Polling Place Location and the Costs of Voting

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Abstract

From 2014 to 2018, the number of polling places in the US doubled while national turnout grew 15.5 p.p. . However, surprisingly little is known about the location of polling places across the United States and their effect on turnout. Current estimates of the effect of a mile increase in distance to the polling location on turnout range from large estimates of 14.5 p.p. reduction in turnout to a null effect. The question of how this cost of voting affects the poor, the young, and the traditionally disenfranchised remains. We acquire voter registration, voting history data, and polling locations for over 15 million voters from Pennsylvania and Georgia to fill this gap. We find small effects of a voter's distance to the polling place on turnout, but considerable heterogeneity. A one mile increase in distance to polling place decreases turnout by 0.3 to 0.6 p.p. on average, but by up to 11 p.p. among those who take public transport to work. The availability to vote by mail helps to reduce reduction in turnout caused by distance to polling place.

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1 Introduction

The 2020 election has set the public's eyes on the influence of electoral design on turnout. Questions on mail-in voting requirements, length of lines for voting, and opening and closing of polling stations, are part of daily news. The clear main thread that links all these discussions refers to the costs of voting. Specifically, how they may influence the election. One particular cost of voting that has been mentioned frequently refers to the distance to the polling location.

One might argue that the distance to the polls during a pandemic is irrelevant given the rise in mail-in-ballots. However, for the 2020 general election [1]34 million voters weren't freely able to switch into absentee voting. Clearly, these voters care very much where their polling places are located. Even in a global pandemic where social distancing and practices of voting by mail are recommended everywhere, we observe states reluctant to adopt them. So, the question of where to vote remains. Plus, it's likely that as the situation improves, the relevance of the question grows as well as we find evidence that while voters earlier in the year voted by mail, now they choose to go back to the polls.

When looking at the literature, we found widely different answers explaining what happens to voter participation as we increase a mile in distance. Amos et al. (2017), Clinton et al. (2019), and Yoder (2018) all find virtually null results, Brady and McNulty (2011) found that a mile increase in distance to the polling place reduces turnout by 4 percentage points. Finally, Cantoni (2020) shows effects that range from 8 to 14.5 percentage points decrease in voting turnout. As we said, widely different answers. An asterisk when comparing all these results however is that methodologies and settings also vary widely. These settings range from parts of LA in Brady and McNulty (2011) to observing a single county in Amos et al. (2017), investigating 9 municipalities in Cantoni (2020) until looking at the whole state of North Carolina in both Clinton et al. (2019), and Yoder (2018).

To put these estimates in perspective, let's look at the 2016 election results. out of the 50 States in the 2016 election, 22 had a margin of victory below the highest effect of this change. From these 22 states, Maine, Nevada, Minnesota, New Hampshire, Michigan, Pennsylvania, Wisconsin, and Florida were all decided by vote margins of less than 3 percentage points. But when discussing the effects on voter participation, clear concerns on voter representation and disenfranchisement come to mind. Which naturally raises the question: So does distance to the polling place affects everyone the same? The literature currently finds that areas with a higher percentage of minorities and registered democrats will respond more to changes in distance, while areas with

[1] https://www.washingtonpost.com/graphics/2020/politics/vote-by-mail-states/

a higher percentage of car ownership will respond less to changes in distance. As the literature stands, our initial concerns on unequal responses to an increase in the distance to the polling location seem validated. But how does the effect of the cost of distance to the polling place compare and interact with other electoral design policies' effects?

One could ask the question: As we transition away from at-polls voting to mail-in ballot options, who does it impact? Following the exercise of increasing a mile of distance to the polling place for all of the US, we can compare the possible negative effects at turnout with the effects the literature finds from electoral design changes. When discussing Early Voting Reform. Kaplan and Yuan (2020) find that an additional day of early voting raises turnout by 0.22 percentage points. Considering Cantoni's largest estimate, If we were to make up for the mile increase in a whole state, we would have to compensate that by having Early Voting Polls remaining open for 2 months and 6 days. Moving on to voting by mail. Thompson et al. (2020) show in a new paper that the impact of implementing state-wide voting by mail strategy can raise turnout by about 2.1 percentage points. This estimate is roughly half of the estimated cost in increasing a mile of distance to the polling location found by Brady and McNulty.

Moreover, polling place locations themselves are the result of a political process. However, very little is known about polling place locations across the United States, leaving many open questions. Who lives close, and who lives far from their polling place? How does this affect turnout and electoral outcomes?

These findings underscore the need for a more comprehensive view of polling places in the United States. It could be that the results reflect heterogeneous effects, given that each study uses a different data source. Moreover, we know that there are large location and election-specific effects on voting behavior (Cantoni and Pons (2019)). However, there is also no overlap in methodologies nor settings used across studies, making comparisons difficult.

To help fill this gap, we collect information about the distance to polling place and turnout for over 15 million voters in two large and diverse states, Pennsylvania and Georgia. To estimate the effect of distance to polling place on voting behavior, we use the border discontinuity approach of Cantoni (2020). We choose this methodology because the identifying assumptions are plausible and because replicating Cantoni's methods also allows us to directly compare results. We use a sample of voters who live within 0.05 miles (about 160 feet or 80 meters) of a voting precinct border. We select voting precinct borders that do not overlap with other important boundaries like for school districts, towns, or legislative districts. These voting precinct borders play no role other than determining where people vote on election day. Any factors possibly correlated with turnout should be continuous across the border, whereas the distance

to a polling place is discontinuous at the border.

We find that, on average, a one mile increase in the distance to polling place decreases the likelihood of voting at polls by 0.9 to 2.7 percentage points (p.p.), increases the likelihood of mail-in voting take up by 0.2 to 2.4 p.p and decreases total likelihood of voting from null results to 0.7 p.p. . However, the average effect masks significant heterogeneity. The analysis of the two large states allows us to explore heterogeneous effects according to demographic characteristics, economic variables, party affiliation, and mobility patterns. We find that means of transportation is a particularly important interacting variable. In areas where a large share of the population relies on public transportation to commute to work, a one mile increase in distance to polling place decreases turnout by up to 14.9%. This is on par with the lower bound of Cantoni's estimates from urban areas in Massachusetts and Minnesota. In general, we find that the large differences in average estimates in our study compared to Cantoni (2020) and others is likely driven by contextual factors and heterogeneous effects.

Our results suggest that the importance of polling place locations for voter participation will vary depending on the constituency affected. If the affected population largely owns cars and drives to work, then a one mile increase in distance to a polling place will have no meaningful effect. On the other hand, a small change to a polling place in an area where people walk to work can have effects on turnout so large that we may expect changes to electoral outcomes. While media attention on election administration and concerns over voter suppression have increased in recent years (CITE ONE OR TWO NEWS ARTICLES IN FOOTNOTE), these results suggest that some of this attention may have been misplaced. Rather than focusing on polling place closures in rural areas, small changes to polling place locations in urban areas are more likely to affect voter participation.

Pennsylvania and Georgia also offer two comparison points for electoral design. Pennsylvania requires an excuse for a registered voter to vote by mail (absentee voting) and offers no early voting, while Georgia does not require any excuse for voting by mail and does have early voting. In Georgia, we find that no-excuse mail-in voting is likely important for mitigating the cost of travelling to a polling place. A longer distance to the polling place makes a voter in Georgia less likely to vote at polls and more likely to vote by mail. In Pennsylvania, by contrast, very few voters appear to be able to substitute to mail-in voting when they are deterred by the distance to the polling place. The overall effect of distance to polling place on turnout is larger in Pennsylvania than in Georgia.

Over the last few years, questions regarding the impact of closing and or moving polling stations on turnout has received quite the attention in the media [2]. In that

[2]We find an article written by Prof. Alderman from University of Tenessee and Prof. Inwood from Penn

article we find the following quote: " Unlike past poll taxes, the modern poll tax isn't paid in money, but in time – how long it takes a person to get to a polling place, and, once there, how long it takes for them to actually cast their ballot." Closing polling locations is associated with an effort to enforce voter suppression, paired with other news such as voter registration list purging [3]. In this paper we look into these claims in detail by comparing blocks with higher percentage of voters of different demographic groups and observing the responses in turnout to changes in the distance to their polling location.

2 Institutional Background

We study the 2019 primary and general elections in Pennsylvania and Georgia. From 2012 to 2018, the number of registered voters in Pennsylvania increased from 8.5 to 8.7 million voters while in Georgia it has grown from 6 to 6.9 million voters (CITATION NEEDED: WHERE DID THESE NUMBERS COME FROM?). In many states, including Pennsylvania and Georgia, 2018 was a year of historically high turnout for a midterm election (58% and 53 % of registered voters cast ballots compared to 43% and 37% in 2014 respectively). However, turnout was much lower for the primary elections (12%) for Pennsylvania.

Pennsylvania and Georgia differ in a number of election policies. In Pennsylvania, voting happens only on election day; there is no early voting. In contrast, Georgia offers the possibility of early voting up to three-weeks earlier than election day. In Pennsylvania, only people who cannot vote in person may use an absentee ballot provided they offer an excuse (prior to 2020). In contrast, Georgia offers no-excuse absentee ballots, where any voter may request it online and get it delivered. Although we do not have the ability to assess these policies with only two states, they are potentially important for understanding any substantive differences in our findings for Pennsylvania and Georgia.

Both states are divided into voting precincts. An accessible location within each precinct, typically a school, library, police station, or church, is chosen as the polling place location by local election commissions. Election Day Polls are open from 7am to 8pm in Pennsylvania, while Election Day Polls are open from 7am to 7pm in Georgia. If a registered voter has voted before in Pennsylvania, they do not need to bring identification. On the other hand, Georgia has more strict voter ID laws that require Georgia residents to show photo identification when voting in person.

State discussing the unequal nature of the costs of voting.

[3]Many news outlets reported on voter registration lists purging efforts. Reports account that the share of voters purged where significantly different by different demographic groups such as race.

3 Data Collection

From the Pennsylvania Department of State and Georgia Secretary of State, we obtain voter registration files, which include a unique voter identification, address, and voting precinct for each registered voter within the state. Through the voter ID, this information can be merged with voter history files, which records whether or not each registered voter voted in each election as well as their method of voting (at polls or absentee).

We obtained the locations of polling places from Georgia's Secretary of State's website and from Pennsylvania's state-run polling place look-up website.[4] Next, we geocode the polling place locations and registered voter addresses using the Address Locator provided by ArcGIS.[5]

It is important to note that we only observe addresses for registered voters. At the individual level, we are only able to estimate the effect of distance to polling place on voting, conditional on an individual already being registered to vote. Since distance to polling place may also affect the likelihood that an individual registers, this introduces selection bias. In order to estimate the effect of distance to polling place on the likelihood that an eligible voter votes, we aggregate to the Census block level. Blocks are the smallest statistical area used by the Census, corresponding to roughly the size of a city block. At the block level, we have information on the voting age population, a proxy for voting eligibility, from the 2010 Census. The main outcome of interest is turnout: the total votes per voting age population. Cantoni similarly aggregates to the block-level, noting that the benefit of avoiding selection bias comes at the cost of less precise measurement of distance.[6] Here, the loss in precision is not as important, since we have a large number of blocks. Additionally, blocks are small so that there is little variation in distance to polling place within a block (the average standard deviation of distance to polling place within a block is 0.1 miles or 160 meters). Finally, the distance to polling place from a registered voter's household is highly correlated with the distance to polling place from the voter's block's centroid (the coefficient of correlation equals 0.99).

To aggregate the data, we assign each registered voter to the census block that

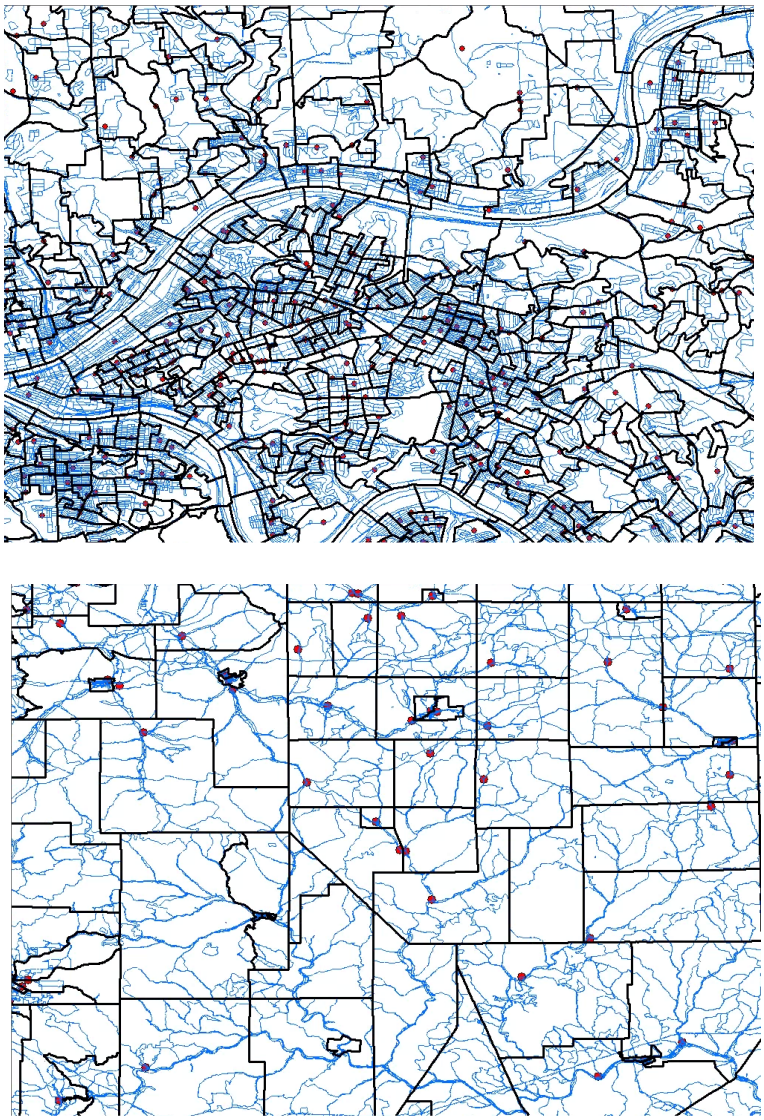
[4]Accessed at `https://www.pavoterservices.pa.gov/Pages/PollingPlaceInfo.aspx` and `https://sos.ga.gov/index.php/elections`

[5]This address locator uses interpolation to locate addresses, meaning it has the latitude and longitude of the endpoints of every street. It then interpolates the latitude and longitude of the specific address based on the street endpoints.

[6]Cantoni also pairs this analysis with analysis at the parcel-level. A parcel is a unit of land, typically containing one household. We don't have parcel data for important parts of Pennsylvania (e.g., Philadelphia) nor Georgia. The benefit of Parcel-level analysis is that the measurement of distance is more precise. The drawback is that there is no data on the voting age population, so parcels are assumed to have roughly the same voting age population.

contains their geolocated address. The distance to polling place for each individual is measured as the Euclidian distance in miles between the voter's address and the polling place address. Distance to polling place at the block level is measured as the average distance to polling place for all registered voters in the block. DO WE NEED THESE MAPS? MAYBE DROP? To give a sense of the the geography and scale of blocks relative to precincts, Figure 1 shows voting precincts, census blocks, and polling places in an urban and rural area.

Figure 1: Maps of Precincts, Census Blocks, and Polling Places



Note: The upper map is in Pittsburgh (population 302,407) and the lower map is in Jefferson County (population 43,804). Bold black lines are precinct boundaries. Thin blue lines are Census block boundaries. Red dots are Poling Place Locations. Both maps are roughly 75 square miles (194 square kilometers).

Finally, the block-level data is merged with census data on race, ethnicity, gender and age using block identifiers. Other covariates of interest that may be correlated to both turnout and distance to polling place include include car ownership, mode of travel to work and commute time, income, and unemployment. These variables are available at the block-group-level and tract-level from the American Community Survey (2006-2010 five-year estimates). We assign the block-group or tract average to each block within the statistical area. Variable definitions, units of observations, and data sources are described in more detail in Appendix A.1.

4 Empirical Framework

4.1 Identification Strategy

We estimate the effect of the distance to polling place on the number of votes at polling places, by absentee ballots. The identification strategy exploits discontinuities at the borders of voting precincts (called Voting Tabulation Districts by the Census). Intuitively, two neighbors who live on opposite sides of a voting precinct border should be comparable in dimensions related to voting, but differ in where they go to vote.

For this approach, we focus on two specifications. Our preferred specification is looking at individuals that are very close to the voting precinct border. Each individual is assigned to the nearest voting precinct border and is only included in the sample if it is within 0.05 miles (161 feet or 81 meters) of the voting precinct border and if it's blocks centroid is within 0.95 miles away from that same border. We restrict on borders who are close to the precinct lines in order to avoid drawing inferences from individuals on blocks who are spread far away from the precinct lines. Doing so, avoids introducing block levels characteristics would be then more likely to be unbalanced in our sample. Additionally, we restrict attention to segments of voting precinct borders that to do not overlap with other important boundaries that would cause residents to sort on either side of the border. Voting precinct boundaries included in our sample do not overlap with school district boundaries, town or county boundaries, nor boundaries for state or federal congressional districts. Figures 2 and 3 show the voting precinct border segments that are included and excluded in the samples for Georgia and Pennsylvania.

On our second specification we use blocks that are very close to a voting precinct border. Each block is assigned to the nearest voting precinct border and is only included in the sample if it is within 0.05 miles (161 feet or 81 meters) of the voting precinct border. Additionally, we use the same segment restrictions as in our individual level sample.

To limit noise due to imprecise geocoding, we use only blocks where the total votes

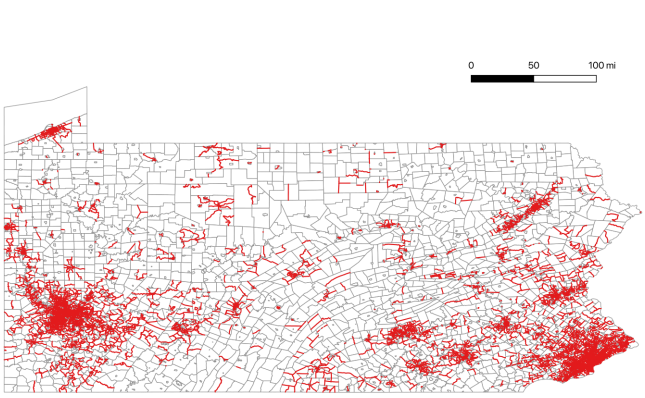


Figure 2: Pennsylvania

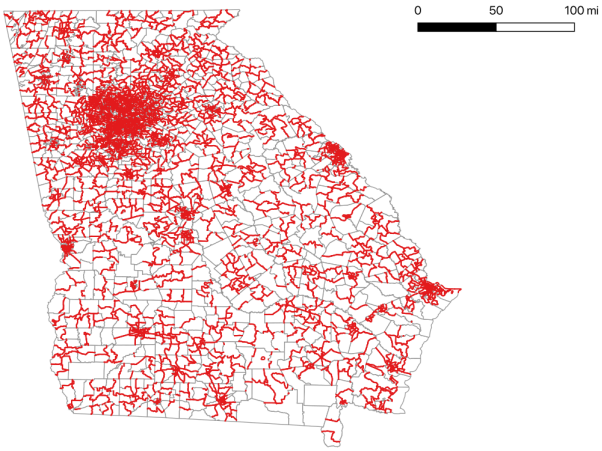


Figure 3: Georgia

are less than the 2010 voting age population (as in Cantoni) and where the average distance to polling place is less than 10 miles. Finally, we discard borders where the nearest blocks include both rural and urban areas since these blocks are unlikely to satisfy identifying assumptions. This selection leaves us with 118855 blocks and 18472 borders in Pennsylvania and 97,622 blocks and 5582 borders in Georgia. On average, each border has 13 blocks in Pennsylvania and 17 blocks in Georgia.

The main empirical specification includes border fixed effects, where each voter i belongs to a unique border-segment $s(i)$:

$$vote_i = \delta_{s(i)} + \beta dist_i + \rho \mathcal{P}_i + \iota \mathcal{X}_{b(i)} + \epsilon_i \tag{1.A}$$

Our second empirical specification includes border fixed effects, where each block b belongs to a unique border-segment $s(b)$:

$$turnout_b = \delta_{s(b)} + \beta dist_b + \iota \mathcal{X}_b + \epsilon_b \tag{1.B}$$

The identifying assumption in both of our specifications is that all unobservable factors affecting voting behavior are uncorrelated with distance across and along border lines conditional on observables.

Next, we introduce controls for latitude and longitude of block i, interacted with county-fixed effects $c(i)$. This less parsimonious model means that the effect is identified using only the discontinuities at the border. The identifying assumption is that any variables that affect turnout, apart from distance, are continuous at all points of the precinct border. Because voters belonging to blocks on either side of the border are assigned to different polling places, there is a discontinuity in $dist_i$ at the border.

$$vote_i = \delta_{s(i)} + \beta dist_i + \alpha_{c(i)} lat_{b(i)} + \gamma_{c(i)} lon_{b(i)} + \rho \mathcal{P}_i + \iota \mathcal{X}_{b(i)} + \epsilon_i \tag{2.A}$$

$$turnout_b = \delta_{s(b)} + \beta dist_b + \alpha_{c(b)} lat_b + \gamma_{c(b)} lon_b + \iota \mathcal{X}_b + \epsilon_b \tag{2.B}$$

4.2 Summary Statistics and Balance test

There are 7014 polling locations in Pennsylvania and 2340 in Georgia. Voters on average live 0.93 miles away of their polling location in Pennsylvania and 1.66 in Georgia. For 2018 general election, likelihood of voting in Pennsylvania is 59 p.p. while in Georgia is 55.55 p.p. Likelihood of voting by main in Georgia is much higher than in Pennsylvania. In Georgia 29.76 percent of those registered to vote choose vote by mail whereas only 2.23 does the same in Pennsylvania. This discrepancy could be due to the difference in the requirement between these two states in soliciting an excuse to vote by mail as mentioned before. Within each state, the shares of voters registered democrat and republican are similar. However we find differences between states in terms of levels of registration. This difference lies in the information provided by the voter registration files, where Pennsylvania offers party last registered while Georgia only offers party last voted. In terms of other demographic characteristics, we find that Georgia and Pennsylvania are similar except with respect of the share of black voters where Georgia's is larger (30% vs 11%).

Comparing our sample with that of the whole state we find some differences. There is a large proportion of our sample that is found in urban areas (98-99%) vs (75-80%). However, we count with 3521 segments (4%) in rural areas in Pennsylvania and 632 (21%) in Georgia in order to explore differences between urban and rural areas. Our sample also contains more black registered voters, and poorer voters.

To see how distance to polling place varies across each state, we regress distance to polling place on political, demographic, and socioeconomic variables in Appendix 6. In both states, polling places tend to be farther away from Republicans, White individuals, and individuals without a high school diploma. After including border fixed effects and county-latitude/longitude controls, we find no statistically significantly correlated to distance. In Georgia, we find that those registered democrats face slightly shorter distances (significant at the 90% confidence level) but this vanishes when controlling for lat long interactions. We also find other statistically significant correlations (at the 90-95% confidence level) in Georgia such as population, VAP, poverty rate and time to work 0-5min. These variables are block (population and VAP), and tract level (poverty rate and time to work) variables. The absence of correlations in the

demographic individual level variables allows us to move on to the estimation of our specifications.

At the individual level we separately estimate equations 1.A and 2.A with additional covariates (democrat indicator, republican indicator, population, voting age population, percent black, percent hispanic, median household income, percent without a high school diploma, percent walk to work, travel time to work is less than 5 minutes, and travel time to work is more than 60 minutes). At the block level we separately estimate equations 1.B and 2.B with additional covariates (percent Voting Age Population, percent Democrat, percent Republican, percent Black, percent Hispanic, Median Household Income, percent without a High School Diploma, percent Walk to Work, Travel Time to Work is less than 5 minutes, and Travel Time to Work is more than 60 minutes).

5 The Effect of Distance to Polling Place on Turnout

We begin with a discussion on the average effect of distance to polling place on likelihood of voting in Pennsylvania (Table 21) and in Georgia (Table 2). We report the coefficient on distance to polling place for several outcomes: likelihood of voting at polling places, by absentee ballot, and overall likelihood of voting for both primary and general elections in 2018. In each table, Panel A reports coefficients from estimating equation 1.A without controls, Panel B reports coefficients from estimating equation 1.A with controls, and Panel C reports coefficients from estimating equation (**??**), with both additional controls and county-specific latitude and longitude controls.

In Panel A of each table, we observe small but statistically significant effects of distance to polling place on likelihood of voting at polls. A one mile increase in distance to polling place is associated with a decrease in at poll voting of 0.93 percentage points (p.p.) and 0.32 p.p. in at poll voting for both primary and general elections respectively in Pennsylvania. In Georgia, the estimated effect on at poll voting is larger. A one mile increase in distance to polling place is associated with a 0.48 p.p. decrease in at poll likelihood of voting in the primary election and a 1.04 p.p. decrease in the general election.

The larger effects on at poll voting in Georgia, however, are compensated for in part by larger positive effects of distance to polling place on absentee voting. In Pennsylvania, effects range from 0.002 in the primary election to 0.1 during the general election. In contrast, Georgia's estimates are 57.18 to 14.32 times larger when looking at general and primary absentee likelihood of voting. In Georgia, an increase of a mile of distance to polling place causes absentee likelihood of voting to increase by 0.16

Table 1: The effect of distance to polling place on likelihood of voting: Pennsylvania

	Panel A: Border FE					
	Primary Election			General Election		
	At Poll	Absentee	Total	At Poll	Absentee	Total
Distance (miles)	-0.9302***	-0.0028	-0.9330***	-0.3217***	0.1055***	-0.2162***
	(0.0543)	(0.0075)	(0.0556)	(0.0668)	(0.0158)	(0.0692)
N	8147813	8147813	8147813	8181846	8181846	8181846
y variable mean	18.43	0.38	18.81	56.87	2.24	59.11
R^2	0.026	0.006	0.027	0.038	0.010	0.044
	Panel B: Border FE with Controls					
	Primary Election			General Election		
	At Poll	Absentee	Total	At Poll	Absentee	Total
Distance (miles)	-1.0996***	0.0522	-1.0474***	-0.8643***	0.1610**	-0.7033**
	(0.2696)	(0.0581)	(0.2718)	(0.3326)	(0.0759)	(0.3359)
N	1342562	1342562	1342562	1347194	1347194	1347194
y variable mean	15.88	0.29	16.17	50.86	1.45	52.31
R^2	0.074	0.024	0.075	0.076	0.026	0.083
	Panel C: Border FE with Controls and County-Lat./Lon.					
	Primary Election			General Election		
	At Poll	Absentee	Total	At Poll	Absentee	Total
Distance (miles)	-1.0863***	0.0641	-1.0222***	-0.8586***	0.1714**	-0.6873**
	(0.2656)	(0.0582)	(0.2678)	(0.3155)	(0.0765)	(0.3171)
N	1342562	1342562	1342562	1347194	1347194	1347194
y variable mean	15.88	0.29	16.17	50.86	1.45	52.31
R^2	0.074	0.024	0.075	0.077	0.026	0.084

Note: Distance to polling place measured in miles. Likelihood of voting is measured as a dummy (separately for votes cast at polling places, through absentee ballots, and total). All regressions include Border Fixed Effects (Border FE). County-Lat./Lon. refers to latitude and longitude controls, interacted with county fixed effects. The additional controls in Panels B and C are: democrat indicator, republican indicator, population, voting age population, percent black, percent hispanic, median household income, percent without a high school diploma, percent that walk to work, and indicators for whether travel time to work is less than 5 minutes or greater than 60 minutes. Standard errors clustered at the border level are reported in parentheses.

Table 2: The effect of distance to polling place on likelihood of voting: Georgia

	Panel A: Border FE					
	Primary Election			General Election		
	At Poll	Absentee	Total	At Poll	Absentee	Total
Distance (miles)	-0.4840***	0.1601***	-0.3240***	-1.0349***	1.5110***	0.4761***
	(0.0412)	(0.0283)	(0.0516)	(0.0601)	(0.0765)	(0.0850)
N	6943121	6943121	6943121	6943121	6943121	6943121
y variable mean	12.31	4.60	16.91	25.81	29.76	55.57
R^2	0.017	0.016	0.023	0.027	0.032	0.029
	Panel B: Border FE with Controls					
	Primary Election			General Election		
	At Poll	Absentee	Total	At Poll	Absentee	Total
Distance (miles)	-0.8063***	0.7284***	-0.0779*	-2.3962***	2.0280***	-0.3682
	(0.1766)	(0.1777)	(0.0416)	(0.3900)	(0.4344)	(0.5043)
N	214881	214881	214881	214881	214881	214881
y variable mean	11.39	3.89	15.28	24.38	25.85	50.23
R^2	0.704	0.244	0.977	0.056	0.165	0.202
	Panel C: Border FE with Controls and County-Lat./Lon.					
	Primary Election			General Election		
	At Poll	Absentee	Total	At Poll	Absentee	Total
Distance (miles)	-0.9012***	0.8007***	-0.1005**	-2.6335***	2.2720***	-0.3615
	(0.1756)	(0.1747)	(0.0441)	(0.4106)	(0.4611)	(0.5363)
N	214881	214881	214881	214881	214881	214881
y variable mean	11.39	3.89	15.28	24.38	25.85	50.23
R^2	0.705	0.246	0.977	0.058	0.167	0.204

Note: Distance to polling place measured in miles. Turnout is measured as the number of votes per voting-age population (separately for votes cast at polling places, through absentee ballots, and total). All regressions include Border Fixed Effects (Border FE). County-Lat./Lon. refers to latitude and longitude controls, interacted with county fixed effects. The additional controls in Panels B and C are: democrat indicator, republican indicator, population, voting age population, percent black, percent hispanic, median household income, percent without a high school diploma, percent that walk to work, and indicators for whether travel time to work is less than 5 minutes or greater than 60 minutes. Standard errors clustered at the border level are reported in parentheses.

percentage points during the primary election and 1.5 percentage points during the general election. It is important to remember that Pennsylvania and Georgia differ in their requirements for voting by mail in the 2018 election. Pennsylvania requires voters who request absentee ballots to provide an excuse while Georgia does not. In Georgia, the estimates are consistent with a larger share of voters substituting to mail-in voting when at poll voting becomes too inconvenient, compared to Pennsylvania. Still, there is an overall negative effect of distance to polling place on likelihood of voting, even in Georgia.

Pennsylvania's response in total likelihood of voting ranges from 0.93 in the primary election to 0.32 percentage points (p.p.) in the general election. These effects are roughly the same as that of at polls (0.93 and 0.22 respectively). This may be due to a deterrence effect in absentee voting system that requires an excuse to obtain an absentee ballot. In Georgia we observe similar small but statistically significant effects in total likelihood of voting ranging from 0.32 for the primary election and 0.47 for the general election.

In Panel B of Tables 21 and 2, controlling for observable characteristics yields coefficients that are slightly larger in magnitude. In Pennsylvania, we see a decrease in the coefficients (more pronounced for the general election). In Georgia, we notice a decrease in the coefficient for at polls primary and general election, an increase in absentee voting and a no longer statistically significant effect total likelihood of voting. The addition of latitude and longitude of block centroids interacted with county-fixed effects in Panel C does little to point estimates compared to in Panel B. The estimates in Panel C suggest that the overall effect of a mile increase in distance to polling place on likelihood of voting in a general election is a 0.62 p.p. reduction in Pennsylvania with no change in Georgia. In a primary election, the estimates suggest a 0.1 p.p. reduction in Georgia and a 1.02 p.p. reduction in Pennsylvania.

Across all specifications, the estimates of the average effect of distance to polling place on overall turnout in Georgia and Pennsylvania are an order of magnitude smaller than those estimated in Cantoni (2020). In order to reconcile these differences, we construct samples of blocks in GA and PA that are more similar to the urban areas studied in Cantoni. Cantoni analyzes the Boston, Massachussets (MA) and Minneapolis, Minnesota (MN) areas. Compared to the statewide PA and GA samples, the census blocks in these areas are higher in population, income, and education. We pool all census-block level data and estimate a propensity score for the likelihood of being in the MA or MN based on the covariates used in Cantoni (population, income, race, car ownership, and education). Then, we construct matched samples in GA and PA by selecting the 1,600 census blocks with the highest propensity score in each state. The resulting Matched Samples are approximately the same size as the sample from Cantoni. We use

the same border fixed effects estimating equation, measure of distance, and covariates, for comparability. However, because Cantoni studies elections in 2016 and earlier, we compare midterm general elections in both samples (2018 in GA and PA, 2014 in MA and MN).

Table 3 reports the fixed effects estimate of the effect of distance to polling place on turnout for full state samples (columns 1 and 2), for matched samples (columns 3 and 4) and for the urban areas in MA and MN (columns 5 and 6). Point estimates in the matched samples in GA and PA are roughly three times as large as average effect estimated in the full samples. Although the point estimates are still smaller than those estimated in Cantoni, the standard errors are larger such that we can not reject the point estimate from the MA sample based in estimates in either the GA or PA matched samples. Overall, this analysis suggests that the effects of distance on turnout are specific to both the setting and electoral design, such that estimates based on small areas are unlikely to generalize to larger areas.

Table 3: Comparing state samples to urban areas: Border fixed effects regressions

	State Samples		Matched Samples		Urban Areas	
	(1) GA	(2) PA	(3) GA	(4) PA	(5) MA	(6) MN
Distance to polling place (mi)	-0.007***	-0.006***	-0.023	-0.019	-0.047*	-0.098
	(0.001)	(0.001)	(0.022)	(0.035)	(0.027)	(0.066)
N	84171	165082	1510	1424	1404	290
y variable mean	0.540	0.476	0.729	0.597	0.379	0.397
R^2	0.251	0.294	0.394	0.514	0.589	0.639

Note: The Urban Areas sample is provided by Cantoni (2020) and include data from the Boston, Massachusetts area (MA) and Minneapolis, Minnesota area (MN). The dependent variable is turnout in the 2018 midterm election for GA and PA, and the dependent variable is turnout in the 2014 midterm election for MA and MN. All regressions include border fixed effects and covariates. Standard errors clustered at the segment level are reported in parentheses.

6 Heterogeneous Effects

The average effects may be covering underlying differences in the responses by different demographic groups, economic groups, and political groups. Understanding the different sensitivities to distance to polling places among various groups is important from an electoral design standpoint as it can lead to uneven representation in the electoral process. Hence, we turn to observe how different groups respond to changes in distance

to polling place. We estimate equation 1.A for each sub-sample of a set of mutually exclusive categories.

We consider separately categorical variables that summarize demographic characteristics like age, education, gender, and race at the individual level. At the block level, we run the following specification:

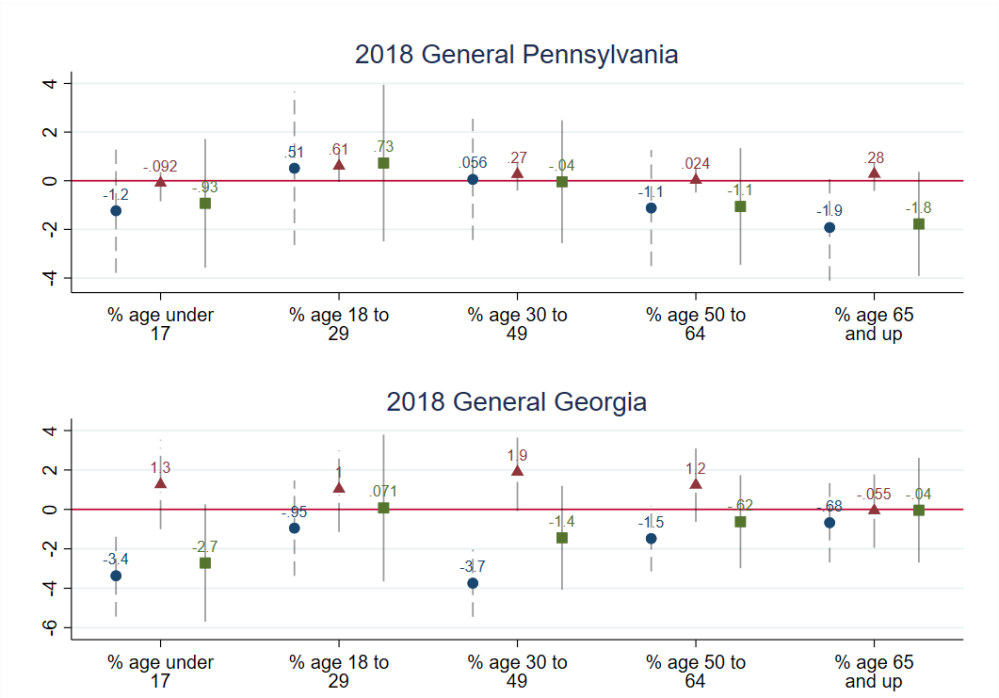
$$turnout_i = \delta_{b(i)} + \gamma\, \mathcal{C}_i + \beta\, \mathcal{C}_i \cdot dist_i + \iota\, \mathcal{X}_i + \epsilon_i \tag{1}$$

Where $\mathcal{C}_i$ refers to a set categorical variables and $\mathcal{X}_i$ is a set of covariates. We look at blocks with a higher percentage of voters at different income groups. We continue to look at effects by political affiliation and finally, we focus on how effects by mobility patterns such as mode of transport to work and length of time to work. We've omitted the main effects from the graphs in the text but included the full tables in the appendix. The graphs showcase the vector of β estimates for turnout at polls, absentee turnout and total turnout. For each interaction effect, we report estimated coefficients in figures for Pennsylvania and Georgia general elections. Tables and results for primary elections are reported in Appendix C.

6.1 Demographic Characteristics: Age

In Figure 15 we report the effects of an increase in the distance to the polling location by age group. We expected to observe higher effects by blocks who had higher percentage of their population in the 18 to 29 age category. This prior was formed from the well documented low levels of turnout by this age group. However we were surprised to find that blocks where the majority of their population is in the 50 to 64 age category consistently seem to react changes in distance. As with our main results, we find smaller effects in Pennsylvania than in Georgia.

Figure 4: The effect of distance to polling place on turnout: by Age



Note: Standard errors clustered at the boundary level.The additional controls are: percent Voting Age Population, percent Democrat, percent Republican, percent Black, percent Hispanic, Median Household Income, percent without a High School Diploma, percent Walk to Work, Travel Time to Work is less than 5 minutes, and Travel Time to Work is more than 60 minutes.

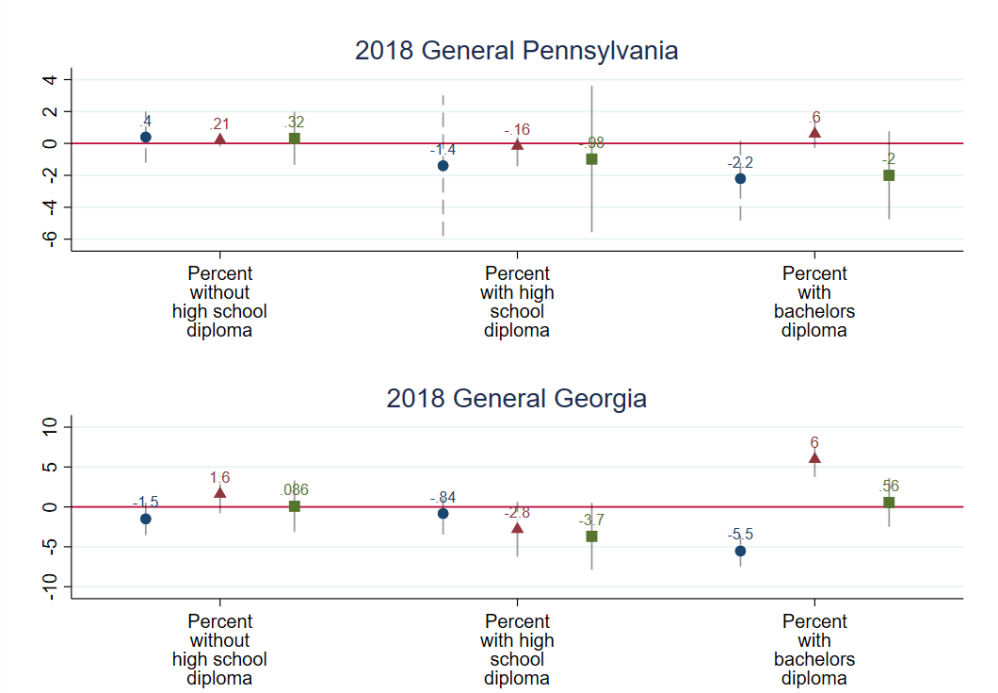
We observe that in Pennsylvania, only blocks who have a higher percentage of their voters in the age categories 50 to 64 and 65 and up react to changes in distance. Still, the decrease in 1.1 p.p. in at polls turnout and total turnout on blocks who have a higher percentage of voters in the 65 and up age category are just about significant at the 90th percentile confidence level. The effect of a mile increase in distance in blocks with a higher percentage of voters in the 50 to 64 age category is a decrease of 1.4 p.p. in at polls turnout and and increase in absentee voting by .5p.p. with a net effect of a percentage point decrease in total turnout.

Georgia, in contrast, shows significant effects for nearly all categories with the exception of those blocks where there are higher rates of citizens between the ages of 18 to 29 years old. Interestingly, blocks with higher percentage of voters in the age categories of 18-29 and 30-49 show slightly higher point estimates in absentee voting than blocks with higher percentage of voters in the 50 to 64 age category. However, we can't say these are statistically significantly different. In terms of total turnout, we find that only blocks with higher percentage of voters in the 50 to 64 age category see a decrease in total turnout of about 1.7 p.p..

6.2 Demographic Characteristics: Educational Attainment

We turn to analyze how blocks with higher percentage of citizens at distinct levels of educational attainment react to changes in distance to their polling location in figure 5. Engrossing, we find small significant effects of a change in distance to the polling location for blocks with higher percentage of voters in any education level in Georgia at polls but not effect in total turnout. In Pennsylvania, we only find significant and negative effects on turnout at polls for blocks with a higher percentage of voters with at least a bachelors degree and a drop in total turnout by 1.6 p.p. at a 90th percentile confidence level.

Figure 5: The effect of distance to polling place on turnout: by Educational Attainment



Note: Standard errors clustered at the boundary level.The additional controls are: percent Voting Age Population, percent Democrat, percent Republican, percent Black, percent Hispanic, Median Household Income, percent without a High School Diploma, percent Walk to Work, Travel Time to Work is less than 5 minutes, and Travel Time to Work is more than 60 minutes.

Outside of blocks with higher percentage of voters with at least a bachelors degree, we don't find other significant effects in Pennsylvania. In Georgia however, we observe that blocks where a higher number of voters didn't graduate high school show a decrease at polls turnout by 0.8 p.p and a decrease in at polls turnout by 0.7 p.p. with no significant effects in total turnout.

We find that blocks where more of their voters have at least a bachelors degree, when faced with a higher cost of voting at polls, mostly may decide to vote absentee or

not voting. The differences in the effects at polls and absentee voting could come from lower costs of switching into absentee voting. Perhaps blocks where more of their voters haven't finished college, faced higher difficulties coping with the intricate procedures of filing the forms to obtain absentee ballots, or are less informed on how to engage with the process.

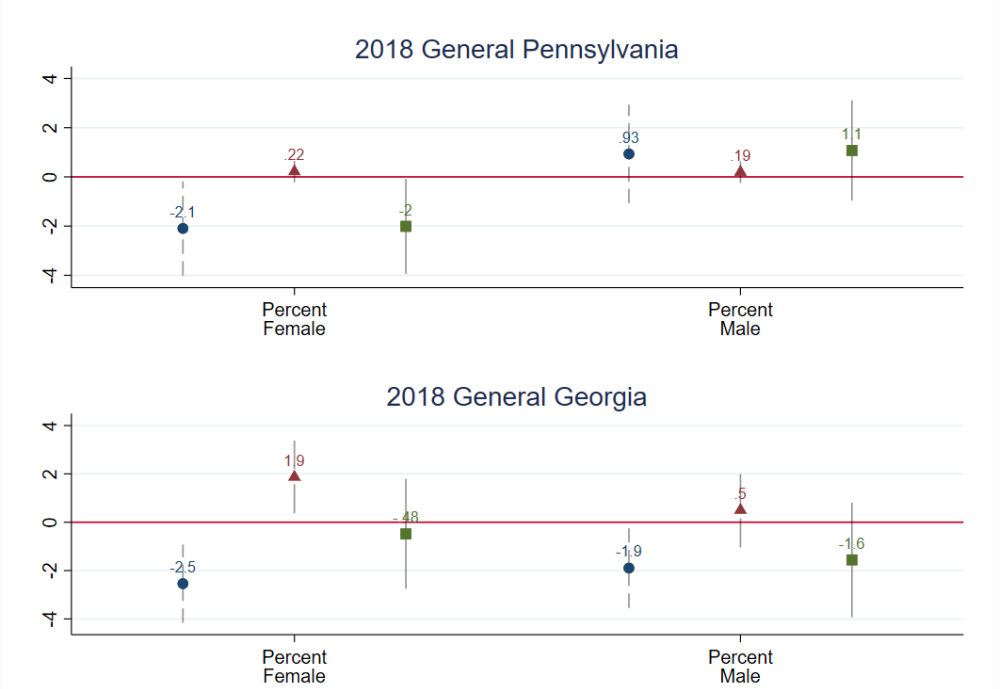
Blocks where more of their voters have at least a bachelors degree decrease turnout at polls from 2.6 to 4.3 p.p. when facing an increase of a mile in distance to their polling location. As mentioned before, this large decrease in at polls turnout is tampered by an increase of absentee voting from 1.2 p.p to 3.4 p.p when faced by the same change in distance which in turn yields null to small effects in total turnout. In Georgia, the response to a mile increase in distance to the polling location for blocks with a higher percentage of voters with a college degree is significantly different from blocks with a higher percentage of voters of other educational attainment levels.

6.3 Demographic Characteristics: Gender

Gender differences in turnout behavior may lead us to believe we should find significant differences in the effects of changes in the cost of voting. Since the 1980 to 2016, the gender gap in turnout has taken values between 4 and 11 percentage points[7]. Nonetheless, estimates in figure 16 show small differences in the reactions to an increase of a mile in distance to their polling location by blocks who have more female voters and blocks who have more male voters. None of these differences are statistically different however.

In Pennsylvania we observe virtually no differences with the exception of the small rise in absentee voting. Georgia shows effects in at polls voting and absentee voting but no effects on total turnout. There seems to be just a small and statistically insignificant difference in the the effects at polls with blocks with higher percentage of female voters with turnout decreased by 1.9 p.p while blocks with higher percentage of male voter turnout decreased by 0.9 p.p..

Figure 6: The effect of distance to polling place on turnout: by Gender



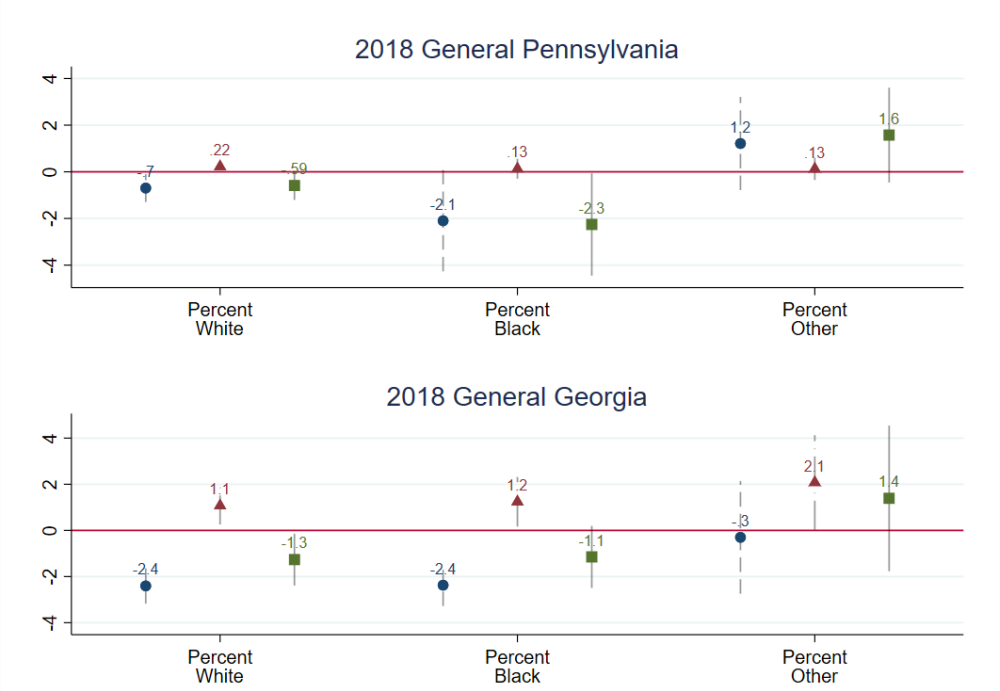
Note: Standard errors clustered at the boundary level.The additional controls are: percent Voting Age Population, percent Democrat, percent Republican, percent Black, percent Hispanic, Median Household Income, percent without a High School Diploma, percent Walk to Work, Travel Time to Work is less than 5 minutes, and Travel Time to Work is more than 60 minutes.

[7] "The Gender Gap". www.cawp.org. 2017. Retrieved September 5, 2018.

6.4 Demographic Characteristics: Race

Race has been a focus when analyzing the cost of voting. Concerns of voter disenfranchisement stem from observations such that African-Americans have longer waiting times (Chen et al. (2019)), are often subject to gerrymandering practices (cite paper here) and have historically lower rates of voter turnout (cite another paper here). Previous papers like Cantoni (2020) find that areas with higher percentage of minorities respond more to changes in distance than those with less percentage of minorities.

Figure 7: The effect of distance to polling place on turnout: by Race



Note: Standard errors clustered at the boundary level.The additional controls are: percent Voting Age Population, percent Democrat, percent Republican, percent Black, percent Hispanic, Median Household Income, percent without a High School Diploma, percent Walk to Work, Travel Time to Work is less than 5 minutes, and Travel Time to Work is more than 60 minutes.

In figure 17, we find that blocks with higher percentage of black voters aren't reacting differently to blocks with higher percentage of white voters when responding to a mile change in distance to their polling location. In Pennsylvania we observe that at blocks with a higher percentage of black voters seem to react more to changes in distance than blocks with higher percentage of white voters. However, this difference isn't statistically significant. In fact, the coefficient found for at polls turnout for blocks where there is a higher percentage of black voters is significant only at the 90th percent confidence level. However, it seems that we observe consistent small effects for blocks where there is a higher percentage of white voters. The effect of turnout at polls is of

-0.5 p.p., in absentee voting is 0.2 p.p. and in total turnout -0.4 p.p. for a mile increase in the distance to their polling location on blocks where there is a higher percentage of white voters.

Interestingly, in Georgia we find a very similar response by blocks with higher percentage of white voters and blocks with higher percentage of black voters in the effects at polls (1.6 and 1.a p.p. respectively). However, there seems to be a small and statistically insignificant difference in the responses on absentee voting where blocks with a higher percentage of black voters seem to respond a bit more than blocks with a higher percentage of white voters. Perhaps this difference could explain why we observe a statistically insignificant coefficient in total turnout by blocks where there is a higher percentage of white voters. However, as mentioned, all these estimates overlap in their confidence intervals, hence we can't reject the null that they may have the same responses.

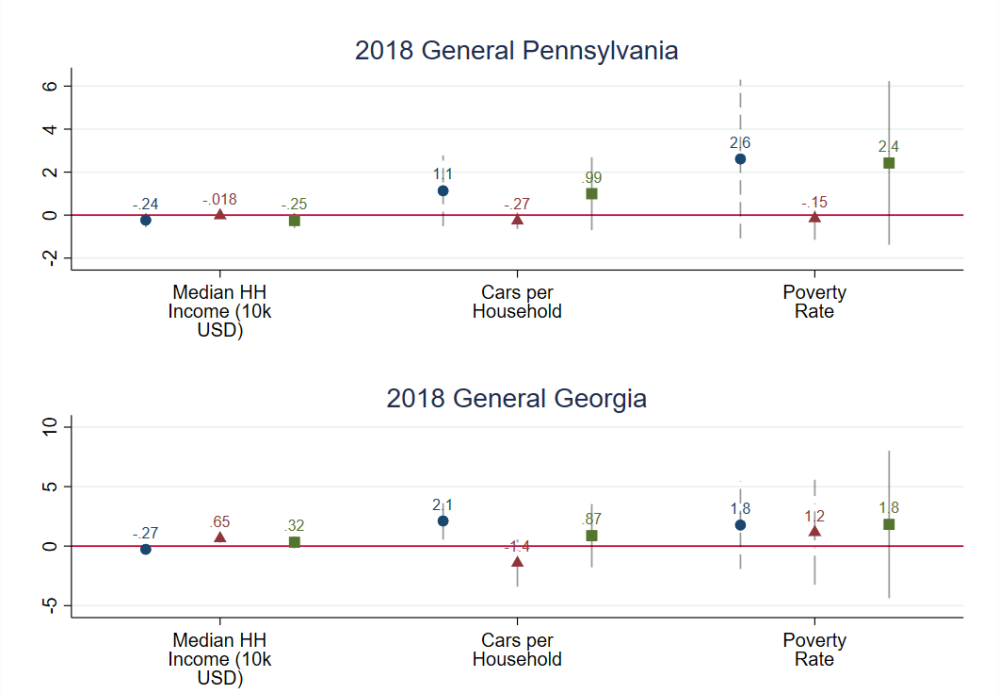
Our results can't reject the null that the responses by blocks with higher percentages of different racial groups react differently to changes in distance. This is an important finding when considering the policy implications on the design of polling place placement.

6.5 Economic Variables

Concerns about representation also emerge when considering the poor. Without being able to voice their votes, they could loose access to crucial government programs which offer relief and opportunities. Government programs such as the supplemental Nutrition Assistance Program (SNAP), more commonly known as "Food Stamps", Earned Income Tax Credit among others are directly beneficial for the poor. Jolliffe et al. (2019) show how SNAP helped assure that the poorest could at least maintain their (low) living standards during a period of inequitable growth as well as economic shocks in the 2008 financial crisis.

Given the stakes that the poor face, being able to participate in the electoral process is crucial. Hence we turned to investigate how income, cars per household and the poverty rate may exacerbate or placate responses to changes in voting costs. In Table 13 we find the estimates of an increase of a mile of distance in turnout at polls, absentee voting and total turnout by block's median household income, cars per household and poverty rate.

Figure 8: The effect of distance to polling place on turnout: by Income, Car Ownership and Poverty Rate

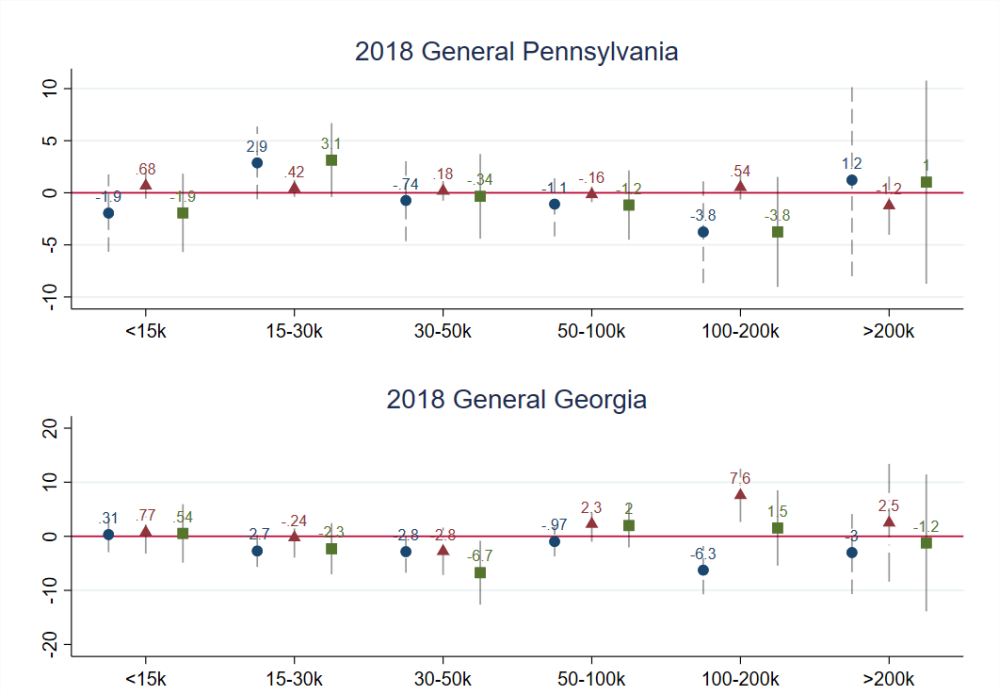


Note: Standard errors clustered at the boundary level.The additional controls are: percent Voting Age Population, percent Democrat, percent Republican, percent Black, percent Hispanic, Median Household Income, percent without a High School Diploma, percent Walk to Work, Travel Time to Work is less than 5 minutes, and Travel Time to Work is more than 60 minutes.

When controlling for income, the poverty rate acts as a measure of inequality for the block. The estimates for poverty rate may hint to the fact that there are no systematic differences in the responses by more or less unequal blocks when faced with an increase in the cost of voting. When it comes to average cars per household, we don't find that it shows differences in responses in the cost of voting among blocks where resident's have more or less cars on average. Finally we look at how the effects may vary in relation with median household income. Although we find negative and significant effects in at polls turnout ranging from 0.13 to 0.19 p.p, these estimates are still small when compared with other estimates in the literature. However, we should note the following: If a block's median household income was 10 thousand dollars, an increase of a mile of distance to the polling place would decrease at polls turnout by 0.13 to 0.19 p.p.. However, if a block's median household income was 150 thousand dollars this decrease could range from 1.95 p.p. to 2.85 p.p.. Although these effects are small, they are large enough to be decisive in certain elections.

Motivated to explore more the interactions between income and changes in the distance to the polling location, we compare blocks with higher percentages of voters in different income brackets. In Pennsylvania we observe that, only blocks with a higher percentage of voters earning between 100 and 200 thousand dollars a year face a large negative effect of 4 p.p. at polls and 3.6 p.p. in total turnout. However, we can't reject the null that this effect is different from the rest. Moving on to Georgia, we find a similar pattern in terms of point estimates with respect to Pennsylvania, but with precisely estimated negative effects across blocks with a higher percentage of voters in multiple income brackets. We still find the largest negative effects in blocks with higher percentage of voters in richer income brackets, however as with Pennsylvania, we can't reject the null that these effects are significantly different from ther rest.

Figure 9: The effect of distance to polling place on turnout: by Income Categories

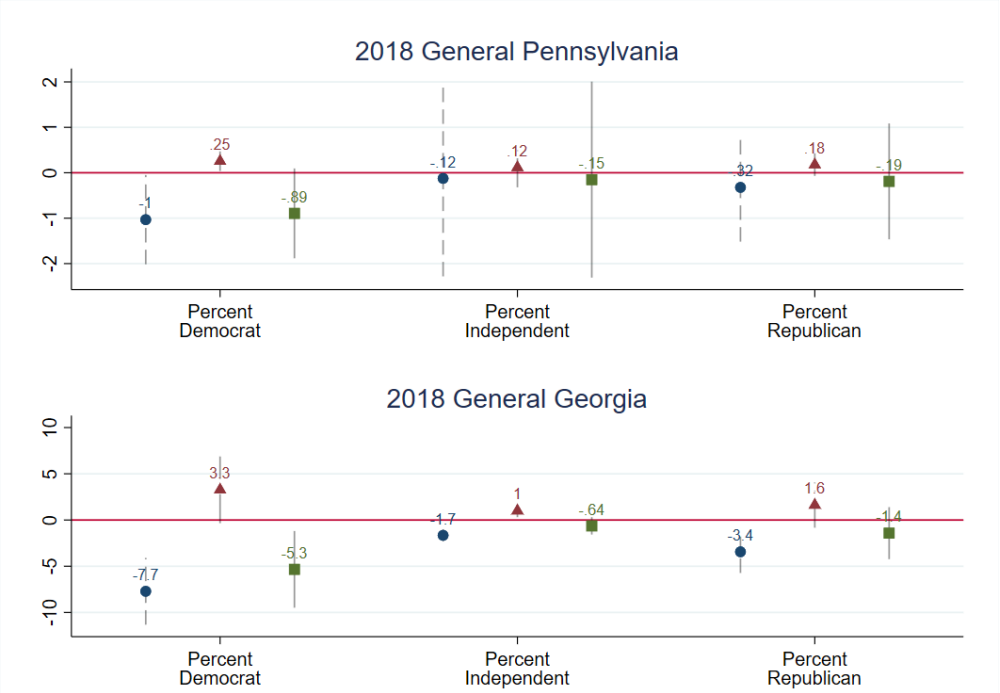


Note: Standard errors clustered at the boundary level.The additional controls are: percent Voting Age Population, percent Democrat, percent Republican, percent Black, percent Hispanic, Median Household Income, percent without a High School Diploma, percent Walk to Work, Travel Time to Work is less than 5 minutes, and Travel Time to Work is more than 60 minutes.

6.6 Political Affiliation

Differences in the effects of changes in the cost of voting by political affiliation could yield incentives for governments to modify electoral design rules in order to gain elections. Concerns that one party is favored while another one is damaged by a change in electoral design could be grounded in responses to the changes by groups of different political affiliation. In particular, a disproportionately negative effect to an increase of a mile in distance by blocks where a large percentage of its voters are democrat could motivate republicans to reallocate polling places if the effects on blocks where most of their voters are republican are mild or null. However, our analysis seems not to support these concerns as a general rule.

Figure 10: The effect of distance to polling place on turnout: by Party Affiliation



Note: Standard errors clustered at the boundary level.The additional controls are: percent Voting Age Population, percent Democrat, percent Republican, percent Black, percent Hispanic, Median Household Income, percent without a High School Diploma, percent Walk to Work, Travel Time to Work is less than 5 minutes, and Travel Time to Work is more than 60 minutes.

In Pennsylvania we find that both blocks with higher percentage of democrats and blocks with a higher percentage of republicans have a decrease in at polls and total turnout due to an increase of a mile in distance to the polling place. When it comes to absentee voting only blocks with a higher percentage of democrat voters see an increase in absentee voting by 0.3 p.p. due to an increase of a mile in distance to the polling place. Overall we see that the point estimates of the effects for blocks with a

higher percentage of democrat voters are smaller than those of blocks with a higher percentage of republicans. However, we can't reject the null that these effects are the same.

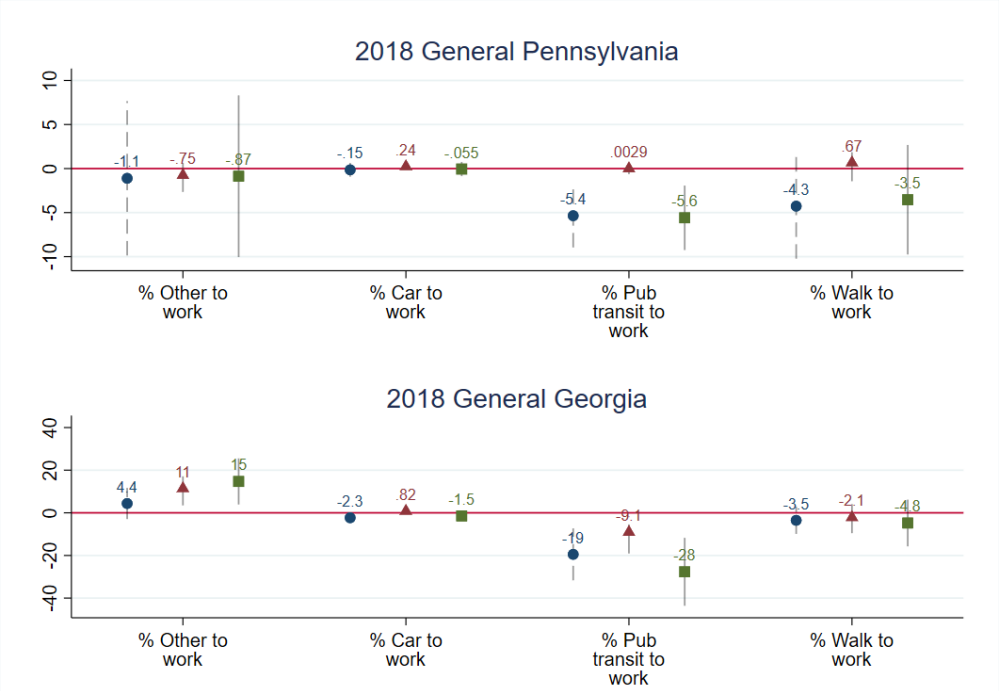
In Georgia we find more pronounced differences in the effects between these different groups. Comparing between states, we find estimates that are approximately 4 times larger in magnitude for at polls voting for all groups and 4 times larger in total turnout for blocks with a higher percentage of democrats and blocks with higher percentage of republicans. Certainly the sensitivity to changes in distance seems more pronounced in Georgia than in Pennsylvania, a pattern we have observed before. The effects of a mile increase in distance in total turnout are smaller for blocks with a higher percentage of republicans with a decrease of 1.3 p.p. than for blocks with a higher percentage of democrats who experience a decrease of 4.3 p.p.. These differences in total turnout response seem to be statistically significant with an F-test value of 13.84. Pairwise testing of the coefficients between blocks with a higher percentage of democrat voters and a higher percentage of republican voters yields an F test value of 9.97, between blocks with a higher percentage of democratic voters and independent voters 25.02 and between blocks with a higher number of republican voters and blocks with a higher percentage of independent voters 5.62 (98% confidence level).Although we observe smaller effects in at polls turnout for block with a higher percentage of republicans (-2.3 p.p.) than for blocks with a higher percentage of democrats (-4.3 p.p.), these block groups seem to also differ in the responses in absentee voting. In absentee voting we observe virtually no effect for for blocks where a higher percentage of its voters are democrats versus a small increase in absentee voting of a percentage point in blocks where there is a higher percentage of republican voters. It is important to remark that the differences in absentee voting are not statistically significant, such that we can't reject the null that blocks with higher percentage of voters of different political affiliations respond differently to an increase of a mile of distance to the polling location.

We find mixed results in terms of statistical significance in the differentiated response on a change of a mile of distance to the polling location by blocks with higher percentage of voters of different political affiliations. In Pennsylvania we find that there is no statistically significant difference whereas in Georgia we find that blocks with a higher percentage of democrat voters experience more turnout losses than blocks with a higher percentage of voters of the other two parties. These results indicate that policy changes might have implications for the electoral results in close elections.

6.7 Mobility Patterns: Way to Work

A natural question that comes to mind when investigating the cost of an increase in the distance to the polling location is: How does it vary with transportation patterns? Luckily the US Census provides information on the ways voter use everyday to get to work. When deciding where to place a polling location, perhaps the boards need to pay close attention to where is the nearest highway, pedestrian accessibility, parking or where is the closest bus stop.

Figure 11: The effect of distance to polling place on turnout: by Way of transport to Work



Note: Standard errors clustered at the boundary level.The additional controls are: percent Voting Age Population, percent Democrat, percent Republican, percent Black, percent Hispanic, Median Household Income, percent without a High School Diploma, percent Walk to Work, Travel Time to Work is less than 5 minutes, and Travel Time to Work is more than 60 minutes.

Our results seem to indicate that paying attention to nearby public transportation routes would be important. In both Pennsylvania and Georgia, we find that the largest effects in at polls and total turnout are found for blocks who have a higher percentage of voters who take public transport to work. These estimates are 8 to 10 times larger than the average effect found in section 4. The effect on at polls turnout is a decrease of 8.2 percentage points and the effect on total turnout is a decrease of 11 percentage points. To grasp the magnitude of these effects, if all the blocks would go from having zero of its residents to 100 percent of its residents using public transit to work, we would observe a drop in turnout that is at least twice as large as the vote margins of

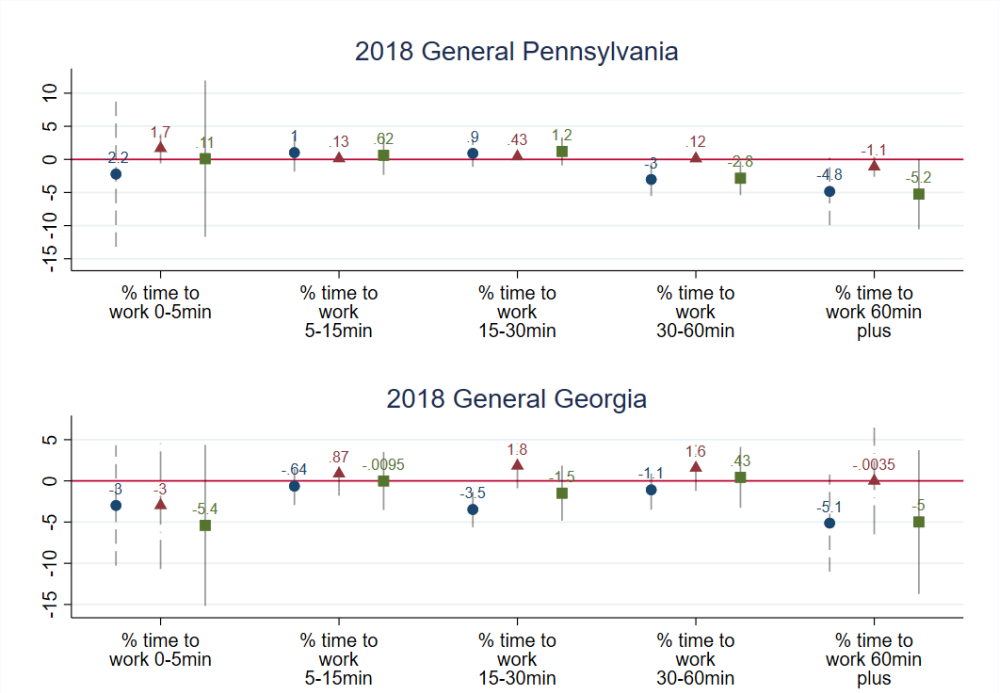
Maine, Nevada, Minnesota, New Hampshire, Michigan, Pennsylvania, Wisconsin and, Florida in the 2016 election.

Besides the large effects in blocks that have a higher percentage of voters who take public transit to work, we also find significant effects in blocks where a majority of its residents take their car to work. These effects are smaller than what we find for blocks with a higher percentage of voters who take public transport to work and similar to those find when analyzing other heterogeneous effects. We observe a decrease of 1.4 p.p. in at polls turnout, an increase in absentee voting by 1.1 p.p. and a net effect of 0.4 p.p. in total turnout (significant only at the 90th percentile confidence level).

6.8 Mobility Patterns: Time to Work

The length of the commute to work might also play a role when considering the effect of distance to the polling location on turnout. This role however is not clear. Those with short commutes might have an easier time re-arranging their schedules to fit the changes in distance (specially if they are walking) while those who have to travel far to work, might be less willing to make a stop at the polls. Another possibility is that those with short commutes might need to take the bus or their car to their polling place and therefore will be discouraged to vote, while for those with long commutes, voting might represent a small deviation from their normal trip. Our results don't show any strong feature in the responses by blocks with varying commute times.

Figure 12: The effect of distance to polling place on turnout: by Way of transport to Work



Note: Standard errors clustered at the boundary level.The additional controls are: percent Voting Age Population, percent Democrat, percent Republican, percent Black, percent Hispanic, Median Household Income, percent without a High School Diploma, percent Walk to Work, Travel Time to Work is less than 5 minutes, and Travel Time to Work is more than 60 minutes.

We find that in Pennsylvania, only blocks with a high percentage of voters with very long commutes (an hour or more) react to changes in distance to the polling place by decreasing at polls turnout by 3.7 p.p. and total turnout by 0.6 p.p. . This could be seen as indicative of the story that, those with longer commutes may be less willing to add more to it in order to vote.

In Georgia we find no distinctive differences across blocks with higher percentages

of different commuting times. With the exception of blocks with a higher percentage of voters who commute between 0 ti 5 minutes to work, we observe a decrease in turnout at polls that ranges between 1.9 p.p. to 2.4 p.p., an effect in absentee voting that ranges 0.5 to 1.6 p.p. and null effects in total turnout. In blocks with a higher percentage of voters who commute between 0 to 5 minutes to work, we find a positive and significant effect of an increase of a mile to their polling location. This effect is however significant only at the 95% confidence interval. We don't therefore observe any strong patterns between blocks with a higher percentage of any commuting time reacting more to changes in distance.

7 Non-linear Effects

In this section we turn to explore the non-linear nature of our effects. We isolate the effects of distance in intervals of different widths (for robustness we include different lengths in the appendix). We run the following specification:

$$turnout_i = \delta_{b(i)} + \gamma\ D_i + \beta\ D_i \cdot dist_i + \iota\ \mathcal{X}_i + \epsilon_i \tag{2}$$

The variable D_i refers to a vector of dummies that take value 1 when the distance by block i is in the range and 0 elsewhere. The ranges are: [0,0.25), [0.25,0.5), [0.5,1), [1,2), [2,3), [3,4), [4,5), and [5 , 10]. We report in the plot below the β vector of coefficients from the interactions between the dummies and the distance variable.

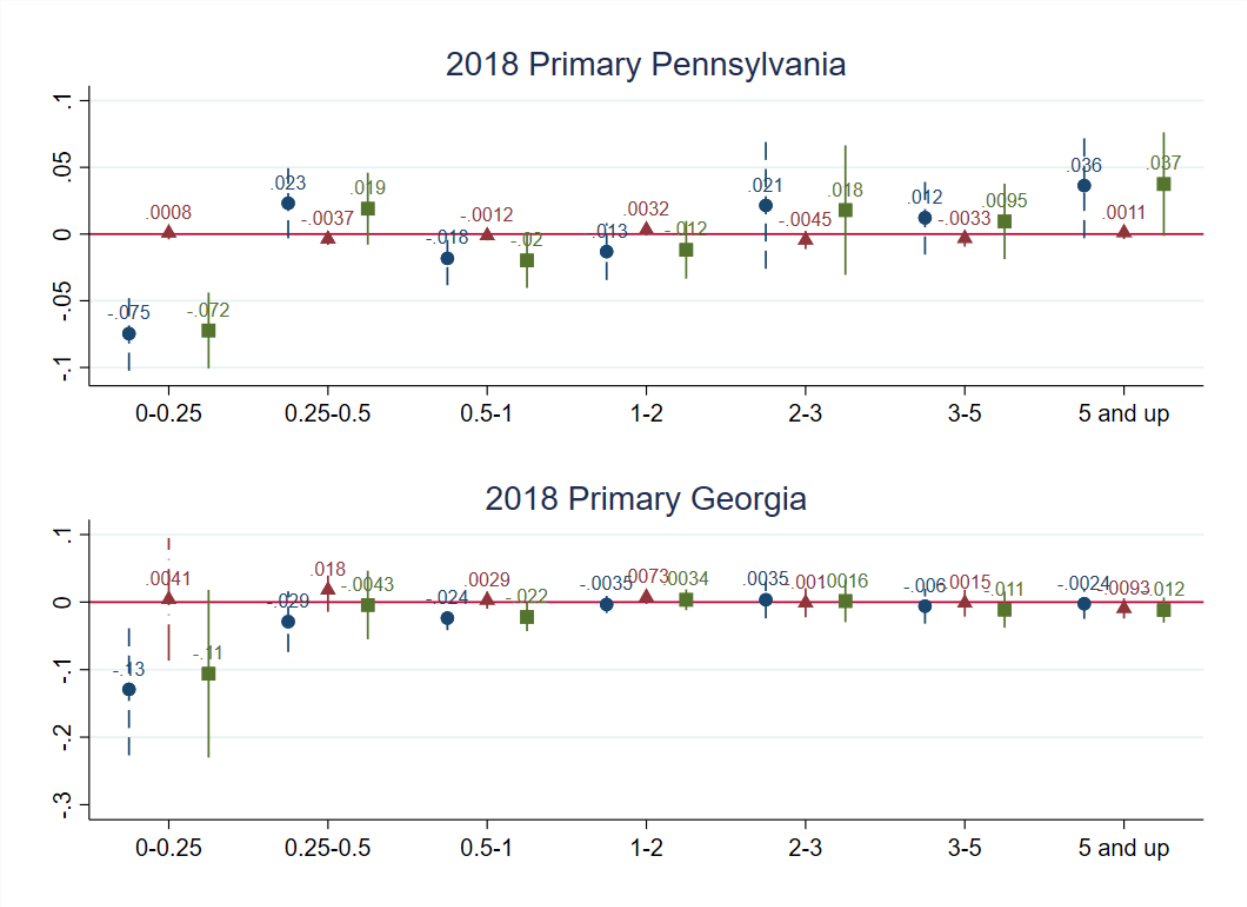
We begin by discussing the results from the primary elections in figure 13. On average we find more negative point estimates coming from smaller distances that eventually become very close to zero. We find significant effects at polls for distances up to two miles in Pennsylvania while in Georgia we find significance for distances up to 0.25 miles and then for distances between 0.5 and a mile and 3 to 5 miles. We find significant effects in absentee voting only in Georgia for distance between a mile and 2. Finally, we find significant effects on total turnout in Pennsylvania for distances less than 0.25 miles and distances between 0.5 and 2 miles while in Georgia we only find significant effects at distances between a mile and two.

Graphically we observe that during primary elections in Pennsylvania, the larger effects are found in the smaller distances and as we continue, the effects tampers out towards the end. We find large negative effects at the 0 to 0.25 mile distance range with negative effects at polls of 7 p.p. and negative effects in turnout of 6.7 p.p. There is a slight exception in the ranges of distance that are 5 miles or larger but we believe this may be some spurious correlation. Similarly, we find in Georgia that the majority of the effect happens at the short distances and then tampers off. We find some large point estimates here, with negative and significant decreases in turnout at polls of 8 p.p. .

In figure 14 we find the results for general elections. We observe that during primary elections in Pennsylvania, most of the effect of turnout happens happens after the half a mile threshold and tampers out towards the end. In contrast, we find in Georgia that the majority of the effect happens at the short distances and then tampers off. We find the largest point estimates here, with negative and significant decreases in turnout at polls of 17 p.p. and increases in absentee voting by 12 p.p. .

These show that although the average effects we find in our main results are small, they mask great non-linearities in the responses to changes in distance to the polling

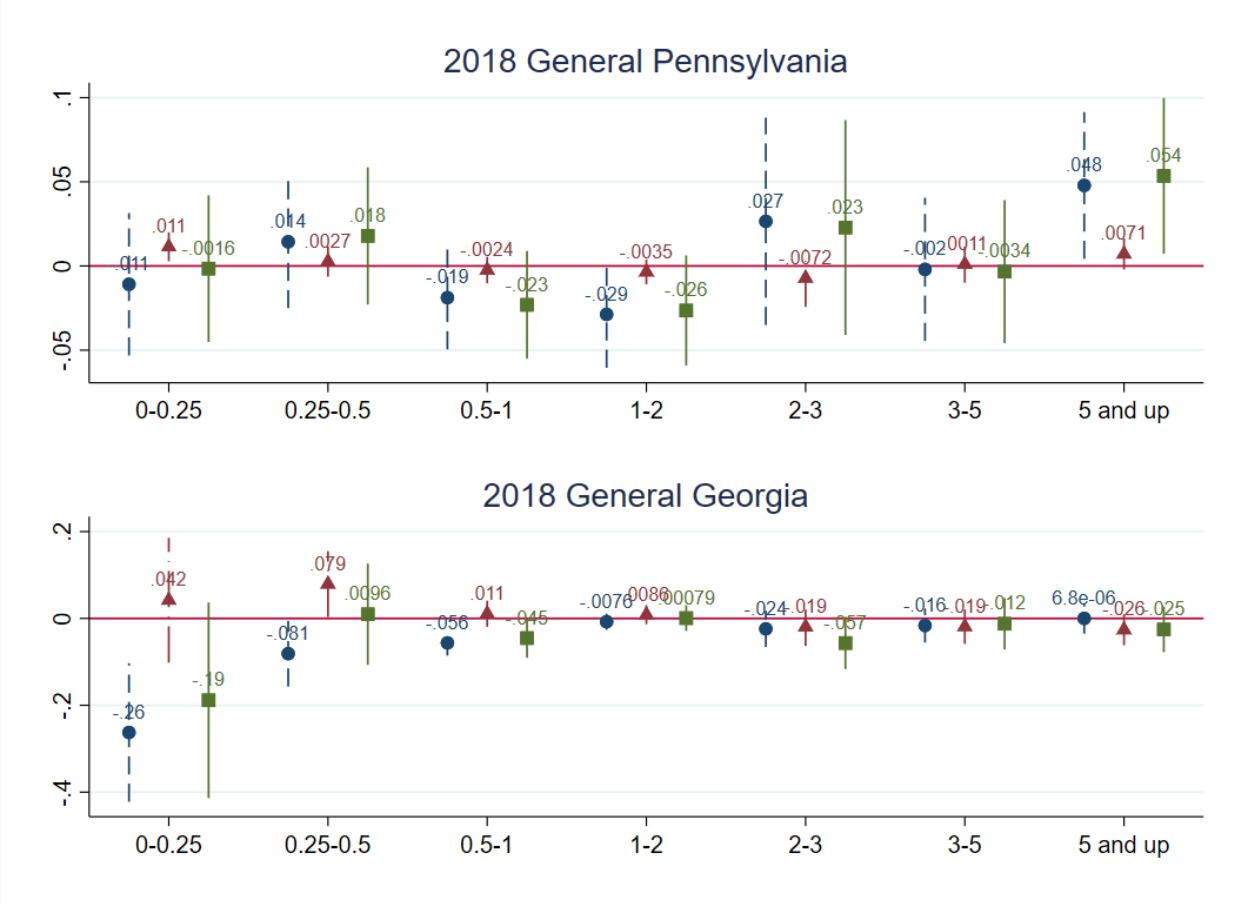
Figure 13: The effect of distance to polling place on turnout: Non-linear Primaries



Note: Standard errors clustered at the boundary level.The additional controls are: percent Voting Age Population, percent Democrat, percent Republican, percent Black, percent Hispanic, Median Household Income, percent without a High School Diploma, percent Walk to Work, Travel Time to Work is less than 5 minutes, and Travel Time to Work is more than 60 minutes.

place. These non-linearities are also different across states. These results inform that policy design should be carefully tailored by state and not based "same for all" solutions.

Figure 14: The effect of distance to polling place on turnout: Non-linear Generals



Note: Standard errors clustered at the boundary level.The additional controls are: percent Voting Age Population, percent Democrat, percent Republican, percent Black, percent Hispanic, Median Household Income, percent without a High School Diploma, percent Walk to Work, Travel Time to Work is less than 5 minutes, and Travel Time to Work is more than 60 minutes.

8 Conclusion

Among the many costs of voting, some are easy to control or ban (polling taxes) and others are impossible to control (bad weather). The distance to the polling place is both inherent to the voting process and is subject to regulation. However, we know very little about how distance to the polling place affects voter participation. This paper is another step toward informing the policy debate on the distributional effects of changes in the distance to the polling location.

The results highlight some important lessons for studies of polling places in the future. First, although our average effect size is very small, even small effects could amount to large changes in turnout in aggregate. As a simple thought experiment, suppose that in 2016, polling places were relocated so that everyone was one mile further from a polling place, with an average effect of 1.3% decrease in turnout in Pennsylvania. This would amount to only 0.06 fewer votes per block, but 13,980 fewer votes across the state. For comparison, Trump's margin of victory in Pennsylvania was 44,292 votes. In the case of Georgia, the controversial gubernatorial election saw a victory by Brian Kemp by less than 55,000 votes. Our results indicate that for the 2018 general election, an increase of a mile in distance to the polling location for all voters would decrease turnout by 0.65% or 25,606 votes in aggregate.

SOMETHING ABOUT ABSENTEE, THEN SOMETHING ABOUT HET EFFECTS (mirrors paper)

Although the estimated average effects of distance to polling place on turnout are small, further analyses reveal that effects can be orders of magnitude larger for some voters depending on the context. This helps to explain the large differences in estimates of the effect of distance to polling place on voting in the extisting literature. We find that by restricting the sample to areas that are more similar to those studied previously, and by replicating multiple estimation methods, results vary based on context, rather than methodology. Cantoni demonstrates that distance to polling place is a large cost of voting in several urban areas. To reconcile differences, we match samples from our dataset to his based on covariates and estimate the effects of distance. Point estimates in the matched samples in GA and PA are roughly three times as large as average effect estimated in the full state samples. Although the point estimates are still smaller than those estimated in Cantoni, the standard errors are larger such that we can not reject the point estimate from the MA sample based in estimates in either the GA or PA matched samples. Overall, this analysis suggests that the effects of distance on turnout are specific to both the setting and electoral design, such that estimates based on small areas are unlikely to generalize to larger areas.

These results highlight the importance of using a large dataset to study costs of voting in large elections. It is important to have the power to estimate very small

effects, since these can add up to large changes in aggregate. Having a state-wide dataset also allows for meaningful descriptive statistics of the distribution of polling places and allows us to explore the effects by different characteristics of the population.

Our heterogeneous effect analysis and non-linear effect analysis show that the costs of voting are not uniformly distributed equally on the population. We found that blocks that had a higher percentage of middle aged population and blocks that had a higher percentage of college graduates were more sensitive to changes in distance to polling place. When comparing blocks with a higher percentage of voters in different income brackets we find that blocks with richer voters are more sensitive to changes in distance. However, in Georgia, we observe that at most income brackets there is an effect at polls.

Voters also respond differently to polling place locations depending on political affiliation. In Pennsylvania we found that the effects of a mile increase in the distance to the polls is negative and significant for both at polls and overall turnout in blocks with a higher percentage of democrat voters and positive on absentee voting. However, in Pennsylvania we can't rule out that the effects are different between different affiliations. In Georgia however we find more pronounced differences in the effects of an increase in distance to the polling location. We find that blocks with a higher percentage of democrats loose more at polls and overall turnout than blocks with a higher percentage of any other party. In contrast with Pennsylvania, blocks with a higher percentage of democrats don't increase absentee voting by the same change, which could explain the large negative effect in total turnout. Blocks with a higher percentage of republican voters also face a significant decrease in at polls turnout, however an increase in absentee voting tampers the negative effect in overall turnout. These results point out that possible incentives for increasing the cost of voting are not uniformly distributed among different parties.

We find that those blocks where a large percentage of voters take public transport are particularly affected by changes in distance. A one mile increase in distance to polling places is associated with an 11 p.p. decrease in total turnout. These findings point to the need of facilitating easier access to polling places for those that rely on public transport. Blocks with a higher percentage of voters with longer commutes are more affected by changes in distance to polling place, perhaps because those with long commutes find it harder to make time to go to the polls.

The findings in this paper can help election commissions that face costly tradeoffs in choosing how many polling places to open and where to place them. Every ten years, following the U.S. Census, state and local officials determine the boundaries of voting precincts, a process known as "reprecincting". This paper suggests that these decisions are not without consequences. This paper also suggests that partisan differences in the

responses could motivate different policies when choosing where to place new polling locations, skewing the costs of voting. Future research should investigate how polling decisions are made, and in particular if they are chosen strategically in order to affect political outcomes.

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A Appendix

A.1 Data

Table 4: Variable Definitions, Units of Observation, and Data Sources

Variable	Definition	Unit of Observation	Source
Turnout	Votes per voting age population	Block	PA Secretary of State
Distance to Polling Place	Miles from block interior centroid to polling place	Block	Computed value
Race, Ethnicity, Gender, Age	Percent of population in demographic group	Block	2010 Census
Car Ownership	Number of cars per housing units	Block-group	2006-2010 ACS
Way to Work	Percent of workers 16 and older using mode of transportation to work	Block-group	2006-2010 ACS
Time to Work	Time to work among workers 16 and older who do not work from home	Block-group	2006-2010 ACS
Median Income	Median household income for the past 12 months	Block-group	2006-2010 ACS
Home Ownership	Percent of households owning home	Block-group	2006-2010 ACS
Education	Percent of population older than 25 belonging to education group	Block-group	2006-2010 ACS
Unemployment	Percent of labor force unemployed	Tract	2006-2010 ACS

B Summary Statistics

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Table 5: Summary Statistics

	All Pennsylvania		Regression sample		All Georgia		Regression sample	
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Turnout, 2018 primary at polls	18.41	38.75	16.07	36.72	12.30	32.85	11.15	31.48
Turnout, 2018 primary absentee	0.38	6.16	0.30	5.44	4.60	20.95	3.85	19.24
Turnout, 2018 primary	18.79	39.06	16.36	36.99	16.90	37.48	15.00	35.71
Turnout, 2018 general at polls	56.79	49.54	51.27	49.98	25.79	43.75	24.26	42.87
Turnout, 2018 general absentee	2.23	14.78	1.50	12.15	29.76	45.72	25.70	43.70
Turnout, 2018 general	59.03	49.18	52.77	49.92	55.55	49.69	49.97	50.00
Democrat	0.48	0.50	0.67	0.47	0.08	0.27	0.10	0.30
Republican	0.38	0.49	0.20	0.40	0.09	0.28	0.05	0.21
Independent	0.14	0.35	0.14	0.34	0.83	0.37	0.85	0.35
Distance (miles)	0.93	3.72	0.33	0.44	1.66	2.70	0.98	0.82
Demographics								
Population	145.70	220.38	122.71	160.05	337.02	465.12	135.01	195.47
Voting Age Population	115.55	190.53	98.50	148.59	244.13	332.47	106.34	157.12
Percent Urban	0.80	0.40	0.99	0.06	0.75	0.43	0.98	0.15
Percent Black	0.11	0.23	0.30	0.36	0.30	0.33	0.43	0.37
Percent Hispanic	0.05	0.11	0.09	0.17	0.07	0.11	0.07	0.11
Poverty Rate	0.12	0.13	0.21	0.18	0.14	0.13	0.20	0.18
Median hh Income (10k USD)	5.86	2.89	4.46	2.47	5.85	2.89	5.33	3.15
Way to work								
% Car to work	0.85	0.17	0.69	0.23	0.90	0.09	0.84	0.14
% Walk to work	0.04	0.09	0.08	0.13	0.01	0.04	0.03	0.07
% Pub transit to work	0.06	0.12	0.18	0.18	0.02	0.06	0.06	0.10
% Bike to work	0.00	0.02	0.01	0.03	0.00	0.01	0.01	0.02
Time to work								
% time to work 0-5min	0.04	0.05	0.03	0.05	0.03	0.04	0.03	0.05
% time to work 5-60min	0.88	0.08	0.88	0.10	0.88	0.08	0.89	0.08
% time to work 60min plus	0.08	0.08	0.10	0.10	0.10	0.08	0.08	0.08
Observations	8245003		1528321		6980226		258273	

Table 6: Distance Prediction

	Pennsylvania			Georgia		
	(1) All Individual	(2) Blocks in Border FE Sample	(3) Blocks in Border FE Sample	(4) All Individuals	(5) Blocks in Border FE Sample	(6) Blocks in Border FE Sample
Democrat	-0.049***	-0.000	0.000	-0.089***	-0.007*	-0.006
	(0.008)	(0.001)	(0.001)	(0.017)	(0.004)	(0.004)
Republican	0.047***	0.001	0.002	-0.074**	-0.001	0.003
	(0.011)	(0.001)	(0.001)	(0.034)	(0.006)	(0.005)
Population	-0.001	-0.000	-0.000	0.000	-0.001*	-0.001*
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age 18 to 29	-0.042***	0.003	0.002	0.008	0.005	0.006
	(0.010)	(0.002)	(0.002)	(0.014)	(0.008)	(0.007)
Age 30 to 49	-0.039***	0.003	0.002	0.024	-0.003	-0.001
	(0.008)	(0.002)	(0.002)	(0.017)	(0.008)	(0.007)
Age 50 to 64	0.002	0.001	0.001	0.040***	0.001	0.001
	(0.006)	(0.002)	(0.002)	(0.012)	(0.007)	(0.006)
Female	-0.015**	0.000	0.000	-0.016***	-0.001	-0.002
	(0.006)	(0.001)	(0.001)	(0.004)	(0.002)	(0.002)
Voting Age Population	0.001	0.000	0.000	-0.000	0.001**	0.001**
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Percent Black	-0.091	-0.021	-0.022	-0.450***	-0.029	-0.043
	(0.065)	(0.023)	(0.023)	(0.111)	(0.041)	(0.040)
Percent Hispanic	1.416	0.031	0.033	-0.594***	-0.056	-0.052
	(1.110)	(0.025)	(0.025)	(0.144)	(0.081)	(0.078)
Median hh Income (10k USD)	-0.006	0.001	0.000	-0.053***	0.011	0.010
	(0.013)	(0.003)	(0.003)	(0.012)	(0.009)	(0.008)
Poverty Rate	-0.098	-0.023	-0.024	-0.457**	0.121	0.196**
	(0.203)	(0.036)	(0.035)	(0.214)	(0.101)	(0.098)
Cars per Household	0.804***	0.010	0.008	0.880***	0.099*	0.075
	(0.177)	(0.015)	(0.015)	(0.183)	(0.052)	(0.051)
Percent without high school diploma	0.365***	-0.005	-0.005	1.540*	0.099	0.038
	(0.096)	(0.024)	(0.025)	(0.900)	(0.111)	(0.110)
% Walk to work	-0.230*	-0.035	-0.036	-0.729	-0.313	-0.264
	(0.131)	(0.034)	(0.034)	(0.724)	(0.218)	(0.215)
% time to work 0-5min	-1.677***	-0.074	-0.060	-2.580***	-0.686***	-0.437**
	(0.401)	(0.084)	(0.080)	(0.715)	(0.174)	(0.202)
Black nh				-0.028*	0.000	0.001
				(0.016)	(0.004)	(0.004)
Hispanic				-0.022***	0.000	0.001
				(0.008)	(0.008)	(0.007)
White nh				0.028**	-0.008	-0.007
				(0.013)	(0.005)	(0.005)
County FE	X			X		
Border FE		X	X		X	X
County-Lat/Long			X			X
N	4924711	964026	964026	6015607	214439	214439
y variable mean	0.91	0.32	0.32	1.66	0.96	0.96
R^2	0.019	0.743	0.747	0.099	0.834	0.854

B.1 The Effect of Distance to Polling Place on Turnout: Quintile Regressions

Table 7: The effect of distance to polling place on turnout: By Quantile

	Border FE - PA - 10th Percentile						Border FE - GA - 10th Percentile					
	Pri AP	Pri AB	Pri Tot	GE AP	GE AP	GE Tot	Pri AP	Pri AB	Pri Tot	GE AP	GE AB	GE Tot
Mean Dist. to polling location (mi)	-0.0102	-0.0001	-0.0104	-0.0162***	-0.0004	-0.0158***	-0.0067	0.0003	-0.0030	-0.0138***	0.0048**	-0.0064***
	(0.0111)	(0.0162)	(0.0143)	(0.0020)	(0.0238)	(0.0020)	(0.0721)	(0.1906)	(0.0222)	(0.0012)	(0.0020)	(0.0020)
N	173505	174631	173499	165876	174533	165853	87838	88318	87704	86485	85540	84525
y variable mean	0.16	0.00	0.17	0.46	0.02	0.48	0.14	0.06	0.19	0.25	0.29	0.54
R^2												
	Border FE - PA - 25th Percentile						Border FE - GA - 25th Percentile					
	Pri AP	Pri AB	Pri Tot	GE AP	GE AP	GE Tot	Pri AP	Pri AB	Pri Tot	GE AP	GE AB	GE Tot
Mean Dist. to polling location (mi)	-0.0089	0.0000	-0.0089	-0.0124***	0.0000	-0.0116***	-0.0060	0.0012	-0.0024	-0.0141***	0.0073***	-0.0052***
	(0.0091)	(0.0153)	(0.0118)	(0.0014)	(0.0223)	(0.0015)	(0.0541)	(0.1615)	(0.0150)	(0.0009)	(0.0015)	(0.0015)
	Border FE - PA - 50th Percentile						Border FE - GA - 50th Percentile					
	Pri AP	Pri AB	Pri Tot	GE AP	GE AP	GE Tot	Pri AP	Pri AB	Pri Tot	GE AP	GE AB	GE Tot
Mean Dist. to polling location (mi)	-0.0067	0.0000	-0.0066	-0.0078***	0.0003	-0.0065***	-0.0053	0.0027	-0.0017	-0.0145***	0.0107***	-0.0039***
	(0.0064)	(0.0151)	(0.0081)	(0.0011)	(0.0212)	(0.0012)	(0.0371)	(0.1190)	(0.0135)	(0.0008)	(0.0012)	(0.0013)
	Border FE - PA - 75th Percentile						Border FE - GA - 75th Percentile					
	Pri AP	Pri AB	Pri Tot	GE AP	GE AP	GE Tot	Pri AP	Pri AB	Pri Tot	GE AP	GE AB	GE Tot
Mean Dist. to polling location (mi)	-0.0039	0.0001	-0.0036	-0.0029*	0.0019	-0.0011	-0.0044	0.0050	-0.0008	-0.0150***	0.0150***	-0.0022
	(0.0050)	(0.0149)	(0.0055)	(0.0015)	(0.0173)	(0.0016)	(0.0189)	(0.0539)	(0.0221)	(0.0013)	(0.0015)	(0.0020)
	Border FE - PA - 90th Percentile						Border FE - GA - 90th Percentile					
	Pri AP	Pri AB	Pri Tot	GE AP	GE AP	GE Tot	Pri AP	Pri AB	Pri Tot	GE AP	GE AB	GE Tot
Mean Dist. to polling location (mi)	-0.0008	0.0005	-0.0002	0.0017	0.0063	0.0040*	-0.0034	0.0083	0.0004	-0.0156***	0.0197***	-0.0004
	(0.0078)	(0.0254)	(0.0084)	(0.0022)	(0.0213)	(0.0023)	(0.0231)	(0.0676)	(0.0403)	(0.0021)	(0.0023)	(0.0031)

Note: Standard errors are clustered at the border level. County-Lat/Long refers to latitude and longitude controls, interacted with county fixed effects. The additional controls in Panel C are: percent Voting Age Population, percent Democrat, percent Republican, percent Black, percent Hispanic, Median Household Income, percent without a High School Diploma, percent Walk to Work, Travel Time to Work is less than 5 minutes, and Travel Time to Work is more than 60 minutes.

C Heterogeneous Effects (with Main Effects)

Table 8: The effect of distance to polling place on turnout: by Age

	Pennsylvania			Georgia		
	(1) GE AP	(2) GE AB	(3) GE Tot	(4) GE AP	(5) GE AB	(6) GE Tot
% age under 17	0.083***	-0.006**	0.078***	0.104***	-0.008	0.110***
	(0.010)	(0.003)	(0.010)	(0.014)	(0.014)	(0.019)
% age 18 to 29	-0.306***	-0.034***	-0.335***	-0.083***	-0.218***	-0.285***
	(0.010)	(0.003)	(0.010)	(0.014)	(0.014)	(0.020)
% age 30 to 49	-0.043***	-0.019***	-0.061***	0.062***	-0.057***	0.014
	(0.010)	(0.003)	(0.010)	(0.015)	(0.016)	(0.021)
% age 50 to 64	0.105***	-0.008**	0.100***	0.058***	0.010	0.090***
	(0.010)	(0.003)	(0.010)	(0.015)	(0.016)	(0.021)
% age 65 and up	0.000	0.000	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)	(.)	(.)
Mean Distance to Polling Place	-0.017**	0.000	-0.013*	-0.019***	0.007	-0.011*
× % age under 17	(0.007)	(0.002)	(0.008)	(0.004)	(0.005)	(0.006)
Mean Distance to Polling Place	-0.006	-0.001	-0.008	-0.008	0.009*	-0.003
× % age 18 to 29	(0.009)	(0.002)	(0.009)	(0.005)	(0.005)	(0.007)
Mean Distance to Polling Place	0.002	0.002	0.001	-0.018***	0.017***	0.001
× % age 30 to 49	(0.007)	(0.003)	(0.007)	(0.004)	(0.005)	(0.006)
Mean Distance to Polling Place	-0.015***	0.004**	-0.010*	-0.017***	0.011***	-0.011**
× % age 50 to 64	(0.005)	(0.002)	(0.006)	(0.003)	(0.004)	(0.005)
Mean Distance to Polling Place	-0.011*	0.001	-0.011*	-0.007*	0.011***	0.005
× % age 65 and up	(0.006)	(0.002)	(0.006)	(0.004)	(0.004)	(0.006)
N	165876	174533	165853	86485	85540	84525
y variable mean	0.46	0.02	0.48	0.25	0.29	0.54
R^2	0.314	0.134	0.333	0.246	0.314	0.310

Note: Standard errors clustered at the boundary level.The additional controls are: percent Voting Age Population, percent Democrat, percent Republican, percent Black, percent Hispanic, Median Household Income, percent without a High School Diploma, percent Walk to Work, Travel Time to Work is less than 5 minutes, and Travel Time to Work is more than 60 minutes.

C.1 Non-linear Effects Table

Table 9: The effect of distance to polling place on turnout: by Educational Attainment

	Pennsylvania			Georgia		
	(1) GE AP	(2) GE AB	(3) GE Tot	(4) GE AP	(5) GE AB	(6) GE Tot
Percent with high school diploma	-0.141***	-0.015***	-0.155***	-0.130***	-0.085***	-0.202***
	(0.021)	(0.006)	(0.022)	(0.016)	(0.017)	(0.024)
Percent with bachelors diploma	0.000	0.000	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)	(.)	(.)
Mean Distance to Polling Place × Percent without high school diploma	-0.001	0.002	0.000	-0.008**	0.004	-0.005
	(0.006)	(0.001)	(0.006)	(0.004)	(0.005)	(0.006)
Mean Distance to Polling Place × Percent with high school diploma	-0.004	-0.007**	-0.011	-0.009*	0.011*	0.002
	(0.013)	(0.003)	(0.013)	(0.005)	(0.006)	(0.007)
Mean Distance to Polling Place × Percent with bachelors diploma	-0.026***	0.012***	-0.014*	-0.043***	0.034***	-0.008
	(0.007)	(0.003)	(0.008)	(0.005)	(0.006)	(0.007)
N	165876	174533	165853	86485	85540	84525
y variable mean	0.46	0.02	0.48	0.25	0.29	0.54
R^2	0.291	0.130	0.308	0.243	0.304	0.299

Note: Standard errors clustered at the boundary level.The additional controls are: percent Voting Age Population, percent Democrat, percent Republican, percent Black, percent Hispanic, Median Household Income, percent without a High School Diploma, percent Walk to Work, Travel Time to Work is less than 5 minutes, and Travel Time to Work is more than 60 minutes.

Table 10: The effect of distance to polling place on turnout: by Gender

	Pennsylvania			Georgia		
	(1) GE AP	(2) GE AB	(3) GE Tot	(4) GE AP	(5) GE AB	(6) GE Tot
Percent Female	0.039***	0.008**	0.050***	0.025*	0.061***	0.082***
	(0.010)	(0.003)	(0.011)	(0.014)	(0.014)	(0.019)
Percent Male	0.000	0.000	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)	(.)	(.)
Mean Distance to Polling Place	-0.014**	0.005***	-0.013**	-0.019***	0.013***	-0.005
× Percent Female	(0.006)	(0.002)	(0.006)	(0.003)	(0.003)	(0.005)
Mean Distance to Polling Place	-0.001	-0.002	0.001	-0.010***	0.010***	-0.002
× Percent Male	(0.006)	(0.002)	(0.006)	(0.003)	(0.004)	(0.005)
N	165876	174533	165853	86485	85540	84525
y variable mean	0.46	0.02	0.48	0.25	0.29	0.54
R^2	0.291	0.130	0.307	0.242	0.304	0.299

Note: Standard errors clustered at the boundary level.The additional controls are: percent Voting Age Population, percent Democrat, percent Republican, percent Black, percent Hispanic, Median Household Income, percent without a High School Diploma, percent Walk to Work, Travel Time to Work is less than 5 minutes, and Travel Time to Work is more than 60 minutes.

Table 11: The effect of distance to polling place on turnout: by Party Affiliation

	Pennsylvania			Georgia		
	(1) GE AP	(2) GE AB	(3) GE Tot	(4) GE AP	(5) GE AB	(6) GE Tot
Percent Independent	-0.239***	-0.016***	-0.255***	-0.116***	-0.320***	-0.449***
	(0.008)	(0.002)	(0.008)	(0.012)	(0.015)	(0.018)
Mean Distance to Polling Place	-0.011***	0.003***	-0.009***	-0.043***	0.002	-0.043***
× Percent Democrat	(0.003)	(0.001)	(0.003)	(0.005)	(0.008)	(0.008)
Mean Distance to Polling Place	-0.005	0.003	-0.002	-0.011***	0.012***	0.000
× Percent Independent	(0.005)	(0.002)	(0.006)	(0.001)	(0.001)	(0.002)
Mean Distance to Polling Place	-0.006**	0.001	-0.005*	-0.023***	0.010**	-0.013***
× Percent Republican	(0.003)	(0.001)	(0.003)	(0.004)	(0.004)	(0.005)
N	165876	174533	165853	86485	85540	84525
y variable mean	0.46	0.02	0.48	0.25	0.29	0.54
R^2	0.291	0.129	0.307	0.243	0.304	0.298

Note: Standard errors clustered at the boundary level.The additional controls are: percent Voting Age Population, percent Democrat, percent Republican, percent Black, percent Hispanic, Median Household Income, percent without a High School Diploma, percent Walk to Work, Travel Time to Work is less than 5 minutes, and Travel Time to Work is more than 60 minutes.

Table 12: The effect of distance to polling place on turnout: by Race

	Pennsylvania			Georgia		
	(1) GE AP	(2) GE AB	(3) GE Tot	(4) GE AP	(5) GE AB	(6) GE Tot
Percent White	0.109***	0.000	0.116***	0.054***	0.044***	0.089***
	(0.012)	(0.004)	(0.012)	(0.013)	(0.013)	(0.019)
Percent Other	0.000	0.000	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)	(.)	(.)
Mean Distance to Polling Place	-0.008***	0.002***	-0.007***	-0.016***	0.011***	-0.006***
× Percent White	(0.002)	(0.000)	(0.002)	(0.001)	(0.001)	(0.002)
Mean Distance to Polling Place	-0.017**	0.001	-0.018**	-0.014***	0.011***	-0.004
× Percent Black	(0.009)	(0.002)	(0.009)	(0.002)	(0.003)	(0.003)
Mean Distance to Polling Place	0.014*	0.006*	0.020**	0.003	0.026***	0.022***
× Percent Other	(0.008)	(0.003)	(0.008)	(0.006)	(0.006)	(0.008)
N	165876	174533	165853	86485	85540	84525
y variable mean	0.46	0.02	0.48	0.25	0.29	0.54
R^2	0.292	0.129	0.308	0.242	0.304	0.298

Note: Standard errors clustered at the boundary level.The additional controls are: percent Voting Age Population, percent Democrat, percent Republican, percent Black, percent Hispanic, Median Household Income, percent without a High School Diploma, percent Walk to Work, Travel Time to Work is less than 5 minutes, and Travel Time to Work is more than 60 minutes.

Table 13: The effect of distance to polling place on turnout: by Income, Car Ownership and Poverty Rate

	Pennsylvania			Georgia		
	(1) GE AP	(2) GE AB	(3) GE Tot	(4) GE AP	(5) GE AB	(6) GE Tot
Cars per Household	0.018***	-0.001	0.017***	0.006	0.006	0.015
	(0.006)	(0.001)	(0.006)	(0.006)	(0.007)	(0.009)
Poverty Rate	-0.053***	0.006*	-0.048***	-0.010	-0.032**	-0.037*
	(0.013)	(0.003)	(0.014)	(0.014)	(0.015)	(0.020)
Mean Distance to Polling Place	0.002	0.008***	0.007	-0.009	0.012	0.004
	(0.008)	(0.003)	(0.008)	(0.006)	(0.007)	(0.009)
Mean Distance to Polling Place	-0.001*	0.000	-0.001	-0.002***	0.001	-0.001
× Median hh Income (10k USD)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Mean Distance to Polling Place	0.000	0.000	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)	(.)	(.)
Cars per Household	0.000	0.000	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)	(.)	(.)
Mean Distance to Polling Place	-0.002	-0.004**	-0.005	0.002	-0.003	-0.001
× Cars per Household	(0.004)	(0.001)	(0.004)	(0.003)	(0.003)	(0.004)
Mean Distance to Polling Place	0.000	0.000	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)	(.)	(.)
Poverty Rate	0.000	0.000	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)	(.)	(.)
Mean Distance to Polling Place	-0.001	-0.006	-0.006	-0.006	0.003	-0.006
× Poverty Rate	(0.013)	(0.004)	(0.014)	(0.008)	(0.008)	(0.011)
N	147700	155041	147683	78468	77611	76697
y variable mean	0.45	0.02	0.46	0.25	0.29	0.53
R^2	0.282	0.126	0.297	0.237	0.301	0.293

Note: Standard errors clustered at the boundary level.The additional controls are: percent Voting Age Population, percent Democrat, percent Republican, percent Black, percent Hispanic, Median Household Income, percent without a High School Diploma, percent Walk to Work, Travel Time to Work is less than 5 minutes, and Travel Time to Work is more than 60 minutes.

Table 14: The effect of distance to polling place on turnout: by Way to Work

	Pennsylvania			Georgia		
	(1) GE AP	(2) GE AB	(3) GE Tot	(4) GE AP	(5) GE AB	(6) GE Tot
% Other to work	0.078**	-0.003	0.078**	0.075**	0.013	0.105*
	(0.032)	(0.007)	(0.033)	(0.037)	(0.041)	(0.057)
% Car to work	0.124***	-0.005	0.121***	0.071**	0.056**	0.141***
	(0.020)	(0.004)	(0.021)	(0.028)	(0.027)	(0.043)
% Pub transit to work	0.128***	0.005	0.133***	0.094*	0.056	0.165***
	(0.025)	(0.005)	(0.026)	(0.050)	(0.038)	(0.062)
Mean Distance to Polling Place	-0.019	0.006	-0.014	-0.028**	0.043***	0.014
× % Other to work	(0.024)	(0.007)	(0.023)	(0.012)	(0.014)	(0.019)
Mean Distance to Polling Place	-0.006***	0.002***	-0.004**	-0.014***	0.011***	-0.004*
× % Car to work	(0.002)	(0.000)	(0.002)	(0.001)	(0.001)	(0.002)
Mean Distance to Polling Place	-0.045***	-0.002	-0.050***	-0.082**	-0.026	-0.105***
× % Pub transit to work	(0.016)	(0.004)	(0.017)	(0.040)	(0.022)	(0.041)
Mean Distance to Polling Place	-0.022	0.004	-0.018	0.003	-0.012	-0.003
× % Walk to work	(0.024)	(0.007)	(0.025)	(0.017)	(0.016)	(0.025)
N	165876	174533	165853	86485	85540	84525
y variable mean	0.46	0.02	0.48	0.25	0.29	0.54
R^2	0.291	0.129	0.307	0.242	0.304	0.298

Note: Standard errors clustered at the boundary level.The additional controls are: percent Voting Age Population, percent Democrat, percent Republican, percent Black, percent Hispanic, Median Household Income, percent without a High School Diploma, percent Walk to Work, Travel Time to Work is less than 5 minutes, and Travel Time to Work is more than 60 minutes.

Table 15: The effect of distance to polling place on turnout: by Time to Work

	Pennsylvania			Georgia		
	(1) GE AP	(2) GE AB	(3) GE Tot	(4) GE AP	(5) GE AB	(6) GE Tot
% time to work 5-15min	-0.023	-0.004	-0.025	0.002	0.007	0.004
	(0.019)	(0.004)	(0.020)	(0.022)	(0.023)	(0.033)
% time to work 15-30min	-0.031*	-0.000	-0.032*	-0.004	0.012	0.005
	(0.018)	(0.004)	(0.019)	(0.021)	(0.022)	(0.031)
% time to work 30-60min	-0.019	0.001	-0.018	-0.013	0.035	0.016
	(0.019)	(0.004)	(0.020)	(0.023)	(0.024)	(0.033)
Mean Distance to Polling Place	0.025	-0.001	0.027	0.028**	-0.011	0.017
× % time to work 0-5min	(0.027)	(0.006)	(0.028)	(0.014)	(0.015)	(0.021)
Mean Distance to Polling Place	-0.004	0.005**	-0.001	-0.019***	0.016***	-0.006
× % time to work 5-15min	(0.008)	(0.002)	(0.008)	(0.004)	(0.005)	(0.006)
Mean Distance to Polling Place	-0.008	0.001	-0.006	-0.016***	0.012***	-0.003
× % time to work 15-30min	(0.006)	(0.002)	(0.006)	(0.003)	(0.004)	(0.005)
Mean Distance to Polling Place	-0.006	0.001	-0.007	-0.012***	0.012**	0.000
× % time to work 30-60min	(0.007)	(0.002)	(0.007)	(0.005)	(0.005)	(0.007)
Mean Distance to Polling Place	-0.037***	0.001	-0.036**	-0.024**	0.006	-0.023
× % time to work 60min plus	(0.014)	(0.004)	(0.014)	(0.010)	(0.010)	(0.014)
N	165876	174533	165853	86485	85540	84525
y variable mean	0.46	0.02	0.48	0.25	0.29	0.54
R^2	0.291	0.129	0.307	0.242	0.304	0.298

Note: Standard errors clustered at the boundary level.The additional controls are: percent Voting Age Population, percent Democrat, percent Republican, percent Black, percent Hispanic, Median Household Income, percent without a High School Diploma, percent Walk to Work, Travel Time to Work is less than 5 minutes, and Travel Time to Work is more than 60 minutes.

Table 16: The effect of distance to polling place on turnout:Non Linear

	Border FE and additional Controls - PA						Border FE and additional Controls - GA					
	Pri AP	Pri AB	Pri Tot	GE AP	GE AP	GE Tot	Pri AP	Pri AB	Pri Tot	GE AP	GE AB	GE Tot
Mean Dist. to polling location (mi) × 0-0.25	-0.0701***	0.0014	-0.0674***	0.0072	0.0080**	0.0133	-0.0802**	0.0180	-0.0441	-0.1670***	0.1161**	-0.0513
	(0.0124)	(0.0020)	(0.0126)	(0.0184)	(0.0041)	(0.0189)	(0.0364)	(0.0306)	(0.0414)	(0.0575)	(0.0548)	(0.0791)
Mean Dist. to polling location (mi) × 0.25-0.5	0.0194*	-0.0022	0.0167	0.0093	0.0064*	0.0150	-0.0119	0.0146	0.0039	-0.0414*	0.0609**	0.0239
	(0.0107)	(0.0018)	(0.0108)	(0.0159)	(0.0036)	(0.0164)	(0.0163)	(0.0108)	(0.0178)	(0.0244)	(0.0244)	(0.0364)
Mean Dist. to polling location (mi) × 0.5-1	-0.0210***	-0.0013	-0.0230***	-0.0117	-0.0011	-0.0120	-0.0106*	0.0060	-0.0049	-0.0389***	0.0316***	-0.0035
	(0.0069)	(0.0012)	(0.0071)	(0.0103)	(0.0026)	(0.0108)	(0.0059)	(0.0044)	(0.0067)	(0.0091)	(0.0098)	(0.0143)
Mean Dist. to polling location (mi) × 1-2	-0.0162***	0.0007	-0.0158***	-0.0220***	-0.0005	-0.0208***	-0.0004	0.0068**	0.0054	-0.0084*	0.0173***	0.0060
	(0.0049)	(0.0008)	(0.0049)	(0.0071)	(0.0019)	(0.0074)	(0.0034)	(0.0027)	(0.0041)	(0.0050)	(0.0059)	(0.0081)
Mean Dist. to polling location (mi) × 2-3	-0.0043	-0.0009	-0.0048	-0.0034	-0.0028	-0.0041	-0.0004	0.0006	0.0006	-0.0119	-0.0111	-0.0270**
	(0.0085)	(0.0012)	(0.0086)	(0.0124)	(0.0030)	(0.0128)	(0.0053)	(0.0042)	(0.0063)	(0.0077)	(0.0088)	(0.0118)
Mean Dist. to polling location (mi) × 3-5	0.0034	-0.0001	0.0032	-0.0089	-0.0032	-0.0131	-0.0061*	-0.0007	-0.0059*	-0.0127**	0.0095*	0.0007
	(0.0059)	(0.0008)	(0.0060)	(0.0092)	(0.0025)	(0.0096)	(0.0032)	(0.0025)	(0.0035)	(0.0050)	(0.0054)	(0.0077)
Mean Dist. to polling location (mi) × 5 and up	0.0359***	0.0025	0.0385***	0.0227	0.0146*	0.0373**	-0.0018	0.0036	0.0026	-0.0004	0.0058	0.0054
	(0.0134)	(0.0016)	(0.0135)	(0.0156)	(0.0078)	(0.0155)	(0.0024)	(0.0023)	(0.0026)	(0.0037)	(0.0044)	(0.0054)
N	173505	174631	173499	165876	174533	165853	87838	88318	87704	86485	85540	84525
y variable mean	0.16	0.00	0.17	0.46	0.02	0.48	0.14	0.06	0.19	0.25	0.29	0.54
R^2	0.220	0.071	0.222	0.291	0.129	0.308	0.444	0.290	0.557	0.243	0.304	0.298

Note: Standard errors are clustered at the border level. County-Lat/Long refers to latitude and longitude controls, interacted with county fixed effects. The additional controls in Panel C are: percent Voting Age Population, percent Democrat, percent Republican, percent Black, percent Hispanic, Median Household Income, percent without a High School Diploma, percent Walk to Work, Travel Time to Work is less than 5 minutes, and Travel Time to Work is more than 60 minutes.

D Individual level

Table 17: Summary Statistics: Individual Level

	All Pennsylvania		Regression sample		All Georgia		Regression sample	
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Turnout, 2018 primary at polls	18.41	38.75	16.07	36.72	12.30	32.85	11.15	31.48
Turnout, 2018 primary absentee	0.38	6.16	0.30	5.44	4.60	20.95	3.85	19.24
Turnout, 2018 primary	18.79	39.06	16.36	36.99	16.90	37.48	15.00	35.71
Turnout, 2018 general at polls	56.79	49.54	51.27	49.98	25.79	43.75	24.26	42.87
Turnout, 2018 general absentee	2.23	14.78	1.50	12.15	29.76	45.72	25.70	43.70
Turnout, 2018 general	59.03	49.18	52.77	49.92	55.55	49.69	49.97	50.00
Democrat	0.48	0.50	0.67	0.47	0.08	0.27	0.10	0.30
Republican	0.38	0.49	0.20	0.40	0.09	0.28	0.05	0.21
Independent	0.14	0.35	0.14	0.34	0.83	0.37	0.85	0.35
Distance (miles)	0.93	3.72	0.33	0.44	1.66	2.70	0.98	0.82
Demographics								
Population	145.70	220.38	122.71	160.05	337.02	465.12	135.01	195.47
Voting Age Population	115.55	190.53	98.50	148.59	244.13	332.47	106.34	157.12
Percent Urban	0.80	0.40	0.99	0.06	0.75	0.43	0.98	0.15
Percent Black	0.11	0.23	0.30	0.36	0.30	0.33	0.43	0.37
Percent Hispanic	0.05	0.11	0.09	0.17	0.07	0.11	0.07	0.11
Poverty Rate	0.12	0.13	0.21	0.18	0.14	0.13	0.20	0.18
Median hh Income (10k USD)	5.86	2.89	4.46	2.47	5.85	2.89	5.33	3.15
Way to work								
% Car to work	0.85	0.17	0.69	0.23	0.90	0.09	0.84	0.14
% Walk to work	0.04	0.09	0.08	0.13	0.01	0.04	0.03	0.07
% Pub transit to work	0.06	0.12	0.18	0.18	0.02	0.06	0.06	0.10
% Bike to work	0.00	0.02	0.01	0.03	0.00	0.01	0.01	0.02
Time to work								
% time to work 0-5min	0.04	0.05	0.03	0.05	0.03	0.04	0.03	0.05
% time to work 5-60min	0.88	0.08	0.88	0.10	0.88	0.08	0.89	0.08
% time to work 60min plus	0.08	0.08	0.10	0.10	0.10	0.08	0.08	0.08
Observations	8245003		1528321		6980226		258273	

Table 18: Distance Prediction

	Pennsylvania			Georgia		
	(1) All Individual	(2) Blocks in Border FE Sample	(3) Blocks in Border FE Sample	(4) All Individuals	(5) Blocks in Border FE Sample	(6) Blocks in Border FE Sample
Democrat	-0.049***	-0.000	0.000	-0.089***	-0.007*	-0.006
	(0.008)	(0.001)	(0.001)	(0.017)	(0.004)	(0.004)
Republican	0.047***	0.001	0.002	-0.074**	-0.001	0.003
	(0.011)	(0.001)	(0.001)	(0.034)	(0.006)	(0.005)
Population	-0.001	-0.000	-0.000	0.000	-0.001*	-0.001*
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age 18 to 29	-0.042***	0.003	0.002	0.008	0.005	0.006
	(0.010)	(0.002)	(0.002)	(0.014)	(0.008)	(0.007)
Age 30 to 49	-0.039***	0.003	0.002	0.024	-0.003	-0.001
	(0.008)	(0.002)	(0.002)	(0.017)	(0.008)	(0.007)
Age 50 to 64	0.002	0.001	0.001	0.040***	0.001	0.001
	(0.006)	(0.002)	(0.002)	(0.012)	(0.007)	(0.006)
Female	-0.015**	0.000	0.000	-0.016***	-0.001	-0.002
	(0.006)	(0.001)	(0.001)	(0.004)	(0.002)	(0.002)
Voting Age Population	0.001	0.000	0.000	-0.000	0.001**	0.001**
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Percent Black	-0.091	-0.021	-0.022	-0.450***	-0.029	-0.043
	(0.065)	(0.023)	(0.023)	(0.111)	(0.041)	(0.040)
Percent Hispanic	1.416	0.031	0.033	-0.594***	-0.056	-0.052
	(1.110)	(0.025)	(0.025)	(0.144)	(0.081)	(0.078)
Median hh Income (10k USD)	-0.006	0.001	0.000	-0.053***	0.011	0.010
	(0.013)	(0.003)	(0.003)	(0.012)	(0.009)	(0.008)
Poverty Rate	-0.098	-0.023	-0.024	-0.457**	0.121	0.196**
	(0.203)	(0.036)	(0.035)	(0.214)	(0.101)	(0.098)
Cars per Household	0.804***	0.010	0.008	0.880***	0.099*	0.075
	(0.177)	(0.015)	(0.015)	(0.183)	(0.052)	(0.051)
Percent without high school diploma	0.365***	-0.005	-0.005	1.540*	0.099	0.038
	(0.096)	(0.024)	(0.025)	(0.900)	(0.111)	(0.110)
% Walk to work	-0.230*	-0.035	-0.036	-0.729	-0.313	-0.264
	(0.131)	(0.034)	(0.034)	(0.724)	(0.218)	(0.215)
% time to work 0-5min	-1.677***	-0.074	-0.060	-2.580***	-0.686***	-0.437**
	(0.401)	(0.084)	(0.080)	(0.715)	(0.174)	(0.202)
Black nh				-0.028*	0.000	0.001
				(0.016)	(0.004)	(0.004)
Hispanic				-0.022***	0.000	0.001
				(0.008)	(0.008)	(0.007)
White nh				0.028**	-0.008	-0.007
				(0.013)	(0.005)	(0.005)
County FE	X			X		
Border FE		X	X		X	X
County-Lot/Lot			X			X

Table 19: Balance Test: Pennsylvania

	(1) Democrat	(2) Republican	(3) Population	(4) VAP	(5) % male	(6) % white, not hispanic	(7 media inco
Distance (miles)	-0.005***	0.005***	-2.673	-2.028	0.001***	-0.001	0.0
	(0.002)	(0.002)	(4.008)	(3.487)	(0.000)	(0.002)	(0.0
N	1852804	1852804	1852804	1852804	1816640	1816640	1843
y variable mean	0.79	0.79	0.79	0.79	0.79	0.79	0.7
R^2	0.151	0.166	0.711	0.745	0.114	0.928	0.8
	(1) % poverty rate	(2) % no hs diploma	(3) car to work	(4) walk to work	(5) time to work < 5 min	(6) time to work > 60 min	
Distance (miles)	-0.003	-0.002	0.003*	-0.002**	-0.002***	0.000	
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	
N	1844477	1846985	1852459	1852459	1852459	1852459	
y variable mean	0.79	0.79	0.79	0.79	0.79	0.79	
R^2	0.853	0.887	0.911	0.888	0.744	0.751	

Table 20: Balance Test: Georgia

	(1) Democrat	(2) Republican	(3) Population	(4) VAP	(5) % male	(6) % white, not hispanic	(7) media inco
Distance (miles)	-0.004***	0.001	2.197	1.665	0.001	0.009***	0.0
	(0.001)	(0.001)	(4.823)	(3.526)	(0.000)	(0.003)	(0.0
N	590232	590232	590232	590232	564939	564939	5902
y variable mean	0.77	0.77	0.77	0.77	0.77	0.77	0.7
R^2	0.053	0.083	0.566	0.574	0.211	0.803	0.8
	(1) % poverty rate	(2) % no hs diploma	(3) car to work	(4) walk to work	(5) time to work < 5 min	(6) time to work > 60 min	
Distance (miles)	-0.004***	-0.002	0.002***	-0.001	-0.000	0.000	
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	
N	590231	590231	590231	590231	590231	590231	
y variable mean	0.77	0.77	0.77	0.77	0.77	0.77	
R^2	0.788	0.799	0.822	0.815	0.637	0.793	

Table 21: The effect of distance to polling place on turnout: Pennsylvania

	Panel A: Border FE					
	Primary Election			General Election		
	At Poll	Absentee	Total	At Poll	Absentee	Total
Distance (miles)	-0.9302***	-0.0028	-0.9330***	-0.3217***	0.1055***	-0.2162***
	(0.0543)	(0.0075)	(0.0556)	(0.0668)	(0.0158)	(0.0692)
N	8147813	8147813	8147813	8181846	8181846	8181846
y variable mean	18.43	0.38	18.81	56.87	2.24	59.11
R^2	0.026	0.006	0.027	0.038	0.010	0.044
	Panel B: Border FE with Controls					
	Primary Election			General Election		
	At Poll	Absentee	Total	At Poll	Absentee	Total
Distance (miles)	-1.0996***	0.0522	-1.0474***	-0.8643***	0.1610**	-0.7033**
	(0.2696)	(0.0581)	(0.2718)	(0.3326)	(0.0759)	(0.3359)
N	1342562	1342562	1342562	1347194	1347194	1347194
y variable mean	15.88	0.29	16.17	50.86	1.45	52.31
R^2	0.074	0.024	0.075	0.076	0.026	0.083
	Panel C: Border FE with Controls and County-Lat./Lon.					
	Primary Election			General Election		
	At Poll	Absentee	Total	At Poll	Absentee	Total
Distance (miles)	-1.0863***	0.0641	-1.0222***	-0.8586***	0.1714**	-0.6873**
	(0.2656)	(0.0582)	(0.2678)	(0.3155)	(0.0765)	(0.3171)
N	1342562	1342562	1342562	1347194	1347194	1347194
y variable mean	15.88	0.29	16.17	50.86	1.45	52.31
R^2	0.074	0.024	0.075	0.077	0.026	0.084

Note: Distance to polling place measured in miles. Turnout is measured as the number of votes per voting-age population (separately for votes cast at polling places, through absentee ballots, and total). All regressions include Border Fixed Effects (Border FE). County-Lat./Lon. refers to latitude and longitude controls, interacted with county fixed effects. The additional controls in Panels B and C are: Democrat dummy, Republican dummy, Population, Voting Age Population, percent Black, percent Hispanic, median household income, percent without a high school diploma, percent that walk to work, and indicators for whether travel time to work is less than 5 minutes or greater than 60 minutes. Standard errors clustered at the border level are reported in parentheses.

Table 22: The effect of distance to polling place on turnout: Georgia

	Panel A: Border FE					
	Primary Election			General Election		
	At Poll	Absentee	Total	At Poll	Absentee	Total
Distance (miles)	-0.4840***	0.1601***	-0.3240***	-1.0349***	1.5110***	0.4761***
	(0.0412)	(0.0283)	(0.0516)	(0.0601)	(0.0765)	(0.0850)
N	6943121	6943121	6943121	6943121	6943121	6943121
y variable mean	12.31	4.60	16.91	25.81	29.76	55.57
R^2	0.017	0.016	0.023	0.027	0.032	0.029
	Panel B: Border FE with Controls					
	Primary Election			General Election		
	At Poll	Absentee	Total	At Poll	Absentee	Total
Distance (miles)	-0.8063***	0.7284***	-0.0779*	-2.3962***	2.0280***	-0.3682
	(0.1766)	(0.1777)	(0.0416)	(0.3900)	(0.4344)	(0.5043)
N	214881	214881	214881	214881	214881	214881
y variable mean	11.39	3.89	15.28	24.38	25.85	50.23
R^2	0.704	0.244	0.977	0.056	0.165	0.202
	Panel C: Border FE with Controls and County-Lat./Lon.					
	Primary Election			General Election		
	At Poll	Absentee	Total	At Poll	Absentee	Total
Distance (miles)	-0.9012***	0.8007***	-0.1005**	-2.6335***	2.2720***	-0.3615
	(0.1756)	(0.1747)	(0.0441)	(0.4106)	(0.4611)	(0.5363)
N	214881	214881	214881	214881	214881	214881
y variable mean	11.39	3.89	15.28	24.38	25.85	50.23
R^2	0.705	0.246	0.977	0.058	0.167	0.204

Note: Distance to polling place measured in miles. Turnout is measured as the number of votes per voting-age population (separately for votes cast at polling places, through absentee ballots, and total). All regressions include Border Fixed Effects (Border FE). County-Lat./Lon. refers to latitude and longitude controls, interacted with county fixed effects. The additional controls in Panels B and C are: Democrat dummy, Republican dummy, Population, Voting Age Population, percent Black, percent Hispanic, median household income, percent without a high school diploma, percent that walk to work, and indicators for whether travel time to work is less than 5 minutes or greater than 60 minutes. Standard errors clustered at the border level are reported in parentheses.

Table 23: The effect of distance to polling place on turnout: by Race

	Georgia		
	(1) GE AP	(2) GE AB	(3) GE Total
Black nh	4.518***	6.254***	10.772***
	(0.348)	(0.372)	(0.470)
White nh	6.510***	2.899***	9.410***
	(0.325)	(0.323)	(0.375)
Hispanic	5.703***	0.172	5.875***
	(0.684)	(0.620)	(0.783)
Other	0.000	0.000	0.000
	(.)	(.)	(.)
Black nh=1 × Distance (miles)	-1.438***	1.627***	0.189
	(0.201)	(0.241)	(0.243)
White nh=1 × Distance (miles)	-1.365***	1.931***	0.567***
	(0.171)	(0.184)	(0.167)
Hispanic=1 × Distance (miles)	-1.374***	-0.557	-1.931***
	(0.417)	(0.418)	(0.508)
Other=1 × Distance (miles)	-1.397***	-0.318	-1.714***
	(0.200)	(0.214)	(0.229)
N	503692	503692	503692
y variable mean	24.37	27.81	52.18
R^2	0.052	0.162	0.196

Note: Standard errors clustered at the boundary level.The additional controls are: Democrat dummy, Republican dummy, Population, Voting Age Population, percent Black, percent Hispanic, Median Household Income, percent without a High School Diploma, percent Walk to Work, Travel Time to Work is less than 5 minutes, and Travel Time to Work is more than 60 minutes.

Table 24: The effect of distance to polling place on turnout: by Age

	Pennsylvania			Georgia		
	(1) GE AP	(2) GE AB	(3) GE Total	(4) GE AP	(5) GE AB	(6) GE Total
age 18 to 29	-21.237***	-1.346***	-22.583***	2.614***	-19.032***	-16.417***
	(0.267)	(0.068)	(0.261)	(0.416)	(0.448)	(0.534)
age 30 to 49	-13.970***	-1.881***	-15.851***	7.897***	-15.369***	-7.472***
	(0.217)	(0.065)	(0.212)	(0.378)	(0.400)	(0.377)
age 50 to 64	-0.341*	-1.553***	-1.894***	7.008***	-6.771***	0.238
	(0.195)	(0.065)	(0.183)	(0.354)	(0.401)	(0.375)
age 65 and up	0.000	0.000	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)	(.)	(.)
age 18 to 29=1 ×	-3.804***	0.287***	-3.517***	-1.487***	0.272	-1.215***
Distance (miles)	(0.355)	(0.074)	(0.342)	(0.195)	(0.178)	(0.221)
age 30 to 49=1 ×	-0.020	-0.111*	-0.131	-1.000***	1.473***	0.473**
Distance (miles)	(0.264)	(0.063)	(0.258)	(0.179)	(0.177)	(0.192)
age 50 to 64=1 ×	0.058	0.139*	0.197	-1.634***	2.445***	0.812***
Distance (miles)	(0.268)	(0.071)	(0.258)	(0.181)	(0.199)	(0.211)
age 65 and up=1 ×	-0.178	0.621***	0.443	-1.457***	2.026***	0.569***
Distance (miles)	(0.330)	(0.129)	(0.301)	(0.202)	(0.223)	(0.195)
N	1607172	1607172	1607172	503692	503692	503692
y variable mean	51.80	1.64	53.43	24.37	27.81	52.18
R^2	0.105	0.032	0.115	0.055	0.184	0.209

Note: Standard errors clustered at the boundary level.The additional controls are: Democrat dummy, Republican dummy, Population, Voting Age Population, percent Black, percent Hispanic, Median Household Income, percent without a High School Diploma, percent Walk to Work, Travel Time to Work is less than 5 minutes, and Travel Time to Work is more than 60 minutes.

Table 25: The effect of distance to polling place on turnout: by Gender

	Pennsylvania			Georgia		
	(1) GE AP	(2) GE AB	(3) GE Total	(4) GE AP	(5) GE AB	(6) GE Total
Female	3.857***	0.201***	4.057***	2.739***	3.790***	6.529***
	(0.163)	(0.027)	(0.162)	(0.182)	(0.170)	(0.220)
Male	0.000	0.000	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)	(.)	(.)
Female=1 × Distance (miles)	-1.733***	0.107	-1.626***	-1.628***	1.428***	-0.199
	(0.297)	(0.069)	(0.291)	(0.164)	(0.175)	(0.168)
Male=1 × Distance (miles)	0.442	0.126**	0.568*	-1.101***	1.684***	0.583***
	(0.313)	(0.063)	(0.307)	(0.164)	(0.178)	(0.170)
N	1150477	1150477	1150477	502822	502822	502822
y variable mean	53.51	1.66	55.17	24.38	27.82	52.20
R^2	0.076	0.030	0.085	0.050	0.160	0.191

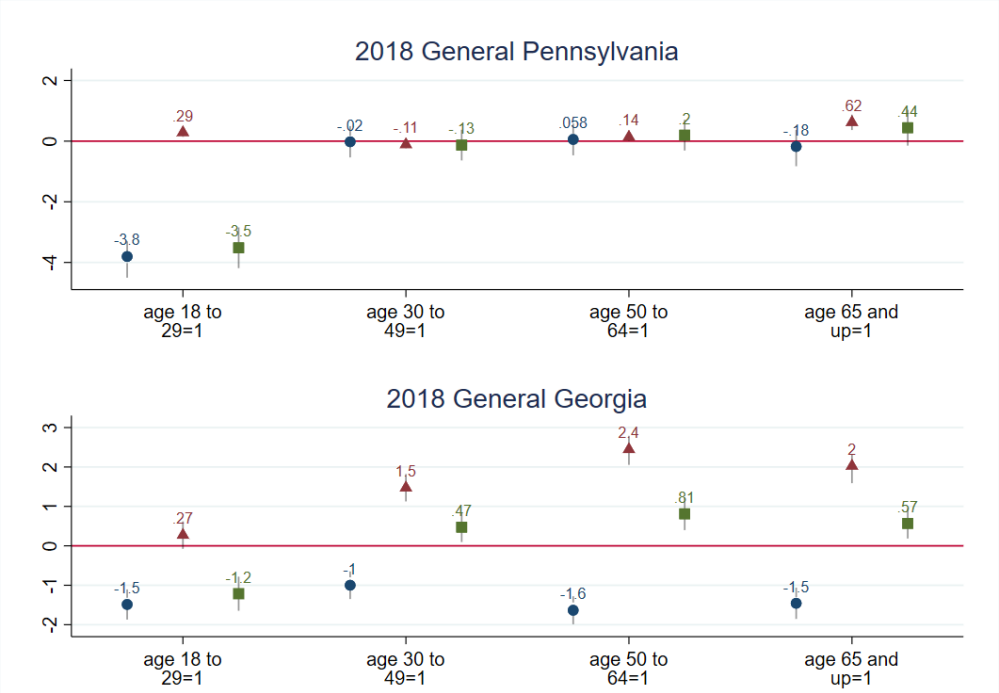
Note: Standard errors clustered at the boundary level.The additional controls are: Democrat dummy, Republican dummy, Population, Voting Age Population, percent Black, percent Hispanic, Median Household Income, percent without a High School Diploma, percent Walk to Work, Travel Time to Work is less than 5 minutes, and Travel Time to Work is more than 60 minutes.

Table 26: The effect of distance to polling place on turnout: by Party Affiliation

	Pennsylvania			Georgia		
	(1) GE AP	(2) GE AB	(3) GE Total	(4) GE AP	(5) GE AB	(6) GE Total
Independent	0.000	0.000	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)	(.)	(.)
Democrat=1 × Distance (miles)	-2.085***	0.201***	-1.884***	-3.443***	2.370***	-1.072***
	(0.279)	(0.071)	(0.270)	(0.307)	(0.311)	(0.223)
Republican=1 × Distance (miles)	1.084***	0.217***	1.301***	-3.061***	2.642***	-0.419**
	(0.276)	(0.084)	(0.266)	(0.276)	(0.282)	(0.171)
Independent=1 × Distance (miles)	-1.299***	0.021	-1.277***	-0.999***	1.327***	0.328*
	(0.299)	(0.073)	(0.300)	(0.155)	(0.173)	(0.170)
N	1607172	1607172	1607172	503692	503692	503692
y variable mean	51.80	1.64	53.43	24.37	27.81	52.18
R^2	0.075	0.028	0.083	0.050	0.158	0.188

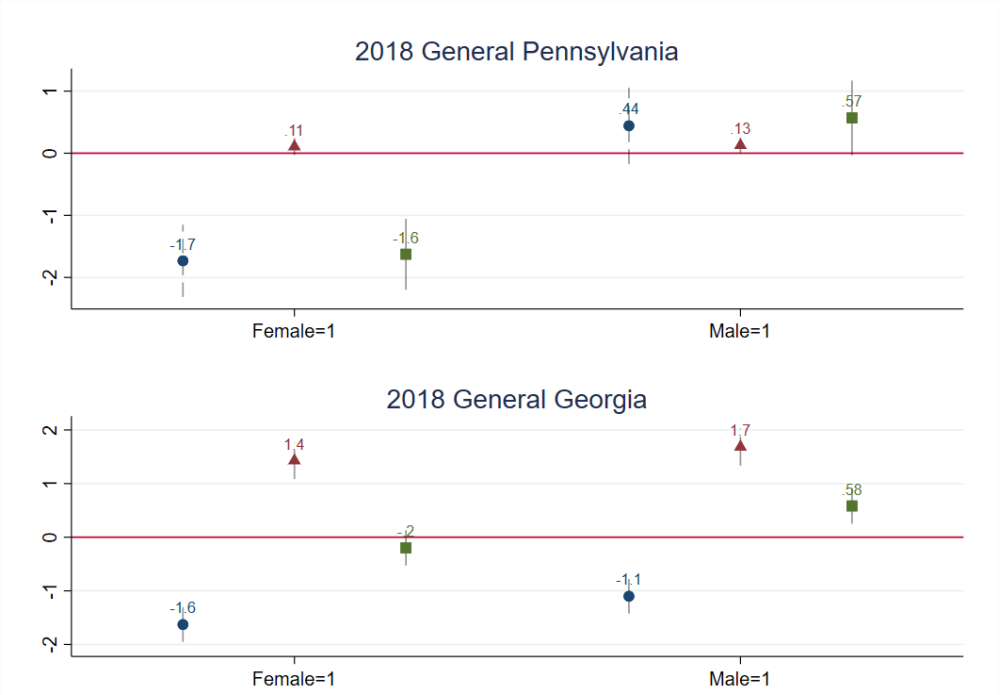
Note: Standard errors clustered at the boundary level.The additional controls are: Democrat dummy, Republican dummy, Population, Voting Age Population, percent Black, percent Hispanic, Median Household Income, percent without a High School Diploma, percent Walk to Work, Travel Time to Work is less than 5 minutes, and Travel Time to Work is more than 60 minutes.

Figure 15: The effect of distance to polling place on turnout: by Age



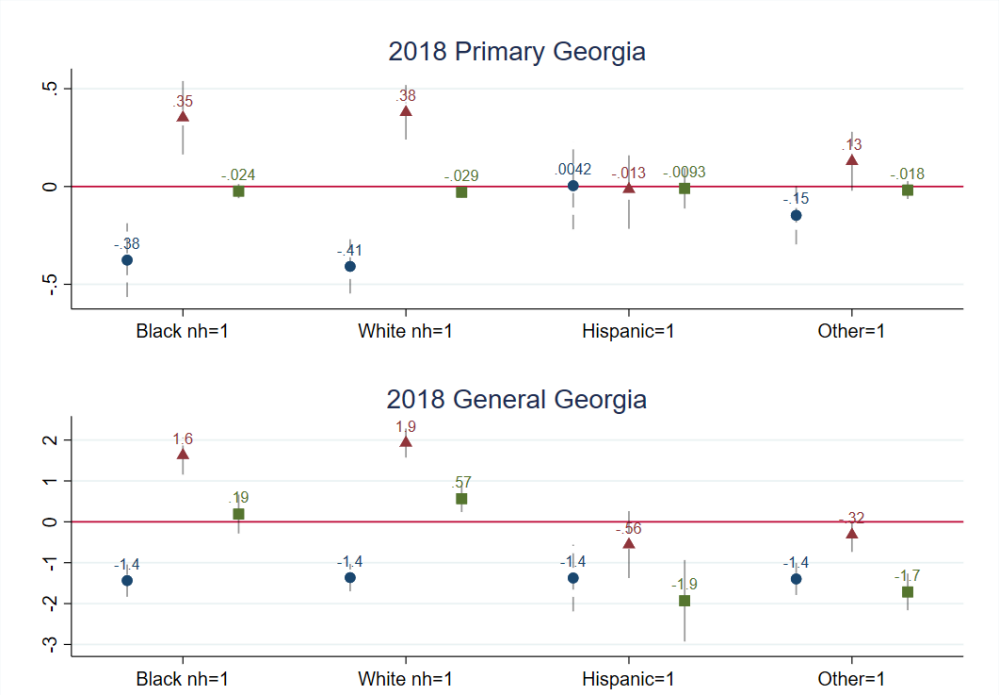
Note: Standard errors clustered at the boundary level.The additional controls are: Democrat dummy, Republican dummy, Population, Voting Age Population, percent Black, percent Hispanic, Median Household Income, percent without a High School Diploma, percent Walk to Work, Travel Time to Work is less than 5 minutes, and Travel Time to Work is more than 60 minutes.

Figure 16: The effect of distance to polling place on turnout: by Gender



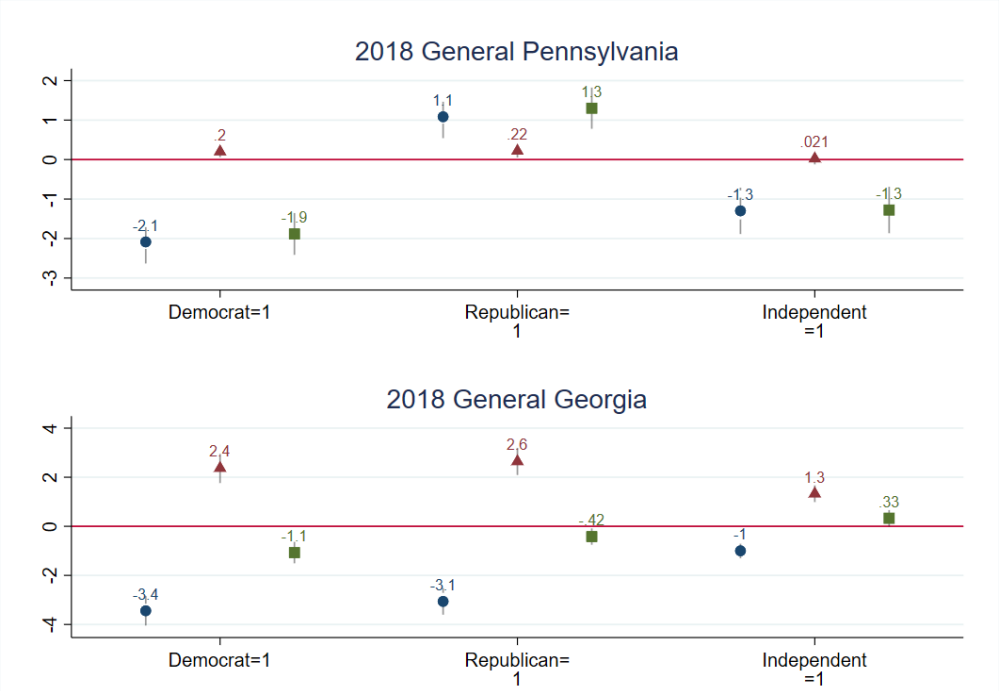
Note: Standard errors clustered at the boundary level.The additional controls are: Democrat dummy, Republican dummy, Population, Voting Age Population, percent Black, percent Hispanic, Median Household Income, percent without a High School Diploma, percent Walk to Work, Travel Time to Work is less than 5 minutes, and Travel Time to Work is more than 60 minutes.

Figure 17: The effect of distance to polling place on turnout: by Race



Note: Standard errors clustered at the boundary level.The additional controls are: Democrat dummy, Republican dummy, Population, Voting Age Population, percent Black, percent Hispanic, Median Household Income, percent without a High School Diploma, percent Walk to Work, Travel Time to Work is less than 5 minutes, and Travel Time to Work is more than 60 minutes.

Figure 18: The effect of distance to polling place on turnout: by Party Affiliation



Note: Standard errors clustered at the boundary level.The additional controls are: Democrat dummy, Republican dummy, Population, Voting Age Population, percent Black, percent Hispanic, Median Household Income, percent without a High School Diploma, percent Walk to Work, Travel Time to Work is less than 5 minutes, and Travel Time to Work is more than 60 minutes.