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California Civic Engagement Project
Research for a Stronger, More Inclusive Democracy

Effects of Automatic Voter Registration in the United States

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About the California Civic Engagement Project (CCEP)

The California Civic Engagement Project (CCEP) is part of the University of Southern California Sol Price School of Public Policy in Sacramento. The CCEP conducts research to inform policy and on-the-ground efforts for a more engaged and representative democracy, improving the social and economic quality of life in communities. The CCEP is engaging in pioneering research to identify disparities in civic participation across place and population. Its research informs and empowers a wide range of policy and organizing efforts aimed at reducing disparities in state and regional patterns of well-being and opportunity. Key audiences include public officials, advocacy groups, media and communities themselves. To learn about the CCEP's research, or review the extensive coverage of the CCEP's work in the national and California media, visit our website at https://ccep.usc.edu

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This report is summarized by a brief of the same name which can be downloaded at: ccep.usc.edu

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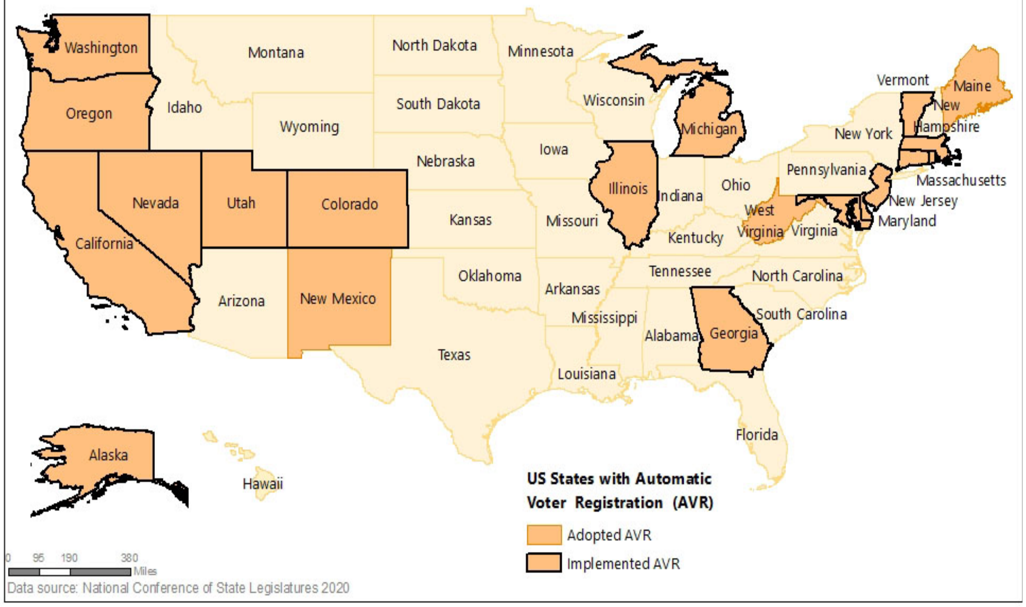
Introduction

FIGURE 1 **U.S. Automatic Voter Registration Passage and Implementation**



Automatic voter registration (AVR) laws take advantage of transactions at government agencies where applicant information can be captured and repurposed to register citizens to vote. Implementation varies, but the core idea is always to make eligible residents actively decline registration if they do not want it. The reform movement is still quite young, so there is little information about how effective AVR has been in the U.S. context. Oregon was the first to adopt a law generally agreed to be AVR, and of the 21 states that have adopted by the time of this writing, only 18 have actually implemented the reform and 12 of those did so by the 2018 General Election (see Figure 1). Thus, systematic evidence of the effects of these laws has been limited.

In this report we begin to address this gap by analyzing the effect of AVR on registration rates in four out of the 12 states that have implemented AVR thus far (Oregon, Colorado, California, and Delaware). We limit ourselves to registration rates because higher registration is arguably the most basic intended consequence of the AVR reform. Our data and methodological approach also permit us to examine key underrepresented groups that many election officials and voter advocacy organizations have hoped AVR would draw onto the registration rolls: Latinos, Asian Americans, and young people.

Our results suggest the consequences of AVR depend on the state and the type of outcome. The reforms appear to be very effective at making the DMV a primary method of registration. In many cases, the reform has reshaped the boom-and-bust pattern of registration in a typical election cycle by ensuring that registrants are steadily added throughout the year and voter records are kept updated. This will likely have the long term effect of a sizable increase in registration.

However, with one exception the AVR programs we look at are quite young, so this process of steady registration increase has not had much time to have an effect. Thus, the evidence for increased registration so far is ambiguous in the context of recent elections that have seen enthusiastic registration and turnout even without reform. More assertive approaches to AVR that have been adopted in Oregon and Alaska might be more successful at increasing registration rates. However, such systems come with important concerns about accidentally registering non-citizens; the challenges in any given state could be considerable.

In addition, we see no clear evidence that AVR has closed gaps in registration between historically overrepresented and historically underrepresented groups. The data for underrepresented groups sometimes show their strong use of AVR over other methods of registration, but without clearly demonstrating an improvement in their registration that was directly caused by reform. Neither do we see clear signs of a worsening position for these groups due to AVR; instead, the evidence is simply too ambiguous at this point to make a firm conclusion.

In short, AVR is promising but the conclusions we can make at this point are not firm. The COVID-19 pandemic has temporarily cut off access to many of the government agencies that serve as touch points for AVR. But when AVR access begins again, it will be important to continue monitoring it as it develops over time.

What is AVR?

If there is an objective common to all AVR reforms, it is the belief that residents should not have to actively seek out voter registration; instead, voter registration should occur as a matter of course unless it is actively declined. When citizens provide the government with information necessary to be registered–even if for some unrelated reason–the government should use it to register them unless expressly told not to.

The government touch point could be any agency, but the most typical one is the Department of Motor Vehicles (DMV). Virtually everyone uses the DMV at some point, and many DMV transactions require customers to provide personal details that can be used for voter registration as well. The DMV has in fact been required to offer voter registration in most states since passage of the National Voter Registration Act (NVRA) in 1993. But states have varied considerably in the ease and visibility of this "motor voter" option (Naifeh 2014; Highton and Wolfinger 1998). DMV customers often have to fill out the same information twice, the registration forms can be buried in piles of papers, and at times the DMV employees might not have time to raise the issue at all. While such inconveniences might not deter more determined residents, part of the point of DMV registration is to encourage those who might find registration confusing or intimidating, or might not be acculturated into self-identifying as a voter, to sign up to vote anyway. Voter registration is made easier by making it a streamlined, seamless part of DMV transactions.

In fact, there are reasons to think that even when voter registration is offered at the DMV in exactly the way the NVRA envisions, the number of people taking advantage of it might still be limited. Research shows that even small changes to the way options (on various topics) are presented can significantly affect decisions. Independent of their preferences, people will often accept the status quo and avoid even simple behaviors that would be to their own long-term benefit (Thaler and Sunstein 2008). A customer who is at the DMV for a driver's license might skip over the questions about voter registration to save time, or because the issue seems unrelated to the original reason they came to the DMV. Thus, a customer's relationship to the voter registration questions matters. Will they be required to answer those questions? If they do not answer them, will they be registered anyway?

Types of AVR

AVR seeks to provide a seamless integration of voter registration with other transactions at agencies that deal frequently with the general public. The main agency is usually the DMV, where AVR tries to improve on a voter registration process that already exists. The manner of the change differs considerably across states. The main distinctions are between back end and front end AVR (Root 2019), and between default registration and a forced choice. Back end AVR states no longer bring up voter registration at the government agency. Instead, the state establishes whether a resident is eligible to vote based on information provided when the person signs up for the government program, and the state then contacts that person to offer the chance to opt out of registration. The person is registered to vote if they do not opt out. By contrast, front end AVR raises the voter registration option at the government agency and allows the customer to opt out at that point as a part of the overall transaction.

Separate from the front end/back end difference, states have also varied how they make residents engage with the voter registration questions. Some states alter the default option: in the absence of a choice, eligible residents are placed into the program and must actively decide to opt out. Currently all back end AVR states use default registration, meaning residents must actively opt out after the fact if they do not want to be registered.[1] But some front end states also have a default option in the form of a box on the agency form that offers the option to decline voter registration. If the box is not checked the resident will be registered. Other front end states work primarily through a forced choice or "hard stop": customers must answer the voter registration questions or they cannot complete their transaction. The default becomes irrelevant because it is only activated when voters skip the registration questions, something the forced choice does not let them do.[2]

Back end AVR: Voter registration is no longer initiated at the government agency. Instead, the state establishes whether a resident is eligible to vote based on information provided when a person signs up for the government program, and then the state contacts that person after the fact to offer the chance to opt out.

Front end AVR: The voter registration option is provided at the government agency and allows the customer to opt out at that point as a part of the overall transaction.

Default registration: In the absence of a choice, eligible residents are placed into the voter registration program and must actively decide to opt out after the fact if they do not want to be registered

Forced choice or "hard stop" registration: Government agency customers must answer voter registration questions or they cannot complete their transaction.

Table 1: Details of AVR in Adopting States

State	Passage	Implementation	Approval Mechanism	Included Agencies	Declination Type	Customer Engagement
Alaska	Nov 2016	Mar 2017	Initiative	Permanent Fund Divided (PFD)	Back end	Default
California	Oct 2015	Apr 2018	Leg. + gov.	DMV	Front end	Forced choice
Colorado		Feb 2017 / Jul 2020	Admin.: DMV	DMV	Front end (2017) / Back end (2020)	Forced choice (2017) / Default (2020)
Connecticut		Aug 2018	Admin.: DMV + SoS	DMV	Front end	Forced choice
Delaware		Feb 2009	Admin.: DMV	DMV	Front end	Forced choice
District of Columbia	Feb 2017	Mar 2017	City council + Congress	DMV	Front end	Default
Georgia		Sep 2016	Admin.: DMV	DMV	Front end	Default
Illinois	Aug 2017	Jul 2018	Leg. + gov.	DMV+	Front end	Default
Maine	June 2019	Expected 2022	Leg. + gov.	DMV+	Front end	Not yet known
Maryland	Apr 2018	Jul 2019	Leg.	DMV+	Front end	Default
Massachusetts	Aug 2018	Jan 2020	Leg. + gov	DMV+	Back end	Default
Michigan	Nov 2018	Sept 2019	Initiative	DMV	Front end	Default
Nevada	Nov 2018	Jan 2020	Initiative	DMV	Front end	Default
New Jersey	Apr 2018	Nov 2018	Leg.	DMV+	Front end	Default
New Mexico	Mar 2019	Expected 2021	Leg. + gov.	DMV	Front end	Not yet known
Oregon	Mar 2015	Jan 2016	Leg.	DMV	Back end	Default
Rhode Island	Jul 2017	Jun 2018	Leg.	DMV+	Front end	Default
Utah	Mar 2018	May 2018	Leg. + gov.	DMV	Front end	Forced choice
Vermont	Apr 2016	Jan 2017	Leg.	DMV	Front end	Default
Washington	Mar 2018	Jul 2019	Leg.	DMV+	Front end	Default
West Virginia	May 2016	Expected 2021	Leg.	DMV	Front end	Not yet known

Table 1 shows details about the AVR experience for all the states that have adopted AVR, whether they have implemented it yet or not. Among all these states, front end AVR with default registration is somewhat more common (Georgia, Illinois, Maryland, Michigan, Nevada, Rhode Island, Vermont, Washington, and Washington, DC.) than front end with a forced choice (California, Colorado, Connecticut, Delaware, and Utah), and both dominate the back end approach (Alaska, Massachusetts, and Oregon).[3] But the importance of the customer experience can make it challenging to place these programs into neat buckets. For example, Delaware is part of our study but is almost never included in lists of AVR jurisdictions and does not even call its approach AVR. Yet as part of a largely unrelated administrative change, it adopted a user interface that turned the registration question into a hard stop question. Complicating matters further, there is evidence DMV employees treated registration as a hard stop even before the interface was made fully electronic. Compare to a state like California: it is often described as default registration, but it requires active assent from the customer and implements the reform as a hard stop question in an electronic interface. The difference between Delaware and California seems more a matter of labels than real experience.

Of these approaches, changing the default option should encourage more voter registration than forcing a choice, because the former makes it more complicated to avoid registration. For similar reasons, a default option ought to produce more registrants when implemented through the back end than the front end, if only because the back end requires newly registered voters to notice a letter in the mail that they were not necessarily expecting, and respond to it.

AVR Goals

AVR is typically promoted as a means to one or more of three goals. First, it is seen as a more effective and efficient means of maintaining the registration rolls. Residents who move often forget to re-register (or do not realize that completing a change of address form with the U.S. Post Office does not affect their voter registration), which complicates or even prevents voting in the next election and also sows doubt among election administrators as to which records are permanently inactive and which could be active again if properly updated. By handling the process of re-registration when a voter is already engaged with government for a different purpose, AVR ensures that voter registration records contain the most up-to-date information.

The second goal is to increase registration, and through that to boost voter turnout. The hope is that many people who are eligible to register and vote but have not done so will agree to be registered if the process is made as simple as possible. With AVR, there is no longer a need to figure out how to register. Almost every aspect of the process is now handled by the state if an individual does not register another way (either with a paper application or online in some states).

Some have questioned the significance of voter registration when compared with turnout. Indeed, the political science literature has treated registration as little more than an in-between step on the way to turnout. Wolfinger and Rosenstone (1980) famously highlighted registration as a key obstacle to voting, but it was the voting that really mattered to them and not the registration. Work on registration reforms has taken a similar tack. Analysis of same-day or Election-Day registration almost uniformly treats turnout as the outcome of interest, finding effects anywhere from a small decrease up to a more substantial increase. They offer little discussion of the overall changes in registration rates that accompany these effects (Brians and Grofman 2001; Hanmer 2009; Keele and Minozzi 2013; Knee and Green 2011). Ansolabehere and Konisky (2006) approach the question from the other direction by estimating the effect of introducing registration in the 1970s in counties where it had not existed before. They find a comparable decline in eligible turnout of about 4 percent, but offer no estimate of a registration effect (indeed, it is not clear how such an effect could even be estimated when registration itself did not previously exist). One study did estimate that 3-4 million eligible Americans in 2012 missed out on registration in the 2012 presidential election due to registration deadlines (Street et al. 2015), and there have also been some field experiments where the immediate treatment concerns registration (Mann and Bryant 2019). But such studies are the exception rather than the rule.

While registration is a necessary means to turnout and the exercise of political power, registration does not lead inevitably to voting. Perhaps the most successful American registration reform of the last century was the Voting Rights Act, but when it was first implemented many African Americans who were added to the rolls did not vote in high numbers (Colby 1986).

However, there are reasons to think that registration may be the most appropriate outcome to examine at this stage of AVR implementation, when the reform is still young in most states. AVR is different than many previous registration reforms. Election-Day registration, for example, is about removing barriers for citizens who are already motivated to vote. Those who show up to register at a polling place on Election Day will almost certainly cast a ballot. By contrast, AVR strongly promotes registration to some who might not have considered it and who may not think much about their registration afterward. This makes AVR less about removing barriers (though it has that element as well) and more about mobilization: about urging eligible residents to get registered when it was not part of their plans. Much like the Voting Rights Act–and maybe more important, the intense registration drives around it (Fraga 2018)–those who get registered through AVR might not have high turnout at first. They might only gradually become regular voters through further mobilization after the registration step is far behind them.

Thus, though we believe that the turnout effects of AVR are ultimately more important than the registration effects, at this point the registration effects may be a better early indicator of the reform's impact. The registration effects also give a sense of the potential that the reform has created. If the registration effects are large, then weak turnout effects are not a failure of the reform per se but a sign that more work must be done to mobilize the newly registered voters.

The final and most important goal of AVR for many is to improve the disparities in turnout by race, ethnicity, age, and other demographic categories deeply entrenched in the country's electoral system. While it is valuable to increase registration and turnout overall, the U.S. electorate is not representative of the population as a whole and addressing this problem may be more important than raising overall participation levels (Fraga 2018). Some scholars have urged turning away from registration reform efforts altogether because the participation increases are modest and can come at the cost of exacerbating inequity (Berinsky 2005). Thus, it is not just the total registration rate that matters, but the rate in key underrepresented groups. Do they register at higher rates under the AVR system as well? Is the effect for these groups larger or smaller than for the population as a whole? An overall registration increase that also made the electorate less representative–that risked increasing the turnout gap–would be deeply concerning. However, evidence that AVR decreased the turnout gap, even in the absence of a positive effect on the size of the overall electorate, would be very valuable.

Uptake, Effect, and Equity

We translate the three goals of AVR into three analytical approaches. The first and most basic goal of AVR is to get people to use it. We call this the program's uptake: using AVR to register or re-register, whether or not one would have done so without the AVR option. This is a simple measure of the attractiveness of the program. If uptake is high, it suggests eligible residents find AVR to be an easy and helpful way to register, at least compared to the alternatives.

The second goal of AVR is to increase the registration rate. We call this the program's effect: its ability to encourage registration among people who had no intention of registering and would not have found a way to register without it. This is a measure of AVR's ability to expand the electorate and get more people to participate.

The third goal of AVR is to improve the representativeness of the electorate. We call this the program's equity: does AVR help traditionally excluded groups register at rates more commensurate with their share of the total population? This tests whether AVR can change the composition of the registered population, regardless of whether the program is generally popular or increases registration as a whole.

Each of these three analytical approaches–uptake, effect, and equity–is important for understanding the total impact of AVR on elections. For each piece of evidence we present in the remainder of this report, we identify the concept it speaks to in order to clarify the sort of impact AVR has had.

Detailed State Reports

In the following sections of this report, we provide an overview of each of the four states we examine in depth, the state's history with the reform and whether, with current data limitations, it is evident their version of AVR may encourage registration through the DMV. We then move on to identify whether AVR registrants in eleven states examined would have registered eventually some other way without AVR and whether the reform has impacted equity.

Oregon

Implementation

Oregon has the most assertive form of AVR of all the states we examine in detail. Of our four states, it has the only true "back end" system where the state can enroll voters without their active participation. Customers do not make any decisions about registering to vote while at the DMV. Instead, the DMV and the Secretary of State identify eligible but unregistered Oregonians who have recently applied for a new driver's license or renewed an existing one and send them a card in the mail (an Oregon resident had to be a citizen or legal resident in order to get a driver's license in our study period). The cards tell potential registrants that they have 21 days to mail the card back if they do not want to be registered. Otherwise they will be registered by default. These potential registrants also have the option to send the card back to choose a party registration, with independent ("no affiliation") registration the default choice in that case.

Phase 1 of this "Oregon Motor Voter" (OMV) system rolled out for new DMV customers in January 2016. The state then followed up with Phase 2 in June of the same year, retroactively identifying unregistered but eligible customers who had gone to the DMV any time in 2014 or 2015 and treating them to the same process as Phase 1 customers. The state also aligned the change of address form to the same default registration approach. Starting in 2016, updated addresses at the DMV were automatically applied to an existing registration record unless the customer checked a box to decline. This is an especially important step for a state with all vote-by-mail elections, since it helps ensure that ballots are mailed to the correct location. However, there was no attempt to apply this approach to earlier address updates as Phase 2 did with new registrants.

This style of AVR ought to have the largest effect because it offers a true default registration approach. It places the burden on the customer to avoid registration, rather than on the state to encourage it. In fact, for new registrants the question of voter registration does not come up at the DMV; they must notice a card they were probably not expecting that comes in the mail after the DMV process is done. Oregon recently limited OMV to customers applying for a "real ID" driver's license to make it compatible with the process for providing driver's licenses to undocumented immigrants. Thus, the findings here may reflect a high water mark for the number of new registrants through the program.

Data Limitations

Oregon has been very transparent about usage of OMV. At least in the first election cycle, the state provided detailed information about the roll-out, including the exact number of DMV customers eligible to vote, the number not already registered, the number who explicitly declined registration, and the party registration of those who did not decline. The number of eligible customers is unavailable from any of the other three states we examine, while the second and third are often inconsistently defined. In that respect, Oregon is to be commended for its clarity.

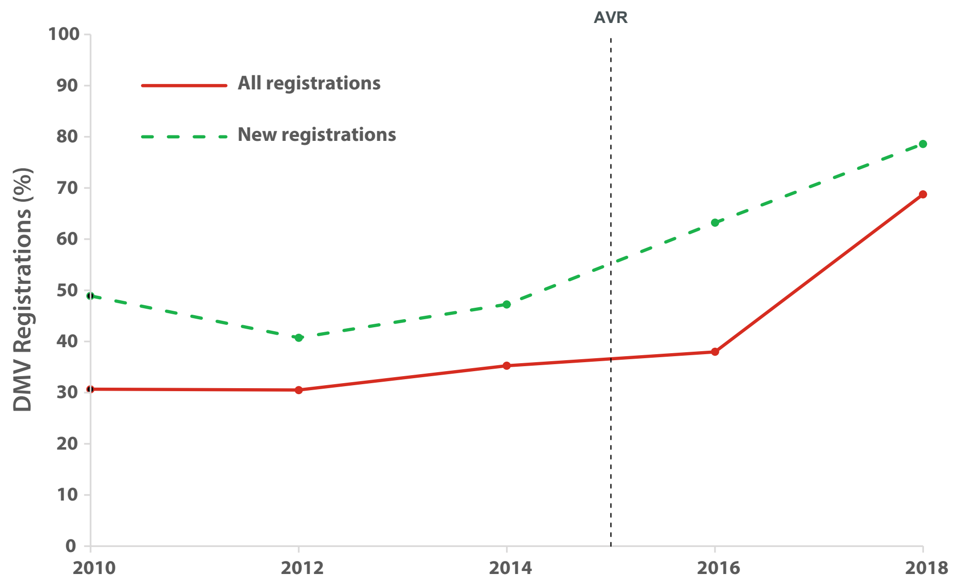
However, none of the same statistics are readily available before OMV, so there is no simple baseline for comparison. We can make some assumptions and also triangulate some of the information using a variety of sources, as will be clear below. But this is no substitute for a clear, simple, public reporting of comparable information from before and after the reform.

Program Uptake

Between its inception in January 2016 and January 2020, OMV has registered a total of 722,823 people who had not previously been registered, and has updated addresses for 1,225,692 existing registrants. DMV customers pulled under Phase 1 had an existing registration rate about 17 points lower than both Phase 2 customers and the broader Oregon population (McGhee et al. 2019). Because Phase 1 and Phase 2 customers differed only in the amount of time that had passed since they went to the DMV, this suggests many Phase 1 customers would eventually have registered to vote by some other means if given a year or two (which also means they would have missed out on voting during this time period in the absence of OMV). However, that still left a substantial number of eligible but unregistered Oregonians for OMV to add to the rolls.

Uptake in the program has been extremely high. Of the 771,515 customers who have received a follow-up card from the Secretary of State, 87 percent have been registered by default because they either sent the card back with a party selection or did not send it back at all. The approximate uptake under the old NVRA system in 2014 and 2015 was 39 percent, 48 percentage points lower than under OMV.[4]

FIGURE 2 Oregon DMV Registration as a Share of Registration Applications



The story is largely the same when the program's uptake is placed in the context of Oregon's broader registration activity. DMV applications as a share of all registration applications do increase under OMV according to data from the Election Administration and Voting Survey (EAVS) of the Federal Election Assistance Commission (Figure 2), though far more in 2018 (69%) than in 2016 (38%). However, the DMV did become a much more substantial source of new registrations in 2016, rising to 63% from 47% the previous election cycle.

The program has reshaped the patterns of registration over the course of the election cycle (Figure 3). In the three election cycles prior to OMV (2010-2014), registration surged heading into the general election and then steadily declined after the election as purged inactive voters outpaced new registrants. The 2016 election featured both a more substantial surge and no decline. The registration rate then continued to slowly climb after the election, meaning the 2018 cycle started at a higher level and continued the steady climb. The surge and decline of other cycles had disappeared.

Oregon is one of two states where we can explore uptake for key underrepresented groups because we have access to the state's voter registration file that includes a flag for DMV registrants. This allows us to see whether underrepresented groups used the system more or less than others. This does not establish whether OMV improved equity by elevating registration levels for communities that have been harder to reach in the past, but it does tell us how attractive the new system was for these groups. At a minimum, did they seem open to using OMV?

FIGURE 3 Oregon Registration over the Course of the Campaign Cycle

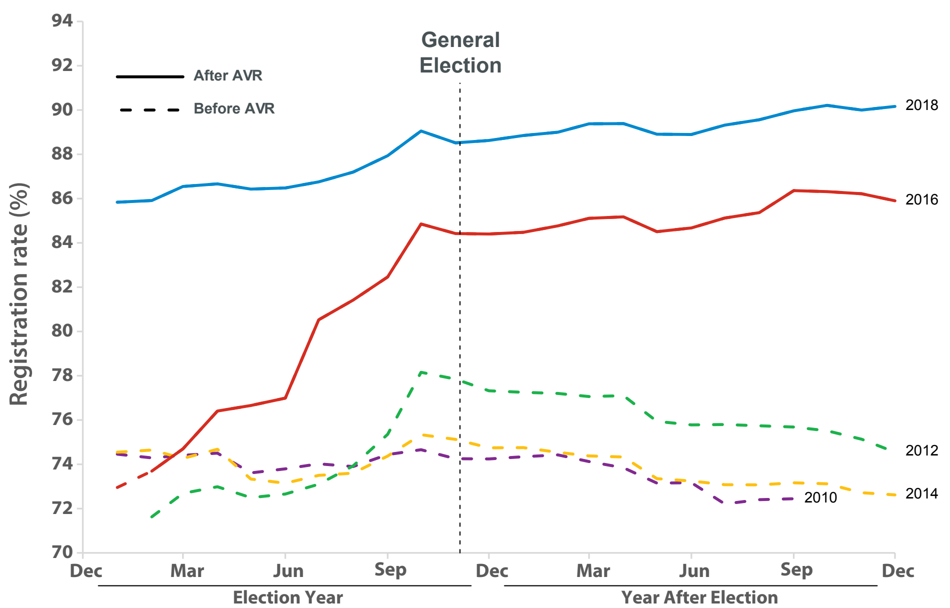
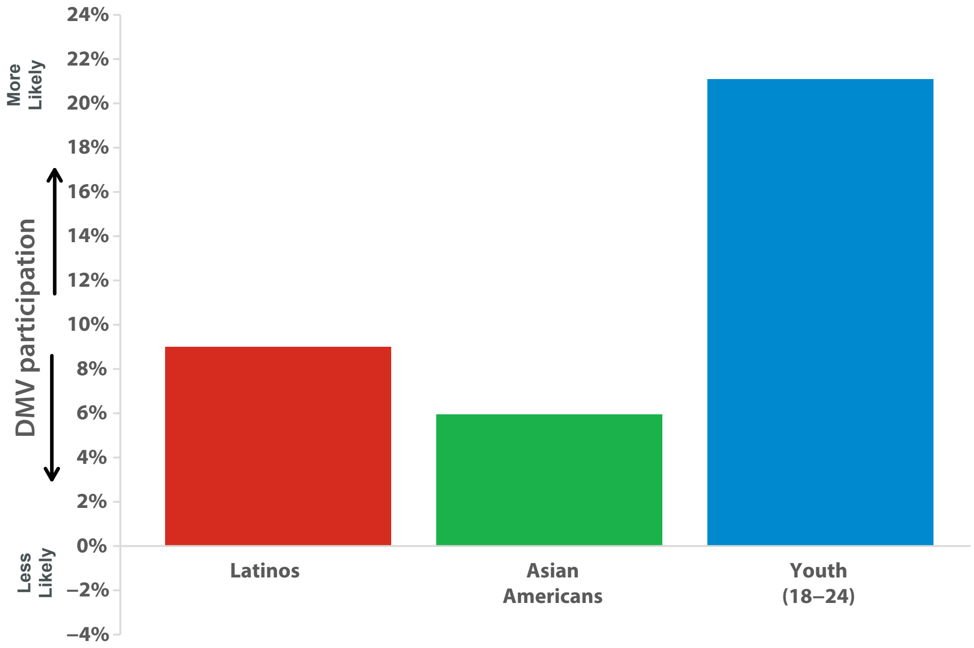


FIGURE 4 Oregon Differential DMV Uptake by Select Demographics



Early research on OMV found that those who registered through the system were younger, more rural, lower-income, and more ethnically diverse (Griffin et al. 2017). Our analysis largely confirms those conclusions. Figure 4 shows the relative uptake for three underrepresented groups in Oregon: Latinos, Asian Americans, and young people between the ages of 18 and 24 (Griffin et al.). For Latinos and Asian Americans, we compare the share of new registrants who used OMV to the same share among those who were not Latino or Asian American. For young people, the comparison is to anyone over 24. All three groups have been more likely to use OMV for registration when compared to other Oregonians: uptake was 9% higher for Latinos, 6% higher for Asian Americans, and a substantial 21% higher for young people.

Colorado

Implementation

In February 2017, Colorado began using information from driver's license or state ID transactions to register customers to vote or update their existing registrations with a new address unless they declined. Unlike Oregon, Colorado AVR was not passed by the legislature but implemented administratively through an agreement between the Colorado Secretary of State and the Department of Motor Vehicles. Initially, registration through the online driver's license form was default opt-in. In contrast, in-person DMV customers were told they would be registered to vote and asked to affirm their agreement. When DMV customers provided their information and electronic signature to complete the registration process, the records were sent to county clerk offices, where the staff verified eligibility and checked for duplicate records.

By July 2019, Colorado Senate Bill 18-233 was implemented. Voters in the state who were already registered to vote were automatically updated if their transaction with the DMV indicated that an update to their record was needed. In addition, in May 2019, the Colorado Legislature passed SB19-235, which expanded AVR to a back end/default model while also including the Department of Health Care Policy and Financing (HCPF) as a qualifying agency. The Colorado Secretary of State's office rolled out this new back end system on April 1, 2020—three months ahead of the statutory deadline—but DMV offices in Colorado have been closed to the public due to the coronavirus outbreak. When in-person transactions restart, the department of revenue will administer a system very similar to Oregon's: the electronic record of each unregistered eligible person who applies for a new driver's license or ID card or updates an existing one will be transferred to the Secretary of State. New registrants will receive a notice in the mail and have 20 days to decline the registration or choose to register with a party. Those who do nothing will be registered to vote by default.

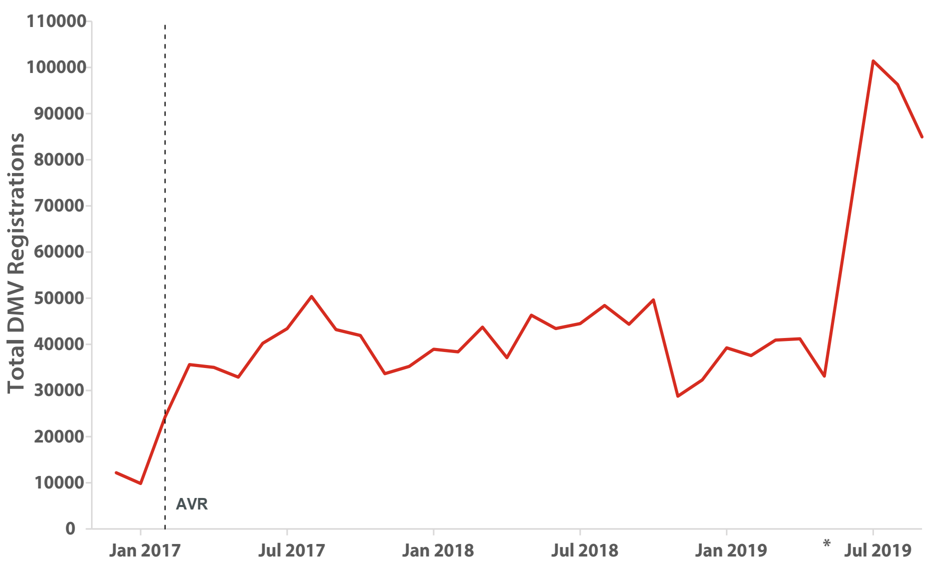
Data Limitations

The Colorado Secretary of State's office readily provides data identifying some impacts of AVR on the state's voter registration rolls. However, as with other states, available AVR data are not ideal for research purposes. Data allowing a comparison over time are only available from a few months before AVR implementation and must be specially requested. With the implementation of Colorado's latest version of AVR, consistency of reporting categories will be important for future analysis.

Program Uptake

FIGURE 5

Colorado DMV Registration over Time

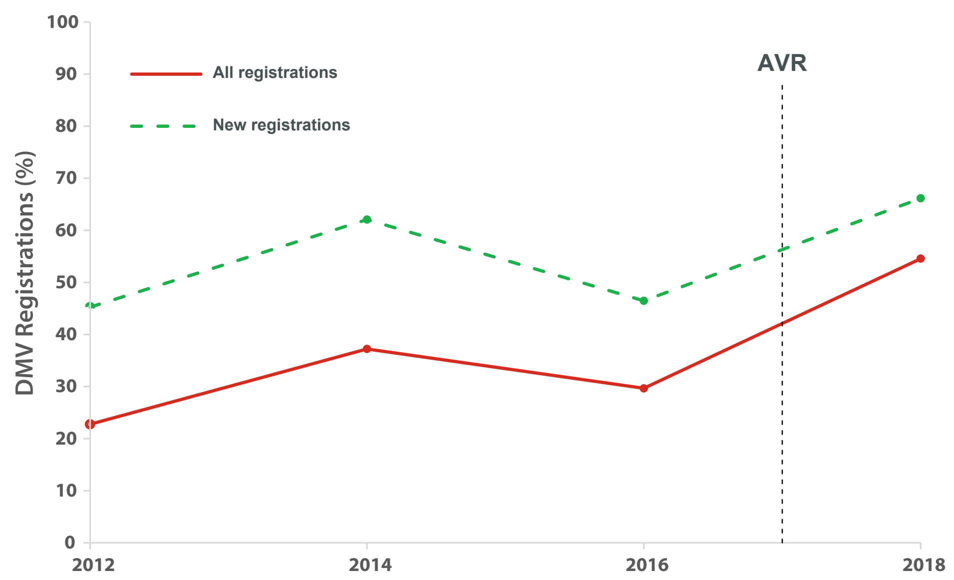


*AVR registration data was not available from the Colorado Secretary of State for June 2019.

Between February 2017 and January of 2019, 1,386,287 Coloradans have been registered to vote or updated their registrations through automatic voter registration at the DMV (see Figure 5). The average monthly registrations through the DMV have increased from 11,014 immediately prior to implementation (December 2016 and January 2017) to 44,719 for the first two years of the reform.

According to the Colorado Secretary of State's office, Colorado Senate Bill 18-233 is responsible for the spike in registration transactions seen in July of 2019. This bill's effective date was the same month.

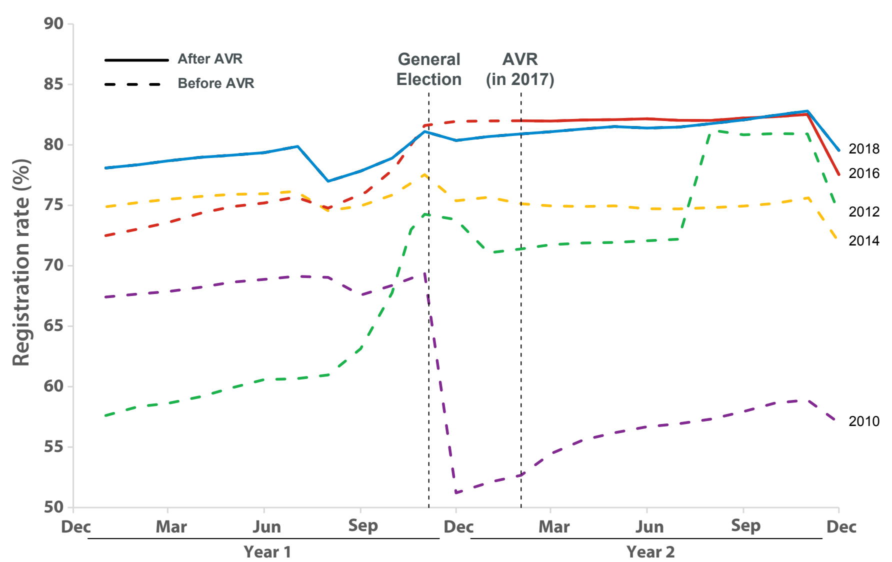
FIGURE 6 Colorado DMV Registration as a Share of Registration Applications



When comparing DMV registrations to overall registration activity we also see a significant uptake. EAVS data in Figure 6 show an increase in DMV applications as a percentage of all registrations–from 30% just prior to implementation to 55% by 2018. These numbers should be viewed in the context of Colorado's already high registration rates. Prior to Colorado's implementation of AVR, the state had the highest percentage of eligible citizens registered to vote and typically one of the highest voter participation rates in the country.

Similar to Oregon, Colorado has typically seen a steady increase in registration prior to general elections, but then a drop in the registration rate immediately after. After the 2018 general election, there was only a small decline in registration leaving registration rates much higher for the year than seen in election years prior to 2016 (Figure 7). AVR in Colorado continued to help grow the registration rolls in the state after the election.

FIGURE 7 Colorado Registration over the Course of the Campaign Cycle



California

Implementation

California passed its version of AVR—"California New Moter Voter" (CNMV)—in October 2015, and the law was implemented in April 2018.

Voter registration at the DMV is not new to California. The option has been offered since passage of the NVRA in 1993. Nonetheless, for many years California's de facto policy made it very easy to avoid finishing a DMV transaction without getting registered. The forms were not integrated: in-person DMV customers received a separate paper voter registration form, and online customers received a link to the Secretary of State's website. Any information required for both forms had to be entered separately into each one (Jacobs, Naifeh et al. 2015). For in-person customers, this also left individual DMV employees with a lot of discretion as to whether they provided notice to customers about the voter registration option.

California began to move beyond this implementation in 2015, when a group of advocates threatened legal action unless the Secretary of State and DMV took steps to integrate the two forms. The sides eventually reached a settlement in May 2016 that added voter registration questions to the driver's license form itself, thus eliminating the need to enter duplicate information. The settlement also required the electronic transfer of voter registration information from the DMV to the Secretary of State. This requirement was established before AVR and laid the groundwork for AVR's implementation.

This new form made voter registration easier, but it still did not guarantee that customers would engage with the registration questions. To help ensure more consistent engagement, the state passed CNMV in the fall of 2015. The new law required the DMV to forward to the Secretary of State any driver's license or state ID from a customer who attested to eligibility and did not explicitly decline voter registration. This made voter registration the default outcome: customers were now supposed to be registered to vote unless they told the state they did not want to be.

CNMV still requires that DMV customers affirmatively attest to eligibility before they move on to the registration questions. Since customers do not have to answer the eligibility questions to finish their DMV transaction, they can avoid voter registration exactly the way they used to: by skipping it (McGhee and Romero 2016).

At the same time that the DMV switched to CNMV it also adopted a new electronic driver's license form, the eDL44. This new form has since become ubiquitous; in most cases even in-person customers use it to enter their information. The DMV has programmed this form to automatically prompt customers with the eligibility questions. If customers say they are eligible, the form then asks the registration questions, and these questions must be answered to complete the form. Thus, the California system is best considered a forced choice rather than a default registration system.

While the eDL44 does most of the work of the new DMV registration system, it is wrong to say the CNMV has played no role. Along with the threat of the advocates' lawsuit, the CNMV helped put pressure on the DMV to implement an electronic system in the first place. And the CNMV has helped shape eDL44 content. Thus, despite the large role for the eDL44, we will refer to the registration changes at the DMV as "CNMV."

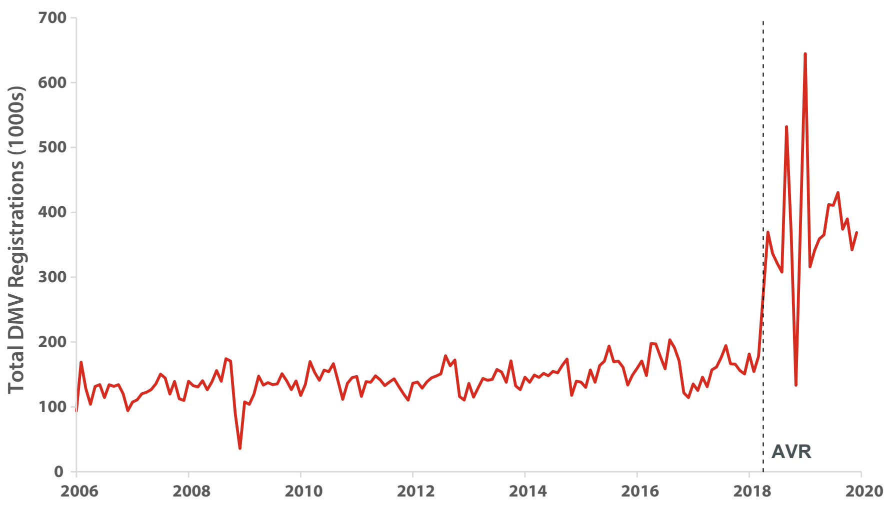
Data Limitations

Limitations in the data made available by the California DMV and Secretary of State, as well as in the basic registration form itself, make it difficult to tell a nuanced story about the effects of CNMV. The electronic form included ambiguous wording that has led many existing registrants to believe they must answer the registration questions or be kicked off the rolls. As a result, they have re-registered when they did not need to, inflating program activity beyond what it might have been otherwise (Finance 2019).

In addition, the Secretary of State and the DMV have not matched reporting categories under CNMV to those before the reform. Basic information such as the shift in the mix of new registrants, re-registrants, and changes of address is currently impossible to calculate. Even the number of people declining to register is inconsistently reported, making it difficult to confidently know how many customers are opting out of registration.

Program Uptake

FIGURE 8 California DMV Registration over Time



CNMV has had a profound effect on the number of registrations at the DMV. Figure 8 shows the total number of people registering, re-registering, or changing their address through the DMV both before and after implementation of CNMV. The monthly average DMV registrations has gone from 142,413 before CNMV to 375,396 after.

Some of this higher rate reflects increased registration overall in the 2018 cycle. However, the increase is comparable when considered as a share of all registration applications from any source, as in EAVS data in Figure 9. The share rose from an average of 13% in the three election cycles before CNMV to 23% in the first election cycle under the new system.

FIGURE 9 California DMV Registration as a Share of Registration Applications

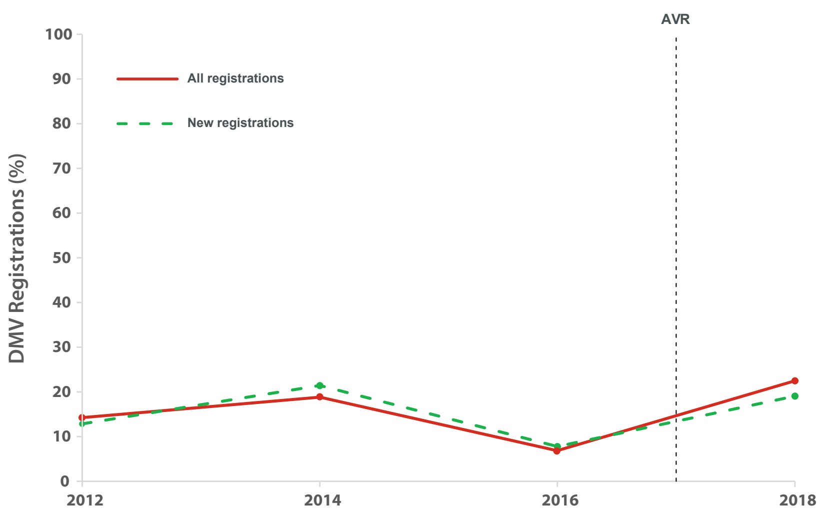
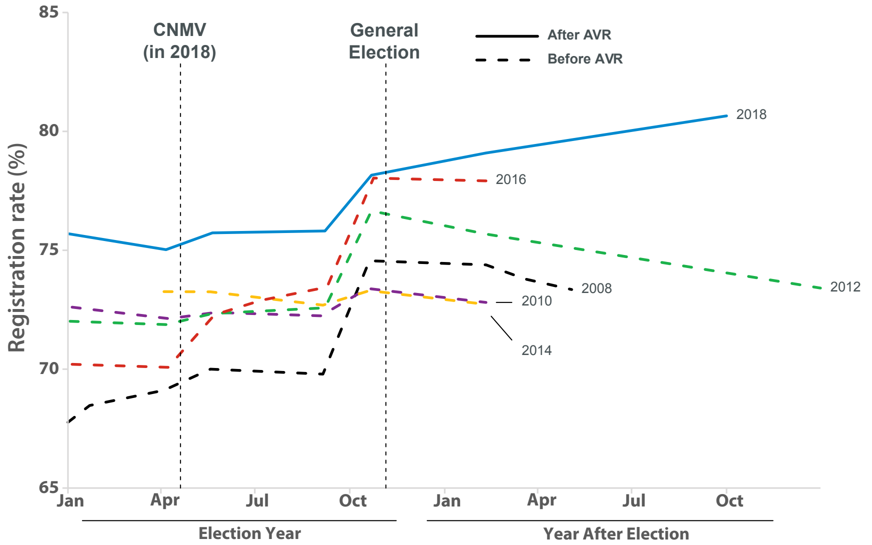
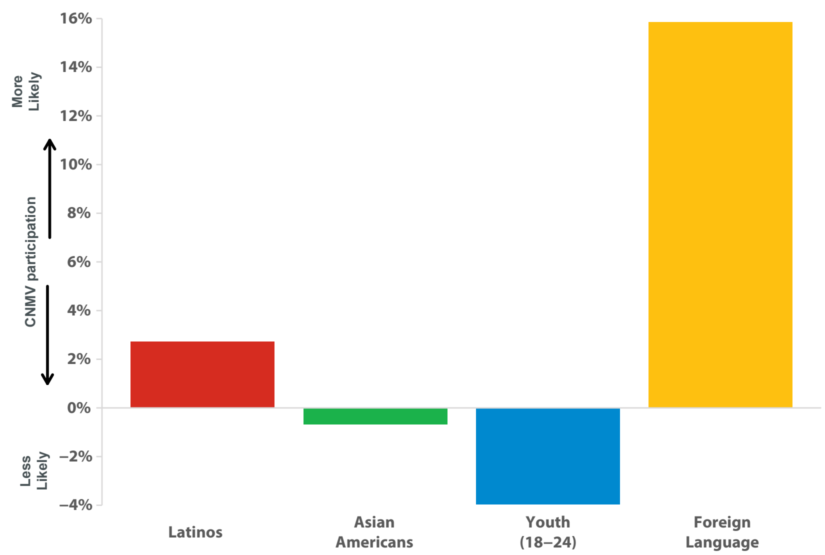


FIGURE 10 California Registration over the Course of the Campaign Cycle



Like OMV in Oregon, CNMV in California has altered the boom-and-bust of registration across the election cycle. Figure 10 shows the official registration reports from the California Secretary of State, grouped by election cycle.[5] The graph makes clear that the dynamics of the 2018 cycle, when registration continued after the election, contrast with previous election cycles, when the rate leveled off or even declined after the excitement of the election season had passed. Californians have continued to go to the DMV after campaign politics have faded into the background, and so they have continued to get registered through CNMV.

FIGURE 11 California Differential DMV Uptake by Select Demographics



Was uptake also higher among underrepresented groups? As in Oregon, in California we had access to individual registration records[6] so we could compare DMV registration rates among newly-registered Latinos, Asian Americans, young people, and (in the case of California) non-English speakers to DMV registration rates among other new registrants. Figure 11 has these comparisons for the 2018 election cycle: bars above the horizontal line are groups that were more likely to register through CNMV. Latinos were somewhat more likely to use CNMV and young people somewhat less, while Asian Americans had a CNMV rate typical of other new registrants. Lower uptake among young people is unexpected by many proponents of CNMV, but appears to reflect, at least in part, the fact that they continued to use California's online voter registration system at higher rate than other groups.[7] Foreign language speakers were the most likely to use CNMV: the difference between their uptake and that of English-speaking registrants was a substantial 16 percent.

Delaware

Implementation

Delaware's experience stands apart from that of the other states we consider for two reasons. First, Delaware residents already used the DMV to register at very high rates before the state reformed its process. According to reports to the Election Assistance Commission, well over 80 percent of the state's registration applications in 2004 and 2006 came from the DMV. That gave the state a ceiling on what was possible from a new approach.

Second, the reform–dubbed "e-Signature"–was intended as a limited correction to the existing process, which had been electronically transmitting DMV registrations to the Secretary of State since the 1990s (Justice 2010). Under the old system, DMV staff would enter a customer's information and then print out the form for the customer to sign. The customer's information would be transmitted electronically but the Secretary of State had to receive the signed paper form before the registration was official. Customers would sometimes leave without providing the "wet" signature on paper, incorrectly thinking they had done everything required to be registered. Other times the DMV would run out of paper forms or forget to mail a batch of forms to the Secretary of State. Occasionally the forms would just be lost in transit. The Secretary's office was increasingly tied up with these dropped registrants, who could not vote without a court order. The e-Signature program simply made the signature electronic so it could be transmitted along with the rest of the information.

From the perspective of choice architecture, the most important aspect of e-Signature was not the electronic submission but the electronic interface that customers began using under the new program. In this form, registration is now a hard stop question: customers have to say whether they want to register or not in order to complete their DMV transaction.[8] That makes the process a forced choice that might encourage customers to register. That said, the high rate of DMV registrations before e-Signature suggests that DMV staff in Delaware were already doing an effective job of pressing registration questions on DMV customers. Thus, the expected uptake and total effect of e-Signature are not clear.

Delaware also differs from some of the other states we have examined because we do not have as much data available for analysis. The state's early adoption (almost seven full years before the next earliest AVR reform, in Oregon) makes before-and-after analysis of the 2009 reform more difficult. Our registration data from Catalist begin in 2010, and the state does not provide reports of DMV registration activity from before e-Signature to permit a detailed comparison. We were also unable to obtain a registration file for the state that identified DMV registrants, thus preventing a more detailed account of the type of person who has used the new system. We are left instead with EAVS reports of DMV registration activity, plus official registration reports from the state. While not ideal, these offer some window into the dynamics of e-Signature.

Program Uptake

FIGURE 12 Delaware DMV Registration as a Share of Registration Applications

Figure 12 shows the share of total Delaware registration applications that have come from the DMV over time. The numbers from 2004 through 2008 confirm the high DMV uptake before e-Signature was implemented, averaging 87% in the EAVS data across those years. Initially, the adoption of e-Signature appears to have increased DMV uptake for the 2010 cycle (85%), at least compared to the election cycle immediately preceding (74%). But then it dropped off, and between 2014 and 2018 it was consistently lower than at any point before the reform. This is less because the raw number of DMV registrations dropped–in fact, they reached their peak for this entire period in 2016–than because the total number of registration applications increased faster overall.

FIGURE 13 Delaware Registration Over the Course of the Campaign Cycle

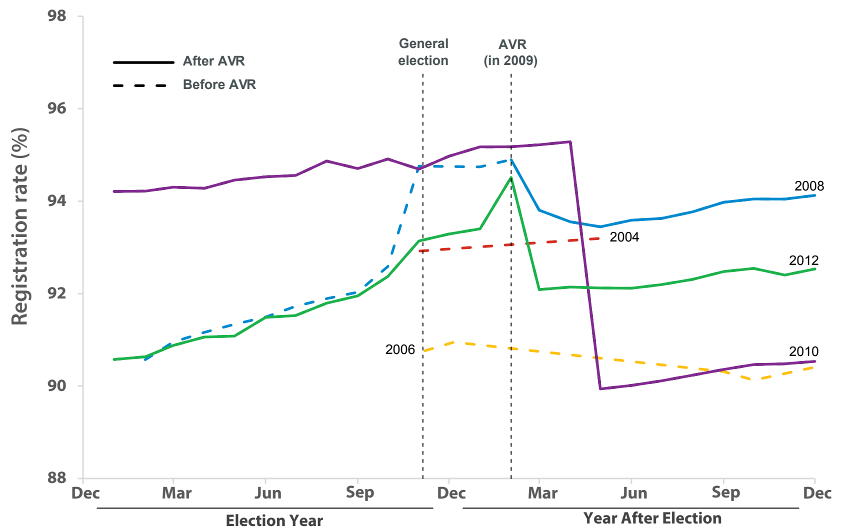


Figure 13 contains the total registration figures for Delaware by month for the 2004 through 2012 election cycles. As before, we say that an election cycle begins the January before the election and ends in December of the next calendar year.[9] However, even the public registration reports presented here are less easily available for earlier election cycles; the final November registration report was the earliest we could obtain for the 2004 or 2006 election cycles. In addition, the state appears to have purged the registration file of inactive records in all three post-reform cycles, making strict comparisons more difficult.

There is some evidence of more post-election registration activity after reform. Apart from the apparent purges, the registration rate climbs steadily under e-Signature after the election is over, while it declines in the 2006 cycle where e-Signature was not available. However, the very limited data we have for 2004 suggests the rate climbed somewhat after the election in that cycle as well, making our conclusions a lot more speculative. It seems fair to say that e-Signature has not been an obstacle to registration outside of the regular campaign season, but neither has it clearly encouraged it when compared with the old paper system.

Effect: Does AVR Cause Total Registration to Increase?

The evidence from our four states suggests AVR can have very high uptake. There is even evidence, especially from Oregon and California, that AVR adds new registrants consistently throughout the election cycle in a way that could have lasting effects on the state's overall registration rate.

AVR may encourage registration through the DMV, but would these AVR registrants have registered eventually some other way without AVR? To address this question we turn to aggregate totals of state registration files from the data vendor Catalist for the elections 2010 through 2018.[10] (As noted above, we cannot use this data set to evaluate Delaware's system, which started in 2009.) Catalist identifies race and ethnicity based on a registrant's surname and information about their geographic location. Age is recorded in the file as a side effect of establishing eligibility to vote.[11]

Understanding whether AVR causes higher registration is a more complicated question than the uptake we have examined so far. AVR states are different from non-AVR states in many ways that might explain higher or lower registration, and only some of these characteristics are easily identified and measured. Figure 14 presents total registration over time for eleven AVR states, as reported in the Catalist data.[12] Most of the AVR states already have a high registration rate compared to other states before AVR was implemented (the main exceptions are California and Utah), a fact that would be obscured by simply comparing AVR to non-AVR states after AVR was implemented.

FIGURE 14 Total Registration Rate Over Time in AVR States

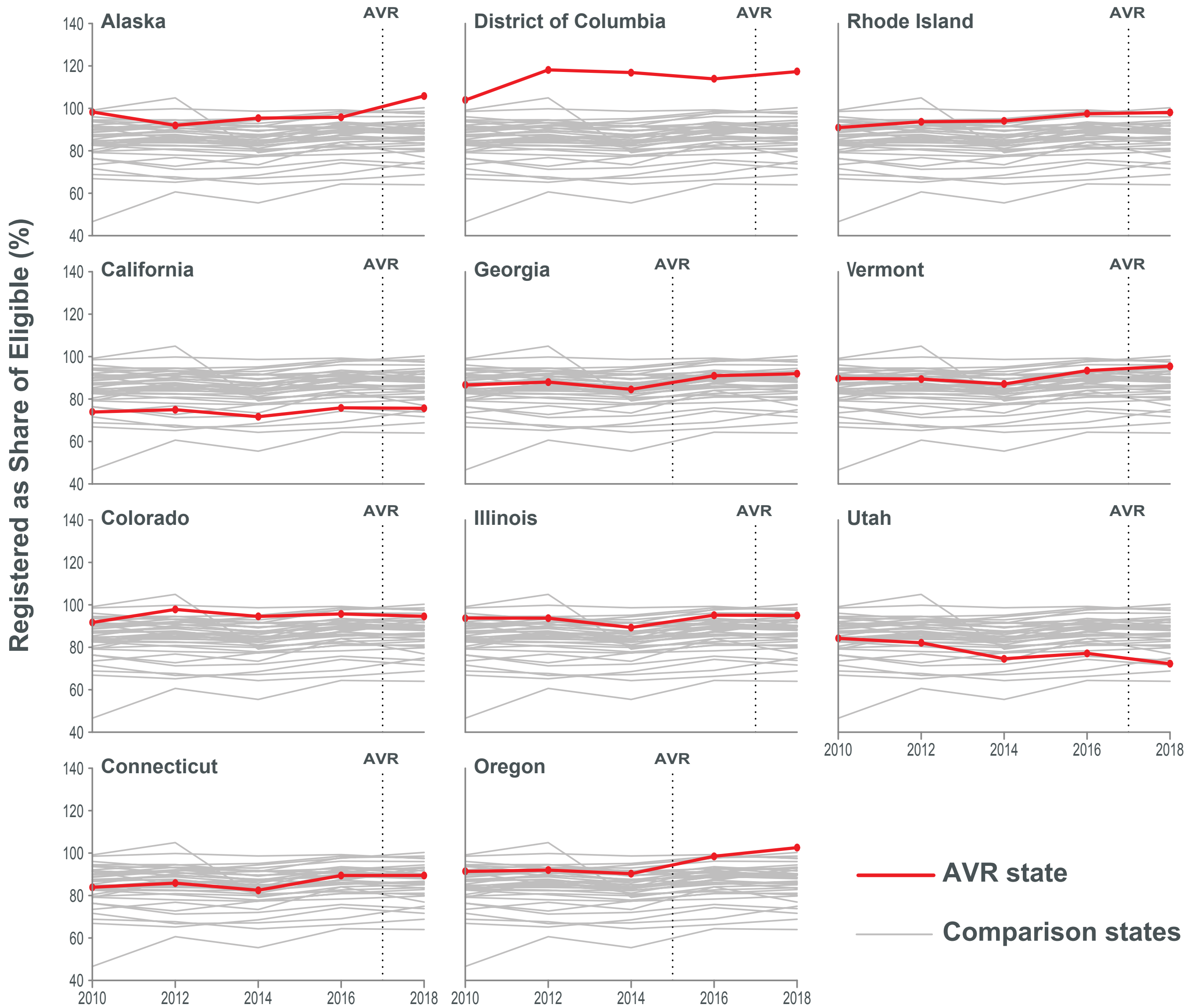


Figure 14 also suggests that AVR states have not seen much immediate registration increase. The main exceptions are Alaska and Oregon, the two states with a back end AVR system, where the registration rate increased 10.5% (Alaska) and 9.3% (Oregon), as well as Georgia, where the rate increased 5.1%.[13] But any change in a state's registration after it adopted AVR may actually reflect broader electoral dynamics that touch all states to one extent or another. For instance, one might not necessarily expect the registration rate to increase in midterm elections. The data above from individual states suggests the registration rate sometimes falls a little in midterms as interest in the election wanes and registration purges outstrip new registrations. Across eleven states in our study period, the registration rate was 87.3% in the two presidential elections and 86.1% in the three midterms.

The most common way of accounting for these alternative explanations is to look at the differential change in registration in AVR states compared to their non-AVR counterparts. Registration may have increased everywhere, but did it increase faster where AVR had been adopted? This approach accounts for each state's unique starting point–all the enduring ways states differ from each other—as well as broader changes over time that affect all states together. All our estimates of causal effect use some version of this approach.[14]

Table 2: Effect of AVR on Total Registration Rate

AVR State	Effect (%)	Probability of no effect
All AVR States	1.5	0.25
Alaska	9.8	0.37
California	-1.7	0.32
Colorado	-2.0	0.77
Connecticut	0.2	0 66
District of Columbia	5.3	0.70
Georgia	4.3	0.21
Illinois	0.9	0.62
Oregon	10.1	0.29
Rhode Island	0.9	0.41
Utah	-8.0	0.49
Vermont	2.8	0.05

Note: Outcome is the registration rate for all registrants. Positive values indicate higher registration under AVR. Estimates for all AVR states comes from a difference-in-differences model; estimates for individual states come from a synthetic control analysis. Model details are in the appendix.

Table 2 shows the effect of AVR on the share of all those eligible to register who have done so. The first column shows the percentage change attributed to AVR across all states and then individually for each state that has implemented it. The second column shows the probability of seeing the effect in the first column by chance, if in reality there were no effect at all.[15] The effects are positive (meaning AVR increases the registration rate) both nationally and in 8 of 11 states. However, the effect size nationally is only about 1.5 percentage point, and the average for the individual states is 2 percentage points. (The national effect is not a simple average of the state effects because it uses a different methodology.) Moreover, the odds are generally high that these effects could emerge without AVR: well above one in four in most cases.

Though the results are generally ambiguous, there are two general exceptions. First, the registration effects in Alaska (9.8%) and Oregon (10.1%) continue to be far larger than in any other AVR state. The probabilities that these results are random are still fairly high (Alaska: 0.4, Oregon: 0.3), but also lower than in most other states. The uncertainty in their estimates may reflect the limited time under AVR more than anything else.

Second, we have much more confidence in Vermont's effect than in the effects for other states. The effect itself is not large–2.8%–but there is just a 0.05 probability of the same result in the absence of AVR. For now we do not have a ready explanation for Vermont's cleaner estimate, so we simply note it and suggest it is worthy of further study.

Equity: How Does AVR Impact Historically Underrepresented Groups?

The effect of AVR on a state's total registration is not the only nor necessarily even the most important potential consequence of the reform. There remains a question of equity: does AVR disproportionately increase registration among key groups that historically have not had electoral power to match their numbers? We examine three groups in particular: Latinos, Asian Americans (identification of whites and African Americans is not available due to data restrictions), and young people (ages 18-24). Because these groups have been underrepresented, it not only matters whether their registration increases or decreases as a result of AVR, but also whether their relative share of the electorate grows compared to dominant groups. In contrast to the analysis in Table 2, we look at the difference between the registration rate for each of these groups and the rate for other groups that have historically had higher participation. For Latinos and Asian Americans, the reference group is all non-Latino, non-Asian-American residents, while for young people the reference group is elderly voters (65 and older).

Several of our AVR states have small Latino or Asian-American populations where the data are too statistically uncertain to examine separately. We removed any state from our analysis where the relevant group comprised less than three percent of the citizen voting-age population. This meant removing Vermont from the Latino analysis, and Colorado, Connecticut, Georgia, Rhode Island, Vermont and Utah from the Asian-American analysis. It also meant dropping a large number of potential comparison states that have similarly small populations.[16]

FIGURE 15

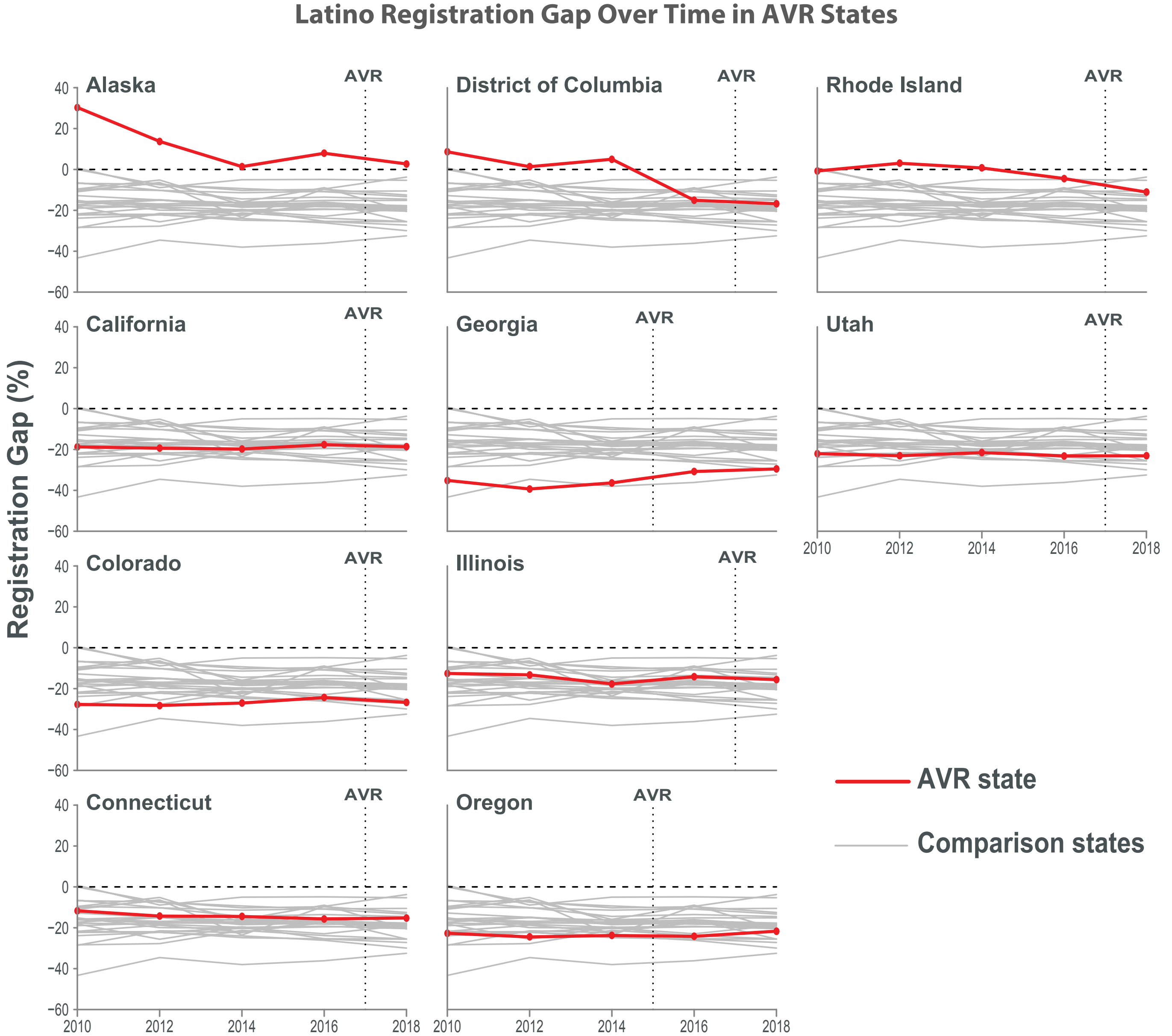


Figure 15 shows the registration "gap" for Latinos in each of our AVR states. To calculate the gap, we subtract the registration rate of non-Latino, non-Asian American voting-age citizens from the rate for Latinos; as a result, positive numbers indicate an advantage for Latinos and negative numbers a disadvantage. As expected, Latinos have a lower registration rate than others in almost all states, though three of the AVR states are among the very few where Latinos have occasionally had higher registration (Alaska, Washington, D.C., and Rhode Island). Unlike with the total registration rate, there is no sign here that AVR has improved the relative registration rate for Latinos in any state that has adopted it. The closest are probably Georgia, where Latino registration has been gaining for a number of years before AVR, and Oregon, where there was no improvement initially but the registration gap improved somewhat in the second year under AVR. At the same time, the three states with the best overall Latino registration performance have also seen that performance decline heading into AVR, so any lower registration rate under AVR is unlikely to be a result of the reform itself.

FIGURE 16

Asian-American Registration Gap Over Time in AVR States

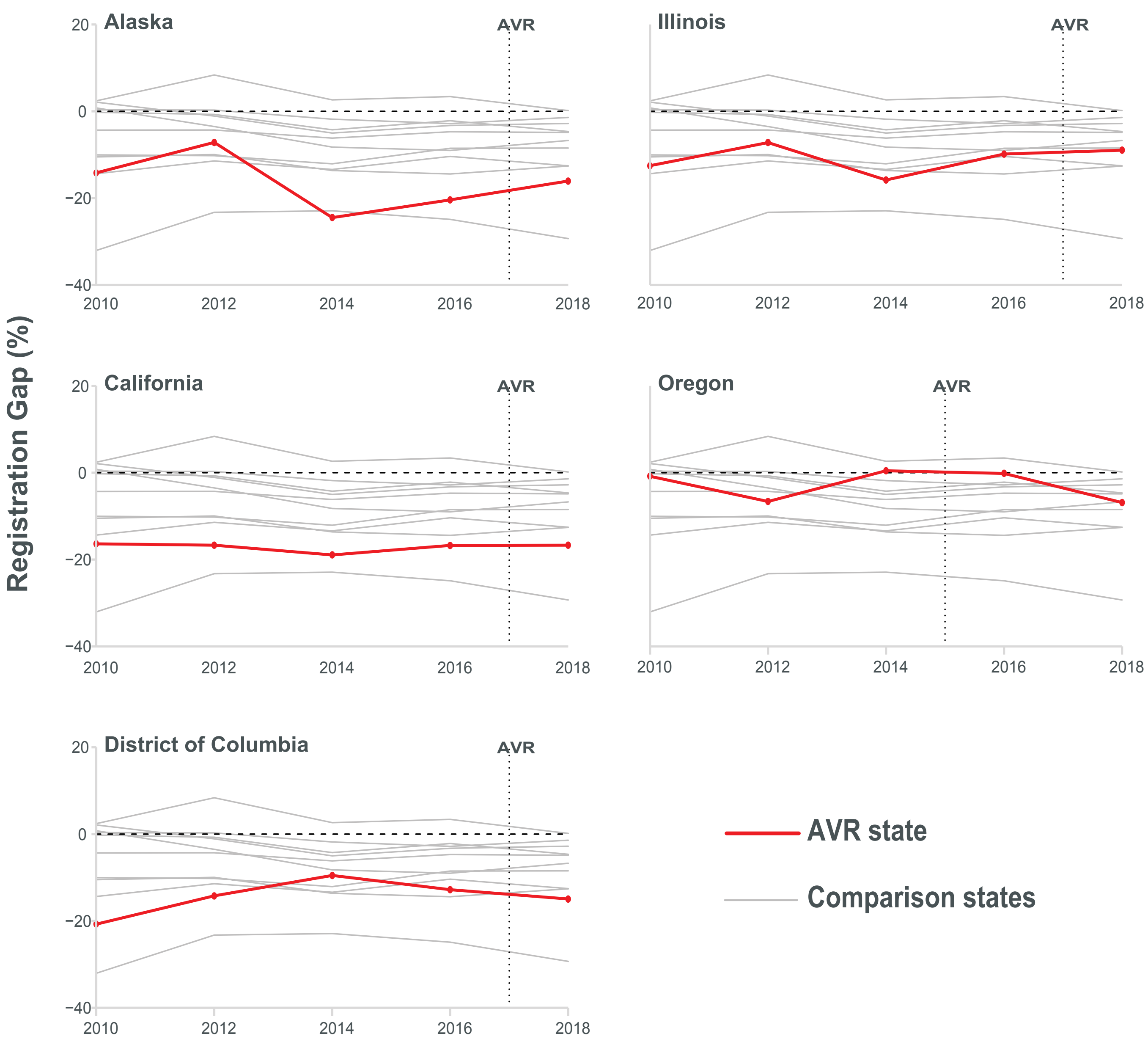


Figure 16 contains the same trends for Asian Americans. Among these states with large enough Asian-American populations for analysis, Asian Americans are more more consistently disadvantaged; only Oregon comes close to parity over this period. None of these states show clear signs of a relative increase in Asian-American registration. The closest is Alaska, but its registration gap had been improving before AVR implementation. Broadly speaking, trends in other states were also flat (-0.6% between 2016 and 2018), so the results are no more positive in that context.

FIGURE 17

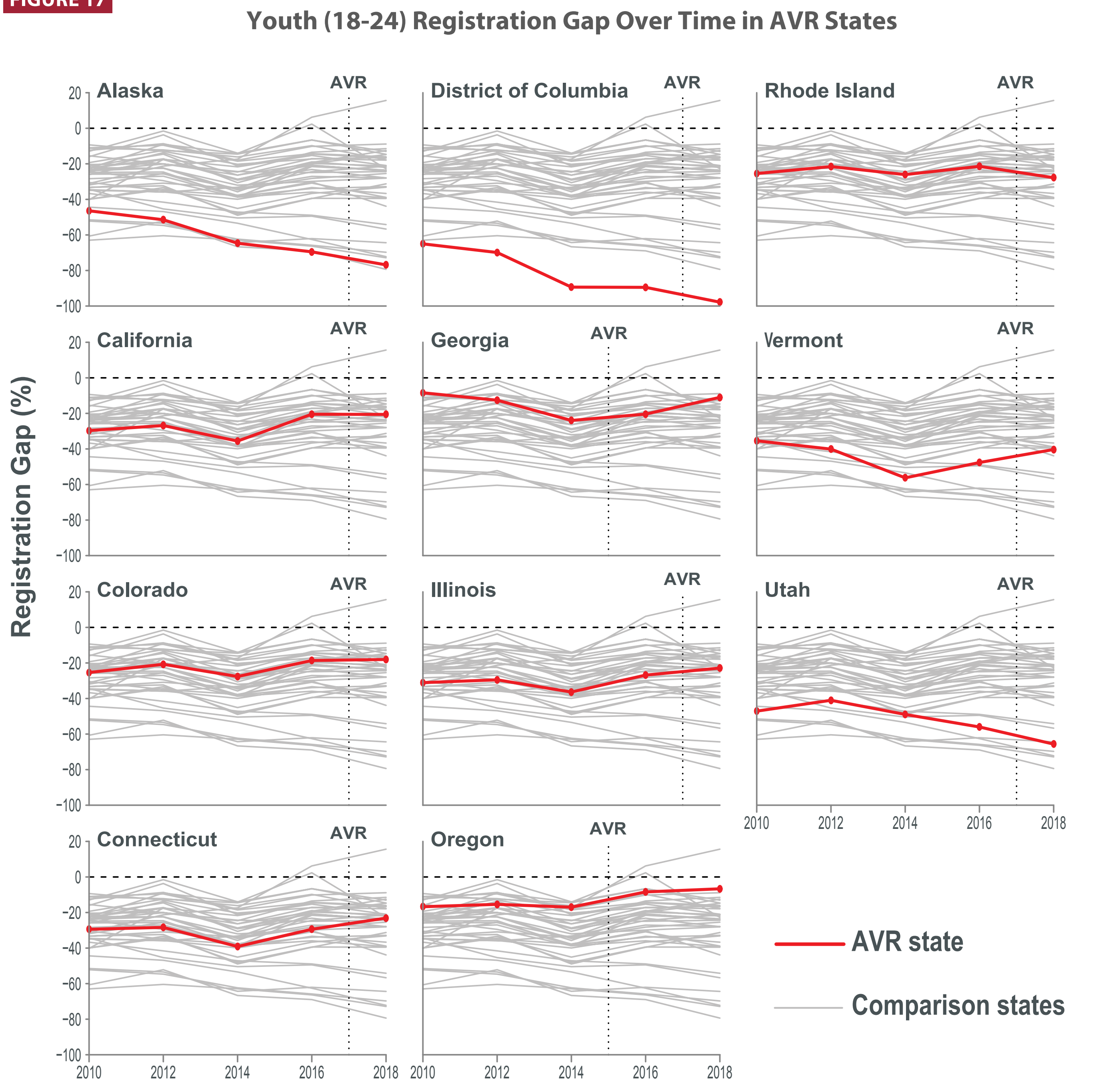


Figure 17 plots the trends for our final group, young people between 18 and 24. These comparisons between the very young and the very old show the largest disadvantages, though the comparison we are making is itself more extreme.[17] There are some states–Alaska, Washington, D.C., and Utah–where AVR came in the midst of a longer downward trend in relative registration for young people. Thus, it is difficult to blame the worsening registration under AVR on AVR itself. At the same time, there are a few states where the gap seems to have improved: Connecticut, Georgia, Illinois, Oregon, and Vermont. In Connecticut, Illinois, and Vermont, the improvement was tied to a longer trend, but in Georgia and Oregon the increase looks more specific to AVR.

Tables 3, 4, and 5 offer the results of our deeper causal analysis, placing the changes in AVR states in the context of the kind of change we might have expected absent AVR. Positive numbers once again mean the underrepresented group is gaining ground, and negative numbers the opposite. The results for Latinos (Table 3) are slightly negative for the nation as a whole (-0.7%), but generally positive when considered state by state. The strongly negative results are no surprise when considered in the context of Figure 15: Alaska, Washington, D.C., and Rhode Island all exhibited longer downward trends that both confound a simple comparison and arguably make the more sophisticated analysis here more challenging as well.[18] Regardless, there is still a great amount of uncertainty in the results. The estimates for Connecticut and Illinois are the most certain (probabilities of 0.16 and 0.19, respectively), while for most others it is more likely than not that there is no real effect at all.

Table 3: Effect of AVR on
Latino Registration Disadvantage

AVR State	Effect (%)	Probability of No Effect
All AVR States	-0.7	0.68
Alaska	-10.3	0.95
California	1.0	0.73
Colorado	-1.3	0.76
Connecticut	2.4	0.16
District of Columbia	-14.3	0.78
Georgia	4.3	0.95
Illinois	0.6	0.19
Oregon	2.6	0.51
Rhode Island	-9.4	0.85
Utah	0.4	0.33
Vermont	——	——

Note: Outcome is the gap between the Latino registration rate and the rate for non-Latino, non-Asian American registrants. Positive values indicate relative improvement for Latinos. Estimates for all AVR states comes from a difference-in-differences model; estimates for individual states come from a synthetic control analysis. Model details are in the appendix.

Table 4: Effect of AVR on
Asian-American Registration Disadvantage

AVR State	Effect (%)	Probability of No Effect
All AVR States	1.5	0.43
Alaska	1.9	0.91
California	1.6	0.63
Colorado	——	——
Connecticut	——	——
District of Columbia	0.5	0.63
Georgia	——	——
Illinois	2.2	0.46
Oregon	-3.2	0.80
Rhode Island	——	——
Utah	——	——
Vermont	——	——

Note: Outcome is the gap between the Asian-American registration rate and the rate for non-Asian American, non-Latino registrants. Positive values indicate relative improvement for Asian Americans. Estimates for all AVR states comes from a difference-in-differences model; estimates for individual states come from a synthetic control analysis. Model details are in the appendix.

The effects for Asian Americans are almost all positive but even more uncertain (Figure 4). The largest positive effects are in Alaska, California, and Illinois, but in each case there is at least a one in two chance of seeing such effects by accident in the absence of AVR. Oregon has the only negative effect (-3.2%), but with a four in five chance of such a result by accident.

Table 5: Registration Effect of AVR on Youth Registration Disadvantage

AVR State	Effect (%)	Probability of No Effect
All AVR States	-1.6	0.52
Alaska	-8.8	0.55
California	-3.6	0.33
Colorado	3.2	0.18
Connecticut	9.8	0.10
District of Columbia	-4.9	0.68
Georgia	5.5	0.69
Illinois	4.4	0.04
Oregon	6.3	0.40
Rhode Island	-5.6	0.22
Utah	-8.6	0.47
Vermont	6.5	0.53

Note: Outcome is the gap between the registration rate for 18-24-year-olds and the rate for those older than 24. Positive values indicate relative improvement for young people. Estimates for all AVR states comes from a difference-in-differences model; estimates for individual states come from a synthetic control analysis. Model details are in the appendix.

Table 5 shows the results for young people. They are more mixed, but also include some of the positive effects measured with the greatest confidence. There were modest or substantial improvements in the relative registration rate of young people in Colorado (3.2%, 0.18 probability of no effect), Connecticut (9.8%, 0.10 probability), and Illinois (4.4%, 0.04 probability). Because every state has a substantial population of young people, and because most of the AVR states looked to have fairly typical gaps between young and old registration prior to adopting the reform, we can have more confidence that these results are picking up the effects of AVR. As was the case with the estimate for overall registration in Vermont, we do not have a good explanation for the better performance of these three states, but each seems worthy of further study.

Conclusion

AVR is a promising reform that has been extremely popular in the four states we examine in detail. Where AVR is implemented, it often becomes the go-to method of registration for a large number of people. The data suggest the reform probably encourages some new people to register who would not have done so without AVR. However, the effect on overall registration is ambiguous because most AVR increases we estimate are small and the reform is still relatively new. Of the types of AVR, back end may produce a larger registration increase than front end. Registration has increased much more in Alaska and Oregon, the two states that had implemented back end AVR by the 2018 election. These results are also still uncertain, but they are consistent with theoretical expectations about how such systems should work.

There are also signs that AVR has more notable effects outside the normal election season. Typically registration rates fall after an election, as states clean their files of outdated records and fewer new people sign up to vote without the excitement of the election as a motivation. But in some AVR states, as residents continue to go to AVR agencies like the DMV they continue to get registered. Whether this will produce an overall registration increase into the 2020 election and beyond remains to be seen.

One of the most important questions about AVR is whether it improves the equity of the system, by helping close the registration gap between overrepresented and underrepresented communities. We find little evidence that Latinos, Asian Americans, and young people have disproportionately increased their registration in any of the states that have implemented AVR. Two states for which we have detailed data--California and Oregon--also tell different stories about AVR use in underrepresented communities. In Oregon, Latinos, Asian Americans, and young people have all been more likely to use AVR as their preferred method of registration, despite the fact that the reform has not been especially likely to draw new registrants from these groups into the electorate. By contrast, in California uptake has been slightly higher among Latinos, no different for Asian Americans, and slightly lower for young people. However, language minorities—for which we have data only in California—have been far more likely than English-language registrants to use the AVR system.

The most achievable near-term objective for AVR may be as a better way to handle the normal flow of voter registrations. This is true regardless of system type. All four of the states we examine in detail have seen large numbers of people use the new systems, including one state with a back end system (Oregon) and three states with front end forced choice systems (California, Colorado, and Delaware). In fact, Delaware had high registration volumes at the DMV before the system became completely electronic. Repurposing information from an unrelated government transaction in this way allows mobilization efforts to focus more directly on voter turnout. It also helps maintain an up-to-date voter file, which can avoid complications that prevent a voter from casting a legitimate ballot.

Recommendations

The optimal approach to AVR adoption for any given state depends on what the state wants to accomplish:

- A more efficient voter registration process is likely achievable through any type of AVR system. All types of AVR have been used heavily.
- Higher overall registration may require a more assertive form of AVR, such as a back end, although protections for non-citizens would need to be addressed in each state. If a state pursues some type of front end system it may need to be patient with the time frame required for notable gains.
- Achieving a more representative electorate that draws in historically disadvantaged groups may require a stepped up mobilization program, not just a policy change to AVR.

Data reporting requirements should also be part of any AVR reform, so policymakers and the public can better understand how the new system is working:

- AVR agencies should be required to share aggregate statistics about the registration process for evaluation of the customer experience. This includes the number of voting-eligible customers, the number who decide to answer the registration questions, the number who fill out detailed registration responses (such as party or language preferences), and the number who explicitly decline registration. Agencies like the DMV tend to have strong privacy mandates, but the data required to track AVR success need not risk any customer's privacy.
- The above statistics should be broken down by demographic categories such as race, ethnicity, age, and language preference where possible, to make it easier to understand the consequences of the reform for equity.
- Reports of AVR activity should establish a set of concepts that can be calculated with data from before and after the reform to facilitate comparison over time. Definitions should be consistent so patterns in the data reflect real changes in behavior.
- Federal and state law should clarify rules around identifying AVR registrants in the voter file. Identifying these registrants can help establish AVR's consequences for equity and turnout, but trade-offs must be acknowledged. Revealing a relatively rare or sensitive government transaction—like enrolling in welfare or food stamps—would be a serious violation of privacy. By contrast, revealing a DMV visit is far less consequential because more than 90 percent of Americans make such a visit at some point in their lives.

Future Research

The limited available data and the early stage of most AVR reforms makes our conclusions somewhat uncertain. Future research can fill in some of these gaps:

- All our conclusions should be updated with data from the 2020 election, when new states will have implemented AVR and the states we study here will have had more time with their reforms.
- Future research should explore expanding the data here to more detailed levels of geography. Breaking apart states in this way might improve the statistical precision of the estimates.
- It would be helpful to examine screenshots of every implemented AVR system, to see exactly how the registration questions are handled in each case.
- Since AVR can lead to a more up-to-date voter file that minimizes confusion and mistakes and enables more existing registrants to vote, voter turnout should be examined as a separate outcome of interest.

Endnotes

1 A back end state would not have default registration if it required residents to respond to the post-transaction contact if they wanted to be registered, rather than to avoid registration as is presently the case.

2 California is planning to implement a middle ground between these possibilities by forcing a choice but pre-filling the "yes" box on the voter registration question. However, California still requires customers to affirmatively attest to eligibility prior to answering the voter registration question, and this eligibility question is a forced choice. Thus, the process is still a forced choice and not a default registration approach.

3 Colorado is a special case because it used front end with a forced choice for the years we study here, but will be implementing a back end with default system for the 2020 election.

4 We used a combination of information in the registration file and Phase 2 numbers to triangulate the 2014-15 uptake. The 845,006 eligible customers who visited the DMV between 2014 and 2015 and were pulled under Phase 2 can be broken into 1) those who were already registered; 2) those who registered at the DMV under the old NVRA process; and 3) those who turned down NVRA registration. Category 1 is not relevant for calculating uptake. We obtained a count of category 2 from a January 2017 copy of the Oregon voter file with a flag for DMV registrants and the date they registered. Category 3 can be further split into 3a) those who ended up registered by some other means between their DMV visit and the point when their record was pulled; 3b) those who ended up registered under OMV Phase 2; and 3c) those who never registered. Category 3b was reported by the Secretary of State in its OMV reports, as was category 3c (i.e., the number of Phase 2 customers who declined). We can approximate category 3a by recognizing that the 17 percent higher pre-existing registration rate among Phase 2 customers logically consists of a mix of those who registered at the DMV because it was still an option (category 2), and those who registered some other way (category 3a). Approximately 13 percent of the pre-existing registrants fall in category 2, thus leaving another 4 percent, or 33,800, for category 3a.

5 California offers official esimtates of eligibility, so unlike the other states we rely on these estimates as our denominator for all calculations.

6 Political Data, Inc. provided California voter registration files with a flag identifying those who registered at the DMV. Latino and Asian-American voters are estimated through their surname, birthplaces, and the demographic characteristics of the areas in which they live. Youth were identified through their reported birthdates.

7 Among new registrants 18-24 years old, 34 percent used the online registration system, COVR, at a time when CNMV was available, compared to 26 percent of those 25 and older. In fact, CNMV uptake is highest not among the young but among those beyond 70, at an age when driver's license renewals must occur in person at the DMV. Among these new registrants, 51 percent can be traced to CNMV, compared to 36 percent for everyone else. Part of the explanation may also be that our data set does not include pre-registrants—those who register to vote at 16 or 17 but cannot cast a ballot until age 18—and the uptake rate might be higher in that group. Yet this group is relatively small compared to the larger set of 18-to-24-year-olds, so adding them would likely not change the results.

8 Conversations with Secretary of State Elaine Manlove on January 26, 2018 and May 15, 2019.

9 Note that under this definition, the 2008 cycle is split in half between a pre-e-Signature (January 2008-January 2009) and post-e-Signature (February 2009-December 2009) period.

10 These data are based on millions of actual registration records, and so are the closest to official public record and the most statistically stable. The main alternative would be the November Voting and Registration Supplement of the Current Population Survey (CPS) of the U.S. Census. The CPS has a longer time series and a likely more accurate self-reported race and ethnicity. But the sample size for our subgroups is far too small in some states, not to mention that even with a large AVR effect the treated group would be very small relative to the total sample. The CPS also has particular challenges with AVR: it is based on self-reported registration and so may understate registration in back end AVR states like Oregon, where many respondents may be only dimly aware that they are registered.

11 Several states report large amounts of missing age data. Because we cannot be certain that these records are a random subset of the total, we control for a state's missing data share in all our models with age as an outcome variable.

12 The Catalist data generally use the entire registration file, including any records that a state has designated "inactive." Figure A1 in the appendix compares the Catalist data to registration numbers from the Election Administration and Voting Survey (EAVS) of the Election Assistance Commission (EAC), and shows that numbers from reported total registration match Catalist much more closely than the reported active-only figures. Using total registration means registration as a share of eligible residents is often quite high and even sometimes over 100 percent. This is another reason to prefer change over time as a measure of effect, because it can account for at least some of this "dead weight."

13 Alaska registers its residents through its Permanent Fund Dividend rather than through the DMV.

14 Our pooled estimate for all states uses a difference-in-differences (DID) model (Ashenfelter and Card 1985): a full set of dummy variables for states and years plus a range of demographic and political covariates that vary across both states and years. The demographic covariates, as well as the citizen voting age population (CVAP) denominator, are derived from the Integrated Public Microdata Sample (IPUMS) of the

U.S. Census's American Community Survey. Our individual estimates for each state use a synthetic control approach (Abadie, Diamond, and Hainmueller 2010, 2015). With only a single post-treatment election year in most cases, overfitting and model dependence become significant threats to inference, so we take extra steps to avoid them. Details of the methodology and model results are in the appendix.

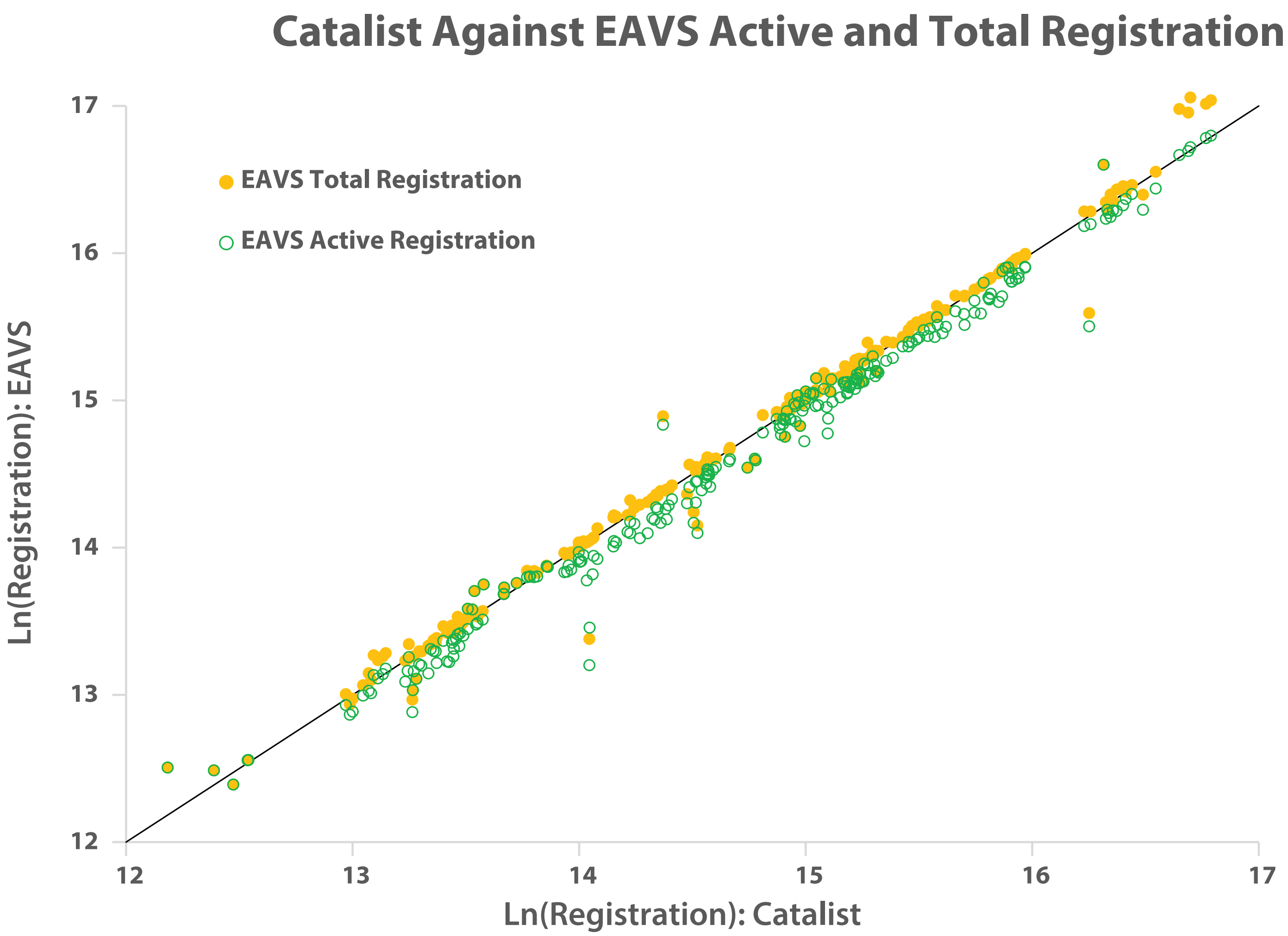
15 For the national effect, the probability of no effect is just a two-tailed t test calculated with the coefficient and standard error of the treatment dummy. For each state effect, the probability of no effect is the share of states that show an effect of similar magnitude in the placebo analysis that is described in the appendix.

16 For Latinos, we dropped 16 states from the comparison pool: Alabama, Iowa, Kentucky, Louisiana, Maine, Minnesota, Mississippi, Missouri, Montana, New Hampshire, North Dakota, Ohio, South Carolina, South Dakota, Tennessee, and West Virginia. For Asian Americans, we dropped the same set of states (with the exception of Minnesota), and dropped 16 more: Arizona, Arkansas, Colorado, Connecticut, Florida, Idaho, Indiana, Kansas, Michigan, Nebraska, New Mexico, North Carolina, Oklahoma, Pennsylvania, Wisconsin, and Wyoming.

17 Our age data have three categories–18 to 24, 25 to 64, and 65 plus–on an ordered variable where higher age generally means a greater likelihood of registering, so using the end points of this ordered variable makes for a stronger contrast. By comparison, race/ethnicity is categorical (the groups have no a priori order) and there is no group we should obviously skip over to make for a sharper comparison.

18 The matching process of the synthetic control method works more poorly when a state's pre-treatment trend is an outlier, as with those three states. In such cases, it is not clear that any weighted combination of other states can adequately capture the pre-treatment trend in the state in question. In fact, Alaska, Washington, D.C., and Rhode Island are perhaps the best comparison states for each other, yet because all three adopted AVR at about the same time, none can be used as a control case for the others.

Appendix



Difference-in-differences Model Results

Because our difference-in-differences (DID) models have a more limited amount of data, especially post-treatment, we want to avoid overfitting the data as much as possible. To select appropriate covariates, we treated each as if it were the outcome variable in a stripped down DID model, regressing each on the treatment indicator plus a full set of state and year dummies. The stronger this placebo treatment effect, the more likely that the variable in question might be a confound for the true treatment effect for registration. We include any variable where the placebo treatment's t statistic had a p value below 0.2.

Table A1: Catalist Difference-in-Differences Models, 2010-2018

	Total Reg.	Reg. Gap		
	All	Latinos	Asian-Americans	Youth
Intercept	1.218	0.079	-0.198	-0.306
	(2.205)	(0.043)	(0.048)	(0.072)
AVR	0.015	-0.007	0.015	-0.016
	(0.013)	(0.017)	(0.019)	(0.025)
College	-0.262			
	(0.397)			
Homeowner			-0.26	
			(0.145)	
Unemployed	0.306		0.96	
	(0.452)		(0.495)	
Moved last year	-0.002			
	(0.377)			
Logged CVAP	-0.009			-0.039
	(0.143)			(0.130)
Age 18-24	-1.657			
	(0.742)			
Presidential vote	0.011	-0.167	-0.068	0.144
	(0.118)	(0.180)	(0.275)	(0.211)
Presidential vote	-0.021	-0.011	-0.058	-0.034
X Midterm	(0.036)	(0.050)	(0.068)	(0.070)
US Senate race	0.019	0.027	0.014	0.047
	(0.016)	(0.028)	(0.030)	(0.031)
US Senate margin	0.022	0.041	0.019	0.056
	(0.019)	(0.034)	(0.036)	(0.038)
State fixed effects	X	X	X	X
Year fixed effects	X	X	X	X
Adjusted R^2	0.888	0.826	0.86	0.869
RMSE	0.032	0.041	0.03	0.065
N	255	170	75	255

Note: Cell entries are ordinary least squares regression coefficients and standard errors, calculated in R 3.6.0.

Synthetic Control Analysis

For our analysis of the causal effect of AVR in individual states, we turn to the synthetic control method (Abadie, Diamond, and Hainmueller 2010, 2015). This involves identifying a "synthetic control group" that consists of a weighted combination of all other states (the "donor pool"). The weights are determined by each state's similarity to a given AVR state using a set of variables specified by the analyst. The key is that these weights are calculated based on data prior to the policy intervention, and then the trajectories of the AVR state and the synthetic control are compared after the intervention. The more these trajectories diverge, the more the treatment is presumed to have had an effect. More formally, the synthetic control method seeks a set of weights W for the donor pool which solves the following constrained minimization problem:

$$\boldsymbol{W}^* = min_W (\boldsymbol{X}_1 - \boldsymbol{X}_0\boldsymbol{W})'\boldsymbol{V}(\boldsymbol{X}_1 - \boldsymbol{X}_0\boldsymbol{W})$$

where X1 is a (kX1) vector of k preintervention characteristics for the treated state, X0 is a (kXJ) matrix of the same variables for the J states in the donor pool, W is a (JX1) matrix of weights for the control states, and V is a set of coefficients indicating the relative predictive power of each of the variables in the model.

The synthetic control method is similar to the DID in that it strives to control for unobserved confounds that can undermine estimates of causal effect. However, the DID presumes that these unobserved confounds are constant in time, and so drop out through the differencing process. The synthetic control, by contrast, allows these confounds to vary in time, permitting the trajectories of the treated and the comparison states to differ prior to the policy intervention. Abadie, et al. (2010) demonstrate that if the synthetic control model is run on a sufficiently large number of pretreatment time periods, the method can fit the observed covariates specified in the model only if it also accounts for any time-varying unobserved confounds.

While it is possible to set V based on a priori substantive beliefs about the relative importance of each of the variables, it is more typical to estimate V from the data such that the pretreatment outcomes in the treated and synthetic control states most closely resemble each other. If Y1 is the pretreatment turnout series for the AVR state and Y0 the same for the untreated states, then this process identifies V such that

$$\boldsymbol{V}^* = min_V (\boldsymbol{Y1} - \boldsymbol{Y}_0\boldsymbol{W}^*(\boldsymbol{V}))'(\boldsymbol{Y}_1 - \boldsymbol{Y}_0\boldsymbol{W}^*(\boldsymbol{V}))$$

Though this is a sensible way of approaching the question, it does not entirely identify the appropriate value of V . There remains the question of model specification; in other words, which of the values of V should be set to zero prior to estimation? One of the challenges of the synthetic control method as applied to AVR is the small number of post-treatment periods. This makes the post-treatment effect estimates more susceptible to random shocks. The magnitude of the effect estimate might therefore be more vulnerable to model specification, and our confidence in any given model estimate more uncertain. Adding to the challenge, the model building process cannot avoid the fundamental bias-variance trade-off that is a part of all such work. A model that perfectly fits the pretreatment turnout series for a particular AVR state might nonetheless poorly predict out-of-sample observations, adding noise to the treatment estimate and undermining our confidence in the reform effect (James et al. 2013; McClelland and Gault 2017).

We address this problem with a cross-validation approach that seeks to identify the models that strike the best balance between these competing considerations. We ran a wide range of different models that accounted for demographics, political variables, and lagged registration numbers. A list of these models and the variables they included can be found in Table A2. We tested each of these models on pre-treatment outcomes, omitting one year of data in turn, predicting that year out of sample, and then averaging the squared prediction errors for this leave-one-out validation. This offered a mean squared prediction error (MSPE) for each of the models. When we then ran the models on the full data, we weighted the average of the treatment effects from these models by the inverse of this MSPE, thus upweighting models that would be expected to have greater out-of-sample predictive accuracy in the absence of the AVR policy intervention.

As recommended by Abadie, et al. (2010), we also ran a placebo test. For each of the models, we pretended as if each of the non-treated states was in fact treated with AVR and then recorded the treatment effect. We then calculated the share of treatment effects that were larger than the effect for the state that actually implemented AVR. The share of states with larger effects becomes the probability of seeing the treatment effect by chance–that is, due to factors unrelated to the application of the AVR treatment. We also averaged these probability numbers with the same weighting procedure that we used for the treatment effects.

Some states in the youth data had a large number of cases with missing age values due to reporting problems from the states themselves. Alaska, Hawaii, Mississippi, North Dakota, New Hampshire, Wisconsin, and Wyoming each averaged more than 13% missing, and for some years some had rates over 20%. To account for this problem, we included the percent missing as a matching variable in all the models run with the youth data.

Table A2: Models for the Synthetic Control Analysis

	Model						
Variable	Political	Demogs.	All Lags	Lags + Demogs.	Lags + Political	Mixture	Full
Non-Hispanic white		X		X		X	X
Homeowner		X		X			X
Unemployed		X		X			X
Age 18-24		X		X			X
Age 25-29		X		X			X
Married		X		X			X
College graduate		X		X			X
Moved last year		X		X			X
U.S. Senate race	X				X	X	X
U.S. Senate margin	X				X	X	X
Governor margin	X				X	X	X
Logged CVAP	X	X	X	X	X	X	X
Lag 1			X	X	X	X	X
Lag 2			X				
Lag 3			X	X	X	X	X
Lag 4			X				

Table A3: Full Synthetic Control Results–Alaska

Model	Treatment	Pr(Treatment)	MSPE
ALL REGISTRANTS			
full	0.117	0.4	0.0013
political	0.075	0.22	0.0017
pol+lags	0.099	0.35	0.0023
original	0.068	0.4	0.0032
dems+lags	0.119	0.3	0.0033
lags	0.114	0.72	0.004
demographic	0.064	0.45	0.0111
LATINOS			
original	-0.098	0.92	0.0398
lags	-0.098	1	0.0398
dems+lags	-0.098	1	0.0398
pol+lags	-0.098	0.92	0.0398
full	-0.098	1	0.0398
political	-0.097	0.79	0.0557
demographic	-0.156	0.96	0.0663
ASIAN AMERICANS			
demographic	0.017	0.9	0.0045
lags	0.017	1	0.0045
dems+lags	0.017	0.9	0.0045
full	0.017	0.9	0.0052
original	0.031	1	0.0059
pol+lags	0.031	1	0.0059
political	0.002	0.5	0.0094
YOUTH			
original	-0.078	0.68	0.0021
pol+lags	-0.078	0.67	0.0021
political	-0.114	0.25	0.0021
demographic	-0.078	0.41	0.0065
full	-0.111	0.57	0.0069
lags	-0.062	0.8	0.0075
dems+lags	-0.078	0.56	0.0083

Note: Cell entries are the results of the synthetic control models described in Table 7, as applied to Alaska. MSPE is the mean squared prediction error from the leave-one-out cross-validation described in the text.

Table A4: Full Synthetic Control Results–California

Model	Treatment	Pr(Treatment)	MSPE
ALL REGISTRANTS			
lags	-0.011	0.3	0.0001
original	-0.021	0.4	0.0002
pol+lags	-0.006	0.49	0.0003
demographic	-0.046	0.12	0.0005
dems+lags	-0.016	0.1	0.0008
full	-0.015	0.15	0.0008
political	-0.024	0.35	0.0024
LATINOS			
political	0.008	0.92	0.0001
full	0.005	0.75	0.0002
dems+lags	0.016	0.42	0.0003
original	0.009	0.92	0.0004
pol+lags	0.009	0.92	0.0004
demographic	0.017	0.22	0.0004
lags	0.012	0.38	0.0005
ASIAN AMERICANS			
political	0.009	0.9	0.0004
demographic	0.016	0.4	0.0004
dems+lags	0.017	0.6	0.0012
full	0.025	0.5	0.0012
original	0.025	0.6	0.0014
pol+lags	0.025	0.6	0.0014
lags	0.017	0.7	0.0014
YOUTH			
political	-0.016	0.65	0.0008
dems+lags	-0.071	0.18	0.0012
full	-0.071	0.18	0.0012
demographic	0.05	0.22	0.0013
pol+lags	-0.075	0.3	0.002
original	-0.067	0.15	0.0023
lags	-0.032	0.38	0.0037

Note: Cell entries are the results of the synthetic control models described in Table 7, as applied to California. MSPE is the mean squared prediction error from the leave-one-out cross-validation described in the text.

Table A5: Full Synthetic Control Results–Colorado

Model	Treatment	Pr(Treatment)	MSPE
ALL REGISTRANTS			
pol+lags	-0.033	0.6	0.0005
original	-0.008	0.9	0.0007
lags	-0.011	0.9	0.0009
dems+lags	-0.016	0.7	0.001
full	-0.016	0.82	0.0012
political	-0.06	0.88	0.0039
demographic	-0.013	0.64	0.0047
LATINOS			
full	-0.03	0.67	0.0007
dems+lags	-0.011	0.88	0.0009
original	-0.01	0.71	0.0015
pol+lags	-0.01	0.71	0.0015
lags	0.005	1	0.0026
political	0.039	0.67	0.0068
demographic	0.013	0.83	0.0074
YOUTH			
pol+lags	0.028	0.12	0
lags	0.04	0.07	0.0001
political	0.046	0.03	0.0001
full	0.013	0.62	0.0001
dems+lags	0.006	0.54	0.0005
original	0.073	0.1	0.0007
demographic	0.007	0.5	0.0016

Note: Cell entries are the results of the synthetic control models described in Table 7, as applied to Colorado. MSPE is the mean squared prediction error from the leave-one-out cross-validation described in the text.

Table A6: Full Synthetic Control Results–Connecticut

Model	Treatment	Pr(Treatment)	MSPE
ALL REGISTRANTS			
dems+lags	-0.003	0.72	0.0001
full	-0.006	0.62	0.0002
original	0.008	0.62	0.0002
pol+lags	-0.002	0.92	0.0004
demographic	0.005	0.68	0.0004
political	0.026	0.3	0.0005
lags	0.003	0.45	0.001
LATINOS			
dems+lags	0.022	0.08	0.0001
original	0.029	0.12	0.0001
pol+lags	0.029	0.12	0.0001
demographic	0.029	0.04	0.0001
full	0.02	0.54	0.0002
lags	0.01	0.38	0.0003
political	0.007	0.46	0.0013
YOUTH			
pol+lags	0.113	0	0.0001
original	0.097	0	0.0002
demographic	0.037	0.9	0.0003
lags	0.094	0.03	0.0005
political	0.111	0	0.0006
full	0.085	0	0.0006
dems+lags	0.029	0.2	0.0014

Note: Cell entries are the results of the synthetic control models described in Table 7, as applied to Connecticut. MSPE is the mean squared prediction error from the leave-one-out cross-validation described in the text.

Table A7: Full Synthetic Control Results–District of Columbia

Model	Treatment	Pr(Treatment)	MSPE
ALL REGISTRANTS			
original	0.058	0.65	0.0228
lags	0.058	0.9	0.0228
dems+lags	0.058	0.75	0.0228
pol+lags	0.058	0.55	0.0228
full	0.058	0.78	0.0228
political	0.015	0.57	0.035
demographic	0.043	0.43	0.085
LATINOS			
full	-0.16	0.75	0.0093
original	-0.16	0.75	0.0104
pol+lags	-0.16	0.78	0.0104
demographic	-0.067	0.92	0.015
dems+lags	-0.135	0.92	0.0177
political	-0.155	0.42	0.0321
ASIAN AMERICANS			
lags	0.031	0.6	0.0022
original	0.027	0.9	0.003
pol+lags	0.027	0.9	0.003
full	-0.024	0.5	0.0036
demographic	-0.024	0.4	0.0039
political	-0.024	0.4	0.0039
dems+lags	-0.009	0.6	0.0041
YOUTH			
original	-0.034	0.74	0.0363
pol+lags	-0.034	0.69	0.0363
full	-0.034	0.87	0.0363
political	-0.098	0.41	0.0378
lags	-0.034	0.88	0.0386
dems+lags	-0.021	0.7	0.0392
demographic	-0.092	0.45	0.0396

Note: Cell entries are the results of the synthetic control models described in Table 7, as applied to District of Columbia. MSPE is the mean squared prediction error from the leave-one-out cross-validation described in the text.

Table A8: Full Synthetic Control Results–Georgia

Model	Treatment	Pr(Treatment)	MSPE
ALL REGISTRANTS			
dems+lags	0.0400	0.12	0.0001
pol+lags	0.0560	0.38	0.0001
full	0.0330	0.23	0.0002
demographic	0.0190	0.33	0.0002
lags	0.0490	0.03	0.0003
original	0.0530	0.2	0.0003
political	0.0570	0.07	0.0004
LATINOS			
original	0.0250	0.92	0.0047
pol+lags	0.0250	0.92	0.0047
full	0.0250	0.96	0.0049
political	0.1370	0.96	0.0056
lags	0.0320	0.96	0.0066
dems+lags	0.0220	0.96	0.0066
demographic	0.0430	0.96	0.0076
YOUTH			
pol+lags	0.0790	0.65	0.0046
dems+lags	0.0350	0.82	0.0047
demographic	0.0590	0.52	0.0051
lags	0.0680	0.75	0.0052
original	0.0500	0.79	0.0066
political	0.0300	0.62	0.0084

Note: Cell entries are the results of the synthetic control models described in Table 7, as applied to Georgia. MSPE is the mean squared prediction error from the leave-one-out cross-validation described in the text.

Table A9: Full Synthetic Control Results–Illinois

Model	Treatment	Pr(Treatment)	MSPE
ALL REGISTRANTS			
lags	0.004	0.45	0.0004
demographic	0.008	0.78	0.0006
dems+lags	0.011	0.75	0.0007
full	0.015	0.68	0.0007
pol+lags	0.007	0.62	0.0011
original	0.014	0.6	0.0012
political	0.012	0.4	0.0033
LATINOS			
lags	-0.024	0	0.0002
dems+lags	0.026	0.26	0.0007
original	0.03	0.12	0.0008
pol+lags	0.03	0.12	0.0008
demographic	-0.007	0.83	0.0009
full	0.037	0.29	0.001
political	0.025	0.25	0.001
ASIAN AMERICANS			
demographic	0.007	0.5	0.0009
full	0.027	0.4	0.0015
original	0.028	0.5	0.0017
pol+lags	0.028	0.5	0.0017
dems+lags	0.02	0.5	0.0019
political	0.028	0.3	0.002
lags	0.029	0.5	0.002
YOUTH			
demographic	0.024	0	0.0001
dems+lags	0.022	0	0.0001
pol+lags	0.119	0.15	0.0002
full	0.061	0	0.0003
lags	0.048	0	0.0004
original	0.049	0	0.0014
political	0.057	0.82	0.0016

Note: Cell entries are the results of the synthetic control models described in Table 7, as applied to Illinois. MSPE is the mean squared prediction error from the leave-one-out cross-validation described in the text.

Table A10: Full Synthetic Control Results–Oregon

Model	Treatment	Pr(Treatment)	MSPE
ALL REGISTRANTS			
pol+lags	0.108	0.38	0
dems+lags	0.091	0.22	0
full	0.091	0.15	0
original	0.102	0.07	0.0001
lags	0.106	0	0.0014
demographic	0.088	0.05	0.0024
political	0.086	0.2	0.0032
LATINOS			
original	0.026	0.5	0.0007
pol+lags	0.026	0.5	0.0007
full	0.043	0.25	0.0008
lags	0.026	0.38	0.0008
dems+lags	0.022	0.25	0.001
demographic	0.003	1	0.0011
political	0.036	0.92	0.0015
ASIAN AMERICANS			
demographic	-0.022	0.8	0.0052
dems+lags	-0.04	0.7	0.0069
political	-0.016	1	0.008
lags	-0.04	0.9	0.0082
original	-0.036	0.78	0.0082
pol+lags	-0.036	0.78	0.0082
full	-0.04	0.67	0.0083
YOUTH			
political	0.046	0.52	0.0021
demographic	0.109	0.35	0.0024
lags	0.034	0.6	0.0038
pol+lags	0.038	0.2	0.0042
dems+lags	0.109	0.32	0.0044
original	0.037	0.26	0.0052
full	0.042	0.43	0.0064

Note: Cell entries are the results of the synthetic control models described in Table 7, as applied to Oregon. MSPE is the mean squared prediction error from the leave-one-out cross-validation described in the text.

Table A11: Full Synthetic Control Results–Rhode Island

Model	Treatment	Pr(Treatment)	MSPE
ALL REGISTRANTS			
original	0.014	0.38	0
full	0.005	0.32	0.0001
lags	0.012	0.45	0.0001
pol+lags	0.005	0.4	0.0001
dems+lags	0.005	0.8	0.0003
demographic	0.011	0.52	0.0007
political	-0.003	0.5	0.0203
LATINOS			
original	-0.099	0.79	0.0045
pol+lags	-0.099	0.88	0.0045
full	-0.099	0.79	0.005
dems+lags	-0.099	0.92	0.005
lags	-0.071	0.88	0.0065
political	-0.084	0.88	0.0267
YOUTH			
political	-0.07	0.05	0.001
lags	-0.034	0.25	0.0011
full	-0.045	0.43	0.0014
demographic	-0.057	0.15	0.0014
dems+lags	-0.052	0.3	0.0015
original	-0.071	0.25	0.0024
pol+lags	-0.084	0.15	0.0024

Note: Cell entries are the results of the synthetic control models described in Table 7, as applied to Rhode Island. MSPE is the mean squared prediction error from the leave-one-out cross-validation described in the text.

Table A12: Full Synthetic Control Results–Utah

Model	Treatment	Pr(Treatment)	MSPE
ALL REGISTRANTS			
lags	-0.059	0.48	0.0008
full	-0.087	0.62	0.0017
original	-0.086	0.52	0.0017
demographic	-0.088	0.43	0.0019
dems+lags	-0.089	0.55	0.0019
pol+lags	-0.092	0.45	0.0025
political	-0.112	0.18	0.0052
LATINOS			
lags	0.001	0.29	0
pol+lags	0.02	0.25	0.0001
dems+lags	0	0.96	0.0002
original	0.015	0.38	0.0004
full	0.011	0.67	0.0004
political	0.035	0.96	0.0006
demographic	0.031	0.88	0.0019
YOUTH			
political	-0.117	0.15	0.0038
lags	-0.141	0.3	0.0039
original	-0.021	0.82	0.0043
full	-0.076	0.43	0.0043
pol+lags	-0.113	0.5	0.0059
dems+lags	-0.02	0.78	0.0067

Note: Cell entries are the results of the synthetic control models described in Table 7, as applied to Utah. MSPE is the mean squared prediction error from the leave-one-out cross-validation described in the text.

Table A13: Full Synthetic Control Results–Vermont

Model	Treatment	Pr(Treatment)	MSPE
ALL REGISTRANTS			
demographic	0.03	0.07	0.0001
full	0.028	0	0.0001
lags	0.025	0.18	0.0003
dems+lags	0.028	0	0.0004
pol+lags	0.024	0	0.0004
original	0.028	0	0.0005
political	0.03	0.12	0.0007
YOUTH			
pol+lags	0.049	0.56	0.0019
original	0.065	0.57	0.0022
dems+lags	0.045	0.52	0.0027
full	0.049	0.62	0.0027
lags	0.049	0.75	0.003
demographic	0.113	0.32	0.0034
political	0.131	0.12	0.0051

Note: Cell entries are the results of the synthetic control models described in Table 7, as applied to Vermont. MSPE is the mean squared prediction error from the leave-one-out cross-validation described in the text.

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