates the *general* marginal impact of a polling place change, while $\delta$ and $\lambda$ are the *additional* impacts of a significant decrease ($\delta$) or increase ($\lambda$) in travel time. Of primary interest is the relative impact of a change of any kind ($\beta$) — costs that represent the net impact of search costs, confusion, habit disruption and any priming effects — versus travel costs ($\delta$,$\lambda$).[20] Because the average marginal effect of a polling place change regardless of travel time is also an important quantity of interest, we also estimate equation 1 without the travel time indicators (i.e. excluding $MuchFurther$ and $MuchCloser$). This effect constitutes the population-weighted average impact of a polling place change.

Existing work suggests that voters may respond to increased costs to one method of voting by switching their mode of voting. Therefore, we not only estimate the effect of *whether* a voter voted, but also *how* they cast their ballot. To do so, we estimate Equation 1 separately for the following outcomes: whether the voter voted on Election Day ($Pr(VoteElecDay)$), whether the voter voted early ($Pr(VoteEarly)$), and whether they voted *at all* regardless of method ($Pr(VoteAny)$).

Our results are presented in Table 2. We find that polling place changes decrease Election Day turnout. Indeed the average effect is to reduce Election Day turnout by -1.6 percentage points (column 1). In addition, this is due in part to the polling place change *per se*, and in part due to changes in travel costs — being moved further from one's polling place depresses Election Day turnout by approximately -4.6 percentage points *more* than a voter who experiences a drive time change of less than 5 minutes — but the effects are not symmetric. Polling places that are moved significantly closer increase Election Day turnout, but by a much smaller amount ($\hat{\lambda}$).

The finding that polling place changes decrease Election Day voting – especially for polling place changes that are moved more than 5 minutes away is reassuringly consistent with prior findings despite the fact that it was unknown whether the results of prior working focusing on specific localities generalized using a more robust identification strategy.

Table 2 also reveals a more novel and striking finding – the negative effects of a polling place chance on Election Day voting are nearly entirely offset by substitution into early voting. On average, polling place changes increase early voting by 1.8 percentage points (column 3). Moreover, voters who are moved much further from their polling place are 4.7 percentage points *more* likely to vote early relative to those who remain relatively close by, but voters are no more or less likely to vote early if their polling place is moved much closer. Columns 5 and 6 confirm that these effects are

[19] Although we have data on past voting behavior, we do not included lagged dependent variables as doing so introduces Nickell bias (Nickell, 1981) in panels with individual fixed effects when the N dimension of the panel is substantially larger than the T dimension.

[20] Appendix E reports substantively identical results using alternative specifications of travel time.

Table 2: The Average Effect of Polling Place Changes and Drive Time on Voter Turnout

| | $Pr(VoteElecDay)$ | | $Pr(VoteEarly)$ | | $Pr(VoteAny)$ | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $\Delta PollingPlace$ ($\hat{\beta}$) | -0.016*** | -0.015*** | 0.018*** | 0.017*** | 0.0023*** | 0.0020** |
| | (0.00093) | (0.00096) | (0.00098) | (0.0010) | (0.00077) | (0.00079) |
| $\Delta MuchCloser$ ($\hat{\lambda}$) | | 0.0084** | | -0.0028 | | 0.0051 |
| | | (0.0042) | | (0.0045) | | (0.0035) |
| $\Delta MuchFurther$ ($\hat{\delta}$) | | -0.046*** | | 0.047*** | | 0.0032 |
| | | (0.0043) | | (0.0045) | | (0.0034) |
| Individual FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Race x Year FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year Sample | Full Panel | Full Panel | Full Panel | Full Panel | Full Panel | Full Panel |
| Observations | 4681792 | 4681792 | 4681792 | 4681792 | 4681792 | 4681792 |
| Mean of DV | 0.30 | 0.30 | 0.46 | 0.46 | 0.80 | 0.84 |
| SD of DV | 0.25 | 0.25 | 0.26 | 0.26 | 0.21 | 0.21 |

Standard errors clustered at the individual level.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

*Notes*: The table presents coefficients from estimating Equation 1 with and without the travel time indicators. The unit of analysis is the voter-election. See Table C1 in Appendix C for the full set of coefficient estimates. The SD of the DV is the average of the within-$i$ standard deviations of the outcome variable.

nearly completely offsetting – the decrease in Election Day voting and the increase in early voting combine to produce less than a half-percentage point point overall change in turnout.

Overall, the results suggest that polling place changes do not decrease overall turnout — even those that greatly increase travel costs — but they do lead voters to change how they vote. At least in the high-stakes presidential election contests we examine, voters respond to an increase in the costs of voting on Election Day by casting their vote early. Moreover, although all voters are more likely to vote early in response to a polling place change, the substitution effects are nearly three times larger for voters whose polling places are moved more than 5 minutes further away. Because most polling place changes result in travel time changes of less than 5 minutes, however, it is the disruptive impact of a change *per se* that is most responsible for changes in voter behavior (as evidenced by the similar magnitudes of the estimates of $\hat{\beta}$ in Table 2).

One explanation for these results is *substitution* between modes of voting — voters who *would have* voted on Election Day, instead decided to vote early when their polling place was changed. However, it is alternately possible that a population of non-voters were induced to vote early — potentially by the mailers informing them of a polling place change and priming them to turnout — and a distinct (but coincidentally equal sized) population of Election Day voters failed to vote on election day. As discussed in detail in Appendix G, additional analyses suggest that our results are reassuringly primarily driven by substitution – the increase in early voting occurs among those who otherwise would have voted on Election Day absent the polling place change. As the counter-factual intention of voters is unobservable, however, these results are only suggestive.

# 4 Effects of Polling Place Changes by County

In this section we investigate the extent to which the average state-wide effects we estimate in the previous section hide county-level heterogeneity. The average statewide effects are crucially

not a function of county-level differences given that we leverage within-voter variation. However, characterizing the county-level variation in the effects of polling place changes on turnout effects is important for several reasons. First, it helps situate our statewide estimates vis-a-vis the results of prior studies that focus on a particular locality — insofar as there is considerable variation in the effects occurring within the same state and race it will be difficult to generalize locally estimated effects. Second, exploring the impact at the county level investigates whether the decisions of some administrators were more impactful than others on turnout.

To estimate the county-level effects of polling place changes on turnout we use the equation 1 to separately estimate the effects of a polling place changes for the subset of our voter-level panel residing in each county. To summarize the results, Figure F1 plots the county-specific coefficient estimates ($\hat{\beta}$) that identify the effect of a polling place change on Election Day voting. Bars around each estimate show the naive 95% confidence interval, while estimates in red marked with solid diamonds are also statistically significant after a multi-test correction to keep the False Discovery Rate below 5% using a Benjamini, Krieger and Yekutieli (2006) two-step multi-test correction. (The appendix reports the estimated effects for early voting (Figure F2).)

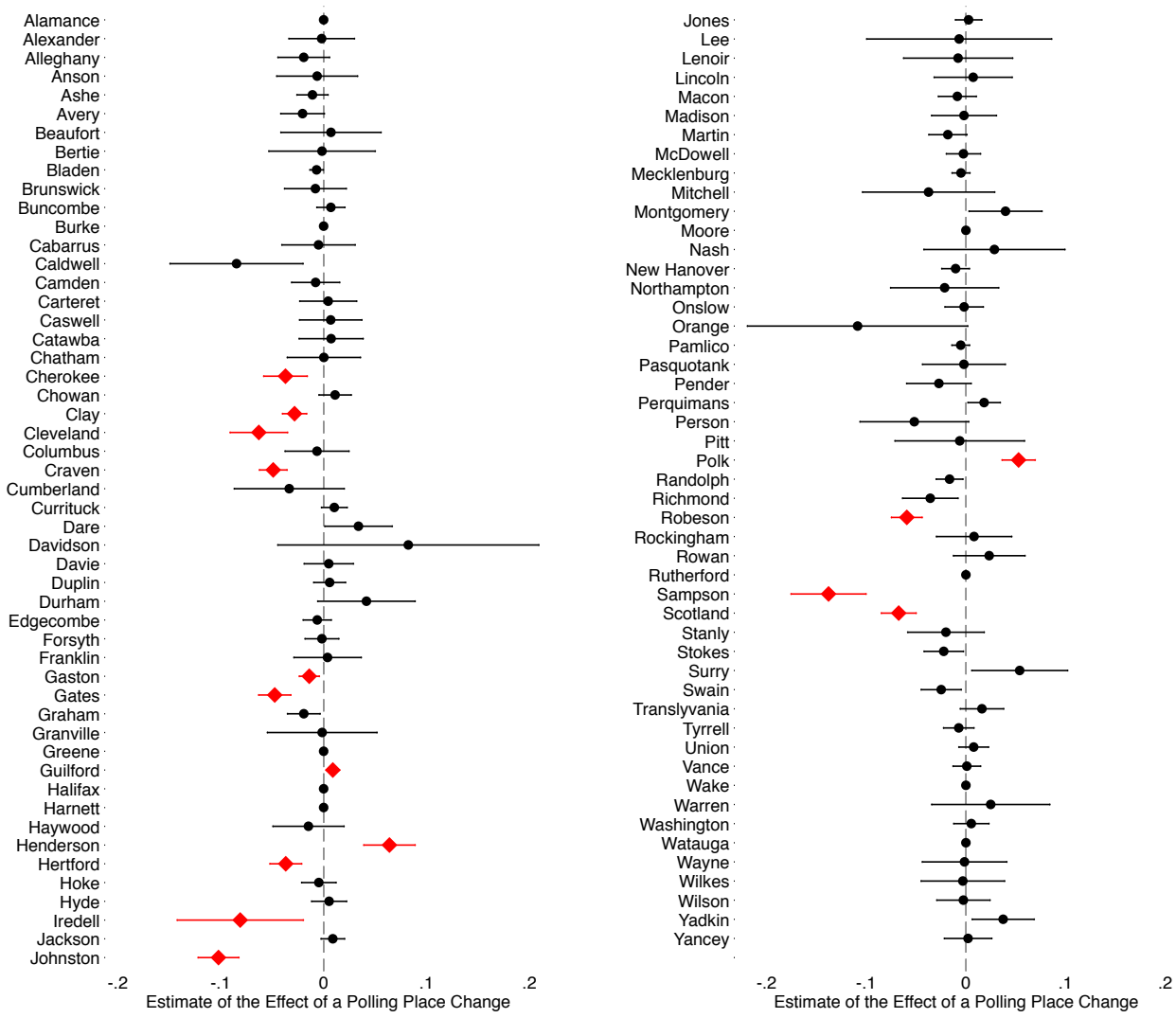
Figure F1 reveals substantial heterogeneity in the estimated effect of a polling place change between counties when using the conventional levels of statistical significance that would be employed when studying the effects in an individual county. In fact, we recover estimates of the effect of a polling place change on Election Day voting that vary in direction, magnitude and statistical significance. For example, polling place changes in Sampson county were estimated to decrease the probability of a voter casting an Election Day vote by nearly 15%, but the changes made in Polk county were estimated to increase the probability of voting on Election Day by nearly 5%.

The variation in the estimated direction and magnitude of effects reveals the potential for misleading inferences when relying on the experiences of a subset of localities. Insofar as data limitations have forced existing work to estimate the impact of polling place changes using limited geographies, the variation we document highlights the difficulty of generalizing to the state-wide level from a specific or set of specific localities.

Figure F3 plots the county-level coefficient estimate ($\hat{\beta}$) of the effect of a polling place change on overall turnout regardless of method (i.e. the net effect of Election Day and early voting). The figure shows that after employing multi-test corrections to account for the fact that we are essentially performing multiple hypothesis tests, in no county can we reject the null hypothesis of no effect on turnout under a False Discovery Rate threshold of 5%. In contrast, the results in eight counties would suggest that there are statistically significant effects on turnout if we relied on conventional (naive) p-values when analyzing individual counties – including Beaufort, Richmond, and even Durham, one of the most populous counties in the state. As a consequence, studying the effects of election administration using a subset of counties risks making misleading inferences about the overall impact of polling place changes on turnout.

One possibility is that perhaps the county-level differences reflect differential effects caused by compositional difference in the counties being compared – e.g., the availability of early voting in the county, the percentage of lower-resourced voters in the county who are less able to overcome the costs imposed by a polling place change. To consider whether this is the case, we now turn to examine whether the average substitution effect we identify varied in the ability to vote early or according to voter characteristics that may impact the ability or willingness to overcome the costs of a polling place change.

Figure 5: County-Specific Estimates of the Effect of a Polling Place Change on Election Day Voting

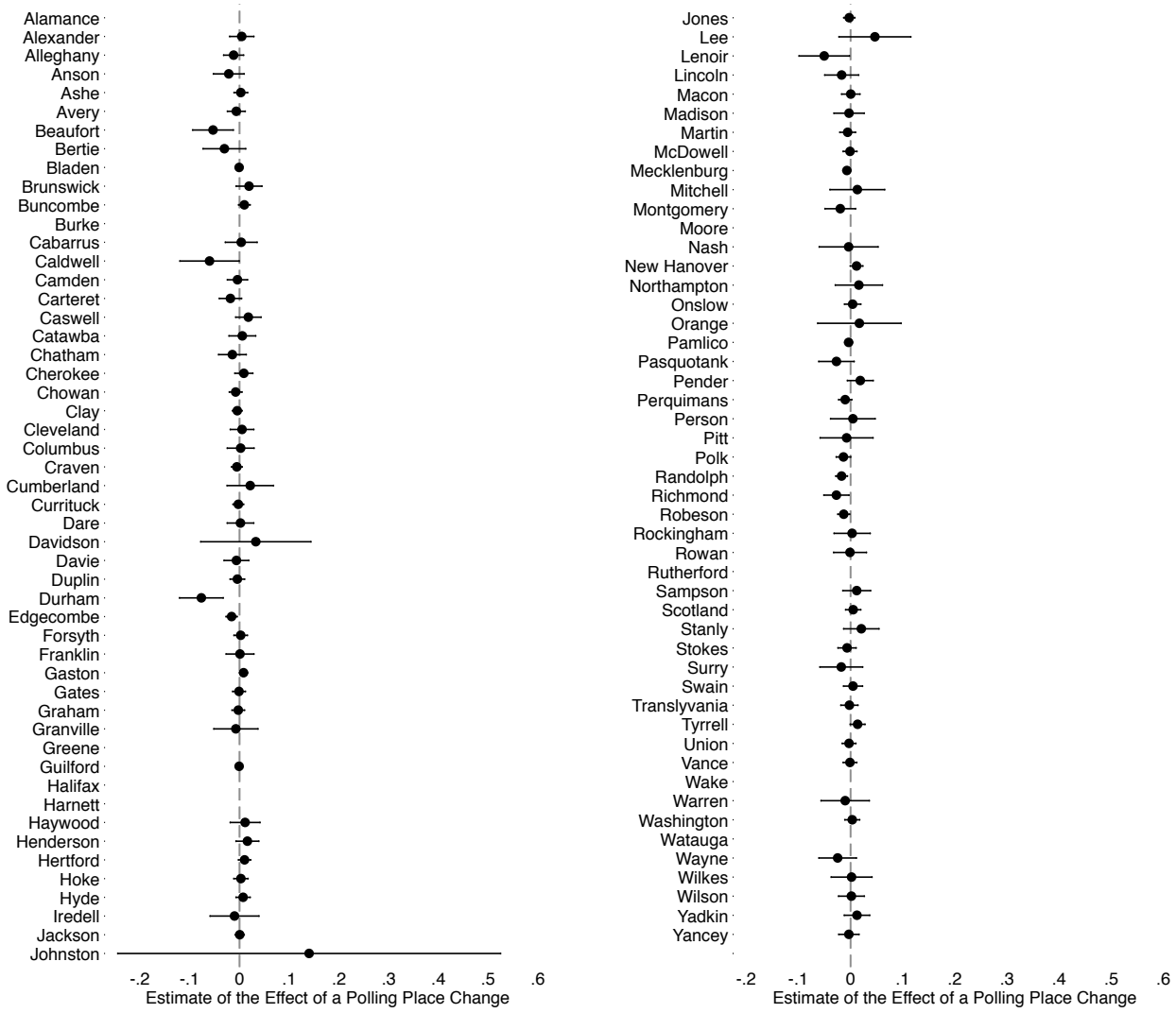



*Notes:*The above plot presents estimates of Equation 1 for each county individually along with 95% confidence intervals. The outcome is $Pr(VoteElecDay)$. Estimates are plotted with naive 95% confidence intervals. Red estimates whose point estimates are plotted as solid diamonds are statistically significant after applying the Benjamini, Krieger and Yekutieli (2006) multiple test correction with a False Discovery Rate limit of 0.05; insignificant estimates are black hollow squares. Some county estimates cannot be estimated because no precincts in those counties experienced a polling place change.

# 5 Differential Effects of Polling Place Changes by Early Voting Availability and Race

Our results show that, on average, polling place changes create a substitution effect from Election Day voting to early voting. We now probe this relationship in more detail to determine whether the substitution effects we identify vary depending on characteristics that are plausibly related to voters' ability to overcome the costs created by polling place changes. We focus in the text on two characteristics: (1) the availability of early voting, and thus the ease of substituting to early voting; and (2) the race of affected voters, which might be related to the resources that voters have to overcome costs associated with polling place changes and/or the desire of voters that have been historically disenfranchised to overcome increased costs of voting. Additional analyses in

Figure 6: County-Specific Estimates of the Effect of a Polling Place Change on Overall Voter Turnout




*Notes:* The above plot presents estimates of Equation 1 for each county individually along with 95% confidence intervals. The outcome is $Pr(VoteElecDay)$. Estimates are plotted with naive 95% confidence intervals. Red estimates whose point estimates are plotted as solid diamonds are statistically significant after applying the Benjamini, Krieger and Yekutieli (2006) multiple test correction with a False Discovery Rate limit of 0.05; insignificant estimates are black hollow squares. Some county estimates cannot be estimated because no precincts in those counties experienced a polling place change.

Appendix I and Appendix K examine whether the effects vary by age and income respectively.[21]

## 5.1 Differential Impacts by the Availability of Early Voting

All North Carolina counties had at least one voting sites in each of the presidential elections that we study, but the number of those sites, and the hours that those sites were open differed between counties and over time. The average effects we identify in Section 3 controls for these differences

[21]In the case of differential effects by age, we find evidence that middle aged voters are more likely to substitute relative to *both* older and younger voters, but no differences in the overall turnout effect of polling place changes by age. In the case of differential effects by income, we find differences in rates of substitution — with wealthier voters less likely to substitute into early voting — but no overall turnout effects.

using voter-level fixed effects, but we might expect that variation in early voting availability would moderate the effect of polling place changes and the magnitude of the substitution effects we identify. We may expect that increased access to early voting increases the likelihood of early voting, although there is disagreement in the literature about how beneficial early voting is (Burden et al., 2017, 2014; Herron and Smith, 2015*b*).[22]

To evaluate whether the effects of polling place changes depend on the availability of early voting, we estimate a cross-sectional version of our panel specification (equation 1) without the travel time indicators separately for each county and the outcome $Pr(VoteEarly)$. We then compare the resulting coefficients on the impact of a polling place change ($\hat{\beta}$) with early voting availability. Appendix F reports the results of county-level specifications. Figure 7 summarizes the relationship between the county-level effects of a polling place change ($\hat{\beta}$) and the number of early voting locations in a county (Plot (a)) and the total number of hours that early voting is available in a county (Plot (b)).[23]

Figure 7 reveals tremendous variation not only in the availability of early voting across counties, but also in terms of the estimated effects of a polling place change on the likelihood of voting early. (Appendix J plots the distributions of early voting availability by partisan election administration regime.) This variation highlights the importance of our focus on the average statewide effect and the difficulty of generalizing from the experiences of any specific county, the scope of prior studies.[24] Because we are interested in the average statewide effect of polling place changes, we use the county-level estimates only to examine whether the county-level substitution effects vary depending on the relative availability of early voting in the county.

The plotted regression lines clearly reveal that the variation in the county-level substitution effects we estimate does not correlate meaningfully with early voting availability in either 2012 or 2016 — a result borne out in by formal regression estimates and investigations that disaggregate early voting hours by weekends and evenings in Appendix J. Because variation in the availability of early voting cannot explain the differences in how polling place changes induce voters to substitute into early voting, other mechanisms must be responsible for the substitution effects that we identify.

## 5.2 Differential Impacts by Race

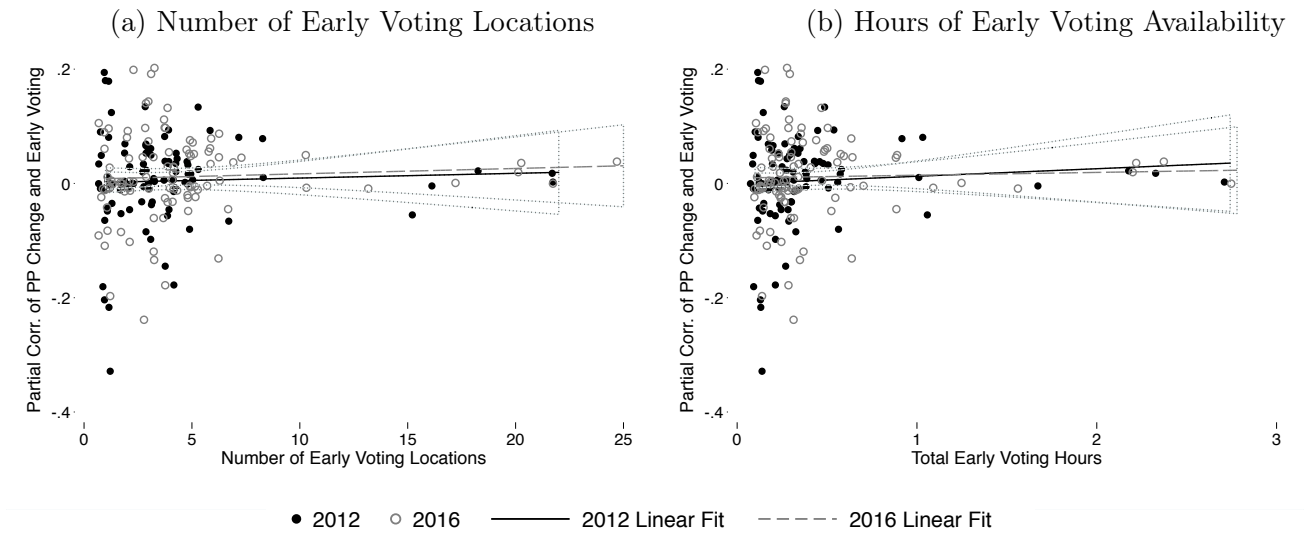
The history of race and disenfranchisement in North Carolina is long and fraught. The state was partially subject to the 1965 *Voting Rights Act* as a consequence of its Jim Crow-era policies, and recent battles over election administration have frequently centered on race-related differences resulting from the correlation between race and partisanship, with additional claims of racial animus motivating voter suppression (insightus, 2016; Vasilogambros, 2018; Michaelson, 2016; Roth, 2015; Berman, 2016). Exploring potential differences in our effects by race is important not only because of the historical legacy of voter disenfranchisement, but also because of what it

[22]The availability of other forms of "convenience voting" have also been associated with mixed turnout results (Gronke, Galanes-Rosenbaum and Miller, 2007; Karp and Banducci, 2000; Kousser and Mullin, 2007; Gerber, Huber and Hill, 2013).

[23]This is data was obtained from the county boards of election for both 2012 and 2016 from `https://dl.ncsbe.gov/?prefix=One-Stop_Early_Voting/2016/`.

[24]We do not deny that our statewide effects average across potentially very different effects in different counties. Exploring the county-level variation in the estimated effects is important (and is one of the reasons that we document such variation in Appendix F). But the focus of our paper is on the overall impact of polling place changes at the state level, rather than theorizing and testing the reasons *why* the effects may vary across counties.

Figure 7: Relationship Between Early Voting Availability and Early Voting by Year




*Notes:* Plot (a) represents the relationship between the number of early voting locations and the average effect of a polling place change on early voting by county. Plot (b) represents the relationship between the total number of early voting hours (in thousands) and the average effect of a polling place change on early voting by county. The average effect of a polling place on early voting by county is obtained by estimating Equation 1 as a cross-section separately for each county using the outcome of $Pr(VoteEarly)$. Points are jittered to aid visualization and linear fits are plotted with 95% confidence intervals.

reveals about the ability of different voters to overcome the costs associated with polling place changes.

Our expectations regarding the differential effects of polling place changes by race are ambiguous. On the one hand, the effects of polling place changes may be larger, on average, among black voters because of differences in material resources that allow voters to overcome costs (Verba, Schlozman and Brady, 1995; Wolfinger and Rosenstone, 1980; Leighley and Nagler, 2013). However, the effect of limited resources may be mitigated by greater value placed on voting by groups with a past history of struggling to secure voting rights (Anoll, 2018) or by other social norms that tend to incentivize turnout in high salience elections (Doherty et al., 2017). Race-related mobilization efforts such as "souls to the polls" events may also differentially moderate the effect of polling place changes.

To investigate whether polling place changes have larger or smaller effects depending on the race of the affected voters, we estimate our panel effects after interacting polling place change with an indicator for non-white voters — classifying a voter as non-white if they *ever* indicate that they are such in the voter rolls. We collapse racial categories into a binary "white" and "non-white" (including hispanics) category to aid interpretability, but similar effects are obtained by estimating separate effects in Appendix D.[25] We present the results of a polling place change *per se*, as well as differential effects in travel times.

Table 3 presents the estimated differential substitution effects by race. We find that non-white voters are less likely to substitute into early voting when their polling place is changed — the estimated coefficient on $\Delta PollingPlace \cdot NonWhite$ is positive and significant in model 1, indicating that non-white voters are more likely than white voters to continue voting on Election Day when their polling place is changed, and negative and significant in model 3, indicating that non-white

[25]The largest non-white racial category in North Carolina is black.

Table 3: The Differential Effects of Polling Place Changes by Race

| | $Pr(VoteElecDay)$ | | $Pr(VoteEarly)$ | | $Pr(VoteAny)$ | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $\Delta PollingPlace$ ($\hat{\beta}$) | -0.019*** | -0.019*** | 0.023*** | 0.023*** | 0.0040*** | 0.0040*** |
| | (0.0011) | (0.0011) | (0.0011) | (0.0011) | (0.00088) | (0.00088) |
| $\Delta PollingPlace{\cdot}NonWhite$ | 0.011*** | 0.011*** | -0.018*** | -0.018*** | -0.0073*** | -0.0069*** |
| | (0.0021) | (0.0022) | (0.0023) | (0.0023) | (0.0018) | (0.0018) |
| $\Delta MuchCloser{\cdot}NonWhite$ | | 0.0049 | | -0.012 | | -0.011 |
| | | (0.0099) | | (0.010) | | (0.0085) |
| $\Delta MuchFurther{\cdot}NonWhite$ | | -0.022** | | 0.015 | | -0.0062 |
| | | (0.010) | | (0.011) | | (0.0087) |
| Individual FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Race x Year FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year Sample | Full Panel | Full Panel | Full Panel | Full Panel | Full Panel | Full Panel |
| Observations | 4681792 | 4681792 | 4681792 | 4681792 | 4681792 | 4681792 |
| Mean of DV | 0.30 | 0.30 | 0.46 | 0.46 | 0.80 | 0.84 |
| SD of DV | 0.25 | 0.25 | 0.26 | 0.26 | 0.21 | 0.21 |

Standard errors clustered at the individual level.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

*Notes*: The table presents coefficients from estimating Equation 1 with the addition of $\Delta PollingPlace$ interacted with voter race. The unit of analysis is the voter-election. See Table C4 in Appendix C for the full set of coefficient estimates.

voters are less likely than white voters to vote early. Overall, non-white voters are slightly *less* likely to turnout to vote overall (model 5) when their polling place is changed, but this differential effect is quite small; less than 1 percentage point difference.

Interestingly, this heterogeneity is almost entirely restricted to the impact of polling place change *per se* — there is no evidence of heterogeneity in sensitivity to travel time by race. The coefficients on the interaction between race, polling place change and travel times are almost universally not statistically different from zero. The exception is voters moved much farther from a polling place and Election Day voting (model 2), where we estimate a differential decrease in turnout for non-white voters. Our results suggest that *per se* changes, again, are more consequential than where in space polling places are located. However, non-white voters who have their polling place moved much further away may differentially struggle to reach the polls, perhaps as a consequence of differential public transportation use.

These results might reflect subtle changes to early voting availability by county that differentially affect voters by race. If early voting is more difficult in minority communities — as evidence from North Carolina suggests — but the value of voting amongst minority groups remains high, this could account for minor overall turnout effect and the more limited substitution. Most existing evidence suggests that convenience forms of voting, like early voting, tend to make it easier for white and well-resourced voters to vote, rather than reducing inequalities (Karp and Banducci, 2000; Berinsky, 2005; Gronke, 2008). Similarly, if minority voters are motivated to overcome costs but have a habit of voting by a particular mode (rather than simply a habit of voting *at all*) they might differentially turn out on Election Day rather than substitute into early voting. We offer these as potential explanations and note later the importance of additional research to probe the mechanisms underlying this effect.

# 6 Discussion

The ability to cast a ballot is fundamental to the legitimacy and functioning of democratic governments. But governments can impact the ability of voters to participate in elections in ways that go beyond formal restrictions on the franchise. In this paper, we examine how voters respond to changes in the location of their Election Day polling place in the swing-state of North Carolina. To do so, we collect data on every registered voter, and we geolocate them relative to the location of nearly every Election Day polling place over three presidential election cycles (2008-2016).

Leveraging the within-voter variation provided by our panel of 2 million registered voters, we show that polling place changes decrease the probability of voters turning out on Election Day, but that those effects are nearly entirely offset by an increase in early voting. Voters are indeed affected by the costs of polling place changes, but surprisingly these costs do not, on average, deter voters from casting a ballot.

In fact, our results show that, on average, voters respond to a polling place change by *substituting* between modes of voting, and polling place changes appear to produce, if anything, a slight overall *increase* in turnout across our period. We estimate differential substitution resulting from changes to drive time, but the overall turnout effect is effectively unchanged. Because we include voter fixed effects, election fixed effects, and interactions between race and election fixed effects, we are assured that our results are *not* the consequence of the individual propensity to vote by a particular mode, generalized state trends in mode of voting, nor differential state trends in the mode of voting amongst particular races.

Our results suggest that what matters is not the nature of the polling place change — whether they are moved closer to or further away — but that a change was experienced at all. These results are perhaps surprising given our strong theoretical priors about how voters react to costly changes in their ability to cast a ballot. However, we note that other scholars of polling place changes have documented similar findings (Brady and McNulty, 2011), although not on the scale to fully off-set declines in Election Day turnout. Other work has also noted that voters substitute between modes of voting even when they face a *reduction* in costs if they are sufficiently motivated to turnout and concerned that their vote may not count (Meredith and Malhotra, 2011). The high salience competitive presidential elections in a swing state that we study may be precisely those elections where voters are the most motivated to overcome costs (Kousser and Mullin, 2007).[26] Therefore, we might expect our results to most plausibly generalize to similar cases.

In addition to the high-stakes election environments that we examine, another another key feature of the North Carolina electoral landscape that might account for our results is that voters affected by a polling place change are notified of the change. This notification provides them with information about the location of their new polling place and websites where they can access additional information about early voting. A vast literature on the get-out-the-vote activities of elites has shown the even simple reminders to vote can be powerful for increasing turnout (Gerber and Green, 2000).

It therefore seems plausible that the informational mailer could create two effects relevant for understanding the substitution that we document. First, the official notification arguably offsets search and confusion costs for voters *both* with regards to their Election Day polling place, as well as the availability of early voting. If voters are already motivated to participate because of the stakes of the election contests that we examine, this additional information may be entirely

[26]These types of elections are also those that might induce counter-mobilization efforts to counteract the costs of polling place changes Fraga and Hersh (2010).

sufficient to counteract costs. Furthermore, if voters are motivated to vote and they worry about the risks associated with voting at a new polling place, voters may choose to vote early rather than wait until Election Day. Second, the notification may also remind affected voters to vote. This plausibly accounts for the fact that substitution is entirely offsetting and we find no evidence of an overall decline in turnout. That informational mailers accompany polling place changes in other states suggests that our results speak to potential effects beyond North Carolina.

To be clear, our results *do not* indicate that polling place changes are not costly for voters. When we consider the number of voters affected, at least 16% of the 2 million voters we examine were subject to increased search costs, confusion, habit disruption and changes in their drive time. Polling place changes are unequivocally confusing even when offset by substantial information about the location of the new polling place and many voters will face increased travel costs to visit their new poll. What our results *do* suggest, however, is that the availability of early voting and official notifications may be enough to induce voters to overcome the costs they face in the context of highly-salient and highly-competitive elections.

Moreover, our results also do not eliminate the possibility that there were some important and consequential effects at the county level. The results of our county-level estimates reveal considerable variation in the estimated effects using standard tests of statistical significance. Although we cannot conclude that the effects are statistically distinguishable if we choose to correct for the problem of multiple comparisons, it is admittedly difficult to discern whether the effects are spurious or real and we are wary of conflating statistical and substantive significance given the stakes involved. While we are confident that there are no net effects on average, conclusions about the impacts in particular counties are less certain.

Although scholars have previously argued that early voting may decrease overall turnout (Burden et al., 2014; Meredith and Malhotra, 2011), our findings suggest that early voting may nonetheless play a potentially crucial role in reducing the impact of polling place changes. While we do not find that differences in the availability of early voting by county conditions the average substitution effects that we find — perhaps because the variation we observe was insufficient given the level of voter motivation in the elections we examine — it seems clear that there is a compelling argument for the importance of early voting at the extensive margin — that is, the availability of *any* early voting at all — on allowing voters to substitute. Although obviously untestable in our case, we would expect that the lack of any early voting options would reduce turnout among voters affected by a change in polling place location.

Given this, our paper raises several important questions for further research. First and foremost, research that leverages variation in voter notifications of polling place changes would be invaluable in more precisely identifying the cause of the substitution we hypothesize may be due to information and priming. Second, while our research clearly documents that non-white voters are substantially less responsive to polling place changes than white voters, additional research is needed to say why this may be the case. But while work remains to investigate the precise mechanisms by which this substitution occurs — and therefore the conditions under which polling place changes do or do not decrease turnout — the causal effects we identify provides a uniquely comprehensive and essential start for these important future efforts.

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# Appendix to "Polling Place Changes and Political Participation: Evidence from North Carolina Presidential Elections, 2008-2016"

Date: May 21, 2018

Note that this Appendix is to be published online only.

**Appendix Contents**

# A Data Sources, Measurement, and Summary Statistics

In this appendix, we provide additional details about the data sources and measurement as well as comprehensive summary statistics. Table A1 presents the data sources and measurement information for the covariates used in the paper's analysis. Table A2 presents summary statistics for all variables used in the analysis.

Table A1: Measurement and Data Sources for Covariates

| Variable | Measurement | Source |
|---|---|---|
| Race | Individual self-identification of race. The race categories are: *White*, *black*, *hispanic*, *unknown*, *other*, *NativeAmerican*, *asian* and *multi − race*. Individuals who self-identify with different racial categories in different years are assigned their modal selected category. We allow hispanic identification to supersede all others given the way that it is measured. All racial categories are measured as indicators. | Self-identification, North Carolina State Board of Elections voter rolls. |
| *NonWhite* | Indicator for whether the individual is non-white (all non-white racial categories combined, including hispanics) as compared to white. | Self-identification, North Carolina State Board of Elections voter rolls. |
| *Income* | Median household income measured at the census block group, 0,000s of inflation adjusted dollars. | 2006-2010 American Community Survey obtained from NHGIS. |
| Partisanship | Individual party registration at the time of voter registration. The partisan categories are: *Republican*, *Democrat*, *Unaffiliated* and *Libertarian*. Each are measured as indicators. | North Carolina State Board of Elections voter rolls. |
| *Age* and $Age^2$ | Individual age reported at the time of voter registration. | North Carolina State Board of Elections voter rolls. |
| *Female* | Indicator for whether the individual self-identifies as female as compared to male at the time of voter registration. | North Carolina State Board of Elections voter rolls. |
| Lagged Vote | Set of categorical variables for how the voter voted in the last election: on Election Day, mail in, early, or provisional. | North Carolina State Board of Elections voter rolls. |
| *EarlyLocs* | Number of early voting locations by county. | County Board of Elections. |
| *EarlyHours* | Total number of early voting hours by county, measured in thousands. | County Board of Elections. |
| *EarlyHoursWeekends* | Total number of early voting hours on Saturday and Sunday only by county, measured in thousands. | County Board of Elections. |
| *EarlyHoursEvenings* | Total number of early voting hours in the evenings by county, measured in thousands. | County Board of Elections. |

Table A2: Summary Statistics

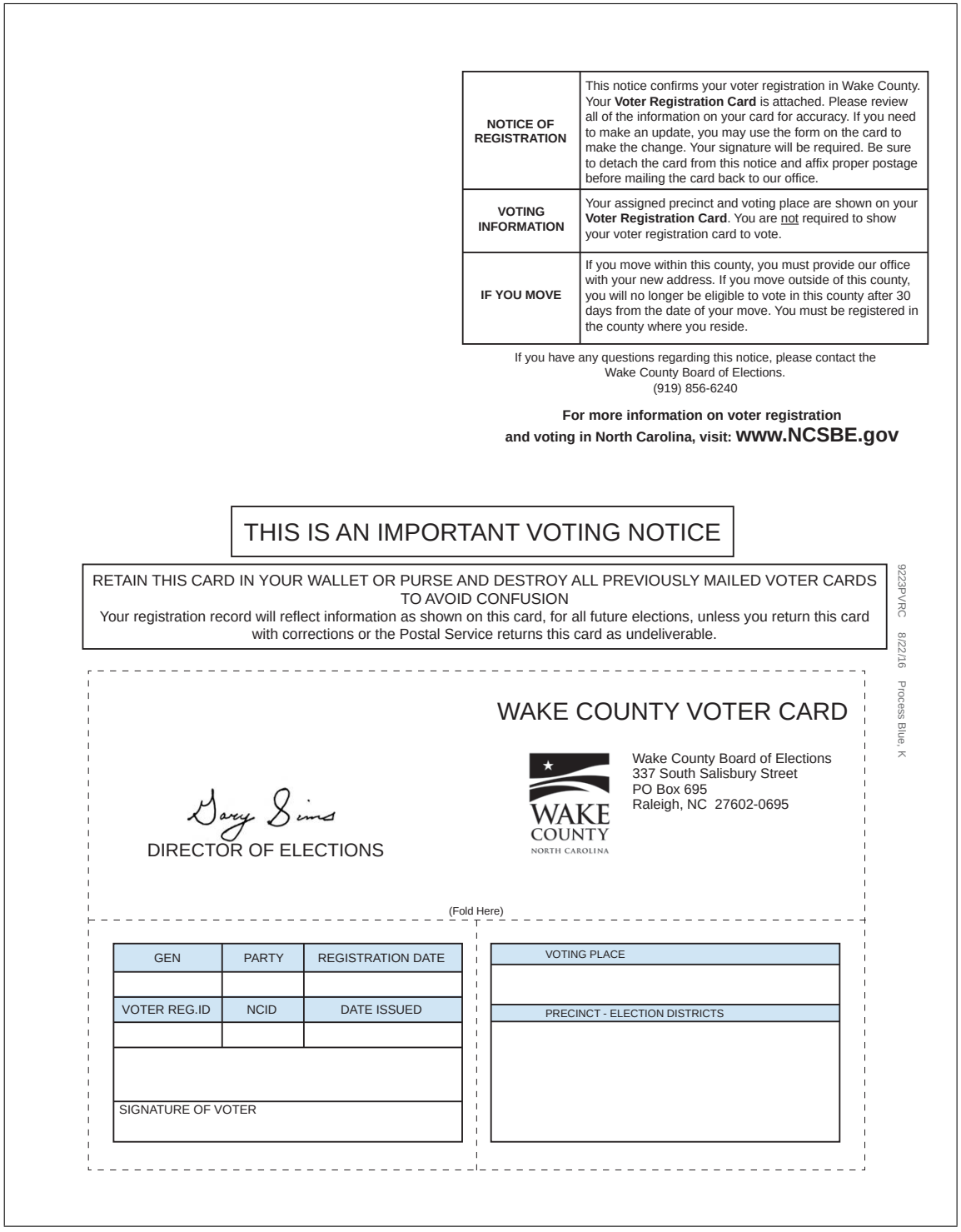
| Variable | Mean | Std. Dev. | Min | Max | N |
|---|---|---|---|---|---|
| $Voted$ | 0.80 | 0.403 | 0.000 | 1.000 | 4,681,792 |
| $VotedEarly$ | 0.46 | 0.498 | 0.000 | 1.000 | 4,681,792 |
| $VotedElecDay$ | 0.30 | 0.457 | 0.000 | 1.000 | 4,681,792 |
| $VotedMailIn$ | 0.04 | 0.185 | 0.000 | 1.000 | 4,681,792 |
| $VotedLastElec$ | 0.89 | 0.313 | 0.000 | 1.000 | 4,681,792 |
| $\Delta PollingPlace$ | 0.16 | 0.368 | 0.000 | 1.000 | 4,681,792 |
| $\Delta DriveTime$ | 0.02 | 1.135 | -23.217 | 22.717 | 4,681,792 |
| $EarlyLocs$ | 9.24 | 7.710 | 1.000 | 25.000 | 4,681,792 |
| $EarlyHours$ | 0.97 | 0.893 | 0.100 | 2.780 | 4,681,792 |
| $EarlyHoursWeekends$ | 0.17 | 0.194 | 0.004 | 0.594 | 4,681,792 |
| $EarlyHoursEvenings$ | 0.14 | 0.162 | 0.000 | 0.528 | 4,681,792 |
| $Income$ | 5.44 | 2.673 | 0.250 | 25.000 | 4,680,586 |
| $Age$ | 57.02 | 16.221 | 20.000 | 116.000 | 4,681,792 |
| $Age^2$ | 3514.55 | 1895.658 | 400.000 | 1.3e+04 | 4,681,792 |
| $Female$ | 0.55 | 0.510 | 0.000 | 2.000 | 4,681,792 |
| $White$ | 0.76 | 0.426 | 0.000 | 1.000 | 4,681,792 |
| $NonWhite$ | 0.24 | 0.426 | 0.000 | 1.000 | 4,681,792 |
| $Black$ | 0.24 | 0.426 | 0.000 | 1.000 | 4,681,792 |
| $Hispanic$ | 0.00 | 0.047 | 0.000 | 1.000 | 4,681,792 |
| $Unknown$ | 0.01 | 0.115 | 0.000 | 1.000 | 4,681,792 |
| $Other$ | 0.01 | 0.111 | 0.000 | 1.000 | 4,681,792 |
| $Asian$ | 0.01 | 0.080 | 0.000 | 1.000 | 4,681,792 |
| $NativeAm$ | 0.01 | 0.074 | 0.000 | 1.000 | 4,681,792 |
| $MultiRace$ | 0.00 | 0.053 | 0.000 | 1.000 | 4,681,792 |
| $Republican$ | 0.35 | 0.476 | 0.000 | 1.000 | 4,681,792 |
| $Democrat$ | 0.44 | 0.497 | 0.000 | 1.000 | 4,681,792 |
| $Unaffiliated$ | 0.21 | 0.406 | 0.000 | 1.000 | 4,681,792 |
| $Libertarian$ | 0.00 | 0.030 | 0.000 | 1.000 | 4,681,792 |

*Notes:* The unit of analysis for all variables is the voter-election, except for *income* which is measured at the census block group. Summary statistics are calculated for 2012 and 2016, pooled.

# B Polling Place Change Information Mailer

This appendix presents an example (from Wake county) of the information mailer sent to voters when either their polling place or precinct changes. The inside of the mailer also contains a single slip of paper on which the new polling place is written in very large bold letters.

Figure B1: Mailer sent to voters when their polling place or precinct changes



| | |
|---|---|
| **NOTICE OF REGISTRATION** | This notice confirms your voter registration in Wake County. Your **Voter Registration Card** is attached. Please review all of the information on your card for accuracy. If you need to make an update, you may use the form on the card to make the change. Your signature will be required. Be sure to detach the card from this notice and affix proper postage before mailing the card back to our office. |
| **VOTING INFORMATION** | Your assigned precinct and voting place are shown on your **Voter Registration Card**. You are not required to show your voter registration card to vote. |
| **IF YOU MOVE** | If you move within this county, you must provide our office with your new address. If you move outside of this county, you will no longer be eligible to vote in this county after 30 days from the date of your move. You must be registered in the county where you reside. |

If you have any questions regarding this notice, please contact the
Wake County Board of Elections.
(919) 856-6240

**For more information on voter registration and voting in North Carolina, visit: www.NCSBE.gov**

THIS IS AN IMPORTANT VOTING NOTICE

RETAIN THIS CARD IN YOUR WALLET OR PURSE AND DESTROY ALL PREVIOUSLY MAILED VOTER CARDS TO AVOID CONFUSION
Your registration record will reflect information as shown on this card, for all future elections, unless you return this card with corrections or the Postal Service returns this card as undeliverable.

9223PVRC 8/22/16 Process Blue, K

WAKE COUNTY VOTER CARD

Gary Sims
DIRECTOR OF ELECTIONS

Wake County Board of Elections
337 South Salisbury Street
PO Box 695
Raleigh, NC 27602-0695

(Fold Here)

| GEN | PARTY | REGISTRATION DATE |
|---|---|---|
| | | |
| VOTER REG.ID | NCID | DATE ISSUED |
| | | |

SIGNATURE OF VOTER

VOTING PLACE

PRECINCT - ELECTION DISTRICTS

# C Full Results with Covariate Coefficients

This appendix presents the results from the main tables in the paper with the coefficient estimates for the control variables. We omit those coefficients from the tables in the main tables in the paper for the sake of space.

Table C1: The Average Effect of Polling Place Changes and Drive Time on Voter Turnout With Controls

| | $Pr(VoteElecDay)$ | | $Pr(VoteEarly)$ | | $Pr(VoteAny)$ | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $\Delta PollingPlace$ ($\hat{\beta}$) | -0.016*** | -0.015*** | 0.018*** | 0.017*** | 0.0023*** | 0.0020** |
| | (0.00093) | (0.00096) | (0.00098) | (0.0010) | (0.00077) | (0.00079) |
| $Black{\cdot}Year$ | 0.020*** | 0.020*** | -0.031*** | -0.031*** | -0.0080*** | -0.0080*** |
| | (0.00028) | (0.00028) | (0.00030) | (0.00030) | (0.00024) | (0.00024) |
| $Hispanic{\cdot}Year$ | -0.024*** | -0.024*** | 0.036*** | 0.036*** | 0.010*** | 0.010*** |
| | (0.0025) | (0.0025) | (0.0026) | (0.0026) | (0.0022) | (0.0022) |
| $Unknown{\cdot}Year$ | -0.016*** | -0.016*** | 0.024*** | 0.024*** | 0.0060*** | 0.0060*** |
| | (0.0010) | (0.0010) | (0.0010) | (0.0010) | (0.00091) | (0.00091) |
| $Other{\cdot}Year$ | -0.018*** | -0.018*** | 0.035*** | 0.035*** | 0.015*** | 0.015*** |
| | (0.0011) | (0.0011) | (0.0011) | (0.0011) | (0.00098) | (0.00098) |
| $NativeAm{\cdot}Year$ | -0.016*** | -0.016*** | 0.033*** | 0.033*** | 0.017*** | 0.017*** |
| | (0.0018) | (0.0018) | (0.0015) | (0.0015) | (0.0016) | (0.0016) |
| $Asian{\cdot}Year$ | -0.014*** | -0.014*** | 0.035*** | 0.035*** | 0.018*** | 0.018*** |
| | (0.0014) | (0.0014) | (0.0015) | (0.0015) | (0.0014) | (0.0014) |
| $MultiRace{\cdot}Year$ | -0.014*** | -0.014*** | 0.021*** | 0.021*** | 0.0048** | 0.0048** |
| | (0.0020) | (0.0020) | (0.0021) | (0.0021) | (0.0020) | (0.0020) |
| $\Delta MuchCloser$ ($\hat{\lambda}$) | | 0.0084** | | -0.0028 | | 0.0051 |
| | | (0.0042) | | (0.0045) | | (0.0035) |
| $\Delta MuchFurther$ ($\hat{\delta}$) | | -0.046*** | | 0.047*** | | 0.0032 |
| | | (0.0043) | | (0.0045) | | (0.0034) |
| Individual FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year Sample | Full Panel | Full Panel | Full Panel | Full Panel | Full Panel | Full Panel |
| Observations | 4681792 | 4681792 | 4681792 | 4681792 | 4681792 | 4681792 |
| Mean of DV | 0.30 | 0.30 | 0.46 | 0.46 | 0.80 | 0.84 |
| SD of DV | 0.25 | 0.25 | 0.26 | 0.26 | 0.21 | 0.21 |

Standard errors clustered at the individual level.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
*Notes*: The table presents coefficients from estimating Equation 1 both with and without the drive time indicators. The unit of analysis is the voter-election. This table presents the full covariates from Table 2 in the paper. The SD of the DV is the average of the within-$i$ standard deviations of the outcome variable.

Table C2: The Average Effect of Polling Place Changes by Year With Covariate Coefficient Estimates

| | $Pr(VoteElecDay)$ | | $Pr(VoteEarly)$ | | $Pr(VoteAny)$ | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $\Delta PollingPlace$ ($\hat{\beta}$) | -0.016*** | -0.028*** | 0.019*** | 0.023*** | 0.0020 | -0.0037** |
| | (0.0035) | (0.0059) | (0.0045) | (0.0055) | (0.0024) | (0.0018) |
| *LagElecDayVoter* | 0.20*** | 0.37*** | -0.053*** | 0.14*** | 0.096*** | 0.50*** |
| | (0.0086) | (0.0063) | (0.0040) | (0.0067) | (0.011) | (0.012) |
| *LagEarlyVoter* | -0.15*** | 0.032*** | 0.32*** | 0.52*** | 0.13*** | 0.54*** |
| | (0.0039) | (0.0066) | (0.0069) | (0.0048) | (0.011) | (0.011) |
| *LagMailInVoter* | -0.21*** | -0.021*** | -0.013* | 0.12*** | 0.031*** | 0.36*** |
| | (0.0049) | (0.0065) | (0.0070) | (0.0058) | (0.0099) | (0.015) |
| *LagProvisionalVoter* | -0.011 | 0.16*** | -0.017 | 0.15*** | -0.064*** | 0.32*** |
| | (0.016) | (0.012) | (0.011) | (0.012) | (0.017) | (0.014) |
| *Age* | 0.0065*** | 0.0036*** | 0.023*** | 0.027*** | 0.027*** | 0.030*** |
| | (0.00078) | (0.00043) | (0.00085) | (0.0016) | (0.0012) | (0.0017) |
| $Age^2$ | -0.000070*** | -0.000037*** | -0.00017*** | -0.00024*** | -0.00021*** | -0.00027*** |
| | (0.0000072) | (0.0000041) | (0.0000074) | (0.000014) | (0.000010) | (0.000015) |
| *Female* | -0.0079*** | -0.0049*** | 0.0075*** | 0.018*** | 0.0036*** | 0.017*** |
| | (0.0010) | (0.0013) | (0.0013) | (0.0014) | (0.0010) | (0.00075) |
| *Black* | -0.090*** | -0.010** | 0.12*** | -0.011** | 0.024*** | -0.029*** |
| | (0.0056) | (0.0049) | (0.0056) | (0.0043) | (0.0030) | (0.0039) |
| *Hispanic* | 0.049*** | -0.029*** | -0.17*** | -0.00025 | -0.11*** | -0.023** |
| | (0.011) | (0.0065) | (0.0086) | (0.0076) | (0.0099) | (0.0087) |
| *UnknownRace* | 0.024*** | -0.018*** | -0.16*** | -0.032*** | -0.13*** | -0.047*** |
| | (0.0058) | (0.0043) | (0.0045) | (0.0042) | (0.0066) | (0.0049) |
| *OtherRace* | 0.044*** | -0.0055 | -0.15*** | -0.0015 | -0.10*** | -0.0028 |
| | (0.0057) | (0.0078) | (0.0037) | (0.0052) | (0.0054) | (0.0061) |
| *NativeAm* | 0.074*** | 0.049*** | -0.15*** | -0.031*** | -0.073*** | 0.023** |
| | (0.0072) | (0.016) | (0.0063) | (0.0079) | (0.0072) | (0.0094) |
| *Asian* | 0.025*** | -0.012 | -0.18*** | -0.0052 | -0.14*** | -0.012 |
| | (0.0074) | (0.0098) | (0.013) | (0.010) | (0.018) | (0.014) |
| *MultiRace* | -0.0027 | -0.031*** | -0.14*** | -0.026*** | -0.13*** | -0.051*** |
| | (0.0063) | (0.0046) | (0.0062) | (0.0058) | (0.0081) | (0.0061) |
| *Income* | -0.0021*** | -0.0030** | 0.0084*** | 0.0064*** | 0.0077*** | 0.0040*** |
| | (0.00069) | (0.0015) | (0.00093) | (0.0016) | (0.00050) | (0.00041) |
| *Republican* | -0.0077*** | 0.028*** | 0.024*** | -0.010* | 0.036*** | 0.021*** |
| | (0.0019) | (0.0041) | (0.0035) | (0.0061) | (0.0024) | (0.0029) |
| *Unaffiliated* | -0.011*** | 0.0091*** | -0.013*** | -0.0059 | -0.019*** | 0.0073*** |
| | (0.0025) | (0.0023) | (0.0031) | (0.0038) | (0.0016) | (0.0022) |
| *Libertarian* | -0.0070 | 0.014 | -0.055*** | -0.034*** | -0.058*** | -0.016 |
| | (0.011) | (0.0086) | (0.014) | (0.0097) | (0.010) | (0.010) |
| County FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year Sample | 2012 | 2016 | 2012 | 2016 | 2012 | 2016 |
| Observations | 2340293 | 2340293 | 2340293 | 2340293 | 2340293 | 2340293 |
| Mean of DV | 0.33 | 0.26 | 0.47 | 0.45 | 0.84 | 0.75 |
| SD of DV | 0.47 | 0.44 | 0.50 | 0.50 | 0.36 | 0.43 |

Standard errors clustered at the individual level.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
*Notes*: The table presents coefficients from estimating Equation 1 without the drive time indicators. The unit of analysis is the voter-election. This table presents the full covariates from Table M1 in the paper.

Table C3: The Average Effect of Changes in Travel Time to Polling Places by Year With Covariate Coefficient Estimates

| | $Pr(VoteElecDay)$ | | $Pr(VoteEarly)$ | | $Pr(VoteAny)$ | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $\Delta MuchCloser$ ($\hat{\lambda}$) | 0.017 | 0.026*** | -0.013 | -0.033*** | 0.00016 | -0.0039 |
| | (0.015) | (0.0087) | (0.014) | (0.0093) | (0.0048) | (0.0050) |
| $\Delta MuchFurther$ ($\hat{\delta}$) | -0.0077 | -0.045*** | 0.0095 | 0.039** | 0.0044 | -0.0073 |
| | (0.0075) | (0.016) | (0.0075) | (0.019) | (0.0048) | (0.0045) |
| $\Delta PollingPlace$ ($\hat{\beta}$) | -0.017*** | -0.027*** | 0.019*** | 0.023*** | 0.0018 | -0.0033* |
| | (0.0034) | (0.0055) | (0.0045) | (0.0051) | (0.0025) | (0.0018) |
| $LagElecDayVoter$ | 0.20*** | 0.37*** | -0.053*** | 0.14*** | 0.096*** | 0.50*** |
| | (0.0086) | (0.0063) | (0.0040) | (0.0067) | (0.011) | (0.012) |
| $LagEarlyVoter$ | -0.15*** | 0.032*** | 0.32*** | 0.52*** | 0.13*** | 0.54*** |
| | (0.0039) | (0.0066) | (0.0069) | (0.0048) | (0.011) | (0.011) |
| $LagMailInVoter$ | -0.21*** | -0.021*** | -0.013* | 0.12*** | 0.031*** | 0.36*** |
| | (0.0049) | (0.0065) | (0.0070) | (0.0058) | (0.0099) | (0.015) |
| $LagProvisionalVoter$ | -0.011 | 0.16*** | -0.017 | 0.15*** | -0.064*** | 0.32*** |
| | (0.016) | (0.012) | (0.011) | (0.012) | (0.017) | (0.014) |
| $Age$ | 0.0065*** | 0.0036*** | 0.023*** | 0.027*** | 0.027*** | 0.030*** |
| | (0.00078) | (0.00043) | (0.00085) | (0.0016) | (0.0012) | (0.0017) |
| $Age^2$ | -0.000070*** | -0.000037*** | -0.00017*** | -0.00024*** | -0.00021*** | -0.00027*** |
| | (0.0000072) | (0.0000041) | (0.0000074) | (0.000014) | (0.000010) | (0.000015) |
| $Female$ | -0.0079*** | -0.0049*** | 0.0075*** | 0.018*** | 0.0036*** | 0.017*** |
| | (0.0010) | (0.0013) | (0.0013) | (0.0014) | (0.0010) | (0.00075) |
| $Black$ | -0.090*** | -0.010** | 0.12*** | -0.011** | 0.024*** | -0.029*** |
| | (0.0056) | (0.0049) | (0.0056) | (0.0043) | (0.0030) | (0.0039) |
| $Hispanic$ | 0.049*** | -0.028*** | -0.17*** | -0.00035 | -0.11*** | -0.023** |
| | (0.011) | (0.0065) | (0.0086) | (0.0076) | (0.0098) | (0.0087) |
| $UnknownRace$ | 0.024*** | -0.018*** | -0.16*** | -0.032*** | -0.13*** | -0.047*** |
| | (0.0058) | (0.0043) | (0.0045) | (0.0042) | (0.0066) | (0.0049) |
| $OtherRace$ | 0.044*** | -0.0054 | -0.15*** | -0.0015 | -0.10*** | -0.0028 |
| | (0.0057) | (0.0077) | (0.0037) | (0.0052) | (0.0054) | (0.0061) |
| $NativeAm$ | 0.074*** | 0.048*** | -0.15*** | -0.030*** | -0.073*** | 0.023** |
| | (0.0072) | (0.016) | (0.0063) | (0.0078) | (0.0072) | (0.0094) |
| $Asian$ | 0.025*** | -0.012 | -0.18*** | -0.0052 | -0.14*** | -0.012 |
| | (0.0074) | (0.0098) | (0.013) | (0.011) | (0.018) | (0.014) |
| $MultiRace$ | -0.0028 | -0.031*** | -0.14*** | -0.026*** | -0.13*** | -0.051*** |
| | (0.0063) | (0.0046) | (0.0062) | (0.0058) | (0.0081) | (0.0061) |
| $Income$ | -0.0021*** | -0.0030** | 0.0084*** | 0.0064*** | 0.0077*** | 0.0040*** |
| | (0.00068) | (0.0015) | (0.00092) | (0.0016) | (0.00050) | (0.00041) |
| $Republican$ | -0.0077*** | 0.028*** | 0.024*** | -0.010* | 0.036*** | 0.021*** |
| | (0.0019) | (0.0041) | (0.0035) | (0.0061) | (0.0024) | (0.0029) |
| $Unaffiliated$ | -0.011*** | 0.0091*** | -0.013*** | -0.0059 | -0.019*** | 0.0073*** |
| | (0.0025) | (0.0023) | (0.0031) | (0.0038) | (0.0016) | (0.0022) |
| $Libertarian$ | -0.0070 | 0.014 | -0.055*** | -0.034*** | -0.058*** | -0.016 |
| | (0.011) | (0.0086) | (0.014) | (0.0097) | (0.010) | (0.010) |
| County FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year Sample | 2012 | 2016 | 2012 | 2016 | 2012 | 2016 |
| Observations | 2340293 | 2340293 | 2340293 | 2340293 | 2340293 | 2340293 |
| Mean of DV | 0.33 | 0.26 | 0.47 | 0.45 | 0.84 | 0.75 |
| SD of DV | 0.47 | 0.44 | 0.50 | 0.50 | 0.36 | 0.43 |

Standard errors clustered at the individual level.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
*Notes*: The table presents coefficients from estimating Equation 1. The unit of analysis is the voter-election. This table presents the full covariates from Table **??** in the paper.

Table C4: The Differential Effects of Polling Place Changes by Race With Controls

| | $Pr(VoteElecDay)$ | | $Pr(VoteEarly)$ | | $Pr(VoteAny)$ | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $\Delta PollingPlace$ ($\hat{\beta}$) | -0.019*** | -0.019*** | 0.023*** | 0.023*** | 0.0040*** | 0.0040*** |
| | (0.0011) | (0.0011) | (0.0011) | (0.0011) | (0.00088) | (0.00088) |
| $\Delta PollingPlace{\cdot}NonWhite$ | 0.011*** | 0.011*** | -0.018*** | -0.018*** | -0.0073*** | -0.0069*** |
| | (0.0021) | (0.0022) | (0.0023) | (0.0023) | (0.0018) | (0.0018) |
| $Black{\cdot}Year$ | 0.020*** | 0.020*** | -0.031*** | -0.031*** | -0.0080*** | -0.0080*** |
| | (0.00029) | (0.00029) | (0.00030) | (0.00030) | (0.00024) | (0.00024) |
| $Hispanic{\cdot}Year$ | -0.024*** | -0.024*** | 0.036*** | 0.036*** | 0.010*** | 0.010*** |
| | (0.0025) | (0.0025) | (0.0026) | (0.0026) | (0.0022) | (0.0022) |
| $Unknown{\cdot}Year$ | -0.016*** | -0.016*** | 0.024*** | 0.024*** | 0.0060*** | 0.0060*** |
| | (0.0010) | (0.0010) | (0.0010) | (0.0010) | (0.00091) | (0.00091) |
| $Other{\cdot}Year$ | -0.018*** | -0.018*** | 0.035*** | 0.035*** | 0.015*** | 0.015*** |
| | (0.0011) | (0.0011) | (0.0011) | (0.0011) | (0.00098) | (0.00098) |
| $NativeAm{\cdot}Year$ | -0.016*** | -0.016*** | 0.033*** | 0.033*** | 0.017*** | 0.017*** |
| | (0.0018) | (0.0018) | (0.0015) | (0.0015) | (0.0016) | (0.0016) |
| $Asian{\cdot}Year$ | -0.014*** | -0.014*** | 0.035*** | 0.035*** | 0.018*** | 0.018*** |
| | (0.0014) | (0.0014) | (0.0015) | (0.0015) | (0.0014) | (0.0014) |
| $MultiRace{\cdot}Year$ | -0.014*** | -0.014*** | 0.021*** | 0.021*** | 0.0048** | 0.0048** |
| | (0.0020) | (0.0020) | (0.0021) | (0.0021) | (0.0020) | (0.0020) |
| $\Delta MuchCloser{\cdot}NonWhite$ | | 0.0049 | | -0.012 | | -0.011 |
| | | (0.0099) | | (0.010) | | (0.0085) |
| $\Delta MuchFurther{\cdot}NonWhite$ | | -0.022** | | 0.015 | | -0.0062 |
| | | (0.010) | | (0.011) | | (0.0087) |
| Individual FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year Sample | Full Panel | Full Panel | Full Panel | Full Panel | Full Panel | Full Panel |
| Observations | 4681792 | 4681792 | 4681792 | 4681792 | 4681792 | 4681792 |
| Mean of DV | 0.30 | 0.30 | 0.46 | 0.46 | 0.80 | 0.84 |
| SD of DV | 0.25 | 0.25 | 0.26 | 0.26 | 0.21 | 0.21 |

Standard errors clustered at the individual level.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
*Notes*: The table presents coefficients from estimating Equation 1 without the drive time indicators. The unit of analysis is the voter-election. This table presents the full covariates from Table D2 in the paper.

# D Additional Racial Heterogeneity Specifications

In this appendix, we present additional results that examine heterogeneity in the effect of polling place changes by race. Table D1 begins by showing that the effects of polling place changes by race do not vary by how those changes impact travel costs, nor are the results different in the panel analysis either overall (Table D2) or depending on drive time (Table D3). Finally, we present the main table polling place change table from the paper but with the non-white category broken out into each race indicator (Table D4). Because we observe no differential travel time effects for white as compared to non-white, and given the heinousness of a table with interactions across two distances for six races, we do not present the table for drive times interacted with each individual race.

Table D1 examines different travel time changes by race. We see no evidence that changes in travel time — either increases or reductions — under different partisan regimes differentially affected non-white voters.

Table D1: The Differential Effects of Changes in Travel Time to Polling Places by Year and Race

| | $Pr(VoteElecDay)$ | | $Pr(VoteEarly)$ | | $Pr(VoteAny)$ | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $\Delta PollingPlace$ ($\hat{\beta}$) | -0.020*** | -0.031*** | 0.022*** | 0.029*** | 0.0012 | -0.0024 |
| | (0.0042) | (0.0059) | (0.0051) | (0.0055) | (0.0026) | (0.0019) |
| $\Delta PollingPlace{\cdot}NonWhite$ | 0.014*** | 0.016*** | -0.015** | -0.023*** | 0.0022 | -0.0041 |
| | (0.0049) | (0.0048) | (0.0063) | (0.0053) | (0.0037) | (0.0034) |
| $NonWhite$ | -0.085*** | -0.014*** | 0.091*** | -0.011** | -0.0021 | -0.032*** |
| | (0.0044) | (0.0041) | (0.0045) | (0.0043) | (0.0029) | (0.0034) |
| $\Delta MuchCloser$ ($\hat{\lambda}$) | 0.016 | 0.028*** | -0.0095 | -0.035*** | 0.0032 | -0.0022 |
| | (0.016) | (0.0098) | (0.014) | (0.010) | (0.0048) | (0.0057) |
| $\Delta MuchFurther$ ($\hat{\delta}$) | -0.0087 | -0.046*** | 0.011 | 0.040** | 0.0047 | -0.0065 |
| | (0.0099) | (0.017) | (0.0092) | (0.019) | (0.0062) | (0.0047) |
| $\Delta MuchCloser{\cdot}NonWhite$ | 0.0084 | -0.0022 | -0.030* | 0.00041 | -0.021 | -0.0077 |
| | (0.015) | (0.021) | (0.017) | (0.013) | (0.013) | (0.016) |
| $\Delta MuchFurther{\cdot}NonWhite$ | 0.0079 | 0.013 | -0.0056 | -0.025 | 0.0039 | -0.0099 |
| | (0.018) | (0.017) | (0.026) | (0.017) | (0.017) | (0.012) |
| County FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Individual Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year Sample | 2012 | 2016 | 2012 | 2016 | 2012 | 2016 |
| Observations | 2340293 | 2340293 | 2340293 | 2340293 | 2340293 | 2340293 |
| Mean of DV | 0.33 | 0.26 | 0.47 | 0.45 | 0.84 | 0.75 |
| SD of DV | 0.47 | 0.44 | 0.50 | 0.50 | 0.36 | 0.43 |

Standard errors clustered at the individual level.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
*Notes*: The table presents coefficients from estimating Equation 1 with voter-race interactions. The unit of analysis is the voter-election.

Our panel results in Table D2 indicate that non-white voters are slightly more likely to continue voting on Election Day when they experience a polling place change, and less likely to vote early. The net effect of this substitution is that they are less likely to turnout in general when they experience a polling place change. The results in

We note that there is little consistent evidence that our results for non-white vary meaningfully

Table D2: The Average Effect of Polling Place Changes on Voter Turnout by Race

| | $Pr(VoteElecDay)$ | $Pr(VoteEarly)$ | $Pr(VoteAny)$ |
|---|---|---|---|
| | (1) | (2) | (3) |
| $\Delta PollingPlace$ ($\hat{\beta}$) | -0.019*** | 0.023*** | 0.0040*** |
| | (0.0011) | (0.0011) | (0.00088) |
| $\Delta PollingPlace{\cdot}NonWhite$ | 0.011*** | -0.018*** | -0.0073*** |
| | (0.0021) | (0.0023) | (0.0018) |
| Individual FE | ✓ | ✓ | ✓ |
| Year FE | ✓ | ✓ | ✓ |
| Race x Year FE | ✓ | ✓ | ✓ |
| Year Sample | Full Panel | Full Panel | Full Panel |
| Observations | 4681792 | 4681792 | 4681792 |
| Mean of DV | 0.30 | 0.46 | 0.80 |
| SD of DV | 0.25 | 0.26 | 0.21 |

Standard errors clustered at the individual level.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
*Notes*: The table presents coefficients from estimating Equation 1 without the travel time indicators. The unit of analysis is the voter-election.

Table D3: The Average Effect of Changes in Travel Time to Polling Place on Turnout by Race

| | $Pr(VoteElecDay)$ | $Pr(VoteEarly)$ | $Pr(VoteAny)$ |
|---|---|---|---|
| | (1) | (2) | (3) |
| $\Delta PollingPlace$ ($\hat{\beta}$) | -0.017*** | 0.021*** | 0.0035*** |
| | (0.0011) | (0.0012) | (0.00091) |
| $\Delta PollingPlace{\cdot}NonWhite$ | 0.0093*** | -0.016*** | -0.0065*** |
| | (0.0022) | (0.0023) | (0.0018) |
| $\Delta MuchCloser$ ($\hat{\lambda}$) | 0.010** | -0.0024 | 0.0079** |
| | (0.0046) | (0.0050) | (0.0038) |
| $\Delta MuchFurther$ ($\hat{\delta}$) | -0.050*** | 0.051*** | 0.0042 |
| | (0.0047) | (0.0049) | (0.0038) |
| $\Delta MuchCloser{\cdot}NonWhite$ | -0.0051 | -0.0095 | -0.019** |
| | (0.011) | (0.011) | (0.0093) |
| $\Delta MuchFurther{\cdot}NonWhite$ | 0.028** | -0.036*** | -0.010 |
| | (0.011) | (0.012) | (0.0095) |
| Individual FE | ✓ | ✓ | ✓ |
| Year FE | ✓ | ✓ | ✓ |
| Race x Year FE | ✓ | ✓ | ✓ |
| Year Sample | Full Panel | Full Panel | Full Panel |
| Observations | 4681792 | 4681792 | 4681792 |
| Mean of DV | 0.30 | 0.46 | 0.80 |
| SD of DV | 0.25 | 0.26 | 0.21 |

Standard errors clustered at the individual level.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
*Notes*: The table presents coefficients from estimating Equation 1. The unit of analysis is the voter-election.

by specific races. We might be interested in whether the effects for black are distinct from other races that are a smaller part of the population or have a less fraught history with voting rights in North Carolina. But Table D4 provides little evidence of this.

Table D4: The Differential Effects of Polling Place Changes by Year and Race

| | $Pr(VoteElecDay)$ | | $Pr(VoteEarly)$ | | $Pr(VoteAny)$ | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $\Delta PollingPlace$ ($\hat{\beta}$) | -0.020*** | -0.032*** | 0.023*** | 0.029*** | 0.0017 | -0.0026 |
| | (0.0044) | (0.0063) | (0.0053) | (0.0060) | (0.0024) | (0.0019) |
| $\Delta PollingPlace{\cdot}Hispanic$ | 0.025 | 0.028* | -0.011 | -0.0016 | 0.010 | 0.014 |
| | (0.019) | (0.016) | (0.015) | (0.018) | (0.014) | (0.012) |
| $\Delta PollingPlace{\cdot}Black$ | 0.013** | 0.018*** | -0.015** | -0.026*** | 0.00023 | -0.0052 |
| | (0.0056) | (0.0054) | (0.0069) | (0.0059) | (0.0033) | (0.0033) |
| $\Delta PollingPlace{\cdot}Unknown$ | 0.017** | -0.0062 | -0.017 | 0.0050 | 0.0030 | 0.0017 |
| | (0.0075) | (0.011) | (0.012) | (0.0098) | (0.011) | (0.0077) |
| $\Delta PollingPlace{\cdot}Other$ | -0.0036 | -0.011 | -0.00098 | 0.0085 | -0.0068 | -0.0019 |
| | (0.0066) | (0.0077) | (0.012) | (0.0100) | (0.0083) | (0.0080) |
| $\Delta PollingPlace{\cdot}NativeAm$ | 0.011 | -0.012 | 0.015 | 0.021 | 0.028 | 0.0055 |
| | (0.022) | (0.027) | (0.017) | (0.026) | (0.025) | (0.0093) |
| $\Delta PollingPlace{\cdot}Asian$ | 0.0064 | -0.0061 | 0.0062 | 0.028** | 0.023 | 0.013 |
| | (0.010) | (0.010) | (0.024) | (0.013) | (0.019) | (0.014) |
| $\Delta PollingPlace{\cdot}MultiRace$ | -0.0030 | 0.0019 | -0.019 | -0.0071 | -0.0097 | -0.0027 |
| | (0.012) | (0.012) | (0.015) | (0.016) | (0.018) | (0.016) |
| *Black* | -0.092*** | -0.013** | 0.13*** | -0.0067 | 0.024*** | -0.028*** |
| | (0.0054) | (0.0050) | (0.0056) | (0.0044) | (0.0031) | (0.0040) |
| *UnknownRace* | 0.021*** | -0.017*** | -0.15*** | -0.033*** | -0.13*** | -0.048*** |
| | (0.0055) | (0.0051) | (0.0053) | (0.0045) | (0.0076) | (0.0055) |
| *OtherRace* | 0.044*** | -0.0038 | -0.15*** | -0.0027 | -0.10*** | -0.0025 |
| | (0.0056) | (0.0081) | (0.0047) | (0.0058) | (0.0056) | (0.0059) |
| *NativeAm* | 0.073*** | 0.050*** | -0.15*** | -0.034*** | -0.078*** | 0.022** |
| | (0.0063) | (0.017) | (0.0067) | (0.0091) | (0.0048) | (0.0095) |
| *Asian* | 0.024*** | -0.011 | -0.18*** | -0.0093 | -0.14*** | -0.014 |
| | (0.0077) | (0.011) | (0.016) | (0.012) | (0.020) | (0.015) |
| *MultiRace* | -0.0023 | -0.031*** | -0.13*** | -0.025*** | -0.13*** | -0.050*** |
| | (0.0066) | (0.0053) | (0.0075) | (0.0064) | (0.0100) | (0.0071) |
| *Hispanic* | 0.045*** | -0.033*** | -0.16*** | -0.000079 | -0.11*** | -0.025*** |
| | (0.011) | (0.0068) | (0.0091) | (0.0087) | (0.010) | (0.0088) |
| County FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Individual Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year Sample | 2012 | 2016 | 2012 | 2016 | 2012 | 2016 |
| Observations | 2340293 | 2340293 | 2340293 | 2340293 | 2340293 | 2340293 |
| Mean of DV | 0.33 | 0.26 | 0.47 | 0.45 | 0.84 | 0.75 |
| SD of DV | 0.47 | 0.44 | 0.50 | 0.50 | 0.36 | 0.43 |

Standard errors clustered at the individual level.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
*Notes*: The table presents coefficients from estimating Equation 1 without the travel time indicators but with $\Delta PollingPlace$ interacted with voter race. The unit of analysis is the voter-election.

# E Alternative Travel Time Changes Specifications

In the main paper we probe the effect of changes in the costs associated with traveling to the polls by estimating a model in which we compare level differences between those people moved more than 5 minutes closer or more than 5 minutes further from their polling place to those who had a smaller move (regardless of whether that move was closer or further).

In this appendix, we present additional results that model the relationship between changing drive time to polling place and voter turnout differently. Specifically, we estimate a model similar to the model from the main paper (in which we trichotomize travel time changes into 5+ minutes closer, 5+ minutes further, and under 5 minutes closer or further) but allow the slope of the effects in those bins to vary. That is, we interact the indicators for move distance with drive time change.

The results are presented in Table E1. We find that there is a differential slope change in the effect of polling place change when voters are moved much further away. The slope of the effect for Election Day voting is more negative relative to those who had smaller changes, and the slope of the effect for early voting is more positive. These results indicate that the effect of a change in drive time does depend on whether that change is large or small when it comes to the choice of mode of vote. However, there is no differential overall turnout effect.

Table E1: The Average Effect of Changes in Travel Time to Polling Place on Turnout Using Linear Fits

| | $Pr(VoteElecDay)$ | $Pr(VoteEarly)$ | $Pr(VoteAny)$ |
|---|---|---|---|
| | (1) | (2) | (3) |
| $\Delta PollingPlace$ ($\hat{\beta}$) | -0.015*** | 0.017*** | 0.0020** |
| | (0.00096) | (0.0010) | (0.00079) |
| $\Delta DriveTime$ | -0.0011*** | 0.0011** | 0.00024 |
| | (0.00043) | (0.00046) | (0.00036) |
| $\Delta MuchCloser$ ($\hat{\lambda}$) | 0.023 | -0.059*** | -0.031*** |
| | (0.014) | (0.015) | (0.012) |
| $\Delta MuchFurther$ ($\hat{\delta}$) | 0.034** | -0.036*** | 0.00040 |
| | (0.013) | (0.013) | (0.011) |
| $\Delta MuchFurther{\cdot}DriveTime$ | -0.010*** | 0.011*** | 0.00013 |
| | (0.0019) | (0.0018) | (0.0015) |
| $\Delta MuchCloser{\cdot}DriveTime$ | 0.0033* | -0.0090*** | -0.0053*** |
| | (0.0020) | (0.0021) | (0.0016) |
| Individual FE | ✓ | ✓ | ✓ |
| Year FE | ✓ | ✓ | ✓ |
| Race x Year FE | ✓ | ✓ | ✓ |
| Year Sample | Full Panel | Full Panel | Full Panel |
| Observations | 4681792 | 4681792 | 4681792 |
| Mean of DV | 0.30 | 0.46 | 0.80 |
| SD of DV | 0.25 | 0.26 | 0.21 |

Standard errors clustered at the individual level.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
*Notes*: The table presents coefficients from estimating Equation 1 with additional interactions. The unit of analysis is the voter-election.

We also estimate a specification that restricts the sample of voters to those who experience a polling place change of less than 10 minutes closer and less than 10 minutes further away. This restriction better reflects what we plot in the scatter plots of the relationship between drive time

and turnout. And it also reflects the fact that there are extremely few observations in these far tails of the distribution. And given that we use OLS, we want to be sensitive to the effect that extreme outliers might have on our results.

Table E2 presents our results for the restricted sample. These are slightly smaller in magnitude, and less significant than the results in the paper. But the sign and pattern of magnitudes is very similar.

Table E2: The Average Effect of Changes in Travel Time to Polling Place on Turnout for the Restricted Sample

| | $Pr(VoteElecDay)$ | $Pr(VoteEarly)$ | $Pr(VoteAny)$ |
|---|---|---|---|
| | (1) | (2) | (3) |
| $\Delta MuchCloser$ ($\hat{\lambda}$) | 0.011** | -0.011** | -0.00042 |
| | (0.0044) | (0.0048) | (0.0037) |
| $\Delta MuchFurther$ ($\hat{\delta}$) | -0.041*** | 0.041*** | 0.0023 |
| | (0.0045) | (0.0047) | (0.0036) |
| $\Delta PollingPlace$ ($\hat{\beta}$) | -0.015*** | 0.017*** | 0.0020*** |
| | (0.00096) | (0.0010) | (0.00079) |
| Individual FE | ✓ | ✓ | ✓ |
| Year FE | ✓ | ✓ | ✓ |
| Race x Year FE | ✓ | ✓ | ✓ |
| Year Sample | Full Panel | Full Panel | Full Panel |
| Observations | 4675138 | 4675138 | 4675138 |
| Mean of DV | 0.30 | 0.46 | 0.80 |
| SD of DV | 0.25 | 0.26 | 0.21 |

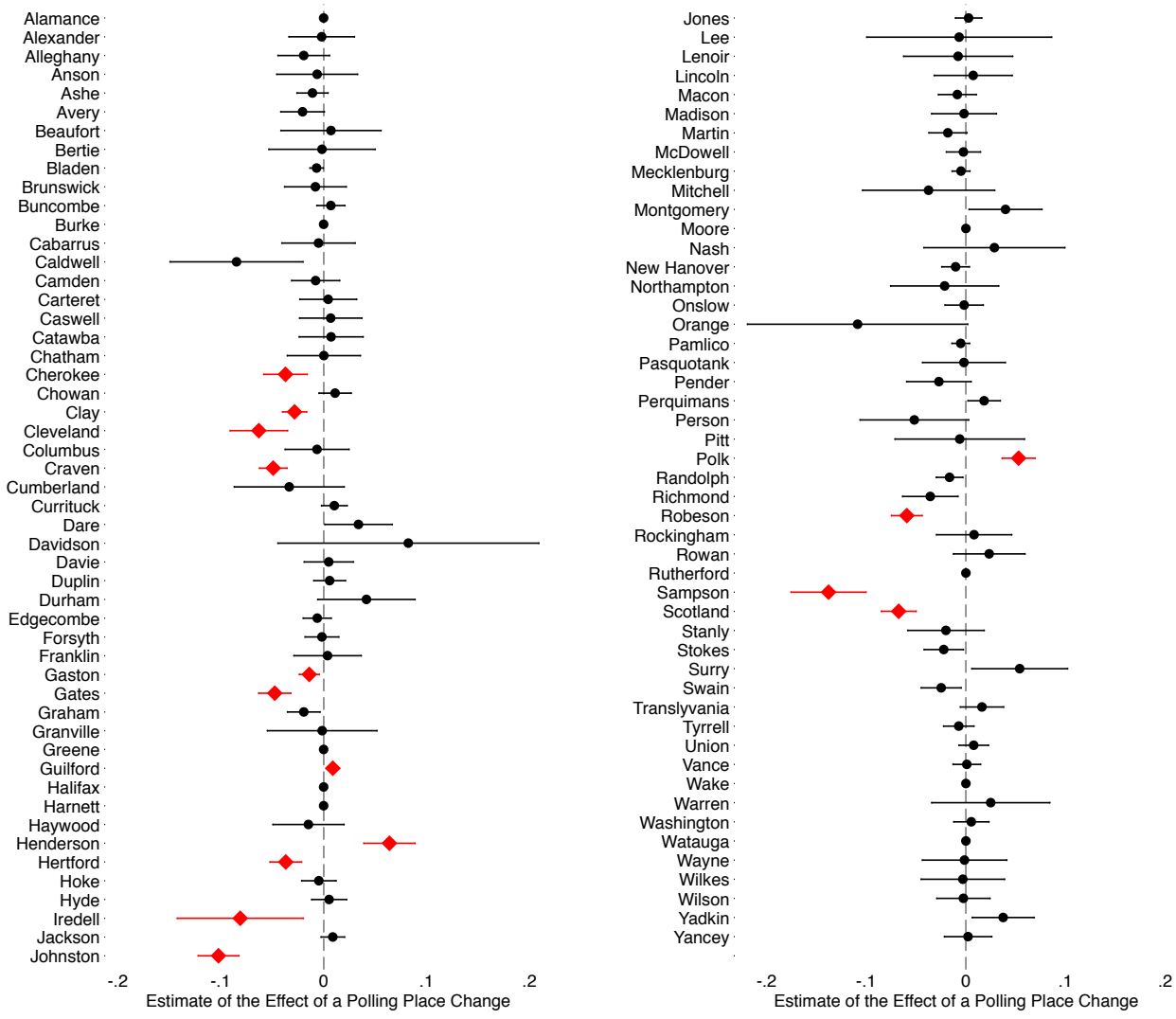
Standard errors clustered at the individual level.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
*Notes*: The table presents coefficients from estimating Equation 1. The unit of analysis is the voter-election. The sample is restricted to those individuals in our sample who experienced drive time changes of less than 10 minutes closer or further away.

Finally, we note that our results are robust to other models that readers might think capture the relationship between drive time and turnout — specifically, models that simply dichotomize the closer/further relationship and model that relationship as linear, and models that dichotomize but model the model relationship as quadratic. We do not present these results for the sake of space, but they are available upon request. By robust, we mean that we find slightly more evidence of substitution when people are moved further from their polling place (as compared to closer), but that these substitution effects offset such that there is no differential overall turnout effect conditional on drive time.

# F Individual County Estimates

In this appendix, we present estimates of the effect of a polling place change for each county in North Carolina and for each the main modes of voting that we study: Election Day voting (Figure F1), early voting (Figure F2), and overall voter turnout (Figure F3).

Figure F1: County-Specific Estimates of the Effect of a Polling Place Change on Election Day Voting

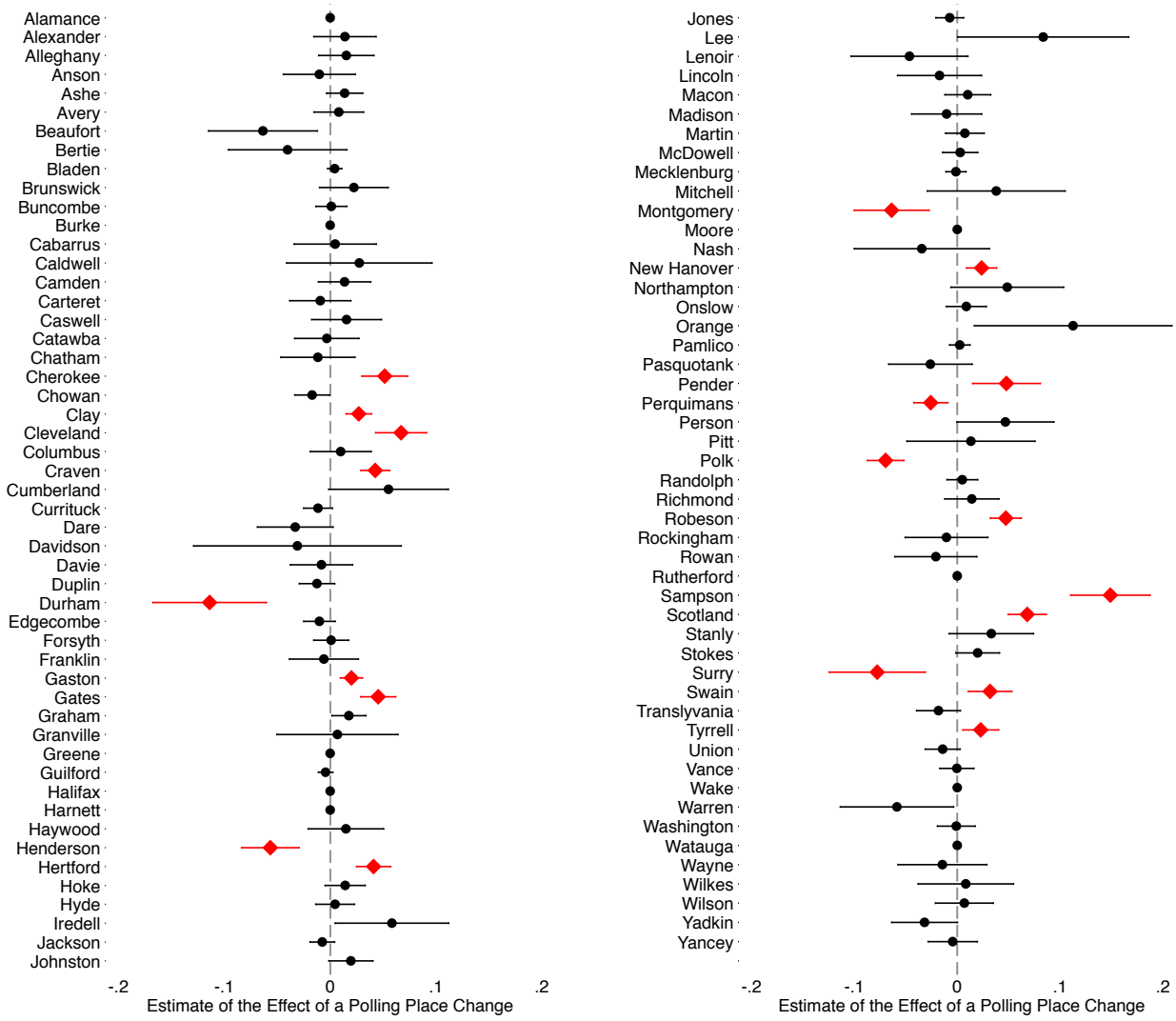



*Notes:* The above plot presents estimates of Equation 1 for each county individually along with 95% confidence intervals. The outcome is $Pr(VoteElecDay)$. Statistically insignificant estimates are presented with a black dot, those estimates statistically different from zero are presented with a hollow diamond. Some county estimates cannot be estimated because no precincts in those counties experienced a polling place change.

Given that the existing literature has estimated effects for counties alone, we present these county-specific estimates to highlight the fact that there is substantial heterogeneity in the effect across counties. For example, in the case of Election Day voting, we can recover estimates of the effect of a polling place change that are both positive, negative and indistinguishable from zero (with varying degrees of precision). Recall that we use a 10% sample of from our sample of voters to

estimate our effects for computational reasons. This increases the imprecision of our estimates, but *not* the coefficient estimate itself.

Figure F2: County-Specific Estimates of the Effect of a Polling Place Change on Early Voting



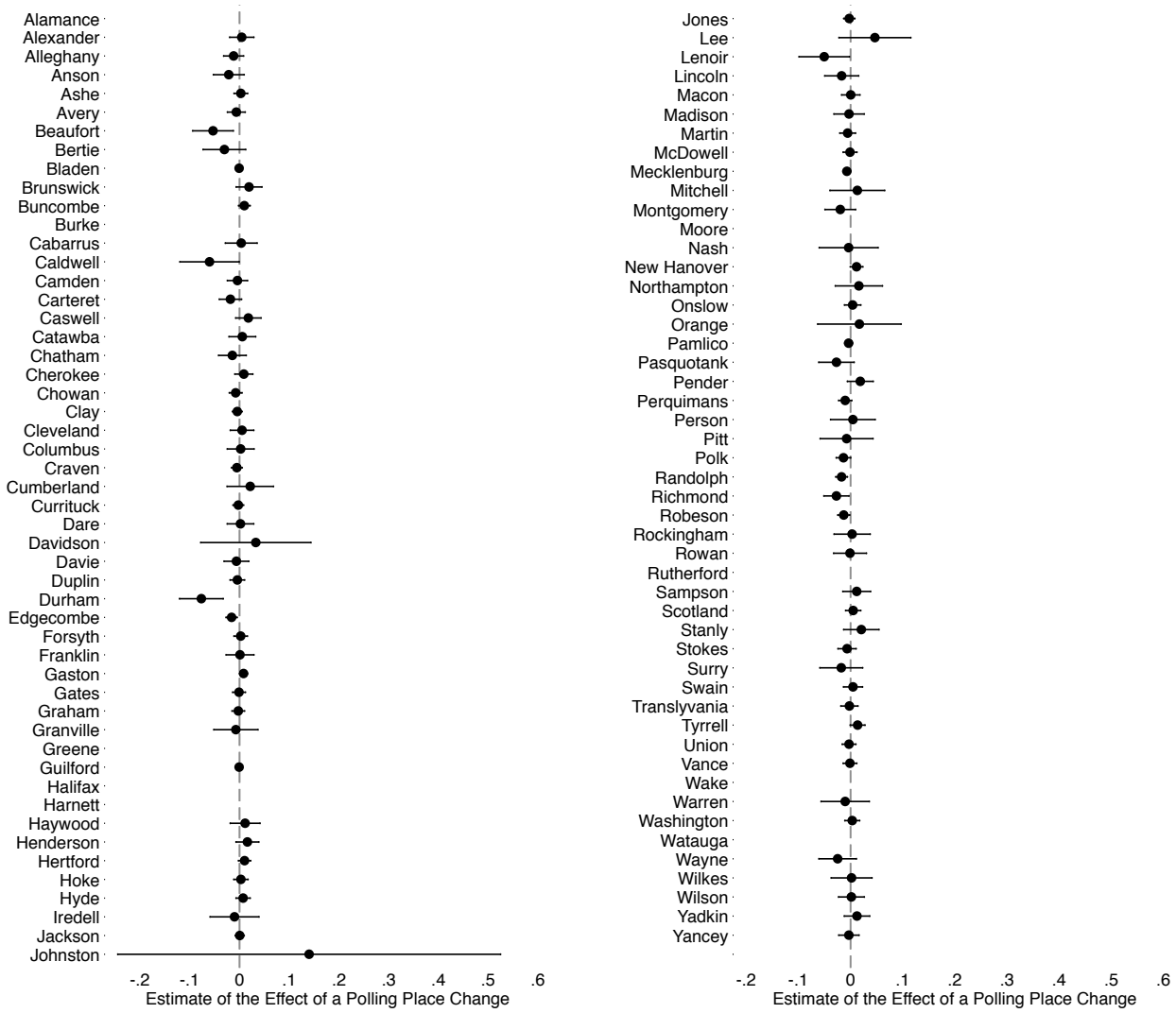

*Notes:* The above plot presents estimates of Equation 1 for each county individually along with 95% confidence intervals. The outcome is $Pr(VoteEarly)$. Statistically insignificant estimates are presented with a black dot, those estimates statistically different from zero are presented with a hollow diamond. Some county estimates cannot be estimated because no precincts in those counties experienced a polling place change.

The fact that there is variation across counties highlights the importance of our statewide estimates for understanding how polling place location changes affect statewide contests. These results suggest that results from a single county *cannot* be generalized to the state level, and doing so would likely lead to deeply erroneous conclusions.

That there is variation in the estimates is quite interesting, however we note that the purpose of our paper is not to theorize and test why the effects of polling place changes differ by counties (although we note that our results in the main paper suggest that it is *not* a function of differences in the availability of early voting hours and locations). Our purpose is to estimate the effect of

polling place changes across an entire state (and to do so more rigorously and precisely than even county-level estimates have previously been estimated). However, probing these differences is likely to be a fruitful avenue for future research.

Figure F3: County-Specific Estimates of the Effect of a Polling Place Change on Overall Voter Turnout




*Notes:* The above plot presents estimates of Equation 1 for each county individually along with 95% confidence intervals. The outcome is $Pr(VoteAny)$. Statistically insignificant estimates are presented with a black dot, those estimates statistically different from zero are presented with a hollow diamond. Some county estimates cannot be estimated because no precincts in those counties experienced a polling place change.

## G Substitution versus Composition

In order to establish whether the decline in Election Day voting and rise in early voting is the result of *substitution* of Election Day voters into early voting or alternatively a decline in Election Day voting by one group of individuals and a rise in early voting *by a different* group of previous non-voters, we examine two empirical patterns.

First, we estimate whether the effect of a polling place change on voting early varies by whether the voter voted on Election Day in the previous presidential election. Vote history can be thought of as a proxy for vote intention (absent a polling place change), and so if polling place changes are driving substitution into early voting by voters *who would otherwise vote on Election Day*, we should see a *larger* effect of polling place changes on early voting within this population. As shown in Table G1, this is precisely what we observe – voters who voted on Election Day in the last election and are impacted by a polling place change are almost 150% more likely to vote early than other voters who experience a polling place change.

Table G1: The Differential Effect of Polling Place Changes on Voter Turnout by Past Voting Mode

| | $Pr(VoteElecDay)$ | $Pr(VoteEarly)$ | $Pr(VoteAny)$ |
|---|---|---|---|
| | (1) | (2) | (3) |
| $\Delta PollingPlace$ ($\hat{\beta}$) | -0.015*** | 0.016*** | 0.00058 |
| | (0.0036) | (0.0035) | (0.0019) |
| $LagElecDayVoter{\cdot}\Delta PollingPlace$ | -0.033*** | 0.026*** | -0.0051* |
| | (0.0054) | (0.0064) | (0.0026) |
| Individual FE | ✓ | | |
| Year FE | ✓ | ✓ | ✓ |
| Race x Year FE | ✓ | ✓ | ✓ |
| Year Sample | Full Panel | Full Panel | Full Panel |
| Observations | 4680586 | 4680586 | 4680586 |
| Mean of DV | 0.30 | 0.46 | 0.80 |
| SD of DV | 0.25 | 0.26 | 0.21 |

Standard errors clustered at the individual level.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
*Notes*: The table presents coefficients from estimating a version of Equation 1 with no travel time coefficients, no fixed effects, and demographic controls from Equation 1. Omission of individual fixed effects is necessary as use of lagged dependent variables in a short panel results in Nickell bias (Nickell, 1981). The unit of analysis is the voter-election.

As an additional test, we examine whether the *composition* of voters varies between precincts with polling place changes and precincts without polling place changes. If mailers are inducing what would otherwise be non-voters to vote, and preventing election-day voters from voting, then we would expect the overall composition of voters who cast a ballot to change as well.

Table G2 correlates overall turnout with voter party and polling place change. In general, the results tend to support the idea of substitution – while there is some change in the composition of the electorate, the estimates are inconsistent across specifications and small in comparison to the degree of substitution observed – about one-half percentage point moves in composition versus -1.6 and 1.8 percentage point changes in Election Day and early voting respectively. Combined

Table G2: Polling Place Changes and Voter Composition

| | $Pr(VoteAny)$ | $Pr(VoteAny)$ | $Pr(VoteAny)$ |
|---|---|---|---|
| | (1) | (2) | (3) |
| $\Delta PollingPlace$ ($\hat{\beta}$) | -0.00041 | 0.0032 | -0.0066*** |
| | (0.0012) | (0.0026) | (0.0020) |
| $\Delta PollingPlace \cdot Rep$ | 0.0042** | -0.0026 | 0.0042 |
| | (0.0017) | (0.0025) | (0.0028) |
| $\Delta PollingPlace \cdot Unaffil$ | 0.0057*** | -0.0017 | 0.0065** |
| | (0.0021) | (0.0020) | (0.0026) |
| Individual FE | ✓ | | |
| Year FE | ✓ | | |
| Race x Year FE | ✓ | | |
| County FE | | ✓ | ✓ |
| Controls | | ✓ | ✓ |
| Year Sample | Full Panel | 2012 | 2016 |
| Observations | 4677529 | 2338392 | 2337937 |
| Mean of DV | 0.80 | 0.84 | 0.75 |
| SD of DV | 0.21 | 0.21 | 0.21 |
| Party Joint Sig | 0.0074 | 0.50 | 0.050 |

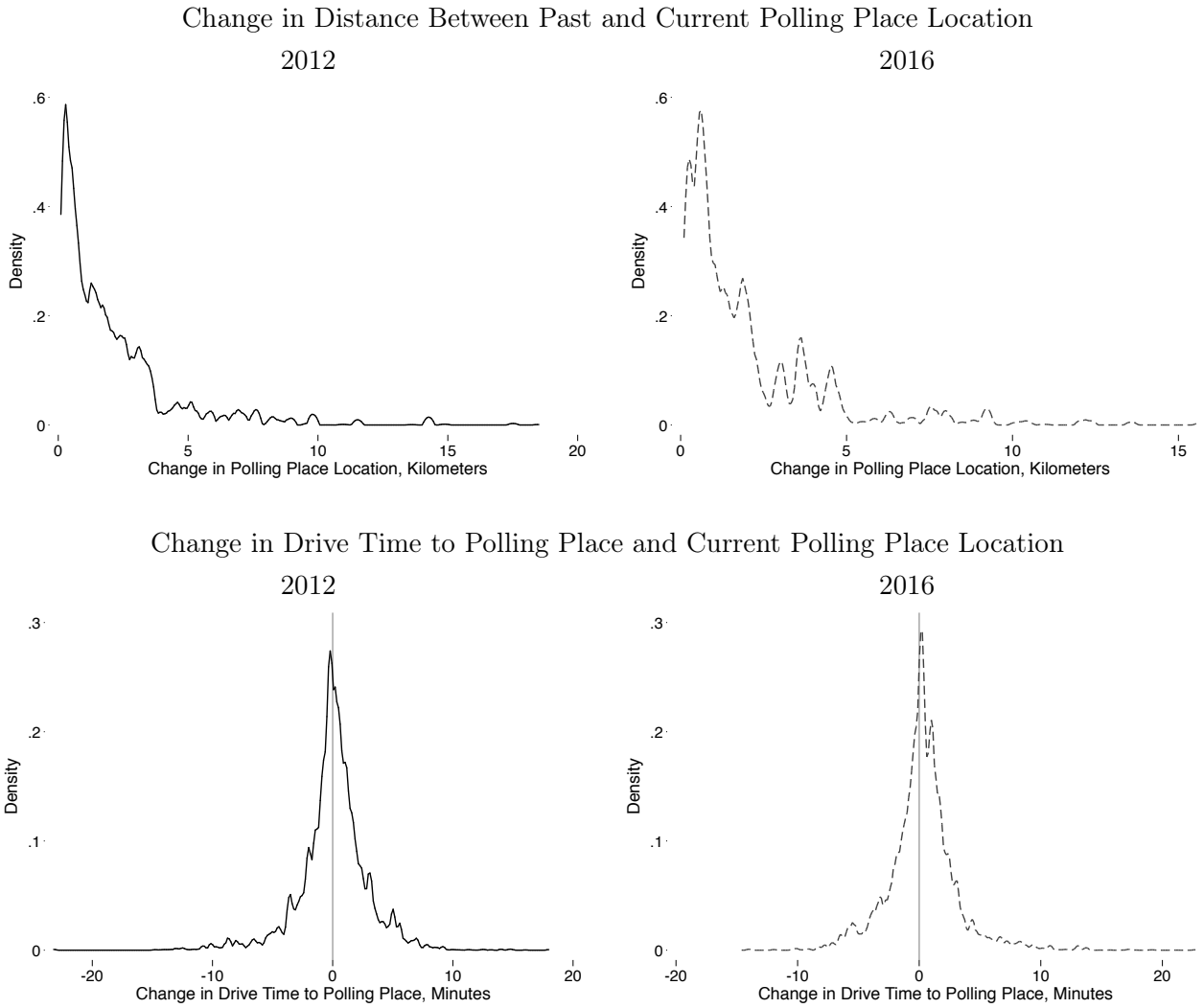
Standard errors clustered at the individual level.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
*Notes*: Omitted party ID is Democrat. A very small quantity of libertarians have been excluded for ease of interpretation. The table presents coefficients from estimating Equation 1 without travel time coefficients. The unit of analysis is the voter-election. The SD of the DV in the panel is the average of the within-$i$ standard deviations of the outcome variable.

with the fact that the largest effects of a polling place change occur among those who previously voted on Election Day – a reasonable proxy for vote intention absent a polling place change – it seems reasonable to conclude that the offsetting effects that we identify are a consequence of voters reacting to a change in polling place location by voting early rather than staying home.

# H Additional Plots for Travel Time Changes

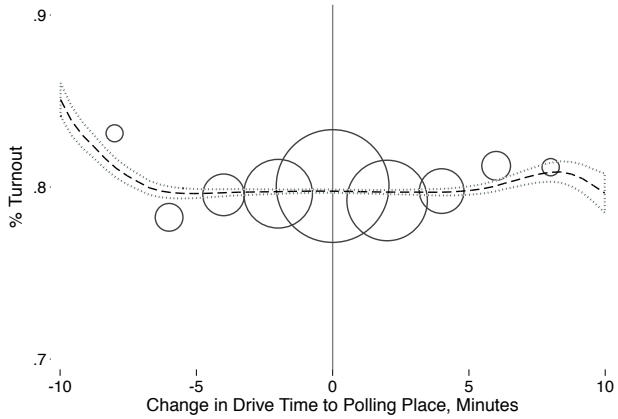
In the main paper, we pool the distributions of polling place distance changes and changes in drive time across our period. In this appendix, we present the distributions separately for each year. The separate distributions reveal little difference in either measure across years with the following exception — in 2016, there were fewer people moved *significantly* closer ($> 10$ minutes) closer to their polling place (lower right plot). But the number of individuals in the tail of the distribution there is extremely small.

Figure H1: Distribution of Distance of Polling Place Changes and Changes in Drive Time by Year




*Notes:* The upper two presents the distribution of the distance between a precinct's polling place location in a given election year relative to its location in the previous election year, conditional on a voters' polling place having moved. The unit of analysis in plot (a) is a voter; therefore, distance changes are weighted by the number of voters experiencing the change. Polling place changes can result from the movement of a given individual's polling place, or from a voter being moved into a new precinct by a precinct boundary change. Plot (b) presents the distribution of changes in drive time to a polling place for voters who experienced a polling place change. Note that some voters can experience a polling place change without a change in drive time.

Figure H2: Relationship Between the Change in Driving Time to Polling Place and Overall Turnout




*Notes:* The above scatter plot presents the bivariate relationship between the change in drive time to polling place (measured in minutes) from the previous presidential election year and total voter turnout. Change in drive time is conditional on a voter not having moved and having had their polling place change. Hollow circles are binned averages of the outcome for every 2 minute interval of drive time change. The circles are sized relative to the population in the bin. We do not plot the very few observations at the tails of the distribution (those with drive time changes that are greater than 1.5 times the 99th percentile of drive time changes). The dashed line represents a local polynomial fit (bandwidth = 3). The fit lines are fit to all of the data, not just the bins. However, we restrict the fits to within 10 minutes since the confidence intervals in the tails are extremely large as a consequence of the limited number of observations with large drive time changes. Circles to the left of the vertical line at zero represent voters who had a polling place moved *closer* to them; circles to the right of the vertical line at zero represent voters who had a polling place moved *farther* away. Data is pooled across 2012 and 2016.

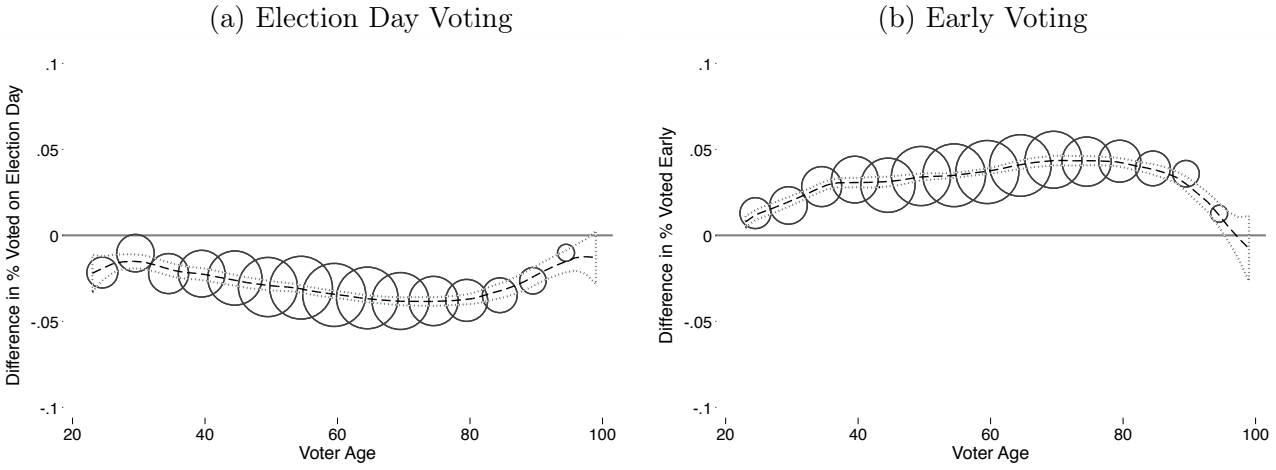
# I Differential Effects by Age

In this appendix, we examine whether the effects that we estimate in the main paper depend on the age of voters.

The expected effects of age on polling place changes are uncertain. If older voters have a longer habit of voting a specific way — e.g., at a specific Election Day polling place — then they may be more impacted by a change in the location of their polling place relative to a younger voter with weaker voting habits tied to a particular polling place or mode. However, if older voters have a stronger habit of voting *generally* regardless of mode, polling place changes may be *less* impactful because of their increased motivation to overcome the costs of polling place changes, or because they do not require a prime to remember to vote. The youngest voters may also have higher expectations of costs associated with voting (precisely because they have not developed a habit of voting by a particular mode or at all), making a polling place change less disruptive because it is already factored into expectations.

Age-related differences may also impact the relative importance of priming, search costs and travel costs in uncertain ways. Younger voters may be more attuned to technology and better able to locate new polling places than older voters, but they may also be better able to locate early voting locations when informed of a change in their polling place location by an official notification. The willingness to risk a new polling place on Election Day rather than vote early may also vary by age if employed individuals are more likely to vote early than try to find a new polling place on Election Day.

Figure I1: Relationship Between Age, Mode of Voting and Polling Place Change




*Notes:* The graphs present the relationship between age (in 2016) and the difference in turnout between those who do and do not experience a polling place change for Election Day voting (a) and early voting (b). The hollow circles are sized relative to the population in the bin (at 5 year intervals). The dashed line represents a local polynominal (bandwidth = 3) fit to all of the data, not just the bins, pooled across 2012 and 2016. The gray horizontal line denotes no difference in turnout – circles above (below) zero represent instances of higher (lower) turnout amongst those who experience a polling place change relative to those who do not.

Figure I1 plots the difference in voting behavior by age in 2016 for those who did and did not

experience a change in polling place. Voters are binned into 5 year age bins where the size of the bins corresponds to the sample size. Points above (below) zero indicate instances when voters of a given age turnout more on average when they experience a polling place relative to those who do not.

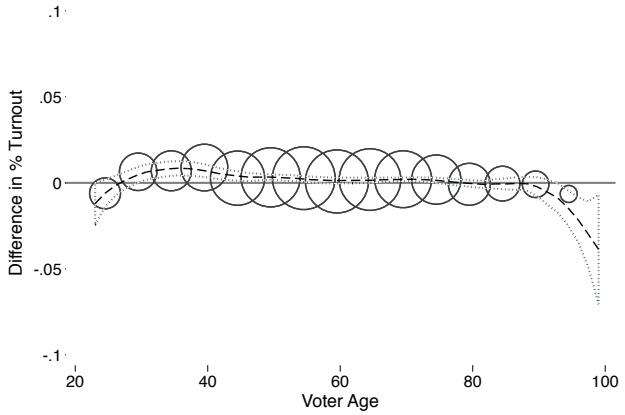
The plots in Figure I1 provide some evidence that the substitution into early voting in response to a polling place change varies by age. In particular, the youngest and oldest voters have the smallest declines in Election Day voting and the smallest increases in early voting — indicating that polling place changes are less likely to affect how they vote relative to middle-aged voters affected by a polling place change. Voters in the middle of the distribution — voters who are also most likely to be employed and invested in the community — are the voters who are most likely to substitute to early voting in response to a polling place change. That said, the net effects of these two effects completely offset and overall turnout does not vary by age in response to a polling place change (figure I2).

The fact that the youngest voters are the least likely to substitute into early voting suggests that they may be the most responsive to the informational mailers that remind them of their new polling place. They may also better able to overcome the search and confusion costs associated with finding a new polling place given technological changes (e.g., smartphones). Although the information mailers lack the emotional appeals found in much of the GOTV literature in political science (Gerber, Huber, Fang and Gooch, 2017; Gerber, Green and Larimer, 2008), the information provided may be sufficiently informative and the election competitive enough that the mailer is enough to mobilize younger voters who are less likely generally to participate (Arceneaux and Nickerson, 2009). Middle-aged voters may fear the uncertainty of a change in polling place location – especially if they are motivated to vote in the high-stakes competitive presidential election contest – and they may choose to vote early rather that risk the consequences of trying to cast an Election Day vote at a new polling place. Although our investigations are not well-positioned to identify the particular mechanisms responsible for the substitution patterns we characterize, our results do suggest that age (or age-correlated characteristics) has only a limited impact of the effects of polling place changes.

The distribution of ages in our sample of voters is presented in Figure I3.

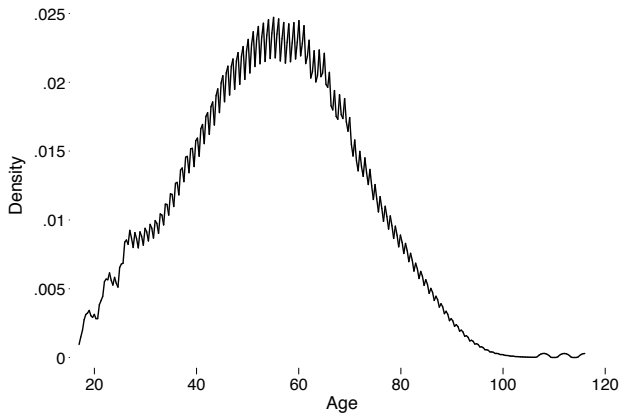
To more formally investigate the relationship between age, polling place change and voter turnout, we estimate the specifications from the main paper. We trichotomize age to make it easier to interpret differential effects. In particular, we construct an $Age < 26$ category (dummy) for the youngest voters in our sample, and an $Age > 76$ category (dummy) for the oldest voters in our sample. These categorical variables allow us to estimate intercept shifts for the group, but constrain the slope of the effect by age. The residual, or base category, is for voters between 26

Figure I2: Relationship Between Age, Overall Turnout and Polling Place Change




*Notes:* The above scatter plot presents the simple bivariate relationship between age and the difference in turnout between those who experience a polling place change and those who do not for all modes of voting (overall turnout). The hollow circles are sized relative to the population in the bin (at 5 year intervals). The dashed line represents a local polynominal fit (bandwidth = 3). The fit lines are fit to all of the data, not just the bins. Data is pooled across 2012 and 2016. The gray horizontal line is at zero; no difference in turnout. Circles above zero represent instances of higher turnout amongst those who experience a polling place change relative to those who do not, while circles below zero represent instances of lower turnout amongst those who experience a polling place change relative to those who do not.

Figure I3: Distribution of Age




*Notes:* The above plot is the distribution of voter age in our sample for all years.

and 76.

Table I1 suggests no differential effects across any of our three outcome variables by age. Similarly, when we examine differential effects in drive time in our panel in Table I3 none of the interactions are statistically significant.

When we turn to examining heterogeneity by age and by partisanship in our cross-sectional regressions there is some evidence that younger voters are differentially failing to show up at the polls in 2016 (as a consequence of Republican-controlled polling place changes), relative to 2012 when younger voters appear slightly more likely to turnout. There are no consistent statistically significant effects for older voters. Nor in Table I4 do we see consistent patterns that would indicate that voters of different ages responded differently to polling place changes in different years

Table I1: The Differential Effect of Polling Place Changes on Voter Turnout by Age

| | $Pr(VoteElecDay)$ | $Pr(VoteEarly)$ | $Pr(VoteAny)$ |
|---|---|---|---|
| | (1) | (2) | (3) |
| $\Delta PollingPlace$ ($\hat{\beta}$) | -0.015*** | 0.017*** | 0.0020** |
| | (0.0010) | (0.0011) | (0.00080) |
| $\Delta PollingPlace \cdot Age$ <26 | 0.0025 | -0.0062 | -0.0019 |
| | (0.0093) | (0.0088) | (0.0098) |
| $\Delta PollingPlace \cdot Age$ 76+ | -0.0051** | 0.0062** | 0.0018 |
| | (0.0025) | (0.0028) | (0.0025) |
| Individual FE | ✓ | ✓ | ✓ |
| Year FE | ✓ | ✓ | ✓ |
| Race x Year FE | ✓ | ✓ | ✓ |
| Year Sample | Full Panel | Full Panel | Full Panel |
| Observations | 4681792 | 4681792 | 4681792 |
| Mean of DV | 0.30 | 0.46 | 0.80 |
| SD of DV | 0.25 | 0.26 | 0.21 |

Standard errors clustered at the individual level.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
*Notes*: The table presents coefficients from estimating Equation 1 without the travel time indicators but with the addition of age dummies. The unit of analysis is the voter-election.

Table I2: The Differential Effect of Changes in Travel Time to Polling Place on Turnout by Age

| | $Pr(VoteElecDay)$ | $Pr(VoteEarly)$ | $Pr(VoteAny)$ |
|---|---|---|---|
| | (1) | (2) | (3) |
| $\Delta PollingPlace$ ($\hat{\beta}$) | -0.015*** | 0.017*** | 0.0020** |
| | (0.0010) | (0.0011) | (0.00080) |
| $\Delta PollingPlace \cdot Age$ <26 | 0.0055 | -0.0060 | -0.00060 |
| | (0.0095) | (0.0090) | (0.0100) |
| $\Delta PollingPlace \cdot Age$ 76+ | -0.0029 | 0.0033 | 0.00045 |
| | (0.0025) | (0.0029) | (0.0025) |
| $\Delta MuchCloser \cdot Age$ <26 | -0.060 | 0.026 | -0.0078 |
| | (0.043) | (0.039) | (0.046) |
| $\Delta MuchCloser \cdot Age$ <26 | -0.046 | -0.022 | -0.033 |
| | (0.045) | (0.043) | (0.046) |
| $\Delta MuchCloser \cdot Age$ 76+ | -0.0024 | 0.026** | 0.029*** |
| | (0.0093) | (0.011) | (0.0096) |
| $\Delta MuchCloser \cdot Age$ 76+ | -0.055*** | 0.055*** | 0.011 |
| | (0.010) | (0.011) | (0.010) |
| Individual FE | ✓ | ✓ | ✓ |
| Year FE | ✓ | ✓ | ✓ |
| Race x Year FE | ✓ | ✓ | ✓ |
| Year Sample | Full Panel | Full Panel | Full Panel |
| Observations | 4681792 | 4681792 | 4681792 |
| Mean of DV | 0.30 | 0.46 | 0.80 |
| SD of DV | 0.25 | 0.26 | 0.21 |

Standard errors clustered at the individual level.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
*Notes*: The table presents coefficients from estimating Equation 1 with the addition of age dummies. The unit of analysis is the voter-election.

(i.e. under different partisan regimes). Thus, consistent with our cross-sectional estimates for year in the main paper, we do find some evidence that Republican changes depressed turnout. And in this case we show that that depression was more substantial for younger voters.

Table I3: The Differential Effect of Polling Place Changes by Year by Age

| | $Pr(VoteElecDay)$ | | $Pr(VoteEarly)$ | | $Pr(VoteAny)$ | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $\Delta PollingPlace$ ($\hat{\beta}$) | -0.016*** | -0.029*** | 0.018*** | 0.025*** | 0.0025 | -0.0027 |
| | (0.0035) | (0.0062) | (0.0048) | (0.0058) | (0.0029) | (0.0021) |
| $\Delta PollingPlace{\cdot}Age$ <26 | -0.00079 | 0.019** | -0.025** | -0.015* | -0.017 | 0.0031 |
| | (0.013) | (0.0073) | (0.012) | (0.0077) | (0.020) | (0.0099) |
| $\Delta PollingPlace{\cdot}Age$ 76+ | -0.0036 | 0.0060 | 0.011*** | -0.0090** | 0.0031 | -0.0052 |
| | (0.0031) | (0.0046) | (0.0037) | (0.0043) | (0.0032) | (0.0045) |
| *Age <26* | -0.091*** | -0.030*** | -0.19*** | -0.15*** | -0.26*** | -0.17*** |
| | (0.0042) | (0.0033) | (0.0098) | (0.0033) | (0.011) | (0.0039) |
| *Age 76+* | -0.053*** | -0.028*** | 0.017*** | -0.17*** | 0.0035 | -0.19*** |
| | (0.0030) | (0.0050) | (0.0021) | (0.0046) | (0.0032) | (0.0043) |
| County FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Individual Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year Sample | 2012 | 2016 | 2012 | 2016 | 2012 | 2016 |
| Observations | 2340293 | 2340293 | 2340293 | 2340293 | 2340293 | 2340293 |
| Mean of DV | 0.33 | 0.26 | 0.47 | 0.45 | 0.84 | 0.75 |
| SD of DV | 0.47 | 0.44 | 0.50 | 0.50 | 0.36 | 0.43 |

Standard errors clustered at the individual level.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
*Notes*: The table presents coefficients from estimating Equation 1 without the travel time indicators and with the addition of age dummies. The unit of analysis is the voter-election.

Table I4: The Differential Effect of Changes in Travel Time to Polling Places by Year by Age

| | $Pr(VoteElecDay)$ | | $Pr(VoteEarly)$ | | $Pr(VoteAny)$ | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $\Delta PollingPlace$ ($\hat{\beta}$) | -0.016*** | -0.029*** | 0.018*** | 0.025*** | 0.0025 | -0.0027 |
| | (0.0035) | (0.0062) | (0.0048) | (0.0059) | (0.0029) | (0.0021) |
| $\Delta PollingPlace{\cdot}Age$ <26 | 0.0021 | 0.019** | -0.025** | -0.014* | -0.016 | 0.0023 |
| | (0.014) | (0.0081) | (0.012) | (0.0075) | (0.021) | (0.011) |
| $\Delta PollingPlace{\cdot}Age$ 76+ | -0.0029 | 0.0077* | 0.011*** | -0.011** | 0.0035 | -0.0055 |
| | (0.0034) | (0.0044) | (0.0039) | (0.0050) | (0.0032) | (0.0044) |
| *Age <26* | -0.091*** | -0.030*** | -0.19*** | -0.15*** | -0.26*** | -0.17*** |
| | (0.0042) | (0.0033) | (0.0098) | (0.0033) | (0.011) | (0.0039) |
| *Age 76+* | -0.053*** | -0.028*** | 0.017*** | -0.17*** | 0.0035 | -0.19*** |
| | (0.0030) | (0.0050) | (0.0021) | (0.0046) | (0.0032) | (0.0043) |
| $\Delta MuchCloser{\cdot}Age$ <26 | -0.074 | 0.037 | -0.00037 | -0.0029 | -0.065 | 0.051 |
| | (0.047) | (0.030) | (0.031) | (0.040) | (0.062) | (0.044) |
| $\Delta MuchCloser{\cdot}Age$ <26 | 0.0064 | -0.022 | 0.0093 | -0.027 | 0.042 | -0.013 |
| | (0.031) | (0.041) | (0.031) | (0.023) | (0.036) | (0.050) |
| $\Delta MuchCloser{\cdot}Age$ 76+ | 0.0044 | 0.025 | -0.0060 | -0.00076 | -0.0035 | 0.032*** |
| | (0.015) | (0.016) | (0.012) | (0.016) | (0.0065) | (0.011) |
| $\Delta MuchCloser{\cdot}Age$ 76+ | -0.018 | -0.060*** | 0.0038 | 0.043** | -0.0047 | -0.023** |
| | (0.011) | (0.017) | (0.012) | (0.017) | (0.0075) | (0.0096) |
| County FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Individual Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year Sample | 2012 | 2016 | 2012 | 2016 | 2012 | 2016 |
| Observations | 2340293 | 2340293 | 2340293 | 2340293 | 2340293 | 2340293 |
| Mean of DV | 0.33 | 0.26 | 0.47 | 0.45 | 0.84 | 0.75 |
| SD of DV | 0.47 | 0.44 | 0.50 | 0.50 | 0.36 | 0.43 |

Standard errors clustered at the individual level.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
*Notes*: The table presents coefficients from estimating Equation 1 with the addition of age dummies. The unit of analysis is the voter-election.

# J Additional Results for Early Voting Availability

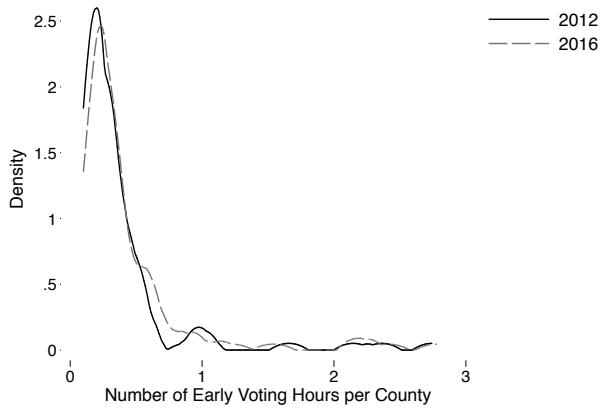
In this appendix, we present additional results related to the availability of early voting.

First, Figure J1 presents the distribution of early voting availability (total hours in plot (a), locations in plot (b), weekend hours specifically in plot (c), and evening hours specifically in plot (d)) by year. Overall, despite frequent discussions about partisan manipulation of early voting, there is little difference in availability between 2012 (Democrats) and 2016 (Republicans). If anything, Republicans added a few early voting locations in 2016.

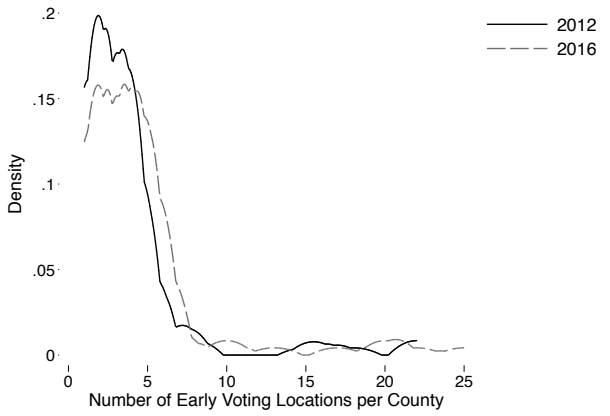
Of course, we note that locations might be moved within counties to favor co-partisans without changing the overall distribution. Because of that, Figure J2 presents scatterplots that relate early voting availability in 2012 to 2016. We note that there does not appear to be substantial changes by year. Instead, most counties are clustered at the 45 degree line of no change.

Figure J1: Distribution of Early Voting Availability by Year

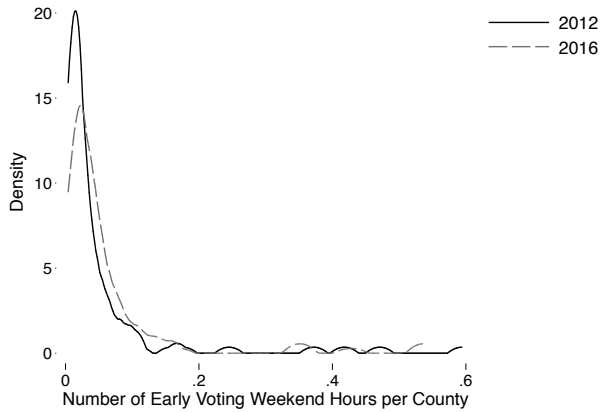
(a) Total Early Voting Hours



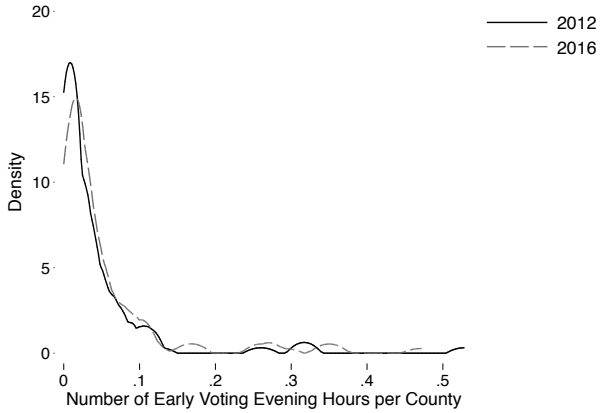

(b) Early Voting Locations




(c) Weekend Early Voting Hours




(d) Evening Early Voting Hours




*Notes:* The above plots present the availability of early voting hours by year (plot (a)) and early voting location by year (plot(b)). Solid lines are for 2012 (Democrats), and dashed lines are for 2016 (Republicans). Early voting hours are measured in thousands.

Given that evening and weekend hours are particularly important for early voting, we re-present

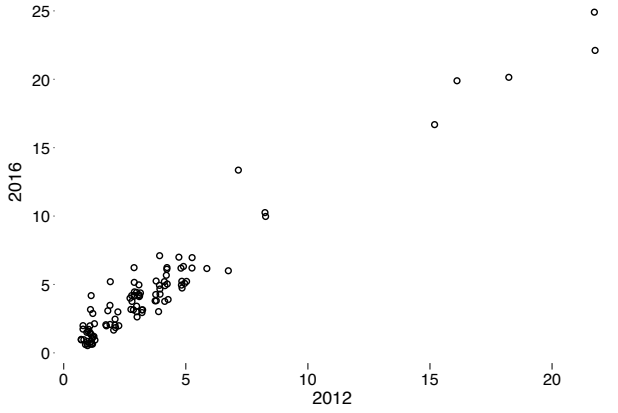
the Figure 7 from the main paper, but examine the relationship between early voting and early voting weekend hours (plot (a)) and early voting evening hours (plot (b)). (For a thorough description of how the plot is constructed, please see the description in the main body of the paper.) We see little evidence that more evening early voting hours nor more weekend early voting hours are associated with higher rates of early voting when voters experience a polling place change.

Because neither the scatterplots presented in the paper, nor the plots here show any evidence of a statistically significant relationship between early voting availability and the probability of early voting, we forgo formally estimating the relationship.

Figure J2: Scatterplot of the Relationship Between 2012 and 2016 Early Voting Availability

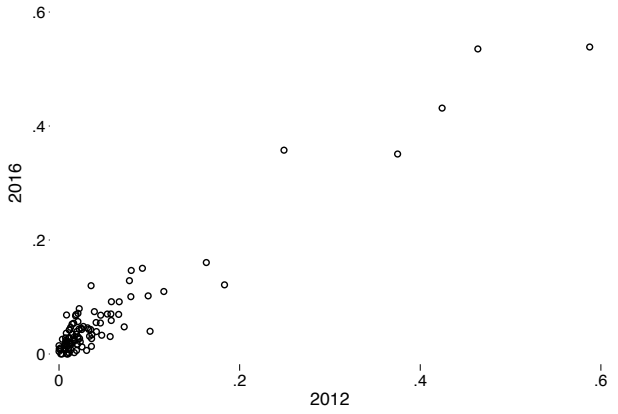
(a) Total Early Voting Hours


(b) Early Voting Locations




(c) Weekend Early Voting Hours

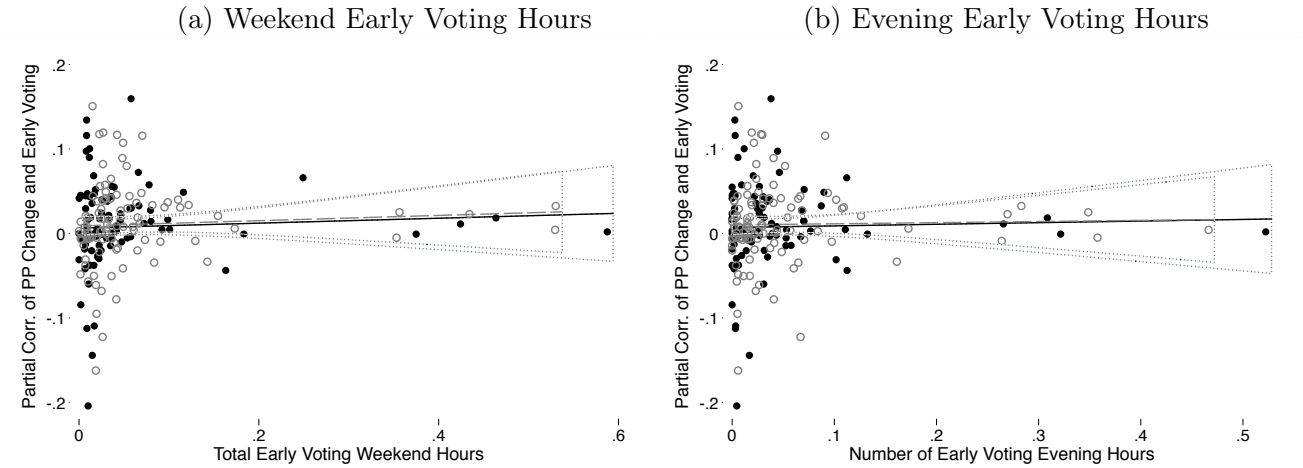

(d) Evening Early Voting Hours




*Notes:* The above plots present scatterplots relating the availability of early voting in 2012 to 2016. Early voting hours are measured in thousands.

Lastly, we investigate whether normalizing our measure of early voting availability affect our conclusions about whether early voting availability moderates the effect of a polling place change. One early voting site in a populous county might have less of an effect than one early voting site

Figure J3: Relationship Between Weekend and Evening Early Voting Hours and Early Voting by Year

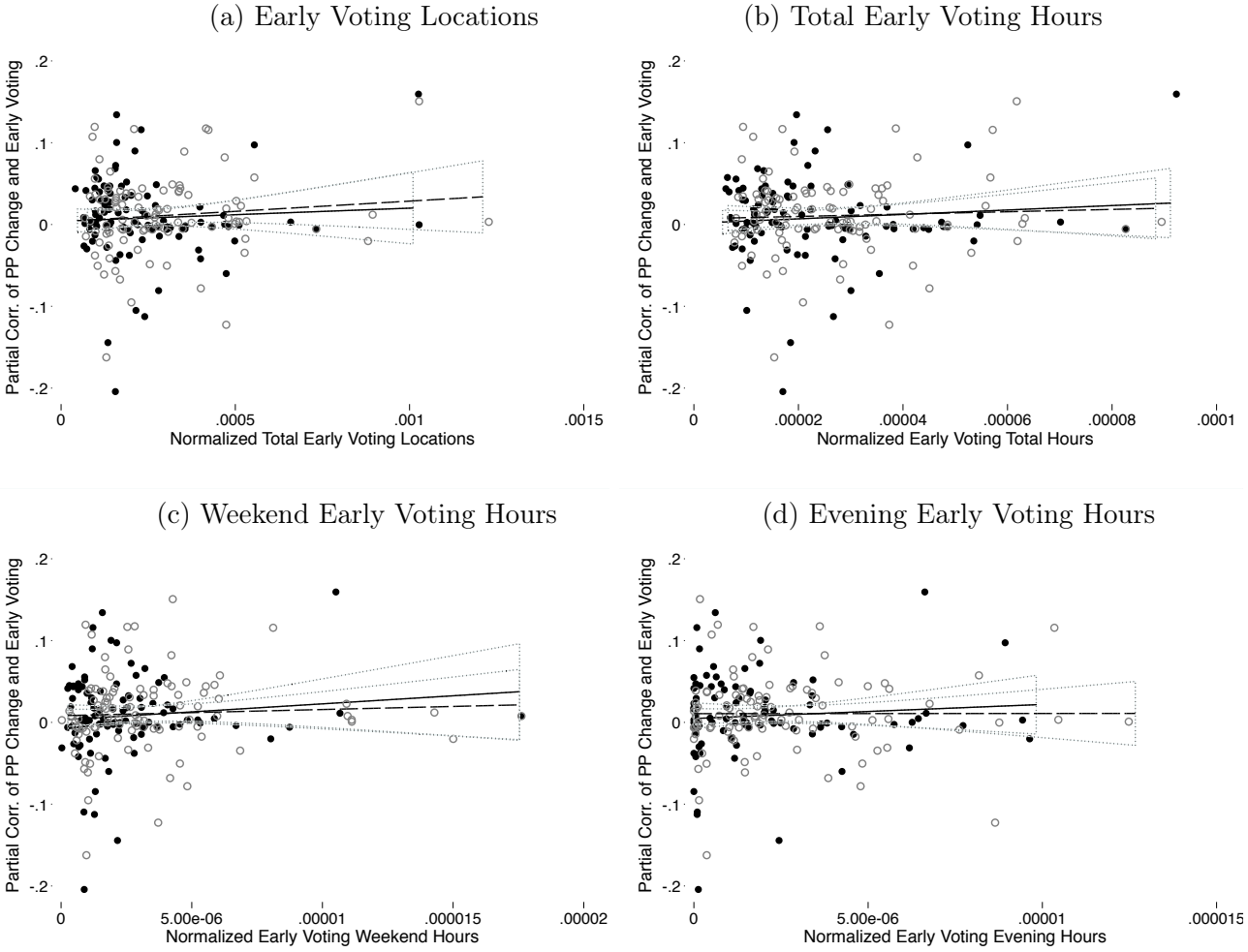



*Notes:* Plot (a) represents the relationship between the number of weekend early voting hours and the average effect of a polling place change on early voting by county. Plot (b) represents the relationship between the number of evening early voting hours and the average effect of a polling place change on early voting by county. Early voting hours are measured in thousands. The average affect of a polling place on early voting by county is $\beta$ obtained by estimating 1 separately for each county using the outcome of $Pr(VoteEarly)$. Points in the plots are jittered slightly to aid visualization. Linear fits are plotted with 95% confidence intervals.

in a less populous county. The same is true of hours. Voters might face longer lines, for instance, if there are few locations or few hours relative to the population size. We present the scatter plots in Figure 7 from the main paper, along with the plots from Figure J3 in Figure J4 below. The measures of early voting availability below are normalized by the number of registered eligible voters (from our sample) in the county (i.e. hours per voter, etc.).

Although we observe more variation in the normalized versions of our early voting variables, we do not observe a different pattern in the relationship between early voting availability and early voting conditional on having a polling place change. From these plots and those presented in the main paper, we cannot but conclude that we cannot detect a statistically significant conditioning effect of early voting availability on early voting turnout. In the discussion section of the main paper, we consider why that might be the case.

Figure J4: Relationship Between Early Voting and Normalized Early Voting Availability by Year




*Notes:* Plot (a) represents the relationship between the number of early voting locations normalized by the number of registered voters and the average effect of a polling place change on early voting by county. Plot (b) represents the relationship between the total number of early voting hours normalized by the number of registered voters and the average effect of a polling place change on early voting by county. Plot (c) represents the relationship between the number of weekend early voting hours normalized by the number of registered voters and the average effect of a polling place change on early voting by county. Plot (d) represents the relationship between the number of evening early voting hours normalized by the number of registered voters and the average effect of a polling place change on early voting by county. Early voting hours are measured in thousands. The average affect of a polling place on early voting by county is $\beta$ obtained by estimating 1 separately for each county using the outcome of $Pr(VoteEarly)$. Points in the plots are jittered slightly to aid visualization. Linear fits are plotted with 95% confidence intervals. We exclude Tyrrell county from the top two plots because it is an extreme outlier given its small population.

# K Heterogeneity of Polling Place Change Effects by Income

In this appendix, we examine whether there is heterogeneity in the effects we estimate in the main paper by the median household income of the census block group. Our expectation is that voters with lower incomes will have fewer resources to contend with the disruption of a polling place change, and therefore turnout less than voters with higher incomes. Lacking data on income at the individual level, we use income data at the census block group level. Although not ideal, this is a very small geographic unit.

Table K1 estimates average effects in our panel by mode of voting. We find that voters with higher incomes (as measured by the median in the census block group), are more likely to vote on Election Day when their polling place has changed, relative to a voter with lower income. There is no statistically significant effect for early voting over overall turnout. These results indicate that while there might be a slight differential response in terms of Election Day voting, there is no difference in overall turnout effects that differ by voter resources.

Table K1: The Differential Effect of Polling Place Changes on Voter Turnout by Income

| | $Pr(VoteElecDay)$ | $Pr(VoteEarly)$ | $Pr(VoteAny)$ |
|---|---|---|---|
| | (1) | (2) | (3) |
| $\Delta PollingPlace$ ($\hat{\beta}$) | -0.031*** | 0.030*** | 0.0010 |
| | (0.0023) | (0.0024) | (0.0019) |
| $\Delta PollingPlace{\cdot}Income$ | 0.0028*** | -0.0022*** | 0.00023 |
| | (0.00040) | (0.00042) | (0.00031) |
| Individual FE | ✓ | ✓ | ✓ |
| Year FE | ✓ | ✓ | ✓ |
| Race x Year FE | ✓ | ✓ | ✓ |
| Year Sample | Full Panel | Full Panel | Full Panel |
| Observations | 4680586 | 4680586 | 4680586 |
| Mean of DV | 0.30 | 0.46 | 0.80 |
| SD of DV | 0.25 | 0.26 | 0.21 |

Standard errors clustered at the individual level.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
*Notes*: The table presents coefficients from estimating Equation 1 without the travel time indicators. The unit of analysis is the voter-election.

When we turn to examining drive time, we see that there are some differential effects (Table K2). Those with higher incomes are more likely to turn out on Election Day when their polling place is moved much further away than those with lower incomes who have their polling place moved no more than 5 minutes closer or further from them (column 1). This results in higher turnout for those with higher incomes who have their polling place moved further away. Again, this is suggestive that resources allow voters to continue voting on Election Day and continue to turnout in general.

The results in Table K3 indicate little evidence that income allowed voters to differentially overcome the costs of polling place changes by year. The interaction between polling place change and income is very small and insignificant in all models. Although we don't estimate the interacted

Table K2: The Differential Effect of Changes in Travel Time to Polling Place on Turnout by Income

| | $Pr(VoteElecDay)$ | $Pr(VoteEarly)$ | $Pr(VoteAny)$ |
|---|---|---|---|
| | (1) | (2) | (3) |
| $\Delta PollingPlace$ ($\hat{\beta}$) | -0.027*** | 0.027*** | 0.0016 |
| | (0.0023) | (0.0024) | (0.0019) |
| $\Delta PollingPlace{\cdot}Income$ | 0.0024*** | -0.0019*** | 0.000081 |
| | (0.00040) | (0.00043) | (0.00032) |
| $\Delta MuchCloser$ ($\hat{\lambda}$) | -0.020** | 0.010 | -0.0084 |
| | (0.0097) | (0.010) | (0.0076) |
| $\Delta MuchFurther$ ($\hat{\delta}$) | -0.075*** | 0.058*** | -0.018** |
| | (0.010) | (0.011) | (0.0080) |
| $\Delta MuchCloser{\cdot}Income$ | 0.0051*** | -0.0023 | 0.0025** |
| | (0.0015) | (0.0016) | (0.0011) |
| $\Delta MuchFurther{\cdot}Income$ | 0.0059*** | -0.0022 | 0.0041*** |
| | (0.0018) | (0.0019) | (0.0014) |
| Individual FE | ✓ | ✓ | ✓ |
| Year FE | ✓ | ✓ | ✓ |
| Race x Year FE | ✓ | ✓ | ✓ |
| Year Sample | Full Panel | Full Panel | Full Panel |
| Observations | 4680586 | 4680586 | 4680586 |
| Mean of DV | 0.30 | 0.46 | 0.80 |
| SD of DV | 0.25 | 0.26 | 0.21 |

Standard errors clustered at the individual level.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
*Notes*: The table presents coefficients from estimating Equation 1. The unit of analysis is the voter-election.

model to determine if the coefficient on the interaction is statistically *different* between 2012 and 2016, even if it were, the magnitudes would be exceedingly small.

The results from Table K4 are similar and suggest that partisan changes between years were moderated by the differential ability of higher relative to lower income voters to overcome costs associated with drive time to their new polling place.

Table K3: The Differential Effect of Polling Place Changes by Year by Income

| | $Pr(VoteElecDay)$ | | $Pr(VoteEarly)$ | | $Pr(VoteAny)$ | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $\Delta PollingPlace$ ($\hat{\beta}$) | -0.022*** | -0.034*** | 0.023** | 0.029*** | 0.0027 | -0.0070 |
| | (0.0085) | (0.0086) | (0.011) | (0.0094) | (0.0051) | (0.0048) |
| $\Delta PollingPlace{\cdot}Income$ | 0.0011 | 0.0012 | -0.00088 | -0.0010 | -0.00013 | 0.00062 |
| | (0.0015) | (0.00079) | (0.0023) | (0.0013) | (0.00089) | (0.00093) |
| $Income$ | -0.0022*** | -0.0032** | 0.0085*** | 0.0065*** | 0.0077*** | 0.0039*** |
| | (0.00062) | (0.0015) | (0.00084) | (0.0015) | (0.00053) | (0.00043) |
| County FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Individual Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year Sample | 2012 | 2016 | 2012 | 2016 | 2012 | 2016 |
| Observations | 2340293 | 2340293 | 2340293 | 2340293 | 2340293 | 2340293 |
| Mean of DV | 0.33 | 0.26 | 0.47 | 0.45 | 0.84 | 0.75 |
| SD of DV | 0.47 | 0.44 | 0.50 | 0.50 | 0.36 | 0.43 |

Standard errors clustered at the individual level.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
*Notes*: The table presents coefficients from estimating Equation 1 without the travel time indicators. The unit of analysis is the voter-election.

Table K4: The Differential Effect of Changes in Travel Time to Polling Places by Year by Income

| | $Pr(VoteElecDay)$ | | $Pr(VoteEarly)$ | | $Pr(VoteAny)$ | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $\Delta PollingPlace$ ($\hat{\beta}$) | -0.013 | -0.018* | -0.012 | -0.00044 | -0.029*** | -0.022*** |
| | (0.0091) | (0.0097) | (0.011) | (0.012) | (0.0056) | (0.0049) |
| $\Delta PollingPlace{\cdot}Income$ | -0.00061 | -0.0017 | 0.0056** | 0.0044** | 0.0056*** | 0.0036*** |
| | (0.0016) | (0.0012) | (0.0025) | (0.0021) | (0.00097) | (0.00098) |
| $\Delta MuchCloser$ ($\hat{\lambda}$) | 0.0091 | 0.0044 | -0.0022 | -0.0081 | 0.0028 | -0.00036 |
| | (0.021) | (0.019) | (0.020) | (0.014) | (0.012) | (0.0082) |
| $\Delta MuchFurther$ ($\hat{\delta}$) | -0.0060 | -0.029 | 0.012 | 0.018 | 0.0070 | -0.0075 |
| | (0.016) | (0.033) | (0.016) | (0.038) | (0.011) | (0.012) |
| $\Delta MuchCloser{\cdot}Income$ | 0.0011 | 0.0036 | -0.0014 | -0.0042** | -0.00017 | -0.00071 |
| | (0.0034) | (0.0022) | (0.0040) | (0.0018) | (0.0014) | (0.0012) |
| $\Delta MuchFurther{\cdot}Income$ | -0.00042 | -0.0036 | -0.000035 | 0.0047 | -0.00021 | 0.00025 |
| | (0.0021) | (0.0050) | (0.0027) | (0.0055) | (0.0018) | (0.0018) |
| County FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Individual Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year Sample | 2012 | 2016 | 2012 | 2016 | 2012 | 2016 |
| Observations | 2340293 | 2340293 | 2340293 | 2340293 | 2340293 | 2340293 |
| Mean of DV | 0.33 | 0.26 | 0.47 | 0.45 | 0.84 | 0.75 |
| SD of DV | 0.47 | 0.44 | 0.50 | 0.50 | 0.36 | 0.43 |

Standard errors clustered at the individual level.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
*Notes*: The table presents coefficients from estimating equation 1. The unit of analysis is the voter-election.

## L Details of the Geocoding Procedure

Data on 2008 polling places come from the NCSBE data archives – snapshot date: April 3rd, 2008 – data on 2012 polling places come from the Data Director of the North Carolina Democratic Party, and data on 2016 polling places were collected from the mid-2017 Internet Archives image of the NCSBE Polling Place Search website.

Shapefiles of precinct boundaries were collected from the NCSBE website for 2012 and 2016 – snapshot dates: October 4th, 2016 for 2016 election; September 1st, 2012 for 2012 – and from the NCSBE 2008 precinct boundary shapefile submitted to the 2011 redistricting database to associate polling places and precincts. In some cases, poor record keeping combined with the fact that not all polling places are located with the borders of the precinct they serve makes it impossible to ascertain the precinct served by a given polling places. When a precinct's polling place cannot be ascertained with certainty, we drop that precinct from the analysis. This generates a sample of 3,362,808 voters with a geolocated polling place, or 79.1% of voters with accurate residence geocodes.

# A Partisan-Controlled Polling Place Changes

Polling place changes made between 2008 and 2012 were made by Democrat-selected local election administrators, while polling place changes made between 2012 and 2016 were made by Republican-selected administrators. In the main manuscript, we suggest why there is limited theoretical expectation that polling place changes made under different partisan regimes should impact turnout. However, we might expect the intentions to differ by these partisan administrators, the voters targeted to differ, their resources to overcome the imposed costs to differ, and therefore the state-wide turnout effects to differ as well. If so, the average effects we identify may obscure important differences in the effects of the polling place changes made by different regimes of partisan-appointed election administrators.

Even if such partisan motivations exist, however, the ability of such changes to differentially affect turnout is theoretically unclear. If, for example, search costs, confusion, and habit disruption are more consequential than travel costs, than *any* change in polling place location may produce similar turnout effects. Put differently, attempts to increase turnout by decreasing travel costs by moving or adding polling places may be undermined by the the resulting search costs, confusion, and habit disruption produced by such changes.

To estimate the impact of polling place changes under different election administration regimes, we separately estimate the impact of polling place changes made between 2008 and 2012 on 2012 turnout and the effects of changes made between 2012 and 2016 on 2016 turnout. We estimate these cross-sectional regressions using a comprehensive set of voter-level covariates and county fixed effects to leverage within-county variation and control for stable county-level features such as population, density, and urban/rural composition that may affect turnout decisions.

Because of our balanced panel, we analyze the same voters in each time period — an important consideration that helps eliminate any confounding effects caused by *compositional* changes in the electorate over time. Even so, comparing the impact of polling place changes between the two time periods is unfortunately and unavoidably confounded by the potential impact of other temporal differences that may be correlated with polling place changes. It is unclear what these time-varying and highly correlated factors might be, but we acknowledge that factors other than partisanship may affects the effect of the polling place changes we examine.

To estimate the effects of Democrat-led and Republican-led polling place changes we estimate the following equation separately for 2012 and 2016:

$$\begin{aligned} Pr(Vote_{i,c}) = \eta_c + \beta \Delta PollingPlace_{i,c} + \delta \Delta MuchFurther_{i,c} + \lambda \Delta MuchCloser_{i,c} \\ + \boldsymbol{\psi Vote}_{i,c,t-1} + \boldsymbol{\kappa X}_{i,c} + \epsilon_{i,c} \end{aligned} \tag{1}$$

where $\eta_c$ are county-level fixed effects, and $\boldsymbol{X}$ is a vector of covariates that we use to account for individual characteristics affecting the decision to turnout, including race, partisan identification,

Table M1: The Differential Effects of Polling Place Changes by Year

| | $Pr(VoteElecDay)$ | | $Pr(VoteEarly)$ | | $Pr(VoteAny)$ | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $\Delta PollingPlace$ ($\hat{\beta}$) | -0.016*** | -0.028*** | 0.019*** | 0.023*** | 0.0020 | -0.0037** |
| | (0.0035) | (0.0059) | (0.0045) | (0.0055) | (0.0024) | (0.0018) |
| County FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Individual Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year Sample | 2012 | 2016 | 2012 | 2016 | 2012 | 2016 |
| Observations | 2340293 | 2340293 | 2340293 | 2340293 | 2340293 | 2340293 |
| Mean of DV | 0.33 | 0.26 | 0.47 | 0.45 | 0.84 | 0.75 |
| SD of DV | 0.47 | 0.44 | 0.50 | 0.50 | 0.36 | 0.43 |

Standard errors clustered at the individual level.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

*Notes*: The table presents coefficients from estimating Equation 1 without the drive time indicators. The unit of analysis is the voter-election. See Table C2 in Appendix C for the full set of coefficient estimates.

age, age squared, gender, and median household income at the 2010 census block.[1] The remaining variables are measured as in equation 1. We cluster our robust standard errors at the county level to account for common shocks to individuals within the same county and the heteroskedasticity of the linear probability model we employ. As before, we estimate equation 1 for each mode turnout, and with and without the travel time indicators.

Table M1 presents the results of the effect of a polling place change unconditioned by changing travel time. As in our panel results (Table 2), both Democrat and Republican-led polling place changes decrease Election Day turnout, although the decline is much larger for Republican-led changes. Comparing the effects of Democrats (column 1) and Republicans (column 2) reveals a decline of -1.6 percentage points under Democrats and -2.8 percentage points under Republicans.

Consistent with our previous panel findings, the decrease in Election Day vote that we identify is accompanied by a similarly sized increase in early voting across *both* years (columns 3 and 4) — 1.9 percentage points under Democrats and 2.3 percentage points under Republicans. However, the Election Day and early voting effects are not completely offsetting for Republican-led changes. Columns 5 and 6 reveal that although voters substitute from Election Day voting to early voting occurs in response to both partisan changes, the Republican-controlled changes were substantial enough to reduce *overall* voter turnout by -0.4 percentage points (column 6). Estimating a model that interacts the effect of polling place change with year (as opposed to splitting the sample) allows us to reject the null hypothesis that the effect of a polling place change in Election Day voting and on overall turnout is the same between the two years. We fail to reject that null hypothesis for early voting. If Democrat-led changes were attempting to increase Election Day turnout by moving polling place locations closer to likely supporters, our results indicate that these attempts were unsuccessful.

[1] Appendix A presents source information, measurement details and summary statistics for the included covariates.

Table M2: The Differential Effects of Changes in Travel Time to Polling Places by Year

| | $Pr(VoteElecDay)$ | | $Pr(VoteEarly)$ | | $Pr(VoteAny)$ | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $\Delta MuchCloser$ ($\hat{\lambda}$) | 0.017 | 0.026*** | -0.013 | -0.033*** | 0.00016 | -0.0039 |
| | (0.015) | (0.0087) | (0.014) | (0.0093) | (0.0048) | (0.0050) |
| $\Delta MuchFurther$ ($\hat{\delta}$) | -0.0077 | -0.045*** | 0.0095 | 0.039** | 0.0044 | -0.0073 |
| | (0.0075) | (0.016) | (0.0075) | (0.019) | (0.0048) | (0.0045) |
| $\Delta PollingPlace$ ($\hat{\beta}$) | -0.017*** | -0.027*** | 0.019*** | 0.023*** | 0.0018 | -0.0033* |
| | (0.0034) | (0.0055) | (0.0045) | (0.0051) | (0.0025) | (0.0018) |
| County FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Individual Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year Sample | 2012 | 2016 | 2012 | 2016 | 2012 | 2016 |
| Observations | 2340293 | 2340293 | 2340293 | 2340293 | 2340293 | 2340293 |
| Mean of DV | 0.33 | 0.26 | 0.47 | 0.45 | 0.84 | 0.75 |
| SD of DV | 0.47 | 0.44 | 0.50 | 0.50 | 0.36 | 0.43 |

Standard errors clustered at the individual level.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

*Notes*: The table presents coefficients from estimating Equation 1. The unit of analysis is the voter-election. See Table C3 in Appendix C for the full set of coefficient estimates.

Because search costs, confusion, and habit disruption arguably occur whenever a polling place change occurs, we might expect the largest differences in partisan effects to occur in terms of the effects of travel costs. (Table G2 in Appendix G already suggests that there are not different overall average effects on turnout by party registration.) In particular, Democratic supporters tend to be concentrated amongst racial minorities and less resourced voters who arguably benefit more from a polling place being moved closer to them than rural Republican voters who live in more expansive precincts — if so, the effects of travel costs may vary depending on the party in control of the process of selecting polling places.

Table M2 presents the results from estimating equation 1 with indicators for travel time. We find some evidence that the impact of travel costs depends on the party in control of the process. Election Day voting increases when polling places are moved much closer to voters, and declines when they're moved much further away (relative to small changes in travel time), but only for Republican-led changes in 2016 (column 2). But even though the differential effects ($\hat{\lambda}$) are distinguishable from zero, the net effect of a polling place being moved much closer on Election Day voting, even in 2016, (i.e., $\hat{\beta} + \hat{\lambda}$) is still nearly exactly zero.

The results for early voting reverse this pattern and again show evidence of substitution. But again, this substitution is only evident for Republican-led changes (column 4). Voters moved much closer to their polling place in 2016 are less likely to vote early, while those moved much further away are more likely to do so. However, even given differential substitution, we find no differential net turnout effects conditional on drive time between the two partisan regimes (column 5 and 6). Although the fact that the effect of a polling place change of any kind ($\hat{\beta}$) is distinguishable from zero for Republican-led changes in 2016 (column 6) reveals that the polling place changes

introduced by Republicans slightly decreased overall turnout. Estimating an interacted model to assess whether the coefficients are the same across years further reveals that only in the case of the probability of early voting and a polling place being moved much further is there statistically significant difference in the effects under partisan regimes — voters are slightly more likely to turnout early when their polling place is moved much further in 2016 (by Republicans) than in 2012 (by Democrats).