Evaluating the Impact of Drop Boxes on Voter Turnout

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Abstract

While evidence indicates that voting by mail (VBM) requirements increase voter turnout, there is not much evidence of the impact ballot drop boxes have on voting, despite that fact that voters in VBM states often prefer these boxes over voting via the postal service. This paper examines the impact of the installation of new ballot drop boxes on voter turnout in Pierce County, the second largest county in Washington State. To identify the causal effects of these boxes on the decision to vote, we exploit the randomized placement of five new ballot drop boxes in Pierce prior to the 2017 general election. We find that these additional drop boxes modestly increased voter turnout. Specifically, the likelihood of those voters located near one of these new drop boxes to vote, increased; and the more the new drop box reduced a voter's distance to his or her nearest drop boxes, the larger was the increase in probability that that voter would vote in the 2017 general election. For the group of voters affected by the new drop boxes, the mean change in reduced distance to their nearest drop box was 1.32 miles. We estimate for this voter, their probability of voting increased by 0.7 percentage points.

Acknowledgements: This project was funded by a grant from the Massachusetts Institute for Technology's Election Data and Science Lab.

Keywords: Voter Turnout; Vote by Mail; Drop Box; Accessibility

1. Introduction

Voter turnout in the United States lags behind most other developed democracies. In a 2018 report by the Pew Research Center, the United States ranks 26th out of 32 developed countries in turnout among the voting age population (VAP); in no national election since 1968 has had a VAP turnout above 60 percent (DeSilver 2018). Midterm and off year elections experience even lower turnouts; for example, in Washington State, VAP turnout in the 2016 Presidential election was 60.5%, but for the 2014 mid-term election it was only 39.5% (Washington Secretary of State 2017).

Among the many options for increasing voter turnout in the U.S., one popular approach is to increase the ease of voting. Indeed, research shows that the traditional method of voting in the U.S. – in person voting at a precinct location on a pre-defined day – deters many from voting. No-excuse absentee voting, early voting and vote-by-mail all represent different measures voting jurisdictions are taking to make voting easier and increase the voting ranks. Of these, vote by mail (VBM) removes the most barriers to voting. In VBM jurisdictions, voters do not need to request an absentee ballot, as they do with no-excuse absentee voting; instead, all registered voters receive their ballot in the mail.

While the effect of VBM provisions on voter turnout has been studied extensively, little research exists on the impact of providing citizens in VBM jurisdictions with the alternative option of voting via drop boxes. Drop boxes are large, secure boxes where voters can drop off their ballots instead of mailing them in. All VBM states (currently Washington, Colorado and Oregon) require some provision for voting via drop boxes, and experience with these boxes shows that many voters choose them over the mail. For instance, in Washington State, 57

percent of the 3.4 million votes cast in the 2016 general election were placed in one of the state's 314 drop boxes (Washington Secretary of State, 2017a). These drop boxes provide several potential advantages over the mail in option. First, one can vote without the expense or inconvenience of acquiring a postage stamp. Second, some may find drop boxes to be a more trustworthy or secure way to vote since they reduce the number of hands through which a ballot passes before it is counted. For these two reasons, drop boxes may encourage more people to vote. The presence of drop boxes, often placed in high traffic areas and embossed with bold pro-voting graphics and quotes from famous individuals encouraging civic participation,[1] may additionally increase voting by serving as a visual reminder to vote.

The demise of the traditional in person precinct voting, and the range of alternatives now in practice across the U.S., makes it especially important to understand the relative impact these alternatives have on voting behavior. One important question within VBM states and in states considering this move, is the extent to which drop boxes should be made available to voters. While they have already proven popular, they are also expensive to install and maintain. A recent law passed by the Washington State Legislature requiring counties to install about 220 additional drop boxes across the state has met with opposition by the county officials who must fund these boxes (Cornfield 2018).

To better understand the effect that drop boxes have on voting behavior, we previously examined the effect that a large expansion in their numbers had in King County, Washington State's largest county. We found that this expansion did increase voter turnout in primary and off-year elections, but not in the 2016 Presidential election (Collingwood et al. 2017).

This study builds on our prior research by investigating the effect an expansion in the number

[1] For instance, one in Pierce County includes this quote attributed to Alice Walker, "The most common way people give up their power is by thinking they don't have any."

of drop boxes has had in Washington State's second largest county, Pierce County. Prior to the 2017 general election, Pierce added five additional drop boxes, increasing the county wide total from 36 to 41. Compared with our analysis of King County, where the number of drop boxes grew from 10 to 43, this study examines the effect of a more marginal increase in drop boxes, one also corresponding with much less publicity surrounding these additional drop boxes, as they were placed to serve a small share of the county's voters. Unlike King County, our present study takes place in a county where new drop boxes are not the novelty they were in King, as drop boxes in Pierce have been around for seven years, and a large share of the county's voters already use them in each election.

Aside from these contextual differences, this study improves on our prior examination of the effect of drop boxes on the decision to vote by employing a more robust experimental design. In Collingwood et al. (2017), the new drop boxes locations were determined by election officials. This means that we could not ensure that the selection of sites was independent of the turnout effect; thus, the increase in turnout we measured in that study could possibly have been due to changes in the voting behavior associated with the location of the new boxes, rather than to the new boxes themselves.

By contrast, this study more convincingly identifies the causal effect of drop boxes. In Pierce County, election officials identified six sites as potential locations for a new box. According to County officials, all six sites had equally strong cases for a new box based on nearby residents' proximity to other drop boxes, and turnout rates in the surrounding community. Yet the county only had resources to install boxes in five of the six locations. Working with county election officials, we randomly selected one of the six potential sites to *not* receive a new drop box for the 2017 general election. This unselected site became our "Placebo" location, with

the other five our "Treatment" locations. This experimental design – voters near the Placebo location serving as a control to those near the Treatment locations – allows us to assess the voting behavior of those served by the five new drop boxes by comparing their voting behavior with those in the Placebo group. The comparison improves our ability to assess the causal effect of a new, closer drop box to a voter's residence. If those located near a new box are more likely to vote in comparison with those near the Placebo box, we can be more confident that the effect is due to the box, rather than the location. This method helps ensure that any measured increase in turnout is due to the new box rather than the characteristics of the locations chosen, a possibility we were not completely able to rule out in our previous study.

2. Background

Since voting laws and policies are enacted and enforced primarily at the state rather than the federal level, voting practices in the United States are influenced by a range of different policies. While some states have imposed greater restrictions on voting through stricter voter ID laws, many others have sought to reduce or eliminate geographic distance or other barriers to voting to increase voter turnout No excuse absentee voting, early voting, Election Day Voting Centers, and vote-by-mail laws have all been enacted to reduce barriers to participation with the hope that higher turnout rates would result. Twenty-seven states currently allow no-excuse absentee voting, which allows anyone to request an absentee ballot without disclosing the reason for this request (NCSL 2017). In 2012, the Pew Research Center estimated that 36 percent of voters, or more than 46 million people, cast their ballots in some way other than through a traditional polling location (Desilver and Geiger 2016). Similarly, the number of ballots cast by mail has

increased from 10 percent in 2000 to 20 percent in 2012 (Green and Ueyama 2015). Research finds that institutional factors and distance to voting locales can make voting more difficult and reduce the likelihood of voting (Dyck and Gimpel 2005; Brady and McNulty 2011; Gimpel and Schuknecht 2003), especially among low-propensity voting populations (Barreto, Nuno, and Sanchez 2009; Rosenstone and Hansen 1993). This in turn can affect political representation, since policymakers tend to pay the most attention to those who vote (Gilens 2012; Mayhew 1974). Demographically, voters in the United States tend to be older, more educated, wealthier, and white, and this tends to be reflected in the policy priorities of politicians (Bartels 2009; Wolfinger and Rosenstone 1980).

Three states have gone the furthest in reducing barriers to voting by eliminating polling stations altogether and moving entirely to a vote-by-mail (VBM) system. Washington, Colorado, and Oregon now conduct all elections by mail and all registered voters receive a ballot, which they can then return by mail or deposit into a secure drop box. Prior research on the effect VBM has had on turnout has found that it increases turnout, though the effect has been dependent on the type of election, demographic group, and novelty of VBM (Gronke et al. 2008; Gronke & Miller 2012; Hamilton 1988; Jeffe & Jeffe 1990; Karp & Banducci 2000; Kousser & Mullin 2007; Magleby 1987; Mutch 1992; Rosenfeld 1995; Southwell & Burchett 1997; Southwell & Burchett 2000; Southwell 2016). As with Collingwood et al. (2018) many of these studies have found that VBM has the largest impact in non-presidential elections, where turnout is lower, allowing for changes in policy like a shift to VBM to have a larger overall effect. Many of the above studies have also found that VBM tends to increase participation among those groups that are already highly represented in the electorate (older, wealthier, more educated white voters).

While the above research shows that VBM does eliminate some impediments to voting, it may not reduce them all, and could even create some new ones. Most VBM jurisdictions require voters to stamp their own ballot. While perhaps a minor cost, this could reduce the likelihood of voting, especially if individuals do not have postage on hand. The need for a stamp could prove an impediment, especially to low-propensity and young voters. Additionally, some voters may be concerned about passing their ballot to election officials via third parties (the USPS), and via a delivery system not designed to ensure the security and safety of their ballot.

It is perhaps these concerns that explain why all VBM states have some drop box requirement. Oregon State has over 300 such boxes (Kreisling 2018), and Washington State has 371 (Washington State Secretary of State 2017b). These boxes are available 24/7 for over two weeks before election day and are usually placed in high traffic areas. When available, drop boxes prove to be a popular way to vote. In Washington's 2016 general election, for instance, more than 50 percent of the state's ballots were returned via these drop boxes. Yet to date, little attention has been paid to whether drop boxes improve turnout in VBM jurisdictions. The one exception is a previous study in King County, Washington (Collingwood et al. 2018). In that study we found that a very large expansion of drop boxes increased voter turnout, and more importantly that the distance between a voter and their nearest drop box location affected their likelihood of casting a ballot. The greatest effect we identified was for primary and off-year elections, with the location of drop boxes having little effect on voting during the presidential election. An important shortcoming of this earlier study, however, was that the placement of the new drop boxes in King County was not random, and thus their location may not have been exogenous to predicted voter behavior. If King County officials targeted areas for drop boxes based on expected changes in turnout, then it would be difficult to separate out the effect of drop

boxes on turnout from the location where these drop boxes were installed. Our results may have overstated the impact of these boxes on voting choices.

In this study, we address this potential shortcoming by exploiting a randomized placement of five new drop boxes in Pierce County Washington, among a set of six pre-determined locations, all of which were identified using the same selection criteria. As described in greater detail below, this experimental design allows us to identify the causal effect of drop boxes by comparing voters near our "Placebo" box with those near the five new drop boxes, which forms our "Treatment" group. Even if Pierce County officials had chosen the potential locations based on expected changes in turnout, this would not affect comparisons between those in our Treatment group versus the Placebo group.

Policymakers in VBM states have increasingly relied on drop boxes for vote delivery, under the assumption that the greater availability of these boxes will improve turnout. In 2017 the Washington State Legislature passed a law mandating counties to expand the number of their drop boxes, stipulating that each county maintain at least one box for each 15,000 voters, with additional requirements for the dispersion of these boxes. This new law requires counties across the state to install an additional 220 new boxes (Washington State Secretary of State 2017b). With the same motive of encouraging more to vote, the following year Washington's Governor authorized the funding of stamped ballots for the 2018 primary and general elections (Connolly 2018). This measure will cost taxpayers an estimated $2 million per year. Given the high cost of both policy options – more drop boxes and stamped ballots – as well as their potentially substitutability as measures to enhance voter turnout, it is important to gain a fuller understanding of the effect each has on voting choices.

3. Pierce County and Drop Boxes

Pierce County has over 800,000 residents and has the second largest population in Washington behind King. The county seat is Tacoma; with more than 200,000 residents and Tacoma is Pierce's largest city. Pierce forms the southern portion of the larger Seattle-Tacoma-Bellevue metropolitan area. It is geographically large and diverse, rising from sea level to 14,411-foot Mt. Rainier. It has over 476 people per square mile, which is about half the population density of nearby King County (where Seattle is located). Over the last few decades, Pierce has been transitioning toward a service-based economy, and a large share of its residents now commute to jobs in neighboring King County. The county encompasses the Port of Tacoma and the Joint Base Lewis-McChord military base, both of which form important components of the local economy. Compared with King County, Pierce residents live in more suburban locales, are less racially diverse, face longer commutes, are more likely to be in the military, and tend to vote less often.

In terms of elections, Pierce has over 500,000 registered voters (Washington State Secretary of State 2017b). Washington's Governor is elected during the midterm election, while the Pierce County Executive is elected during presidential elections. Other elections for county positions occur during one of these two elections cycles. During off year elections, mayors and city council positions are on the ballot, as well as positions in other local districts, such as school boards, and fire, park, water and school districts. As Figure 1 shows, over the last two decades, the share of voting age residents who are registered has ranged from 65 to 75 percent. Turnout, defined as the share of registered voters who cast a ballot, is typically around 75 percent during Presidential elections; between 50 and 65 percent during mid-term elections, and range from 35

to 50 percent during off year elections (Figure 1). In the 2017 general election, turnout was only 28.3 percent, putting Pierce second place for the lowest countywide turnout in Washington state, with statewide turnout at 35.6 percent (Washington State Secretary of State, 2017).

Figure 1 here

Pierce County currently has 35 drop boxes located throughout the county. The oldest three drop boxes date to 2009, with two more added the following year. In 2011, Pierce became a VBM jurisdiction, and that year the county added 16 new boxes. Since then, each year at least one box has been added, with the largest number of new boxes (5 boxes) installed in 2017. These five boxes brought the county-wide total to 35. Pierce boxes are all open 24/7 beginning 18 days before each election. In their selection of new drop box locations, county officials are deliberate and open, and consider community input into their locational decisions. According to county documents (Rooney 2018), site selection is based on:

1. Proximity to population centers and density, ballot drop-off users, and major traffic corridors;
2. Familiarity of locations for a majority of the population;
3. Access to public transportation routes;
4. Accessibility features of the sites for voters with disabilities;
5. Availability of parking and adequate traffic flow;
6. Ability to maintain consistent locations for all countywide elections;

7. Ability to partner with a public organization with stable community ties. These partners include transit centers, park and ride lots, police stations, city halls, libraries and fire stations; and
8. Socio-economic indicators such as income and ethnicity.

Since 2014, over 50 percent of the votes cast in Pierce County have been delivered via one of the county drop boxes. Figure 2 shows the location the county's 35 current drop boxes, including the five new ones. Because of the recent expansion, 98 percent of all registered voters in Pierce now live within five miles of one of these drop boxes.[2]

Figure 2 here

4. Data and Methodology

To identify individuals in our Treatment and Placebo groups, we first calculated the distance between every Pierce County voter's home address and each of the County's 35 ballot drop boxes, plus the one Placebo drop box.[3] A voter was assigned to the Treatment group if their nearest drop box in 2017 was one of the five installed during the 2017 expansion. A voter was assigned to the Placebo group if their closest drop box would have been the box we randomly chose not to be installed (the Placebo drop box). We identified 55,835 voters who lived closest to one of the five new drop boxes in Pierce, who constitute our "Treatment" group. We also

[2] Figure 3 showing the location of the five new boxes is forthcoming.
[3] These distances are calculated "as the crow flies." This procedure also maintains the assumption that individuals interact with the ballot drop box closest to their home address. This may not be the case and is an important question for future study.

identified 10,607 voters as being closest to the Placebo box, and this group became our set of "Control" voters. Table 1 contains summary statistics for both the Treatment and Control groups. For the Treatment group, we're interested to know if their changed proximity to a drop box influences their propensity to vote. To know this, we first need to know how much closer each "moved" to a drop box. We calculate the change in distance to the nearest drop box as the difference between the number of miles to the nearest drop box prior to 2017 and the number of miles to the nearest drop box in 2017.[4] Note that the change in distance is zero for all individuals close to the Placebo box. This group serves as a control because according to county officials, the underlying characteristics of this community and their voting record was nearly identical to those in the Treatment group – something that cannot be said of the rest of Pierce County voters, which is why this larger pool of voters was not used as the Control group instead of those in the "Placebo" condition.

Table 1 here

Table 1 reveals that over the last three general elections (2015, 2016, and 2017), an average of 44 percent of those individuals in the Placebo group voted, while those in the Treatment Group were slightly less likely to vote: on average 41 percent of them voted during these elections. Table 1 also shows some differences in sociodemographic characteristics between our Treatment and Control (Placebo) groups. The placebo group has a significantly higher average income (p=0.00) and a greater proportion of men (p=0.00). The treatment group has a greater proportion of East and South Asians (p=0.00), Europeans (p=0.00), and "other"

[4] For simplicity, we estimate our models using the absolute value of the change in distance. A large positive value indicates a large decrease in distance to the nearest drop box.

ethnicities, while the Placebo group has a greater proportion of Hispanic (p=0.00) and black (p=0.00) voters. Individuals in the Treatment group also on average were 1.32 miles closer to a drop box in 2017 than they had been in 2016. This change of distance for each member of the Treatment group is, essentially, their "treatment".

The randomization described above, where similar communities were randomly assigned to receive or not receive a closer drop box, allows us to estimate the causal effect these new drop boxes had on the propensity to vote in 2017. We are able to do so as long as individuals within our Treatment and Placebo groups exhibited similar past voting behavior and trends. As discussed above, for those in our Treatment groups, we define their "treatment" to be the change in distance he or she experienced to the nearest ballot drop box caused by the addition of the new five new boxes.

Because the randomization occurred between communities rather than individuals, and because of some differences in individuals within those communities (see Table 1), it t is important that our empirical methodology controls for differences in the sociodemographic characteristics of those in the treatment versus control groups, as these are commonly associated with the propensity to vote. Thus, to identify the causal effect of a change in distance to the nearest ballot drop box, we must control for these differences. To do so, we estimate a difference-in-difference model:

$$Vote_{i,t} = \alpha_0 + \alpha_1 \Delta Distance_i + \alpha_2 Year2017_t + \alpha_3 \Delta Distance_i * Year2017_t + \gamma_i + \tau_t + \varepsilon_{i,t} \quad (1)$$

- $Vote_{i,t}$ equals one if individual *i* who was registered to vote in year *t* (= 2015, 2016, or 2017) cast a ballot in that year's general election, and zero otherwise

- $\Delta Distance_i$ represents the change in distance to the nearest drop box experienced by individual *i* following the 2017 expansion.
- $Year2017_t$ is equal to one if the observation is from the 2017 general election, after the ballot drop box expansion
- γ_i and τ_t are individual and year fixed effects, respectively

The causal effect of the ballot drop box expansion is captured by α_3, the coefficient on the interaction between $\Delta Distance_i$ and $Year2017_t$. This coefficient quantifies the average difference between individuals in the "treatment" and "placebo" groups in terms of the change in likelihood of voting between 2017 and the two prior election years. If there is a drop box effect, this coefficient will be positive and statistically significant, indicating that those in the treatment group were more likely to vote in 2017 than were those in the Placebo group, controlling for the past voting history of both groups.

To interpret any such difference identified between those in the two groups as the causal effect of the additional ballot drop boxes, we need only maintain the assumption that the "treatment" and "placebo" groups would have exhibited similar trends in voting if the ballot drop box expansion had not occurred – that is, we must assume that the change over time in turnout between the two groups would have been the same without the drop box. The design also implicitly controls for differences in the level of voter turnout caused by time-invariant individual characteristics, including all of those described above.

Ideally, we would estimate (1) using a conditional (or fixed effects) logit because the dependent variable ($Vote_{i,t}$) is binary. We instead estimate (1) using a linear probability model (LPM). This is because the conditional logit drops all individuals in the sample who do not

exhibit variation in the dependent variable over time. In our data set, that means it excludes all individuals who always voted or who never voted, or 47 percent of our sample. For this reason, we employ a linear probability model to avoid this reduction in sample size, and the biases introduced by it.[5] Moreover, since our purpose is to estimate marginal rather than overall effects, using an LPM instead of a conditional logit should not bias our estimates.

Estimating a difference-in-difference model as in (1) requires that the data satisfy the so-called parallel trends assumption. Identifying the causal effect of a treatment requires that there be no systematic differences between the treatment and placebo control groups in terms of the change in voter turnout over time. If the voters in the treatment group had been increasing their propensity to vote faster than were those in the placebo group before the boxes were installed, it would be difficult to attribute any higher turnout among the Treatment group to the new drop boxes. Figure 4 shows the mean levels of voter turnout for the placebo and treatment groups in the 2015, 2016, and 2017 general elections.

Figure 3 Here

As Figure 4 shows, the treatment and placebo groups display similar trends. If anything, the placebo group exhibited faster growth in voter turnout between 2015 and 2016. As an additional check, we estimated (1) identifying 2016 (incorrectly) as the treatment year. A positive and statistically significant coefficient on $\alpha 3$ would be evidence that the two groups have different turnout trends that will exaggerate the causal effect of the new 2017 drop boxes on

[5] We estimated (1) using a conditional logit and found that the results were very similar to those for an LPM with an equivalent 47 percent restriction in the sample size. The results were also very different from our unrestricted LPM, but we take this difference to be an artifact of the selection bias introduced by the conditional logit model due to its requirement of variation in voting choices over time.

turnout. The results of this analysis are shown in Table A1 in the appendix. As shown there, this simulation shows no significant difference in the change in voter turnout between the placebo and treatment groups between the years 2015 and 2016, findings that support the parallel trends assumption necessary for isolating out the causal effect of the drop boxes.

5. Results

Table 2 presents the full LPM difference-in-difference estimation results. Column 1 in Table 2 reports the treatment effects based on the LPM specification including the individual fixed effect (γ_i) as in equation (1).[6] The results indicate that the reduction in distance to the nearest drop box caused by the 2017 drop box expansion increased the probability of voting in the Treatment group, although the magnitude of this effect is fairly small. Decreasing a voter's distance to their nearest drop box by one mile increases their likelihood of voting by 0.56 percentage points.

Column 2 in Table 2 includes interaction terms with age, income, gender, and ethnicity. These interactions allow us to investigate if the average treatment effect identified in column (1) differs among individuals with different sociodemographic characteristics. Contrary to the finding in Collingwood et al. (2018), where we found that the expansion of drop boxes in King County led to higher turnout among those with higher income levels, here we find significant smaller treatment effects among those with higher incomes in Pierce County.

Table 2 Here

[6] The full set of parameter estimates are reported in Table A2 in the appendix.

To show the magnitude of our findings, we use them to simulate the effect of new drop boxes and the propensity to vote. Using the parameter estimates from column (2) of Table 2, we predict the likelihood of voting in the 2017 general election if those in both the Placebo and Treatment groups experienced the mean level of change in distance to their nearest drop box (that is, their closest box moved 1.32 miles closer). Then we use the same parameter estimates to predict the likelihood of voting in the 2017 general election if every voter in the estimation sample experienced no change in their distance to the nearest drop box. Figure 5 displays the results of this simulation for the average voter in our sample. As shown, the average untreated voter in our simulation had a probability of voting of 25.8 percent; once we place everyone 1.32 miles closer to a drop box, we predict that the probability of voting (or alternatively, turnout for the group of a whole) rises to 26.3 percent, for a .56 percentage point increase.

Figure 4 here

Figure 5 is simply another way to visualize the parameter estimate in column (1) of Table 2. However, we are also interested in how the exposure to a new drop box changed the profile of the average voter in terms of age, income, gender, and ethnicity. These are illustrated in Figures 6, 7, 8, and 9, respectively.

Figures 5, 6, 7, and 8 here

By age, we see an increase in turnout among all age groups, with the smallest in the 32-43 age range. By income, we see increases in every income quintile except the second highest bracket. These voters become less likely to vote. We see similar increases in turnout for both men and women. Finally, we see significant increases in turnout for every ethnic/racial group except those from East and South Asia, with the new drop boxes causing especially large increases in turnout among black voters in the Treatment group. This is again a divergence from the findings in King County, where the expansion of boxes seemed to have little if any effect on turnout among minority groups. It should be noted that the differences across sociodemographic groups in the simulation do not necessarily indicate significant differences in group-specific marginal effects. Those results are shown in column (2) of Table 2. This exercise is similar to comparing summary statistics for two possible states of the world: one in which every voter was exposed to a new drop box, and one in which no voters were exposed to a new drop box.

6. Conclusions

Overall, our findings support the positive effect that drop boxes have on voter turnout, though the effect is not a significantly large one. The findings of the current study, as well as our previous one of King County (Collingwood et al. 2017), both show that decreasing the distance of a voter to their nearest drop box increases their likelihood of voting. While the overall effect on turnout was small, it is nonetheless significant because of the low turnout the United States (and WA) tends to see in non-presidential elections. Because Pierce County also tracks the drop box that voters use, we are also planning to examine whether voters do in fact use the one closest to their home, or if they are instead choosing to use ones that are perhaps closer to work, schools, or retail areas. Additionally, Washington state will, in 2018, move to pre-stamped ballots,

removing yet another barrier to participation. In future research we plan to examine the role that this change has on drop box use and voter participation.

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Table 1
Summary Statistics

Placebo Group	**n=10,607**			
Variables	**Mean**	**Std. Dev.**	**Min**	**Max**
Voter Turnout	0.44	0.50	0	1
ΔDistance	0	0	0	0
Age	48.49	16.50	17	100
East and South Asian	0.05	0.21	0	1
European	0.87	0.34	0	1
Hispanic and Portuguese	0.05	0.22	0	1
Black	0.002	0.05	0	1
Other	0.03	0.17	0	1
Income	$111,312.50	$47,986.83	$6,000	$250,000
Female	0.51	0.50	0	1

Treatment Group	**n=55,835**			
Variables	**Mean**	**Std. Dev.**	**Min**	**Max**
Voter Turnout	0.41	0.49	0	1
ΔDistance	1.32	1.43	0.00001	7.32
Age	48.82	17.90	17	100
East and South Asian	0.04	0.20	0	1
European	0.86	0.35	0	1
Hispanic and Portuguese	0.07	0.25	0	1
Black	0.01	0.11	0	1
Other	0.02	0.14	0	1
Income	$79,490.25	$41,884.06	$6,000	$250,000
Female	0.52	0.50	0	1

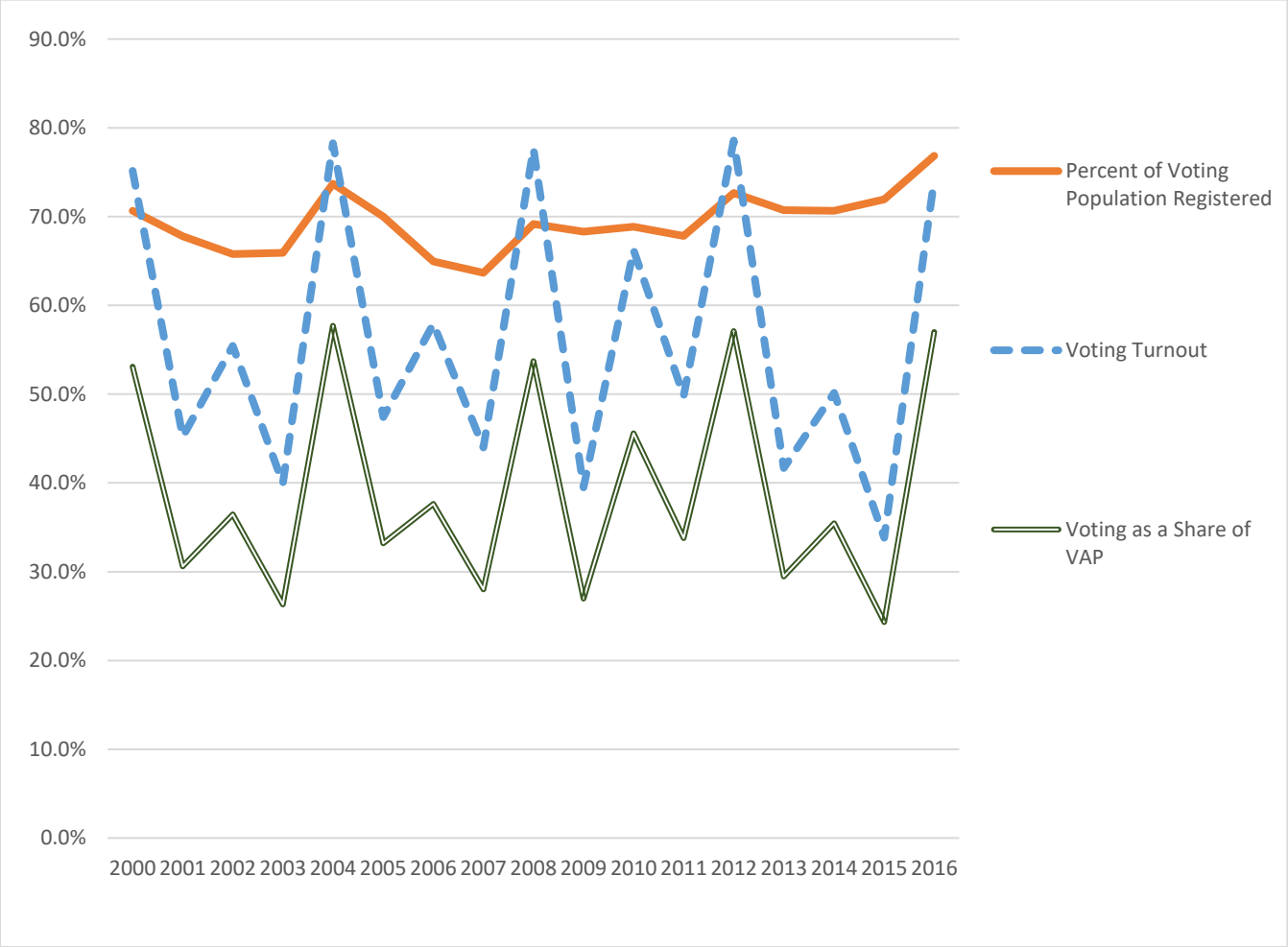
Table 2
Treatment Effects Derived from LPM Difference in Difference Model

Treatment Effects	(1) Base Model		(2) By SDG Group	
	Coeff.	P-val	Coeff.	P-val
Main Effect	0.0056***	(0.0000)	0.0139	(0.2129)
Age 26-31			-0.0052	(0.3824)
Age 32-36			-0.0033	(0.5976)
Age 37-42			-0.0161***	(0.0092)
Age 43-48			-0.0044	(0.4874)
Age 49-54			-0.0023	(0.7169)
Age 55-59			0.0051	(0.4215)
Age 60-65			-0.0019	(0.7613)
Age 66-73			0.0031	(0.6068)
Age 74+			0.0033	(0.5701)
Income $35,832-$51,000			-0.0116**	(0.0224)
Income $51,041-$60,881			-0.0168***	(0.0034)
Income $60,999-$72,000			-0.0085*	(0.0677)
Income $72,064-$77,860			0.0063	(0.3190)
Income $77,875-$85,624			-0.0141***	(0.0031)
Income $85,702-$96,000			-0.0179***	(0.0004)
Income $96,081-$115,341			-0.0278***	(0.0000)
Income $116,000-$131,000			-0.0122**	(0.0178)
Income $132,000			-0.0155***	(0.0045)
Female			-0.0014	(0.5505)
European			0.0073	(0.4335)
Hispanic and Portuguese			0.0031	(0.7733)
Black			0.0137	(0.4533)
Other			0.0016	(0.8955)
Observations	332,210		332,210	
R-squared	0.2145		0.2185	
Number of Individuals	66,442		66,442	

Notes:

- The omitted age decile is 17-25
- The omitted income decile is $6000-$35,768
- The omitted ethnicity category is “East and South Asian”
- Marginal effects for specific sociodemographic groups are found by adding the group’s coefficient to the “Main Effect” coefficient
- Robust pval in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Figure 1: Pierce County Washington Voting Statistics, 2000-2016



Source: Washington State Secretary of State's Office.

Figure 2: Location of All Drop Boxes in Pierce County (2018)

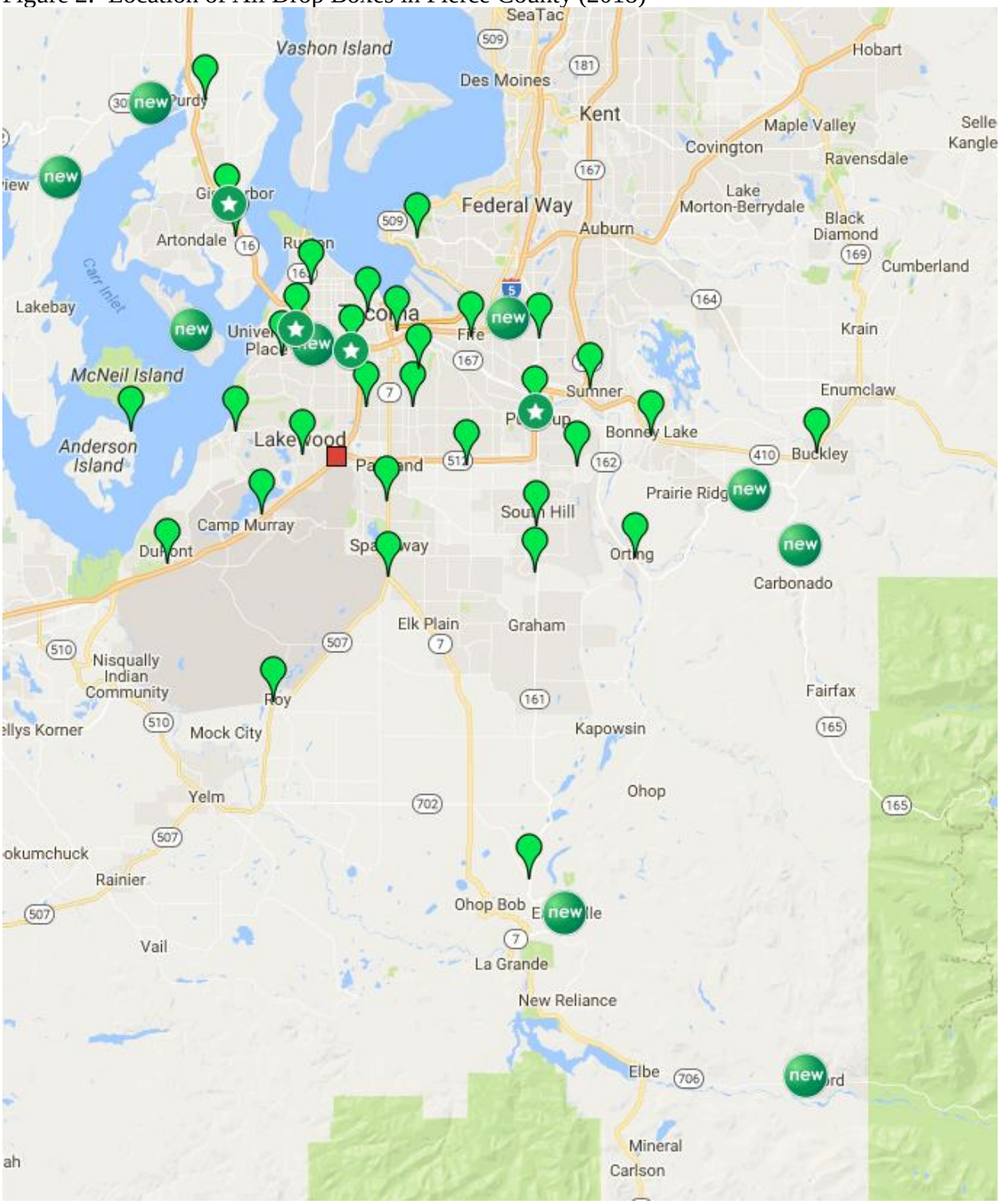


Figure 3
Treated vs. Placebo General Election Voter Turnout Trends

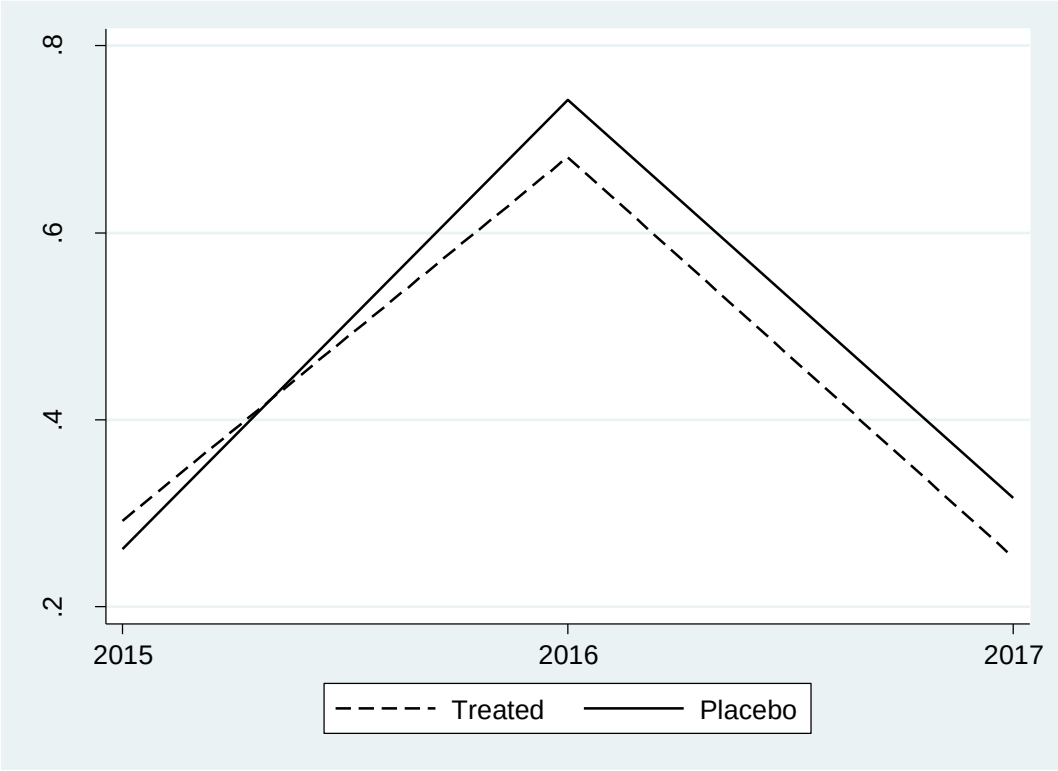
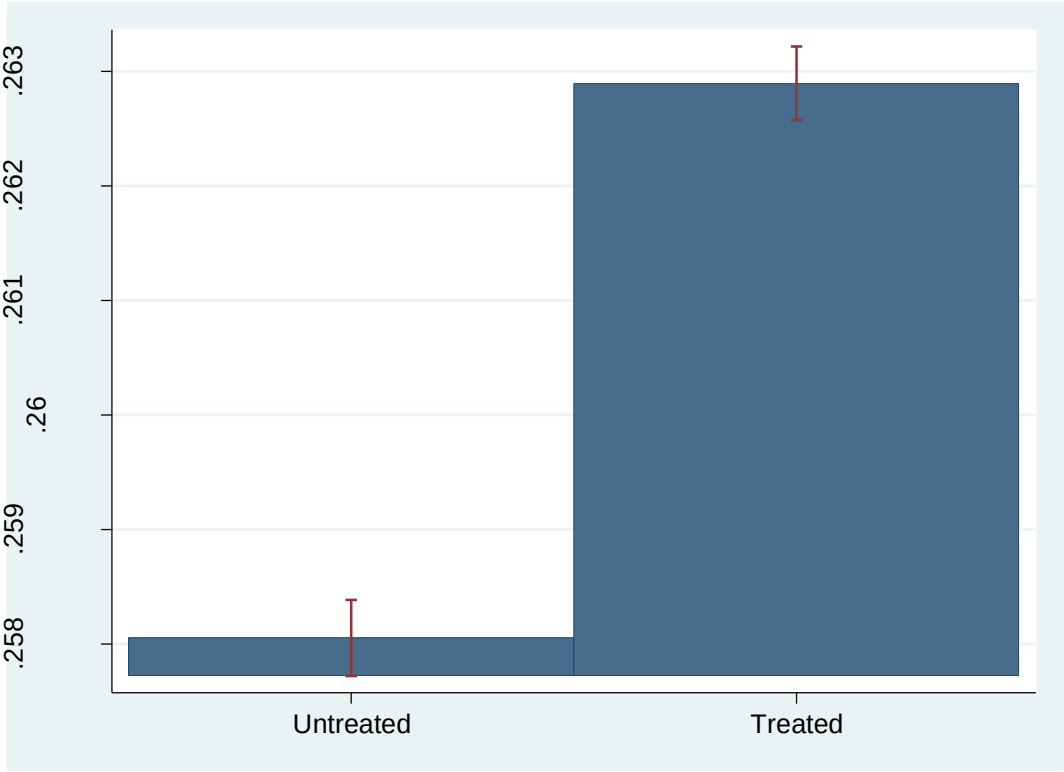
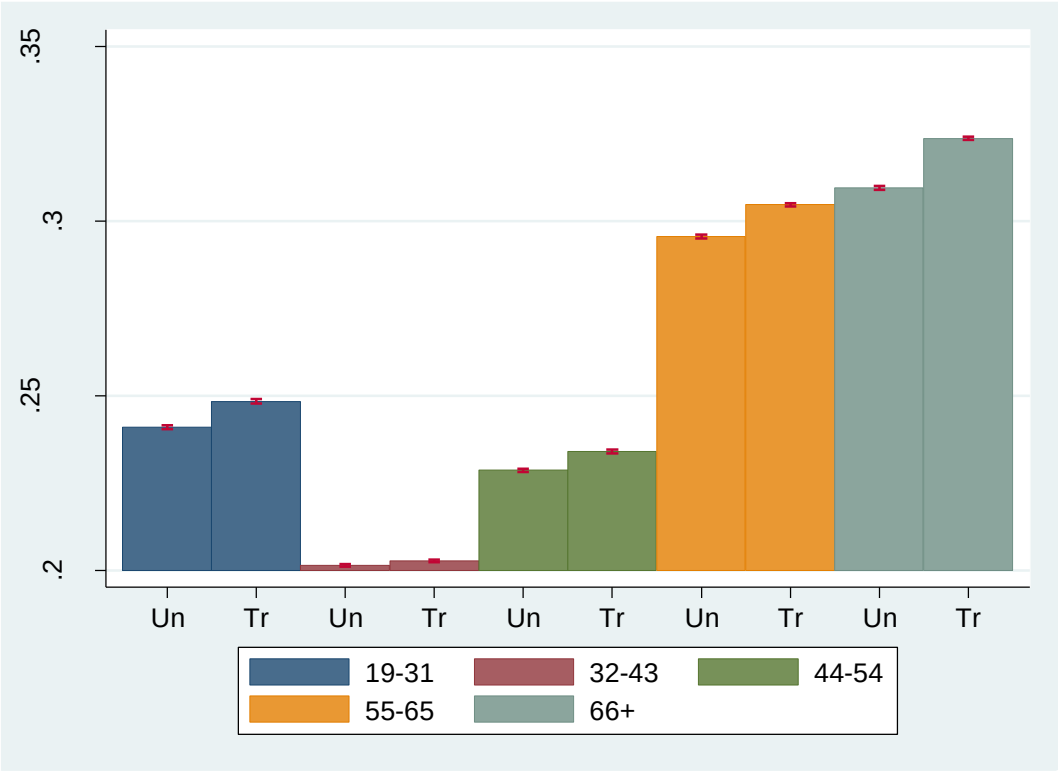


Figure 4
Simulated Treated vs. Untreated Turnout for the 2017 General Election



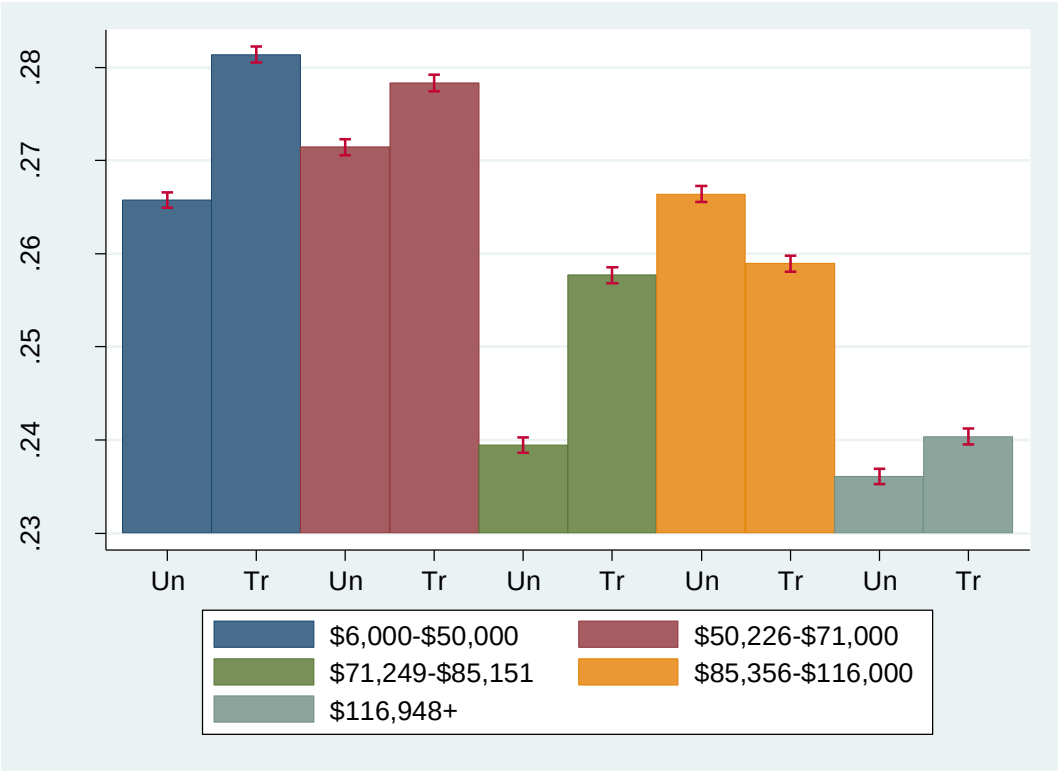
Note: "Untreated" indicates simulated turnout among our estimation sample assuming none of the ballot drop boxes were installed before the 2017 general election. "Treated" indicates simulated turnout among our estimation sample assuming all individuals experienced a reduction in their distance to the nearest drop box equal to the mean value among our treatment group (1.32 miles).

Figure 5
Simulated Treated vs. Untreated Turnout for the 2017 General Election by Age



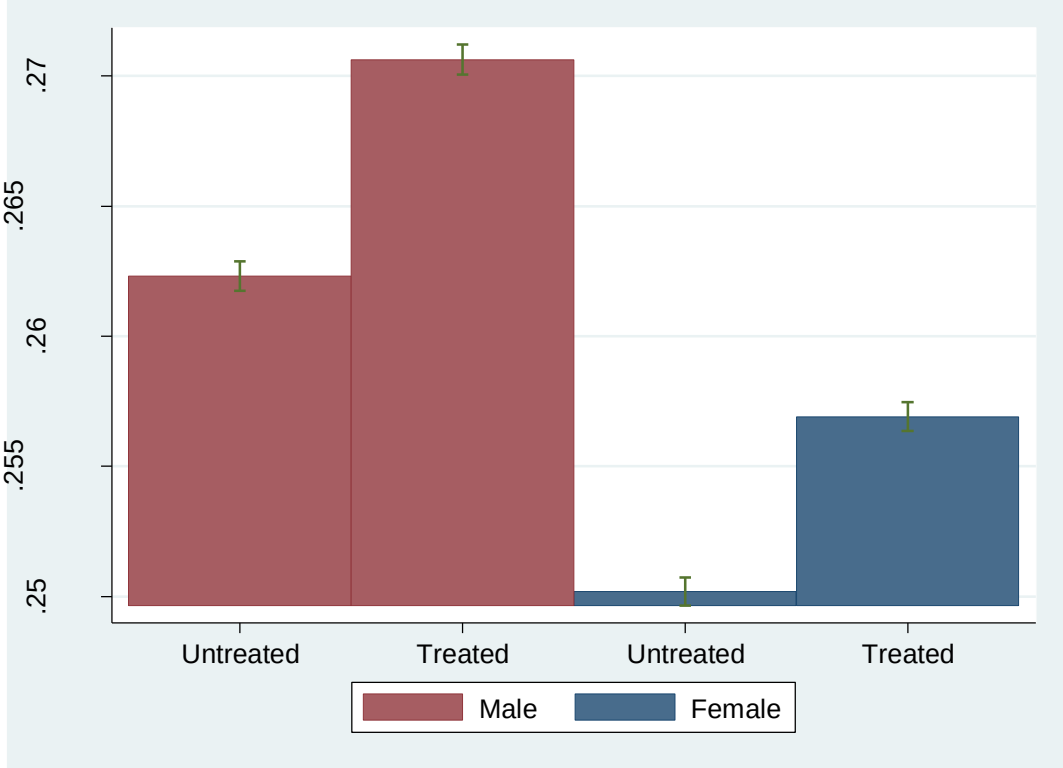
Note: "Un" indicates simulated turnout among our estimation sample assuming none of the ballot drop boxes were installed before the 2017 general election. "Tr" indicates simulated turnout among our estimation sample assuming all individuals experienced a reduction in their distance to the nearest drop box equal to the mean value among our treatment group (1.32 miles).

Figure 6
Simulated Treated vs. Untreated Turnout for the 2017 General Election by Income



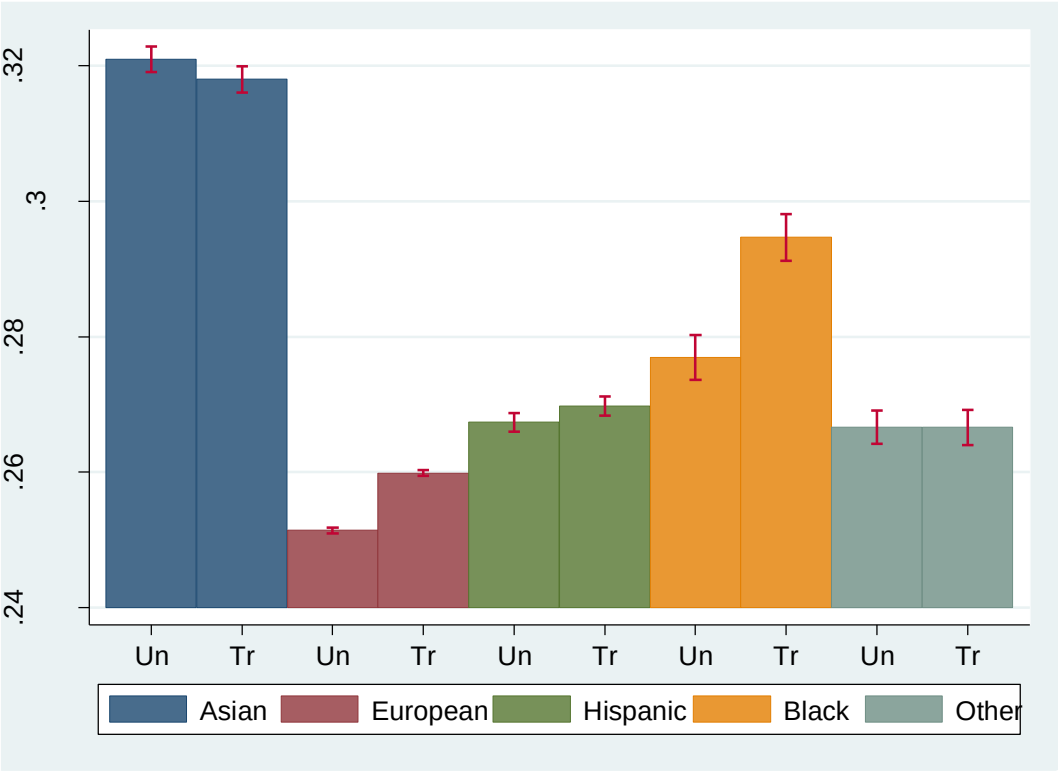
Note: "Un" indicates simulated turnout among our estimation sample assuming none of the ballot drop boxes were installed before the 2017 general election. "Tr" indicates simulated turnout among our estimation sample assuming all individuals experienced a reduction in their distance to the nearest drop box equal to the mean value among our treatment group (1.32 miles).

Figure 7
Simulated Treated vs. Untreated Turnout for the 2017 General Election by Income



Note: "Untreated" indicates simulated turnout among our estimation sample assuming none of the ballot drop boxes were installed before the 2017 general election. "Treated" indicates simulated turnout among our estimation sample assuming all individuals experienced a reduction in their distance to the nearest drop box equal to the mean value among our treatment group (1.32 miles).

Figure 8
Simulated Treated vs. Untreated Turnout for the 2017 General Election by Ethnicity



Note: "Un" indicates simulated turnout among our estimation sample assuming none of the ballot drop boxes were installed before the 2017 general election. "Tr" indicates simulated turnout among our estimation sample assuming all individuals experienced a reduction in their distance to the nearest drop box equal to the mean value among our treatment group (1.32 miles).

Appendix

Table A1
Treatment Effects with Placebo Intervention Years

	(3) Year 2016
Main Effect (Placebo Year)	-0.001
	(0.223)
Observations	199,326
R-squared	0.325
Number of Individuals	66,442
Individual FE	Yes

Robust pval in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A2
Full LPM Difference in Difference Model Results

	(1) Base Model	(2) By SDG Group
Year 2017 x ΔDistance	0.0056***	0.0139
	(0.0000)	(0.2129)
Age 26-31		-0.0371***
		(0.0008)
Age 32-36		-0.0262
		(0.1079)
Age 37-42		-0.0186
		(0.3538)
Age 43-48		0.0103
		(0.6647)
Age 49-54		0.0544**
		(0.0415)
Age 55-59		0.0944***
		(0.0014)
Age 60-65		0.1100***
		(0.0006)
Age 66-73		0.1053***
		(0.0026)
Age 74+		0.0763**
		(0.0466)
Year 2017 x Age 26-31		-0.0153
		(0.1088)
Year 2017 x Age 32-36		-0.0633***
		(0.0000)
Year 2017 x Age 37-42		-0.0771***
		(0.0000)
Year 2017 x Age 43-48		-0.1017***
		(0.0000)
Year 2017 x Age 49-54		-0.1164***
		(0.0000)
Year 2017 x Age 55-59		-0.1174***
		(0.0000)
Year 2017 x Age 60-65		-0.0813***
		(0.0000)
Year 2017 x Age 66-73		-0.0483***
		(0.0000)
Year 2017 x Age 74+		-0.0436***
		(0.0000)
Age 26-31 x ΔDistance		0.0074
		(0.2833)
Age 32-36 x ΔDistance		0.0115

	(0.2357)
Age 37-42 x ΔDistance	0.0313***
	(0.0069)
Age 43-48 x ΔDistance	0.0285**
	(0.0379)
Age 49-54 x ΔDistance	0.0218
	(0.1544)
Age 55-59 x ΔDistance	0.0193
	(0.2550)
Age 60-65 x ΔDistance	0.0087
	(0.6345)
Age 66-73 x ΔDistance	-0.0032
	(0.8715)
Age 74+ x ΔDistance	-0.0072
	(0.7376)
Year 2017 x Age 26-31 x ΔDistance	-0.0052
	(0.3824)
Year 2017 x Age 32-36 x ΔDistance	-0.0033
	(0.5976)
Year 2017 x Age 37-42 x ΔDistance	-0.0161***
	(0.0092)
Year 2017 x Age 43-48 x ΔDistance	-0.0044
	(0.4874)
Year 2017 x Age 49-54 x ΔDistance	-0.0023
	(0.7169)
Year 2017 x Age 55-59 x ΔDistance	0.0051
	(0.4215)
Year 2017 x Age 60-65 x ΔDistance	-0.0019
	(0.7613)
Year 2017 x Age 66-73 x ΔDistance	0.0031
	(0.6068)
Year 2017 x Age 74+ x ΔDistance	0.0033
	(0.5701)
Year 2017 x Income $35,832-$51,000	0.0279***
	(0.0021)
Year 2017 x Income $51,041-$60,881	0.0306***
	(0.0011)
Year 2017 x Income $60,999-$72,000	0.0077
	(0.3954)
Year 2017 x Income $72,064-$77,860	-0.0188*
	(0.0567)
Year 2017 x Income $77,875-$85,624	0.0027
	(0.7762)
Year 2017 x Income $85,702-$96,000	0.0055
	(0.5766)
Year 2017 x Income $96,081-$115,341	0.0300***

		(0.0006)
Year 2017 x Income $116,000-$131,000		-0.0147
		(0.1240)
Year 2017 x Income $132,000 x ΔDistance		-0.0048
		(0.6041)
Year 2017 x Income $35,832-$51,000 x ΔDistance		-0.0116**
		(0.0224)
Year 2017 x Income $51,041-$60,881 x ΔDistance		-0.0168***
		(0.0034)
Year 2017 x Income $60,999-$72,000 x ΔDistance		-0.0085*
		(0.0677)
Year 2017 x Income $72,064-$77,860 x ΔDistance		0.0063
		(0.3190)
Year 2017 x Income $77,875-$85,624 x ΔDistance		-0.0141***
		(0.0031)
Year 2017 x Income $85,702-$96,000 x ΔDistance		-0.0179***
		(0.0004)
Year 2017 x Income $96,081-$115,341 x ΔDistance		-0.0278***
		(0.0000)
Year 2017 x Income $116,000-$131,000 x ΔDistance		-0.0122**
		(0.0178)
Year 2017 x Income $132,000 x ΔDistance		-0.0155***
		(0.0045)
Year 2017 x Female		-0.0136***
		(0.0007)
Year 2017 x Female x ΔDistance		-0.0014
		(0.5505)
Year 2017 x European		-0.0690***
		(0.0000)
Year 2017 x Hispanic		-0.0439***
		(0.0004)
Year 2017 x Black		-0.0299
		(0.1583)
Year 2017 x Other		-0.0434***
		(0.0042)
Year 2017 x European x ΔDistance		0.0073
		(0.4335)
Year 2017 x Hispanic x ΔDistance		0.0031
		(0.7733)
Year 2017 x Black x ΔDistance		0.0137
		(0.4533)
Year 2017 x Other x ΔDistance		0.0016
		(0.8955)
Year 2016	0.4034***	0.4019***
	(0.0000)	(0.0000)
Year 2017	-0.0300***	0.0969***

	(0.0000)	(0.0000)
Constant	0.2873***	0.2371***
	(0.0000)	(0.0000)
Observations	199,326	199,326
R-squared	0.3254	0.3292
Number of Individuals	66,442	66,442
Individual FE	Yes	Yes

Notes:

- The omitted age decile is 17-25
- The omitted income decile is $6000-$35,768
- The omitted ethnicity category is “East and South Asian”
- Differences in causal effects across sociodemographic groups are indicated by the estimated coefficient on the three-way interaction terms
- Robust pval in parentheses: *** p<0.01, ** p<0.05, * p<0.1