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**TITLE**    **In Line or Online? American Voter Registration in the
Digital Era**

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# In Line or Online?

# American Voter Registration in the Digital Era

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**Abstract**

Online voter registration is one of the most recent efforts to stimulate turnout in American elections. Within the past decade, an increasing number of states have begun to allow their residents to register as voters electronically. Like other efforts to increase political participation, though, the actual impact on registration and turnout remains unclear. Although other voting liberalizations have received a fair amount of scrutiny, the peer-reviewed literature does not include a systematic exploration of how voters are responding to online registration. In this paper, I develop an individual-level model that point identifies an estimate for the impact of online registration on the likelihood of both registration and turnout. The results suggest that online registration may be one of the more successful implementations of convenience voting. Perhaps even more importantly, its effects seem to be concentrated most highly among young adults and those who have moved recently, two subgroups that are consistently underrepresented at the polls. I then use the individual-level model to predict changes in state-level aggregate turnout and identify states for which this registration alternative could have influenced the election. Although it is hard to know how the partisan distribution would shift, several states in both the 2008 and 2012 Presidential elections could have experienced different outcomes had they offered online registration. At both the individual and aggregate level, therefore, the introduction of online registration may have significant implications for American elections.

The President of the United States is one of the most powerful figures worldwide. Nationally and abroad, election to this office commands an enormous amount of attention. And yet, for decades, turnout in these elections has hovered around 60% of the voting-eligible population (Leighley and Nagler 2014). Turnout in midterm and local elections is typically even lower; in the last decade, turnout in midterm elections hovered between 40% and 42%.[1] Despite concentrated efforts to mobilize eligible voters, the turnout problem has proved pervasive, and the United States perennially lags behind other democracies in the accessibility of participation (Hanmer 2007).

The turnout puzzle has a rich history in the academic literature. Political scientists have long acknowledged that citizens will turn out only if their expected utility exceeds the participation costs they must incur (Downs 1957, Riker and Ordeshook 1968). The United States affords individual states a great deal of autonomy in how they conduct elections, and political scientists have exploited the resultant heterogeneity to identify how certain institutional features influence the turnout decision. Beginning with Wolfinger and Rosenstone (1978), a steady stream of literature has estimated how various attempts to reduce the costs of voting have influenced individual-level and aggregate turnout. And despite the promise that voting reforms bring, many scholars remain pessimistic that such legislation has had any substantial impact, a skepticism supported by the persistently low rate of participation (Berinsky 2005, Hanmer 2007, Glynn and Quinn 2011).

Many such reforms have targeted the inconveniences of voter registration. The *National Voter Registration Act* of 1993 expanded the number of places individuals could register, and the *Help America Vote Act* of 2002 required states to developed digitized databases of registered voters. Even so, registration rates in America do not match those of its democratic counterparts. While most democracies register voting-eligible citizens automatically,

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[1]More specifically, 40.5% in 2002, 41.3% in 2006, and 41.7% in 2010, according to `http://elections.gmu.edu/voter_turnout.htm`.

American elections are somewhat unique in that almost every state (excepting North Dakota) places the burden of registration on the individual rather than the government, thereby rendering the voting process even more costly (Alvarez and Hall 2009). One of the most recent reforms is the advent of online voter registration. Beginning with Arizona in 2002, a sizable minority of states now allow their residents to complete and submit their registration paperwork over the Internet. Media outlets and election administrators have cheerfully announced that thousands of citizens have taken advantage of this option.[2]

Without further inquiry, however, we cannot know if these individuals would have registered regardless, and if online registration will have a merely substitutive impact. A small collection of recent papers address this lacuna (notably, Baretto *et al.* 2010 and García Bedolla and Veléz 2013), and several news outlets have published articles, but the body of peer-reviewed literature is entirely silent. Legislators, election administrators, and the press have touted online registration as a natural evolution in an increasingly technological election environment, and an innovation that will encourage participation form historically under-represented demographic subgroups, particularly young adults. Yet other voting reforms have been accompanied by similar promises, and failed to produce the eagerly anticipated results. Instead, there is evidence that these reforms simplify the process for the politically engaged, but fail to stimulate turnout from those who typically abstain (Hanmer 2007, Berinsky 2005). To ascertain whether online registration reshapes the turnout puzzle, I propose an individual-level model that estimates the causal relationship between online registration and political behavior, at both the registration and turnout levels. And perhaps surprisingly, the results suggest that this new registration alternative will expand the electorate in any kind of meaningful way.

The paper proceeds as follows. I first briefly discuss the mechanics of online registra-

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[2]http://latimesblogs.latimes.com/california-politics/2012/10/online-registration-boosts-voter-rolls-sha
html

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tion and its short history in American elections. I then present a broader view of convenience voting by reviewing the legislation that has introduced convenience methods, and surveying the literature that motivates the task at hand. The next section details the econometric methods I use to tackle this question of causal inference. After presenting the results at the individual level, I use the fitted model to predict aggregate turnout in the counterfactual for the 2008 and 2012 elections (*i.e.*, turnout if control states had introduced online registration). I conclude with a discussion of the results, and the implications for this and other mobilization efforts.

## Registration in the Digital Era

In the wake of the technological failures of the 2000 Presidential election, political scientists began to question how we can better use technology within the context of election administration (Stewart 2011). As a response to this notorious technological failure, political scientists collaborated to form the Caltech/MIT Voting Technology Project, which advances research that addresses obsolete technology. Proposals to incorporate new forms of technology are often met with public resistance, with parties wondering how their opposition can exploit the new technology (Alvarez and Hall 2008). Backlash against electronic voting has been particularly strong, and the academic literature points out its relative merits and drawbacks: Estonia has implemented e-voting in a way that makes voting more accessible but also relatively protected from fraud (Alvarez, Hall, and Teschel 2009), while an experiment in Salta, Argentina, proved that concerns of fraud may be warranted (Alvarez *et al.* 2013). Online registration has received scrutiny of its own, though it has proven less controversial that online voting. Recent work has suggested that online registration will allow more accurate databases (Ansolabehere and Stewart 2013, Presidential Commission on Election Administration 2014). Moreover, there is evidence that the Internet is a viable tool

in engaging citizenry. With information about candidates, issues, and campaigns accessible online, citizens may find obtaining political knowledge less costly, and may consequently become more politically active (Tolbert and Mcneal 2003). It is important to clarify just what online registration entails, and how it differs from other methods of registration. Citizens in every state may fill out registration paperwork online, but they must then print and return their paperwork via fax or postal mail. The states that offer online registration allow residents to submit the forms online, as well. Typically, this option is limited to citizens with a driver's license or other state-issued identification. The website retrieves the citizen's signature from that form of identification (which is electronically stored) for the voter registration paperwork.

Arizona spearheaded this movement in 2002, and eighteen states have since followed suit[3]: Washington (2007); Colorado, Indiana, Kansas, Louisiana, Oregon, and Utah (2009); Maryland and California (2011); Nevada, Delaware, and South Carolina (2012); and Connecticut, Georgia, Hawaii, New Mexico, Virginia, and West Virginia (legislation passed, but not yet implemented). And at the time of this writing, another twelve states have legislation pending.[4] We point out that this voting initiative has received support and criticism from both major political parties. Typically, the majority party in the state legislature has supported the legislation, and some members of the minority party have vocalized concerns of fraud.[5]

Most of the states have implemented online registration at the behest of election officials or voter advocacy groups. Proponents point out that this form of registration is much cheaper for the state and leads to fewer clerical errors, since individuals – rather than

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[3]Figure AI in the Appendix provides a graphic overview of the states' various stages in this process. This list was obtained courtesy of the National Conference of State Legislatures: `http://www.ncsl.org/legislatures-elections/elections/electronic-or-online-voter-registration.aspx`.

[4]Arkansas, Illinois, Massachusetts, Michigan, Missouri, Montana (failed), New Jersey, New York, North Carolina, Ohio, Pennsylvania, and Texas.

[5]`http://www.usatoday.com/story/tech/personal/2012/10/14/online-voter-registration-catches-on/1625321/`

bureaucrats or third-party registrants – verify the accuracy of their own information. In Arizona, for example, the estimated difference in cost for the state is approximately $ 0.80 per registrant (Barreto *et al.* 2010). Such features make online registration an appealing alternative from an administrative perspective, given the inaccuracies that perennially plague registration databases (Alvarez and Hall 2009). Indeed, many election officials have voiced support for this initiative, and in several states, the requisite legislation was requested by the Secretary of State (who assumes ultimate responsibility for conducting the state's elections). By adding an online alternative, potential registrants have an option that is often more convenient and less time-intensive. On the other hand, online registration may "crowd out" other proven methods of encouraging citizens to register (e.g. registration drives). Furthermore, voters may fall into the "procrastination trap": Registration appears so costless that they put it off until another time, and realize too late that they have neglected the process. The primary concern among the popular press and dissenting legislators, however, appears to be potential fraud; detractors worry that there will not be enough oversight to ensure that only voting-eligible citizens are using this option.[6]

The 2012 Presidential election featured several news articles that questioned how online registration would affect turnout. A few states implemented their online registration processes within a couple of months of the November election, leaving political commentators to speculate how unregistered voters might respond. To date, though, very little research directly examines whether online registration encourages additional participation. In fact, to our knowledge, the existing body of literature contains no academic papers that estimate its effects.

The studies that have been published give reason to be optimistic about the potential impact of online registration, particularly for young adults, who traditionally participate at lower rates. Baretto *et al.* published a report of how citizens are utilizing online registration

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[6]As just one example, see Perlroth (2012).

in the two states that implemented it first, Arizona and Washington (2010). Those who are registering via this mechanism are disproportionately young. The authors laud the fact that those who register online actually cast ballots at higher rates than their counterparts, suggesting that this method of registration might do more to stimulate actual turnout than other alternatives. And in a study of online registrants in California prior to the most recent election, García Bedolla and Veléz (2013) find that most belonged to the youngest cohort of eligible voters, though a large number also belonged to other age brackets. Additionally, many of the online registrants in San Diego and Alameda Counties belonged to low- or middle-income brackets.[7]

I use data from the *Current Population Survey* to ascertain whether individuals are taking advantage of this opportunity. The Voter Supplement of this survey, administered prior to every national election, asks respondents how they registered.[8] In the two most recent elections, only 1 - 3 % reported that they registered online; although this number seems but a small fraction, we must consider that relatively few were exposed to the treatment. Furthermore, among those individuals who did live in states that offered online registration, a substantial proportion had registered before this alternative became available. To capture a more informative picture of how online registration influenced registration and turnout, I construct a formal model that draws inspiration from studies of other forms of convenience voting.

## Convenience Voting

Although the act of voting in today's American elections is technically "free," the actual process is accompanied by certain inconveniences. The registration and balloting pro-

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[7]The authors only examined these counties, selected for their volume of online registrants and socioeconomic heterogeneity.

[8]Table AI in the Appendix shows the distribution of responses.

cesses both involve sacrifices of time. Although election officials attempt to make the voting process efficient, millions of voters still experience extraordinarily long lines. Most interested voters must also consider transportation to and from the local polling place, and perhaps parking. All interested voters must learn where and how to register and vote, and many feel obligated to seek information about candidates, propositions, and referenda. The literature has conceptualized all of these inconveniences as "costs" that citizens must incur if they wish to participate in the election, beginning with Downs (1957). His influential work pioneered the theoretical development of the voting decision calculus; in this framework, an individual will vote if and only if the expected benefits exceed the costs. Riker and Ordeshook (1968) refine this model and include an additional variable that represents the utility an individual would receive from fulfilling a perceived civic duty. From a theoretical standpoint, then, we should expect turnout to increase if the costs of the voting process decrease.

In this vein, numerous pieces of legislation have sought to reduce potential barriers to voting, particularly for the historically underrepresented (young adults, minorities). The first landmark piece of legislation is the *Voting Rights Act* of 1965, which dismantled several election practices that imposed unduly high costs on the electorate (e.g. poll taxes). In the wake of this renewed effort to engage the voting-eligible population, Wolfinger and Rosenstone (1978) published a seminal investigation into what institutional features had any impact on the turnout decision at the individual level and the composition of the electorate. Although they find that certain institutional features have a significant effect on the probability of turnout, they also conclude that even an extreme liberalization of the electoral laws would hardly impact the electoral outcome, or meaningfully change the demographic distribution of the electorate.

In more recent decades, the government has attempted to ease the burden of electoral participation primarily through legislation that targets registration practices. The *National Voter Registration Act* of 1993 (NVRA, popularly dubbed "Motor Voter") required, among

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other things, that Departments of Motor Vehicles and public assistance agencies provide registration forms. States could avoid this requirement by offering Election Day Registration (hereafter, EDR).[9] Nevertheless, despite all this legislation, millions of citizens still encounter prohibitive barriers to registration, particularly minorities and young adults (Alvarez and Hall 2009, Leighley and Nagler 2014).

Since the initial inquiry of Wolfinger and Rosenstone (1978), a number of voices have contributed to the debate of the efficacy of various voter reforms. A tension has emerged within the literature, as some scholars have identified a meaningful impact while others have painted a far less rosy picture. The most optimistic suggest that certain liberalizations (particularly EDR) can substantially increase turnout, and perhaps more importantly, yield an electorate that more accurately reflects the demographic distribution of voting-eligible citizens (*e.g.*, Alvarez and Nagler 2007, 2008, 2011; Brians and Grofman 2001). Burden *et al.* (2014) echoes the conclusion that EDR can substantially increase turnout, but add a caveat that other reforms might have a negligible or even depressive effect (in the case of early voting). Such papers acknowledge that no reform is a panacea for the turnout problem, but express hope that certain reforms can make participation more accessible for certain subgroups; for instance, no-excuse absentee voting may have a positive, significant effect on turnout among the elderly and disabled (Alvarez, Levin, and Sinclair 2012). Highton and Wolfinger (1998) emphasizes that although convenience voting will do little to stimulate political interest among non-voters, it can yield improvements in turnout among young adults and the residentially mobile, since these groups vote at low rates and are particularly susceptible to registration hurdles. Online registration, if it is has any impact, should theoretically influence these two groups the most; young, mobile voters are more likely to use technology and online resources.

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[9]While most states impose a registration deadline a pre-specified number of days before the election, EDR states allow residents to register as voters on Election Day.

Other papers on convenience voting, however, arrive at more conservative estimates. These papers tend to argue that while specific implementations have seen moderate success, by and large, we have not seen the promised and anticipated results (Hanmer 2007, Neiheisel and Burden 2012, Ansolabehere and Konisky 2006). Neiheisel and Burden (2012) points out that one drawback of EDR is that delayed registration might hinder parties in their mobilization efforts, since those who register on Election Day are not included in any registration databases. The authors point out that this consequence might result in an even more demographically unrepresentative electorate. Ansolabehere and Konisky (2006) considers the puzzle in reverse, considering how the imposition of registration historically reduced turnout in Ohio and New York. The authors identify some depressive effect, but conclude that the literature has overstated the impact of registration hurdles.

And finally, the most dismal contend that all these reforms simply streamline the process for those who are already interested in politics, and that to engage non-voters, we must re-conceptualize our efforts to mobilize voters (Glynn and Quinn 2011, Berinsky 2005). Berinsky (2005) points out that reform efforts have targeted the more obvious costs, but do little to address the barriers introduced by cognitive costs. That is, to entice non-voters, we must find some means of communicating information about politics in a more accessible manner. Online voter registration would certainly be susceptible to this criticism, as its implementation does little to inform and intrigue perennial non-voters; it merely allows a potentially more convenient form of registration.

Although there is a healthy literature on barriers to participation, the debate on the efficacy of these measures remains unresolved. Moreover, online registration has yet to become a niche within the peer-reviewed literature, and it is unclear whether its implementation in any way shifts the debate. Online voter registration is the byproduct of sustained interest in stimulating participation and the modernization of the election process. Election officials have sought to streamline the administrative process through the use of new

technologies. In 2002, Congress passed the *Help America Vote Act* (HAVA), which requires states to maintain electronic registered voter databases; this feature allows potential voters to verify their registration status prior to Election Day, and perhaps more importantly, the registration closing date in their states of residence. Online registration is a somewhat natural extension, then, of the digitalization of registration records.

To date, however, few papers offer any kind of systematic investigation into the impact of online registration on participation.[10] Although politicians and the media have touted this reform effort as a promising new method of engaging the electorate, we have yet to see an econometric model that estimates its causal impact. Despite the optimism of its proponents, I expect online registration to have a meaningful effect on registration but a far more muted effect on turnout; while this registration alternative reduces the costs of registration, it does nothing to reduce the inconveniences of casting a ballot. The impact of turnout will come indirectly from individuals who find the traditional registration processes – but not the online alternative – overly cumbersome. I am skeptical that it will dramatically alter the ethnic composition of the electorate, as I see no reason *a priori* that minorities in particular will turn to online registration. On the other hand, I am optimistic that young adults may utilize this process, given the dominant role of technology for their generation.

Fortunately, the literature on convenience methods, particularly EDR, offers a nice blueprint for my line of inquiry. To our knowledge, states have implemented this form of registration across all precincts simultaneously, so the RD design is not particularly appropriate. The most natural line of inquiry follows the Wolfinger-Rosenstone model, which fits the probability that an individual participates to individual-level demographics and state-level electoral features.

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[10]Notable exceptions include the aforementioned papers by Baretto *et al.* 2010 and García Bedolla and Veléz 2013

# Model

With this intellectual history in mind, I turn to the primary questions of this paper: Does online voter registration actually fulfill its promise to capture new segments of the electorate, or does it simply make the registration process easier for those would participate regardless? Does it do anything to stimulate participation among the historically underrepresented, including minorities and young voting-eligible citizens? To answer these questions, I need a model that identifies and estimates the probability that an individual votes with and without the opportunity to register online.

As with any question of causal inference, I encounter the challenge that I do not observe the counterfactual. In this particular case, I cannot simultaneously know an individual's voting behavior with and without treatment exposure, since for each election the individual experiences only one of these two states of the world. To derive estimates of how individuals would behave in the counterfactual, I can use an experimental design that is within-unit (if their treatment status changes over time) or between-unit. To my knowledge, there does not exist a longitudinal survey that asks individuals about their registration and voting behavior before and after exposure to the online registration treatment. Fortunately, though, I can exploit the heterogeneity in the availability of online registration across states and time.

To this end, we rely on the framework established in Wolfinger and Rosenstone (1978) and utilized in much of the literature on convenience voting. The outcome of interest – turnout, and in this case, registration as well – is modeled as a probabilistic function of various demographic features, electoral characteristics, and the treatment (online registration):

$$\mathbb{P}(Y_{ist} = 1) = \Phi(\alpha + \beta X_{ist} + \rho Z_{st} + \delta T_{st} + \gamma_s + \theta_t + \epsilon_{ist})$$

Previous papers have used probit (Wolfinger and Rosenstone 1978; Leighley and Nagler 1992; Alvarez and Nagler 2007, 2008, 2011), logit (Highton 1997; McDonald 2008), and scobit (Nagler 1994) regressions; I select the probit link but include other structural forms in the Appendix as a robustness check.[11]

In my specification, $Y$ is a binary variable indicating whether or not the individual participated (registered or voted, depending on the outcome of interest); $X$ is a vector of demographic covariates; $Z$ is a vector of controls for the local political climate; and $T$ is a binary variable indicating whether the state offered online registration for that particular election. I also include state and year fixed effects ($\gamma$ and $\theta$, respectively) to account for heterogeneity in electoral trends dictated by geography and time. The demographic covariates are taken from a long stream of literature that has explored heterogeneity in voting behavior: age, gender, ethnicity, income, education, employment, and residential mobility. The electoral controls are the competitiveness of the election and the availability of the most prominent forms of convenience voting; I include EDR in the model of registration behavior and EDR, early voting, no-excuse absentee voting, and vote by mail in the model of turnout.[12]

Like many other papers in this area, I rely primarily on data from the Current Population Survey (CPS), a survey jointly administered by the Census Bureau and the Bureau of Labor Statistics.[13] Every presidential and midterm election, the CPS also includes a Voter Supplement, which asks respondents a series of questions about their registration and voting behavior. The CPS is quite extensive, with each implementation surveying tens of thousands of respondents. Thus, the overall sample is quite large, but more importantly, I observe a

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[11]See Tables AIII and AIV. The direction and significance of the main effects are not affected by the variation in structural form.

[12]I see no strong theoretical reason to include early voting, no-excuse absentee voting, and vote by mail when registration is the outcome of interest.

[13]For example, see Rosenstone and Wolfinger (1978), Mitchell and Wlezien (1995), Alvarez and Nagler (2007, 2008, 2011), Knack and White (2000), Highton (1997), Hanmer (2007), and Glynn and Quinn (2011).

large number of individuals for each state, for each election. Such a rich source of data offers us the opportunity to explore political participation using a model with adequate statistical power.

The CPS dataset naturally lends itself to a TSCS structure. I have a panel dataset, with different individuals sampled each national election cycle, from 2000 to 2012. Because Arizona implemented online registration prior to the 2002 midterm election, I begin with the 2000 electoral cycle, so that every state that currently allows online registration is represented by individuals who belonged to the treatment and the control. To consider how demographic populations of interest respond to the treatment, I also consider a model that includes interactive terms. As the long stream of voting literature evidences, we care not only about how the treatment of interest affects the size of the electorate; we take interest also in how it affects the demographic distribution of the electorate.

## Data

The Voter Supplement is a particularly useful database for studying voter participation, since the survey includes information about political participation and demographic background for hundreds of thousands of respondents.[14] Political scientists have identified a number of demographic variables that are strong predictors of participation; chief among these are age (Highton and Wolfinger 1998, Knack and White 2000),[15] ethnicity, [16] financial status (Schlozman et al. 2012, Highton 1997), education (Rosenstone and Wolfinger 1978, Schlozman *et al.* 2012, Leighley and Nagler 1992, Highton 1997), and residential stability

[14]Distributions of all variables are given in Table AII of the Appendix.

[15]I include both a linear term to capture the general relationship between age and participation, as well as a quadratic term to capture the concavity. Typically, the likelihood of participation increases with age, but those who are in the uppermost age brackets are more likely to experience mobility barriers.

[16]The CPS asks individuals to describe their ethnicity and then - in a distinct question - whether or not they have Hispanic heritage. To accommodate this survey design, I code individuals as White, Black, Asian, or Other Race for ethnicity but also include an indicator variable for Hispanics. Therefore, it is possible for an individual to have a value of unity for one of the race dummy categories and for the Hispanic indicator.

(Highton and Wolfinger 1998, Knack and White 2000, McDonald 2008).

Like most survey datasets, the CPS is not without its downfalls. Chiefly, anyone who wishes to use this information must somehow accommodate missingness in the data. Many values are left blank for any number of reasons; an individual will choose not to finish the survey, refuse to answer a potentially sensitive question (such as family income), or simply not know how to respond. Within the literature, there is substantial variation in how researchers tackle the problem of missing data. This paper executes the model using Complete Case Analysis (CCA) for the demographic variables. To measure political participation, we follow the Census Bureau's method: Those individuals who do not give a clear answer when asked if they are registered are included among the unregistered. Similarly, those who do not explicitly claim to have voted are considered non-voters. This approach does not entirely remove measurement error, but given that this practice is the national benchmark, we use this rubric to code participation.[17]

For state-level access to various forms of convenience voting, I rely on information gathered by the National Council of State Legislatures. Electoral competitiveness is widely acknowledged as an important factor for political participation, but unfortunately, there does not exist a standard approach to measuring competitiveness. To account for heterogeneity in electoral intensity, I generate a measure based on the margin of victory between the top-two vote-getters. For each state and each election year, I find the margin of victory between the top two candidates in the presidential, gubernatorial, and U.S. senatorial contests (subject to availability); I then take the minimum of these values as the measure of the state's competitiveness level for that election cycle. For example, if the closest race in Hawaii in 2008 is the Presidential election, I use the margin of victory between the top-two senatorial candidates. A few states did not hold any of these kinds of elections for a given cycle. For

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[17]There is precedent within the literature to use this codification, as well; see, for example, Leighley and Nagler (1992) and McDonald (2008). Recently, this approach has received some criticism in Hur and Achen (2013), but I choose here to follow the conventions of the literature and the reporting agencies.

these states, I take the maximum over all remaining states (for that cycle), and use this value.

# Results

Table I displays the results of the model that considers only the main effects, while Tables AV and AVI of the Appendix report the entire host of main and interactive effects. I first discuss the main effects model before turning to a framework that also considers how specific individuals interact with the treatment. In general, the signs on the coefficient point estimates accord with the general consensus in the literature. Unless otherwise noted, the sign of the coefficient and significance level are the same for both the model for registration and the model for turnout.

As expected, the coefficient on age is positive and statistically significant, indicating that older people are more likely to participate in the political process. The negative coefficient on Age$^2$ indicates a slightly downward curvature to this relationship, as we might expect given the mobility issues that some of those in the uppermost age brackets face. Also, females are more likely than males to register and vote.[18] For employment status, those who are employed serve as the reference group; the negative coefficients on the variables for unemployed and not in the labor force, therefore, indicate that individuals in these groups are less likely to participate than those who are employed. Likewise, the coefficients on the education variables are in the expected direction; those who have a high school diploma (or did not finish high school) and those who have some college experience are less likely to participate than college grads, while those with postgraduate education are more likely to do so than college grads. Those who have lived at their current address for 5$^+$ years serve as the benchmark group for mobility, and the negative and statistically significant on each other

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[18]This result is consistent in the literature (e.g. Rosenstone and Wolfinger 1978, Leighley and Nagler 1992).

category indicates that *ceteris paribus*, more mobile individuals are less likely to participate, a result that is well-documented elsewhere in the literature; moreover, the 95 % confidence intervals for each categorical group do not overlap, strongly suggesting that participation is monotonically increasing with residential stability.[19]

One of the more surprising demographic results is the sign of the coefficient on the indicator variable for African American heritage. Because the ethnicity omitted from the model is White, the positive sign on Black indicates that all else held constant, a Black person has a greater likelihood of registering and voting than a White person. On the other hand, this result could reflect a recent trend of increasing political participation among minorities; indeed, the 2012 CPS reports that for the first time in American history, blacks are participating at higher levels than whites (Census Bureau 2013). Thus, the positive coefficient for Blacks is perhaps less surprising than it appears at first blush. The negative coefficients on the other ethnicity covariates indicate that Asians and those who belong to another race are less likely to participate than whites, and Hispanics are less likely to participate than non-Hispanics.

The electoral variables are somewhat in line with what we would expect. An individual has a higher predicted probability of voting in a presidential election than a midterm election. Note, too, that the relative magnitude is particularly high for the model of turnout; this results intuitively makes sense given that registration typically carries over from other elections, so those who register in a presidential election are often still registered the next midterm election. The sign on the margin of victory variable is negative, suggesting that more distant (e.g. less competitive) races generate lower turnout. The coefficient is, however, quite small in relative magnitude; it is possible that the intensity of the political climate is most effectively captured by the state and year fixed effects. Perhaps surprisingly, the coefficient on EDR does not reach statistical significance in any of the models, contradicting other

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[19]I use those who have lived at their residence for at least 5 years as the benchmark because this is the mode.

research that claims a pronounced, positive impact. On the other hand, the opportunities to vote absentee (without an excuse) and to vote by mail both seem to exert a meaningful impact on the citizen's participation decision. The negative coefficient on Early lends credence to the conclusion of Burden *et al.* (2014) that early voting might actually have a detrimental effect on participation.

And of course, the variable of primary interest for this paper is the exposure to online registration. The coefficient for online registration is positive and statistically significant in both the registration and turnout models, indicating that individuals who live in OR states are more likely both to register and to vote. Those who promote online registration as a promising mechanism for stimulating turnout will no doubt be pleased to see evidence that individuals are taking advantage of this new convenience. Yet although the nature of the relationship gives reason for optimism, I point out that the magnitude is fairly low. Even so, it still seems to exert stronger influence than EDR. This result suggests that online registration does as much to stimulate civic engagement as one of the most popular forms of convenience voting. Moreover, the main effect of online registration appears even stronger in a model that includes interactive terms.

*Interactive Effects*

Those who promote various forms of convenience voting often express a desire for an electorate that is more representative of the voting-eligible population. Historically, certain demographics have registered and voted at lower rates, and many policies seek to reduce the institutional barriers that might discourage participation. In this vein, we consider how individuals of different demographic backgrounds interact with the online registration treatment. In a survey that asked individuals when they registered, or a panel that asked individuals the same questions in multiple waves, we could directly identify the individuals whom online registration could affect. This survey does not afford us the opportunity for such a

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research design, so instead we consider a model that includes interactive effects for nearly all demographic variables.[20] To analyze the importance of these interactions, we evaluate the individual significance of variables that are not binned and the joint significance of the categorical variables. To view the joint significance test statistics, see Table II.

As we might expect, the interaction with gender does not appear significant, though we *a priori* have little reason to believe that one gender will be more drawn to this registration alternative. Unfortunately for reform advocates, there is also little reason to believe that online registration will stimulate participation from racial minorities; the coefficients on the interactions with Black, Asian, Hispanic, and Other Race all fail to reach statistical significance. Alternatively, the coefficient on the interaction with age is negative and statistically significant, suggesting that young voters might be more likely to take advantage of this reform; this result makes sense, given young citizens' greater familiarity with technology. This particular form of convenience voting may be one of the most promising avenues of stimulating participation among young adults, since this cohort turns to online mechanisms for many logistical tasks, including banking, educational enrollment, and shopping, among other activities. Figures 1A and 1B display graphically how different simulated individuals respond to treatment, holding all covariates constant but age. In each graph, the solid line represents the individual's predicted probability of turnout as a function of age *without OR available*, and the dotted line represents the predicted probability if exposed to the treatment. The gap between the two curves narrows as age increases, visually demonstrating how those in the younger cohorts have more to gain by the introduction of online registration.

Also encouraging is the negative sign on the coefficient on the interaction between family income and online registration; our model therefore implies that those in lower income brackets are more inclined to take advantage of online registration. We can similarly find theoretical justification for this result, as those in lower income brackets may find it more

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[20]Tables AV and AVI in the Appendix display the results.

difficult to register at courthouses or DMVs. Yet another sign of promise is the positive interactive effect on registration for those who have lived at their current residence for 1 - 6 months or 7 - 11 months; this result suggests that online registration may be particularly helpful to those who have moved within the past year. Because registration is tied to residence, those who moved before the election face the additional participatory burden in updating their registration information. Aside from the logistical costs, recent movers also may face cognitive barriers if they do not know where or how to register at their new address; some may even be unaware that they need to register again. Having the opportunity to register online may streamline the process for this subset of citizens, and improve retention. We should temper our optimism, though, as the mobility interactive effects do not manifest themselves the same way in the turnout model.

One other return that this model yields is a far higher estimate of the main effect of online registration. This result holds even when I omit the interactions that were not jointly significant, and implies that the model with only main effects underestimates the true impact of online registration. Tables III and IV display an abbreviated form of the model, including only the interaction terms that hold individual or joint significance. In sum, these interactive terms lend credence to the hope that online registration will stimulate political participation, particularly among young adults, the less wealthy, and those who moved recently.

## Adding It Up

As its advocates attempt to implement online registration, what many will want to know is whether this reform will have any practical impact on the election. I have presented the estimated impact at the individual level, but it remains unclear whether or not online registration will actually have any bearing on the actual election. To gauge the real-world significance, for each state that did not allow online registration, I estimate the number of

additional votes if it had implemented such a system prior to the 2008 and 2012 elections. I arrive at this measure by first estimating the predicted probability that each such individual voted during these elections, using the point estimates for the abbreviated interactive model in Table 5:[21]

$$\hat{\mathbb{P}}^0(Y_{ist} = 1) = \Phi(\hat{\alpha} + \hat{\beta}X_{ist} + \hat{\rho}Z_{st} + \hat{\gamma}_s + \hat{\theta}_t + \hat{\epsilon}_{ist}).$$

I then estimate the predicted probability that each individual would have participated if the state had allowed online voter registration, given the estimated main and interactive effects of the treatment:

$$\hat{\mathbb{P}}^1(Y_{ist} = 1) = \Phi(\hat{\alpha} + \hat{\beta}X_{ist} + \hat{\rho}Z_{st} + \hat{\delta}T_{st} + \hat{\lambda}I_{ist} + \hat{\gamma}_s + \hat{\theta}_t + \hat{\epsilon}_{ist}),$$

where $I_{ist}$ represents the subset of demographic variables that are interacted with the treatment.

For control state $s$ in time $t$, let $\pi_{st}^0$ represent the proportion of individuals for whom $\hat{\mathbb{P}}^0 > 0.5$ and $\pi_{st}^1$ represent the proportion of individuals for whom $\hat{\mathbb{P}}^1 > 0.5$. Define $\Delta_{st} = \pi_{st}^1 - \pi_{st}^0$. That is, define the measure $\Delta_{st}$ to be the difference in the estimated fractions of individuals who would vote in the counterfactual and in the control. To translate this measure into an intuitively interpretable difference, for each control state and election year, I multiply $\Delta_{st}$ by the number of voting-eligible citizens to arrive at the additional number of votes online registration would have generated.

Tables V and VI contrast each state's estimated influx of votes with its margin of victory in the presidential contest, for the 2008 and 2012 election cycles, respectively. In each year, for a small collection of states (including perennial battleground states such as Ohio and Florida), the estimated influx of voters exceeds the margin of victory between the top-two presidential slates. Hypothetically, then, it is within the realm of possibility

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[21]Note that $T_{st}$ is omitted from this model, given that these individuals all belong to the control.

for online registration to have influenced the outcome. The Voter Supplement does not detail partisan affiliation, so it is difficult to estimate the partisan makeup of these additional votes. Consider, though, Missouri in 2008 (Table V). The margin of victory was 3903 votes, while the estimated increase in turnout with online registration is 308,353; it is hardly inconceivable that the partisan makeup of these additional voters could alter the outcome of the election. This comparison gives merely a glimpse of the potential aggregate impact of this form of convenience voting, but Missouri's results in 2008 suggest that politicians and campaign activists may want to consider the potential electoral implications.

## Conclusion

Despite my skepticism that online registration would have any meaningful impact on individual or aggregate turnout, the results of this paper suggest that this particular form of convenience voting may actually live up to the promises of its enthusiasts. Indeed, the results of this investigation suggest that this reform may be especially important for young adults, those in lower income brackets, and recent movers. Given these implications, perhaps we can don our rose-colored glasses with fewer misgivings. On the other hand, it is fair to point out that the results are driven primarily by two cross-sections of data. As we amass additional data, future projects should continue to evaluate whether online registration is part of the solution to the turnout puzzle, or simply a distraction from the true barriers to universal participation.

Of course, conservative results are still entirely compatible with a normative case for the online registration movement. Firstly, states do save money and reduce error when residents register themselves online. Secondly, we can expect that the effect, however minimal, will be positive; it would be extremely surprising if voters became *less* likely to participate if given the opportunity to register online. Even if the effect of online registration is purely

one of substitution, we can still assume that overall welfare has increased; the citizens who utilize online registration presumably find it more convenient and less costly than the other registration alternatives.

The true effect of online voter registration remains to be seen. In the future, more citizens may become aware of this opportunity, and knowledge of the existence of online registration is a prerequisite to its utilization. As more states' election administrations consider online registration, news coverage of the movement will increase. Others may learn through word of mouth, and it is quite possible that voter mobilization groups will shift resources to promoting this method. Decades passed in California before a substantial proportion citizens took advantage of no-excuse absentee voting (Alvarez, Levin, and Sinclair 2012). Furthermore, people are already completing more of their daily activities online. And finally, as the voting base naturally shifts with each generation, we can hope that the influx of new voters, who have greater technological exposure, will be more likely to seek and pursue registration online.

Yet while proponents of online voter registration have argued that it will foster a new sense of political activism, the current project gives reason to temper those expectations. It is fair to celebrate the potential impact on young adults, low-income earners, and those who moved within the past year, but we should bear in mind that there is regrettably no evidence that online registration is doing anything to capture other underrepresented segments of the electorate, such as racial minorities, the less educated, and the non-employed. Consequently, the results of this study seem to echo the concern that despite persistent reform efforts, we still have difficulty encouraging fully representative participation.

There is still a great deal of work to be done if we want to develop an accurate metric for assessing the performance of these reforms. An assumption of exogenous selection is implicitly embedded within the probit model used in this paper and widely in the literature, and this assumption is tenuous at best. In other words, this method assumes that whether or not

an individual is treated is independent from how she would respond to treatment. We might reasonably infer that if this assumption does not hold in reality, our results might incorporate some bias, but just how this bias might manifest itself remains unclear. Some papers have attempted to sidestep this assumption by instead using nonparametric bounds (Glynn and Quinn 2011, Hanmer 2007), but Hanmer (2007) admits that the results of this method are substantively uninformative. Other papers have utilized an RDD approach (Keele and Minozzi 2013, Ansolabehere and Konisky 2006), but opportunities to exploit this design are limited by the structure of implementation. Furthermore, the literature does not fully account for the possibility that individuals may interact with the treatment differently, and perhaps as a function of their demographic backgrounds. It seems inherently plausible, for example, that only politically engaged citizens take advantage of these reforms because they are the only ones aware of the liberalizations. Future papers should consider and address the importance of salience in these reform efforts.

And finally, even with the fairly promising results presented in this paper, the turnout puzzle remains unresolved. Despite numerous pieces of legislation designed to reduce the costs of voting and millions of dollars poured into "Get Out the Vote" campaigns, American elections are still plagued by a lack of participation. Even if it helps, online registration is not a panacea; the most generous estimates of its promise do not suggest anything near universal participation. This paper acknowledges the concerns about the futility of mobilization efforts and naturally begs the question of *why* these reforms are not having the promised effect. Are non-voters so apathetic about politics that they are indifferent? Are they convinced of the improbability of pivotality and unwilling to vote if there is any cost? Or are they perhaps unaware of the reforms that could enhance their voting experiences? Future research should disentangle these potential explanations, as they imply dramatically different forecasts of the upper bound on participation.
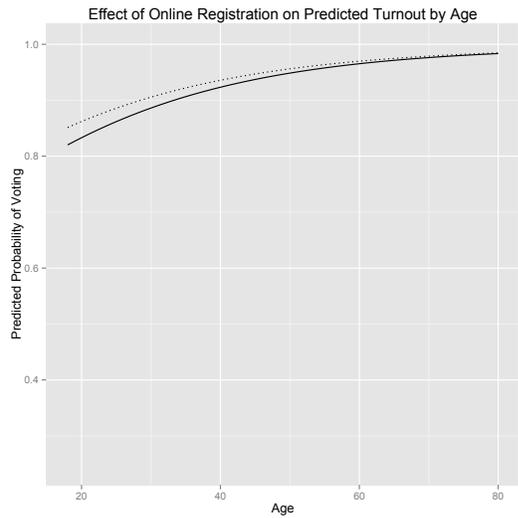
Effect of Online Registration on Predicted Turnout by Age

This graph shows the relationship between age and predicted probability of turnout with (dotted) and without (solid) online registration. The simulated individual is a non-Hispanic, black woman living in Ohio in 2008. She is college-educated and employed, and her family income is between $35,000 and $39,999. She has lived at her current residence for at least 5 years.

FIGURE 1B
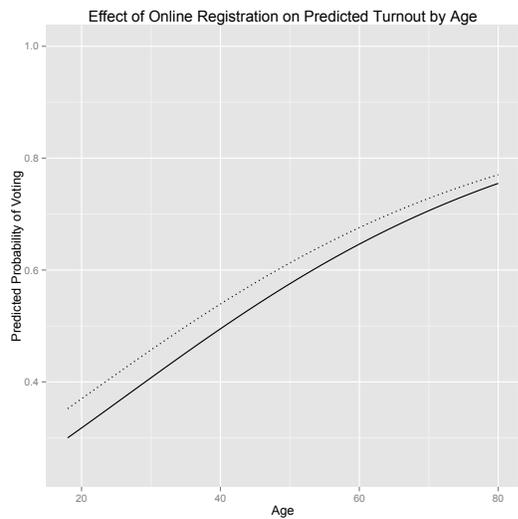


Effect of Online Registration on Predicted Turnout by Age

This graph shows the relationship between age and predicted probability of turnout with (dotted) and without (solid) online registration. The simulated individual is a Hispanic, white man living in Florida in 2012. He attended but did not complete college, he is employed, and his family income is between $15,000 and $19,999. He has lived at his current residence for 1 - 2 years.

| | Outcome: Registration | | Outcome: Turnout | |
| --- | --- | --- | --- | --- |
| | Coeff. | Std. Error | Coeff. | Std. Error |
| Age | 0.021 *** | (0.001 ) | 0.028 *** | (0.001 ) |
| Age$^2$ | -0.000 *** | (0.000 ) | -0.000 *** | (0.000 ) |
| Female | 0.130 *** | (0.004 ) | 0.089 *** | (0.004 ) |
| Black | 0.215 *** | (0.008 ) | 0.283 *** | (0.007 ) |
| Asian | -0.557 *** | (0.013 ) | -0.537 *** | (0.012 ) |
| Other Race | -0.108 *** | (0.014 ) | -0.150 *** | (0.013 ) |
| Hispanic | -0.182 *** | (0.008 ) | -0.162 *** | (0.008 ) |
| Family Income | 0.041 *** | (0.001 ) | 0.049 *** | (0.001 ) |
| High School | -0.707 *** | (0.006 ) | -0.686 *** | (0.005 ) |
| Some College | -0.218 *** | (0.007 ) | -0.236 *** | (0.006 ) |
| Postgrad | 0.251 *** | (0.011 ) | 0.251 *** | (0.008 ) |
| Unemployed | -0.105 *** | (0.011 ) | -0.099 *** | (0.010 ) |
| Not in Labor Force | -0.152 *** | (0.006 ) | -0.110 *** | (0.005 ) |
| <1 Month | -0.538 *** | (0.017 ) | -0.672 *** | (0.017 ) |
| 1 - 6 Months | -0.473 *** | (0.008 ) | -0.485 *** | (0.007 ) |
| 7 - 11 Months | -0.442 *** | (0.010 ) | -0.451 *** | (0.010 ) |
| 1 - 2 Years | -0.320 *** | (0.006 ) | -0.308 *** | (0.006 ) |
| 3 - 4 Years | -0.171 *** | (0.007 ) | -0.172 *** | (0.006 ) |
| Margin of Victory | -0.001 *** | (0.000 ) | -0.003 *** | (0.000 ) |
| Presidential | 0.112 *** | (0.008 ) | 0.462 *** | (0.008 ) |
| EDR | -0.005 | (0.024 ) | 0.034 | (0.022 ) |
| Early | | | -0.250 *** | (0.021 ) |
| No Excuse Abs | | | 0.362 *** | (0.028 ) |
| Mail | | | 0.174 *** | (0.026 ) |
| Online Registration | 0.056 *** | (0.011 ) | 0.058 *** | (0.011 ) |
| Constant | 0.252 *** | (0.035 ) | -0.961 *** | (0.027 ) |
| N | 509,439 | | 509,439 | |
| Pseudo $R^2$ | 0.154 | | 0.175 | |

***: significance at 1% level

*: significant at 5% level

: significant at 10% level

This table represents the point estimates and associated (robust) standard errors for the probit model. The reference categories are as follows: male (gender), white (ethnicity), non-Hispanic (Hispanic indicator), college (education), employed (employment status), midterm election (election type), and no convenience voting. When the outcome of interest is registration, $Y = \mathbb{1}\{Registered\}$, and when the outcome is turnout, $Y = \mathbb{1}\{Voted\}$. Although not reported here, I include both state and year fixed effects.

| Variable | Outcome: Registration | Outcome: Turnout |
|---|---|---|
| Ethnicity (3) | 3.26 | 1.03 |
| Education (3) | 6.74 * | 6.74 * |
| Employment (2) | 8.18 ** | 2.8 |
| Residential Mobility (5) | 11.73 ** | 14.98 *** |

***: significance at 1% level
*: significant at 5% level
: significant at 10% level

This table represents the $\chi^2$ test statistics for joint significance. This test statistic is derived by using the likelihood ratios of a fully specified model and a nested model with only a subset of the covariates. The numbers in parentheses detail the degrees of freedom for each categorical variable. The models with all interactive effects are presented in the Appendix, specifically tables AV and AVI.

TABLE III: MAIN AND INTERACTIVE EFFECTS ON REGISTRATION (PROBIT)

| | Main Effects | | Interactions with OR | |
| | Coeff. | Std. Error | Coeff. | Std. Error |
|---|---|---|---|---|
| Age | 0.021 *** | (0.001 ) | 0.021 ** | (0.001) |
| Age$^2$ | -0.000 *** | (0.000 ) | | |
| Female | 0.130 *** | (0.004 ) | | |
| Black | 0.215 *** | (0.008 ) | | |
| Asian | -0.557 *** | (0.013 ) | | |
| Other Race | -0.108 *** | (0.014 ) | | |
| Hispanic | -0.182 *** | (0.008 ) | | |
| Family Income | 0.041 *** | (0.001 ) | -0.008 *** | (0.002) |
| High School | -0.703 *** | (0.006 ) | -0.058 *** | (0.022) |
| Some College | -0.217 *** | (0.007 ) | -0.017 | (0.025) |
| Postgrad | 0.252 *** | (0.011 ) | -0.015 | (0.040) |
| Unemployed | -0.110 *** | (0.011 ) | 0.051 | (0.038) |
| Not in Labor Force | -0.149 *** | (0.006 ) | -0.041 ** | (0.020) |
| <1 Month | -0.531 *** | (0.018) | -0.094 | (0.065) |
| 1 - 6 Months | -0.476 *** | (0.008) | 0.051 * | (0.030) |
| 7 - 11 Months | -0.449 *** | (0.011) | 0.087 ** | (0.038) |
| 1 - 2 Years | -0.320 *** | (0.007) | 0.005 | (0.025) |
| 3 - 4 Years | -0.170 *** | (0.007) | -0.011 | (0.026) |
| Margin of Victory | -0.001 *** | (0.000) | | |
| Presidential | 0.112 *** | (0.008) | | |
| EDR | -0.005 | (0.024 ) | | |
| Online Registration | 0.237 *** | (0.047) | | |
| Constant | 0.240 *** | (0.035 ) | | |
| $N$ | 509,439 | | | |
| Pseudo $R^2$ | 0.154 | | | |

***: significance at 1% level
*: significant at 5% level
: significant at 10% level

This table represents the point estimates and associated (robust) standard errors for the probit model associated with registration. It includes the individually and jointly significant interactive effects. The reference categories are as follows: male (gender), white (ethnicity), non-Hispanic (Hispanic indicator), college (education), employed (employment status), midterm election (election type), and no convenience voting. When the outcome of interest is registration, $Y = \mathbb{1}\{Registered\}$, and when the outcome is turnout, $Y = \mathbb{1}\{Voted\}$. Although not reported here, I include both state and year fixed effects.

**TABLE IV: MAIN AND INTERACTIVE EFFECTS ON TURNOUT (PROBIT)**

| | Main Effects | | Interactions with OR | |
| | Coeff. | Std. Error | Coeff. | Std. Error |
|---|---|---|---|---|
| Age | 0.029 *** | (0.001 ) | -0.002 *** | (0.000) |
| Age$^2$ | 0.000 *** | (0.000 ) | | |
| Female | 0.089 *** | (0.004 ) | | |
| Black | 0.284 *** | (0.007 ) | | |
| Asian | -0.537 *** | (0.012 ) | | |
| Other Race | -0.150 *** | (0.013 ) | | |
| Hispanic | -0.162 *** | (0.008 ) | | |
| Family Income | 0.049 *** | (0.001 ) | -0.008 *** | (0.002) |
| High School | -0.684 *** | (0.005 ) | -0.027 | (0.020) |
| Some College | -0.238 *** | (0.006 ) | 0.028 | (0.022) |
| Postgrad | 0.252 *** | (0.009 ) | -0.012 | (0.033) |
| Unemployed | -0.099 *** | (0.010 ) | | |
| Not in Labor Force | -0.110 *** | (0.005 ) | | |
| <1 Month | -0.660 *** | (0.018 ) | -0.151 ** | (0.066) |
| 1 - 6 Months | -0.484 *** | (0.008 ) | -0.023 | (0.028) |
| 7 - 11 Months | -0.454 *** | (0.010 ) | 0.038 | (0.037) |
| 1 - 2 Years | -0.305 *** | (0.006 ) | -0.042 * | (0.023) |
| 3 - 4 Years | -0.168 *** | (0.006) | -0.060 ** | (0.024) |
| Margin of Victory | -0.003 *** | (0.000 ) | | |
| Presidential | 0.463 *** | (0.008) | | |
| EDR | 0.034 | (0.022) | | |
| Early | -0.251 *** | (0.021 ) | | |
| No Excuse Abs | 0.363 *** | (0.028 ) | | |
| Mail | 0.172 *** | (0.026 ) | | |
| Online Registration | 0.235 *** | (0.044 ) | | |
| Constant | -0.973 *** | (0.027 ) | | |
| N | 509,439 | | | |
| Pseudo $R^2$ | 0.175 | | | |

***: significance at 1% level

*: significant at 5% level

: significant at 10% level


This table represents the point estimates and associated (robust) standard errors for the probit model associated with turnout. It includes the individually and jointly significant interactive effects. The reference categories are as follows: male (gender), white (ethnicity), non-Hispanic (Hispanic indicator), college (education), employed (employment status), midterm election (election type), and no convenience voting. When the outcome of interest is registration, $Y = \mathbb{1}\{Registered\}$, and when the outcome is turnout, $Y = \mathbb{1}\{Voted\}$. Although not reported here, I include both state and year fixed effects.

**Table V: Predicted Change in Presidential Turnout by State, 2008**

| State | Estimated Influx | Margin of Victory |
|---|---|---|
| Florida | 709,368 | 236,148 |
| Texas | 1,390,758 | 950,695 |
| Indiana | 368,922 | 28,391 |
| Missouri | 308,353 | 3,903 |
| North Carolina | 305,171 | 14,177 |
| Georgia | 461,325 | 204,636 |
| Ohio | 460,628 | 262,224 |
| West Virginia | 176,188 | 93,609 |
| Virginia | 284,784 | 234,527 |
| South Carolina | 216,667 | 172,447 |
| Nevada | 137,899 | 120,909 |
| Montana | 26,360 | 11,723 |
| South Dakota | 29,323 | 32,130 |
| Pennsylvania | 610,055 | 620,478 |
| New Hampshire | 39,712 | 68,292 |
| Iowa | 106,963 | 146,561 |
| Alaska | 21,519 | 70,247 |
| Colorado | 165,540 | 215,004 |
| Nebraska | 68,057 | 119,660 |
| Arkansas | 163,608 | 215,707 |
| Mississippi | 116,015 | 169,935 |
| New Mexico | 71,475 | 125,590 |
| Wyoming | 26,279 | 82,090 |
| Kansas | 123,589 | 184,890 |
| Delaware | 24,186 | 103,085 |
| Rhode Island | 48,362 | 131,180 |
| Maine | 40,762 | 126,650 |
| Tennessee | 303,549 | 391,741 |
| Vermont | 28,369 | 120,288 |
| Kentucky | 199,687 | 296,477 |
| Idaho | 69,522 | 166,572 |
| Hawaii | 91,049 | 205,305 |
| Utah | 147,099 | 268,360 |
| Louisiana | 187,727 | 365,286 |
| Oregon | 93,576 | 298,816 |
| Minnesota | 86,692 | 297,945 |
| Connecticut | 136,920 | 368,345 |
| Oklahoma | 179,234 | 457,669 |
| Alabama | 162,565 | 453,067 |
| New Jersey | 310,392 | 602,215 |
| Wisconsin | 107,785 | 414,818 |
| Michigan | 357,300 | 823,940 |
| Maryland | 199,047 | 669,605 |
| Massachusetts | 178,893 | 795,244 |
| Illinois | 474,354 | 1,388,169 |
| New York | 730,947 | 2,052,174 |
| California | 1,515,180 | 3,262,692 |

**TABLE VI: PREDICTED CHANGE IN PRESIDENTIAL TURNOUT BY STATE, 2012**

| State | Estimated Influx | Margin of Victory |
|---|---|---|
| Florida | 881,608 | 74,309 |
| Ohio | 642,197 | 166,272 |
| Pennsylvania | 673,976 | 309,840 |
| North Carolina | 408,386 | 92,004 |
| Texas | 1,571,234 | 1,261,719 |
| Georgia | 564,326 | 304,861 |
| Virginia | 387,466 | 149,298 |
| Iowa | 125,518 | 91,927 |
| New Mexico | 104,173 | 79,547 |
| New Hampshire | 54,032 | 39,643 |
| Missouri | 257,119 | 258,644 |
| Alaska | 34,746 | 42,036 |
| Montana | 37,840 | 66,089 |
| Mississippi | 114,850 | 147,797 |
| West Virginia | 144,579 | 179,386 |
| South Dakota | 26,272 | 65,571 |
| Delaware | 32,236 | 77,100 |
| Wisconsin | 167,351 | 213,019 |
| Arkansas | 196,749 | 253,335 |
| Maine | 48,201 | 109,030 |
| Wyoming | 27,565 | 101,676 |
| Vermont | 28,686 | 106,541 |
| Rhode Island | 43,915 | 122,473 |
| Hawaii | 97,828 | 185,643 |
| Tennessee | 412,827 | 501,621 |
| Nebraska | 80,646 | 172,983 |
| Connecticut | 173,086 | 270,210 |
| Michigan | 350,655 | 449,313 |
| Idaho | 85,152 | 208,124 |
| Minnesota | 96,829 | 225,942 |
| Kentucky | 245,295 | 407,820 |
| Oklahoma | 237,898 | 447,778 |
| New Jersey | 392,443 | 647,861 |
| Alabama | 188,422 | 460,229 |
| Illinois | 517,375 | 884,296 |
| Massachusetts | 227,686 | 733,301 |
| New York | 981,444 | 1,995,381 |

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# Appendix

## Online Registration by State



● — OR Before 2008
● — OR Before 2010
● — OR Before 2012
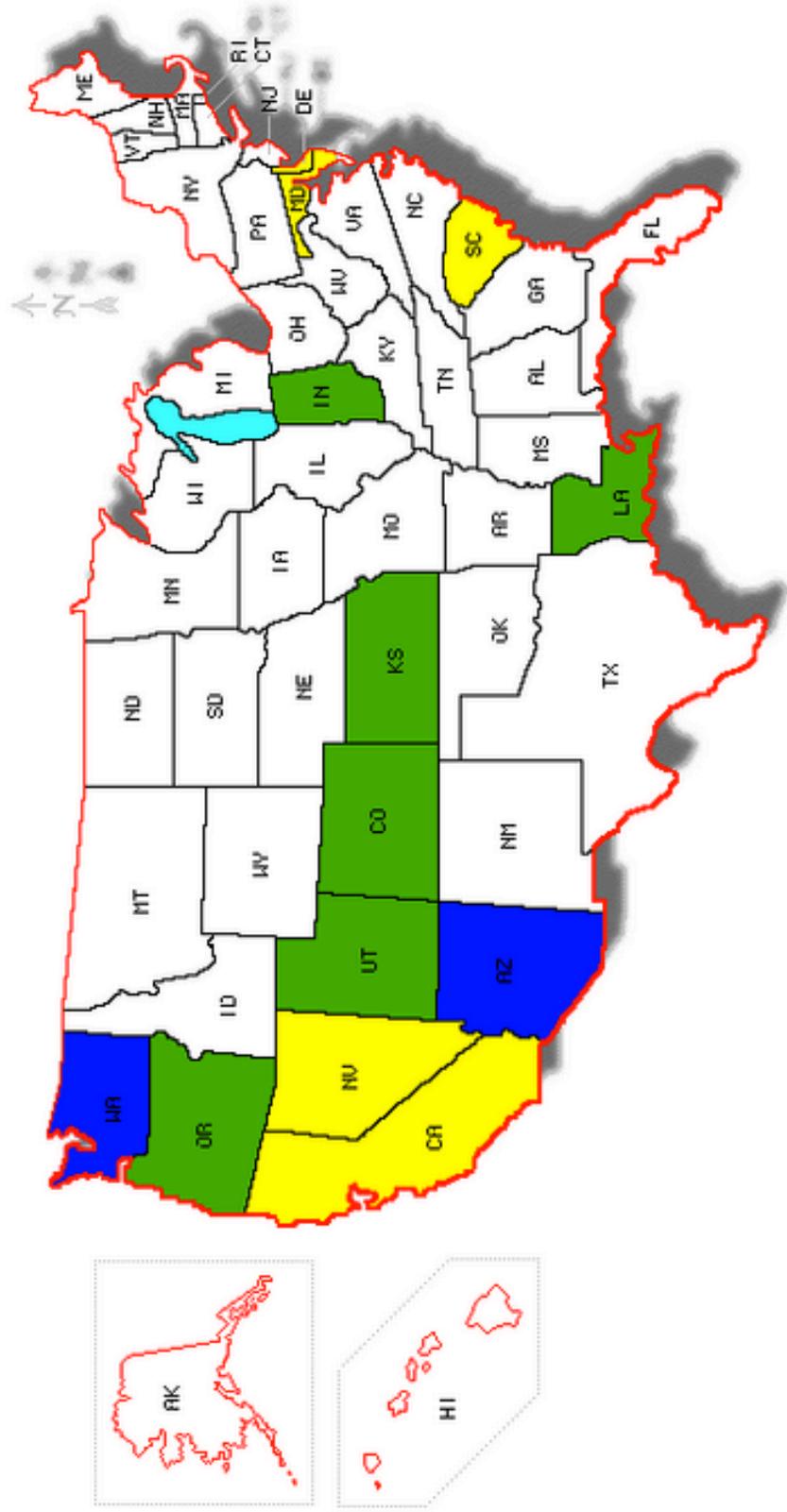
**TABLE AI: DEMOGRAPHIC DISTRIBUTION**

| Variable | | Frequency | Percent |
|---|---|---|---|
| *Gender* | Female | 268,222 | 52.65 % |
| | **Male** | **241,217** | **47.35 %** |
| *Ethnicity* | Black | 44,457 | 8.73 % |
| | Asian | 15,976 | 3.14 % |
| | Other Race | 11,732 | 2.30 % |
| | **White** | **437,274** | **85.83 %** |
| *Hispanic Indicator* | Hispanic | 36,513 | 7.17 % |
| *Education* | High School or Less | 218,347 | 42.86 % |
| | Some College | 103,566 | 20.33 % |
| | **College** | **140,022** | **27.49 %** |
| | Postgraduate | 47,504 | 9.32 % |
| *Employment* | Unemployed | 19,028 | 3.74 % |
| | Not in Labor Force | 160,630 | 31.53 % |
| | **Employed** | **329,781** | **64.73 %** |
| *Mobility* | <1 Month | 6,676 | 1.31 % |
| | 1 - 6 Months | 43,585 | 8.56 % |
| | 7 - 11 Months | 20,690 | 4.06 % |
| | 1 - 2 Years | 70,317 | 13.80 % |
| | 3 - 4 Years | 67,727 | 13.29 % |
| | **5+ Years** | **300,444** | **58.98 %** |

This table gives the demographic distribution for the sample. The variables in boldface serve as reference categories in the econometric models. Age is treated as a continuous variable, with mean 46.93, minimum 18, and maximum 80.

**TABLE AII: ACCESS TO CONVENIENCE VOTING BY YEAR**

| Convenience Voting | 2000 | 2002 | 2004 | 2006 | 2008 | 2010 | 2012 |
|---|---|---|---|---|---|---|---|
| EDR | 8.91 % | 11.37 % | 12.21 % | 13.93 % | 16.13 % | 15.16 % | 15.14 % |
| Early | 64.37 % | 63.28 % | 63.58 % | 64.34 % | 63.75 % | 63.01 % | 62.79 % |
| No Excuse Abs | 55.31 % | 54.54 % | 54.28 % | 54.89 % | 54.43 % | 53.42 % | 52.92 % |
| Mail | 2.48 % | 3.54 % | 3.51 % | 3.42 % | 3.39 % | 3.31 % | 3.41 % |
| Online Registration | 0.00 % | 1.39 % | 1.33 % | 1.22 % | 3.00 % | 12.17 % | 25.12 % |

This table illustrates the percentage of people who enjoyed each type of convenience voting for each yearly cross-section. Of particular interest is access to Online Registration, which has been steadily increasing.

| | Outcome: Registration | | Outcome: Turnout | |
|---|---|---|---|---|
| | Coeff. | Std. Error | Coeff. | Std. Error |
| Age | 0.035 *** | (0.001) | 0.046 *** | (0.001) |
| Age$^2$ | -0.000 *** | (0.000) | -0.000 *** | (0.000) |
| Female | 0.225 *** | (0.008) | 0.149 *** | (0.007 ) |
| Black | 0.387 *** | (0.014) | 0.485 *** | (0.013) |
| Asian | -0.954 *** | (0.022) | -0.904 *** | (0.021) |
| Other Race | -0.181 *** | (0.023) | -0.252 *** | (0.022 ) |
| Hispanic | -0.301 *** | (0.014) | -0.269 *** | (0.013) |
| Family Income | 0.068 *** | (0.001) | 0.081 *** | (0.001 ) |
| High School | -1.243 *** | (0.010) | -1.150 *** | (0.009) |
| Some College | -0.400 *** | (0.012) | -0.402 *** | (0.010 ) |
| Postgrad | 0.506 *** | (0.021) | 0.447 *** | (0.015 ) |
| Unemployed | -0.176 *** | (0.018) | -0.165 *** | (0.017) |
| Not in Labor Force | -0.271 *** | (0.010) | -0.187 *** | (0.009 ) |
| <1 Month | -0.908 *** | (0.029) | -1.128 *** | (0.030) |
| 1 - 6 Months | -0.800 *** | (0.013) | -0.811 *** | (0.012) |
| 7 - 11 Months | -0.753 *** | (0.017) | -0.751 *** | (0.017) |
| 1 - 2 Years | -0.550 *** | (0.011) | -0.516 *** | (0.010) |
| 3 - 4 Years | -0.298 *** | (0.011) | -0.289 *** | (0.010) |
| Margin of Victory | -0.001 *** | (0.000) | -0.004 *** | (0.000) |
| Presidential | 0.190 *** | (0.014) | 0.773 *** | (0.013) |
| EDR | -0.015 | (0.042) | 0.059 | (0.038) |
| Early | | | -0.421 *** | (0.036) |
| No Excuse Abs | | | 0.608 *** | (0.047) |
| Mail | | | 0.292 *** | (0.044) |
| Online Reg | 0.098 *** | (0.020) | 0.098 *** | (0.018) |
| Constant | 0.490 *** | (0.062) | -1.588 *** | (0.045) |
| N | 509,439 | | 509,439 | |
| Pseudo $R^2$ | 0.153 | | 0.175 | |

***: significance at 1% level

*: significant at 5% level

: significant at 10% level

This table represents the point estimates and associated (robust) standard errors for the logit model fitted to the entire sample. The reference categories are as follows: male (gender), white (ethnicity), non-Hispanic (Hispanic indicator), college (education), employed (employment status), midterm election (election type), and no convenience voting. When the outcome of interest is registration, $Y = \mathbb{1}\{Registered\}$, and when the outcome is turnout, $Y = \mathbb{1}\{Voted\}$. Although not reported here, I include both state and year fixed effects.

**TABLE AIV: MAIN EFFECTS ON POLITICAL PARTICIPATION (SCOBIT)**

| | Outcome: Registration | | Outcome: Turnout | |
|---|---|---|---|---|
| | Coeff. | Std. Error | Coeff. | Std. Error |
| Age | 0.025 *** | (0.001) | 0.041 *** | (0.001) |
| Age$^2$ | 0.000 *** | (0.000) | 0.000 *** | (0.000) |
| Female | 0.143 *** | (0.005) | 0.128 *** | (0.006) |
| Black | 0.232 *** | (0.010) | 0.402 *** | (0.012) |
| Asian | -0.640 *** | (0.016) | -0.782 *** | (0.019) |
| Other | -0.128 *** | (0.016) | -0.220 *** | (0.019) |
| Hispanic | -0.214 *** | (0.010) | -0.238 *** | (0.012) |
| Family Income | 0.047 *** | (0.001) | 0.071 *** | (0.001) |
| High School | -0.767 *** | (0.014) | -0.966 *** | (0.014) |
| Some College | -0.228 *** | (0.008) | -0.328 *** | (0.010) |
| Postgrad | 0.249 *** | (0.012) | 0.345 *** | (0.013) |
| Unemployed | -0.126 *** | (0.012) | -0.143 *** | (0.015) |
| Not in Labor Force | -0.163 *** | (0.007) | -0.155 *** | (0.008) |
| <1 Month | -0.626 *** | (0.022) | -0.981 *** | (0.028) |
| 1 - 6 Months | -0.544 *** | (0.011) | -0.699 *** | (0.013) |
| 7 - 11 Months | -0.497 *** | (0.013) | -0.641 *** | (0.016) |
| 1 - 2 Years | -0.352 *** | (0.009) | -0.434 *** | (0.010) |
| 3 - 4 Years | -0.185 *** | (0.008) | -0.240 *** | (0.009) |
| Margin of Victory | -0.001 *** | (0.000) | -0.004 *** | (0.000) |
| Presidential | 0.126 *** | (0.009) | 0.657 *** | (0.013) |
| EDR | -0.004 | (0.026) | 0.047 | (0.032) |
| Early | | | -0.357 *** | (0.031) |
| No Excuse Abs | | | 0.518 *** | (0.040) |
| Mail | | | 0.246 *** | (0.037) |
| Online Registration | 0.061 | (0.013) | 0.083 *** | (0.015) |
| Constant | -1.399 *** | (0.099) | -2.070 *** | (0.056) |
| N | 509,439 | | 509,439 | |
| ln $\alpha$ | 1.348 | | 0.490 | |
| $\alpha$ | 3.850 | | 1.632 | |

***: significance at 1% level
*: significant at 5% level
: significant at 10% level

This table represents the point estimates and associated (robust) standard errors for the scobit model fitted to the entire sample. The reference categories are as follows: male (gender), white (ethnicity), non-Hispanic (Hispanic indicator), college (education), employed (employment status), midterm election (election type), and no convenience voting. When the outcome of interest is registration, $Y = \mathbb{1}\{Registered\}$, and when the outcome is turnout, $Y = \mathbb{1}\{Voted\}$. Although not reported here, I include both state and year fixed effects.

**TABLE AV: MAIN AND INTERACTIVE EFFECTS ON REGISTRATION (PROBIT)**

| | Main Effects | | Interactions with OR | |
| --- | --- | --- | --- | --- |
| | Coeff. | Std. Error | Coeff. | Std. Error |
| Age | 0.021 *** | (0.001 ) | -0.001 ** | (0.001 ) |
| Age$^2$ | -0.000 *** | (0.000 ) | | |
| Female | 0.128 *** | (0.004 ) | 0.024 | (0.017 ) |
| Black | 0.214 *** | (0.008 ) | 0.022 | (0.034 ) |
| Asian | -0.560 *** | (0.013 ) | 0.025 | (0.041 ) |
| Other Race | -0.115 *** | (0.014 ) | 0.077 | (0.049 ) |
| Hispanic | -0.178 *** | (0.009 ) | -0.039 | (0.026 ) |
| Family Income | 0.041 *** | (0.001 ) | -0.008 *** | (0.002 ) |
| High School | -0.704 *** | (0.006 ) | -0.054 ** | (0.022 ) |
| Some College | -0.217 *** | (0.007 ) | -0.016 | (0.025 ) |
| Postgrad | 0.252 *** | (0.011 ) | -0.015 | (0.040 ) |
| Unemployed | -0.110 *** | (0.011 ) | 0.051 | (0.038 ) |
| Not in Labor Force | -0.149 *** | (0.006 ) | -0.046 ** | (0.020 ) |
| <1 Month | -0.531 *** | (0.018 ) | -0.097 | (0.065 ) |
| 1 - 6 Months | -0.476 *** | (0.008 ) | 0.050 * | (0.030 ) |
| 7 - 11 Months | -0.449 *** | (0.011 ) | 0.087 ** | (0.038 ) |
| 1 - 2 Years | -0.320 *** | (0.007 ) | 0.005 | (0.025 ) |
| 3 - 4 Years | -0.170 *** | (0.007 ) | -0.011 | (0.026 ) |
| Margin of Victory | -0.001 *** | (0.000 ) | | |
| Presidential | 0.113 *** | (0.008 ) | | |
| EDR | -0.005 | (0.024 ) | | |
| Online Registration | 0.223 *** | (0.049 ) | | |
| Constant | 0.241 *** | (0.035 ) | | |
| N | 509,439 | | | |
| Pseudo $R^2$ | 0.154 | | | |

***: significance at 1% level
*: significant at 5% level
: significant at 10% level

This table represents the point estimates and associated (robust) standard errors for the probit model for registration, with interactions for nearly all demographic variables. The reference categories are as follows: male (gender), white (ethnicity), non-Hispanic (Hispanic indicator), college (education), employed (employment status), midterm election (election type), and no convenience voting. When the outcome of interest is registration, $Y = \mathbb{1}\{Registered\}$, and when the outcome is turnout, $Y = \mathbb{1}\{Voted\}$. Although not reported here, I include both state and year fixed effects.

|  | Main Effects | | Interactions with OR | |
|---|---|---|---|---|
|  | Coeff. | Std. Error | Coeff. | Std. Error |
| Age | 0.029 *** | (0.001 ) | -0.001 ** | (0.001) |
| Age$^2$ | -0.001 *** | (0.001 ) |  |  |
| Female | 0.088 *** | (0.004 ) | 0.019 | (0.016) |
| Black | 0.284 *** | (0.008 ) | 0.000 | (0.031) |
| Asian | -0.537 *** | (0.013 ) | -0.004 | (0.040) |
| Other Race | -0.155 *** | (0.014 ) | 0.045 | (0.046) |
| Hispanic | -0.160 *** | (0.008 ) | -0.023 | (0.025) |
| Family Income | 0.049 *** | (0.001 ) | -0.008 *** | (0.002) |
| High School | -0.684 *** | (0.005 ) | -0.022 | (0.020) |
| Some College | -0.238 *** | (0.006 ) | 0.031 | (0.022) |
| Postgrad | 0.252 *** | (0.009 ) | -0.012 | (0.033) |
| Unemployed | -0.102 *** | (0.011 ) | 0.032 | (0.037) |
| Not in Labor Force | -0.108 *** | (0.005 ) | -0.024 | (0.019) |
| <1 Month | -0.660 *** | (0.018 ) | -0.152 ** | (0.066) |
| 1 - 6 Months | -0.483 *** | (0.008 ) | -0.024 | (0.028) |
| 7 - 11 Months | -0.454 *** | (0.010 ) | 0.037 | (0.037) |
| 1 - 2 Years | -0.305 *** | (0.006 ) | -0.042 * | (0.023) |
| 3 - 4 Years | -0.168 *** | (0.006 ) | -0.061 ** | (0.024) |
| Margin of Victory | -0.003 *** | (0.000 ) |  |  |
| Presidential | 0.463 *** | (0.008 ) |  |  |
| EDR | 0.034 | (0.022 ) |  |  |
| Early | -0.251 *** | (0.021 ) |  |  |
| No Excuse Abs | 0.363 *** | (0.028 ) |  |  |
| Mail | 0.171 *** | (0.026 ) |  |  |
| Online Registration | 0.222 *** | (0.047 ) |  |  |
| Constant | -0.972 *** | (0.027 ) |  |  |
| N | 509,439 |  |  |  |
| Pseudo $R^2$ | 0.154 |  |  |  |

***: significance at 1% level

*: significant at 5% level

: significant at 10% level

This table represents the point estimates and associated (robust) standard errors for the probit model for turnout, with interactions for nearly all demographic variables. The reference categories are as follows: male (gender), white (ethnicity), non-Hispanic (Hispanic indicator), college (education), employed (employment status), midterm election (election type), and no convenience voting. When the outcome of interest is registration, $Y = \mathbb{1}\{Registered\}$, and when the outcome is turnout, $Y = \mathbb{1}\{Voted\}$. Although not reported here, I include both state and year fixed effects.