

Differences-in-different Counties: The Heterogeneous Effect of a Voter ID Law in Virginia

Abstract

The proliferation of voter ID laws across the US has had an ambiguous impact on voting and registration rates, despite fear from civil-rights advocates that these laws would increase the cost of voting. To better understand the causal impact of voter ID laws on turnout and registration, I study Virginia's 2014 law change which required voters to present photo ID to vote for the first time. Virginia gathered information on voters most likely to be impacted by the voter ID law, and has off-year gubernatorial and state legislative elections, allowing for the comparison of federal and state elections separately. I find significant and durable declines in both registration and turnout rates across election types in voting precincts with higher shares of voters likely to lack valid ID. These differential effects on turnout are reversed in counties with higher levels of Democratic support, suggesting significant counter-mobilization against the voter ID law.

1 Introduction

Beginning in 2005, the decades-long trend towards lowering barriers to voting in the United States, highlighted by the Voting Rights Act of 1965 and the National Voter Registration Act of 1993, began to reverse with the passage of voter identification laws in Indiana and Georgia. These laws required voters to produce an approved identification document on election day or be denied the ability to vote. In 2013, the U.S. Supreme Court struck down the pre-clearance requirement of the 1965 Voting Rights Act in *Shelby County v. Holder*, leading to a wave of new voting restrictions from states that were previously restricted in their ability to change voting laws (Anderson, 2018). While there is substantial evidence that the expansion/contraction of voting rights decreases/increases racial disparities in government spending (Cascio & Washington, 2014), treatment by law enforcement (Facchini, Knight, & Testa, 2020), labor market outcomes (Aneja & Avenancio-León, 2019; Aneja & Avenancio-Leon, 2019), and political representation (Fresh, 2018; Schuit & Rogowski, 2017), there is still debate on the effect of contemporary voting restrictions on voter turnout.

The existing literature is split on the impact of the new wave of voting restrictions on voter participation. Studies looking at voter ID laws in Georgia (Hood III & Bullock III, 2012), North Carolina (Grimmer & Yoder, 2021), Rhode Island (Esposito, Focanti, & Hastings, 2019), and South Carolina (Hood III & Buchanan, 2020) have all found decreases in voter turnout among voters who lacked a driver's license. Meanwhile, Hopkins, Meredith, Morse, Smith, and Yoder (2017) find an increase in turnout when studying Virginia's voter ID law and Cantoni and Pons (2021) find no effect in a nationwide study. Recent works using ecological inference approaches to study the overall impact of the *Shelby* decision do not find evidence for an increase in racial disparities in voter behavior (Gibson, 2020; Komisarchik & White, 2021; Raze, 2022), suggesting that counter-mobilization against voting restrictions may be effective in overcoming voting barriers (Biggers, 2019; Valentino & Neuner, 2017).

To better understand the impact of voter ID laws and potential counter-mobilization efforts, I study Virginia's passage of House Bill 1337 (HB1337) which required voters to

present a photo ID on election day to vote starting with the 2014 midterm elections. I estimate the change in turnout and registration in elections after the law went into effect using an ecological inference approach with data on the number of registered voters within a voting precinct who lack a Department of Motor Vehicles (DMV) record, making them unlikely to have a photo ID that satisfies HB 1337. To avoid concerns about the use of continuous treatment in difference-in-difference estimations (Callaway, Goodman-Bacon, & Sant'Anna, 2021) I define a voting precinct as treated if the percentage of registered voters who lack a DMV record is above the median (3.2%) and find that these precincts experience a 3.07% decline in turnout and a 3.09% decline in registration compared to precincts below the median. This suggest that the primary driver of decreased turnout may be a decrease in the number of registered voters, as opposed to a decrease in the rate at which registered voters show up to the polls. While we must be cautious in interpreting these results due to the ecological fallacy, it is unlikely that citizens who satisfy the new voting laws would experience a decline in voting. An ecological approach also has the advantage of identifying the localized effect on registration, an effect that studies utilizing data from continuously registered voters may miss, which is another possible cause for the divide within the existing literature.

Virginia has a unique election structure that makes it valuable to study, as it is one of only five states that hold off-year gubernatorial elections and one of four that hold off-year state legislative elections. This administrative setup allows for me to study more elections within a small window around the change in the law, and to compare the impact of the law change in elections with lower turnout and that elect the officials who establish statewide voting laws. To account for differences in types of elections being held between 2011 and 2017, I interact an election year fixed effect with the racial distribution, age distribution, and percentage urban within a voting precinct, as well as restrict comparisons to years with the same election type, and find comparable declines in voter participation across specifications.

That I find significant results in low-turnout elections¹ implies that voter ID laws can prevent high-propensity voters from turning out and potentially shift election outcomes at multiple levels of governance.

The analysis then turns to testing for differences across county types and for possible counter-mobilization efforts by the Democratic Party and civil rights organizations. Non-white voters, specifically Black and Hispanic voters, are more likely to be impacted by voter ID laws (Ansolabehere & Hersh, 2017; Barreto, Nuño, Sanchez, & Walker, 2019; Barreto, Nuño, & Sanchez, 2009), and these laws have been exclusively proposed by Republican lawmakers (Biggers & Hanmer, 2017; Rocha & Matsubayashi, 2014) against consistent opposition from Democrats² and civil rights organizations.³ I therefore test for potential mobilization against the voter ID law and find that the differential effect in turnout across precincts is mitigated or reversed in counties that had high support for Barack Obama in 2008, and possibly in more urban counties. This is consistent with a story of counter-mobilization by Democratic organizations, combined with voter education by the state, successfully muting the aggregate effect of voter suppression. The lack of a flip on registration in this context suggests that while counter-mobilization and information sharing may be effective at turning out previously registered voters, these efforts were not successful in getting voters off of the sidelines and registered to vote. This comes through in the aggregate data, as counties with higher levels of Democratic support and urban residents did not experience a relative increase in turnout compared to other counties. This further suggests that attenuating the impact of voter restrictions required shifting resources away from other “get out the vote” efforts, such as registering new voters.

Other specifics of Virginia’s voter ID law and election structure make it a unique and valuable setting to study. In contrast to previous studies of voter ID laws, I examine the

¹Virginia’s hotly contested 2021 gubernatorial election was the first off-year election that saw greater than 50% voter turnout in Virginia since 1995.

²HB 1337 was passed along party lines, receiving zero votes from Democrats in the House of Delegates and the State Senate.

³See *North Carolina State Conference of the NAACP v. McCrory* (2016) for one example of civil rights organizations and political actors working to oppose new voting laws.

impact of moving from a strict non-photo ID law in 2012 to a strict photo ID law in 2014 and find significant deterrent effects, highlighting the impact of the most restrictive type of voter ID law. Virginia made it difficult for citizens to vote in multiple ways aside from their voter ID laws, and was measured as having one of the highest costs of voting in the country (Li, Pomante, & Schraufnagel, 2018). This provides another plausible explanation for why I find the main suppression effect to be through decreased registration: citizens who were already regular voters in Virginia had already revealed a high willingness to pay to register to vote and were therefore willing to pay the cost of acquiring a valid ID, which would be similar to having to re-register. On the other hand, citizens who had not already registered to vote would now face a higher cumulative effect of registering under the voter ID law and would be less likely to register at all. This suggests an important avenue for heterogeneous effects across states based on the cost of voting. This also highlights the value of using an ecological approach to measuring voter suppression, as it avoids the selection problem of using data on registered voters.

2 A History of Virginia Voting Rights and Regulations

Virginia first passed a nonstrict and nonphoto voter ID law in 1996, meaning that a registered voter had to either: show a valid government issued ID card, such as a Virginia voter registration card or Social Security card (which did not contain a photo of the voter), *or* sign a sworn statement affirming their identity in lieu of showing a valid identification document. In 2012, Virginia passed HB 9, which moved Virginia into the *strict* nonphoto category by removing the option to sign a sworn statement, but expanded the list of nonphoto identification documents that could be used.⁴

HB 1337 was introduced in November 2012 and signed into law in March 2013, moving Virginia into the strict *photo* ID category for the 2014 election. Virginia voters were now

⁴The newly eligible documents were: student IDs from 4-year institutions of higher education located in Virginia, utility bills, bank statements, government checks, and paychecks that show the name and address of the voter.

required to present photo ID, such as a valid U.S. passport, driver's license, valid student ID card, or an ID card issued by their employer. However, voters without a valid ID could file a provisional ballot and present valid documentation within three days of the election and have their vote counted. Virginia continued to make free photo IDs available at local voter registration offices during the three days that provisional ballots were still being counted. Although voter identification was not required for absentee ballots by mail, Virginia limited absentee voting to those with a qualifying excuse.⁵

In addition to raising the requirements to vote in 2013, Virginia also engaged in an effort to find voters who were now ineligible to vote due to a felony conviction or because they moved out of the state. When the Virginia Board of Elections sent a list of voters to be removed, local administrators discovered that hundreds of voters who shouldn't be removed were set to be purged from the state's voter rolls (Wilson, 2013). The Virginia Democratic Party sued the Board of Elections to restore more than 38,000 names to state voter rolls that were removed before errors had been caught by local administrators, but had their request denied two weeks before the 2013 November election (*The Democratic Party of Virginia v. Virginia State Board of Elections et al*, 2013).

Virginia had multiple other institutional arrangements that created barriers to voting. Through the 2019 election, Virginia did not offer no-excuse absentee voting, did not offer same day voter registration, and was one of only 11 states that did not allow for early voting. In conjunction with a strict photo ID law, Virginia had one of the highest voting costs in the country (Li et al., 2018).⁶

While Virginia voters faced a high cost to voting, the state engaged in an informational campaign to inform voters about the new voter ID requirements. Prior to the 2014 election, Virginia's Department of Elections sent registered voters who lacked a DMV record and had either voted or registered in or since the 2012 presidential election a mailer explaining the

⁵Virginia offered 19 acceptable excuses, including being out of state for school or business.

⁶Li et al. (2018) also consider preregistration laws, restrictions on registration drives, and poll hours.

new law.⁷ Lacking a DMV record means that a voter does not have a Virginia driver's license, indicating that the voter may lack a valid photo ID.⁸ This measure, active, registered voters who lack a DMV record, serves as a proxy for voters likely to be impacted by Virginia's strict photo ID law. Virginia also shared data of registrants without DMV records with at least four outside organizations⁹ and used various promotional tools, including print, radio, billboards, bus shelters, bus ads, and television to inform voters of the changes of the law (Schmidt, 2013).

In the 2014 general election, Virginia's first with the strict photo ID law in place, voters who lacked a valid ID were allowed to offer a provisional ballot and submit an acceptable photo ID in person within three days after the election. Hopkins et al. (2017) found only 474 provisional ballots had to be cast due to lack a proper ID, indicating that very few votes that would have been counted in 2013 were directly prevented in 2014. The authors also find that voter turnout actually increased in precincts with more voters who lacked a DMV record and theorize that their results might be explained by the targeted Department of Elections mailings, suggesting the importance of informing and targeting voters impacted by new voter laws.

3 Theoretical Expectations

There are two primary avenues through which voter ID laws may impact turnout and registration rates: by raising the cost of voting and registering to vote, and providing additional motivation for voters who oppose voter ID laws. Political scientists often study the decision to register and vote with a cost-benefit framework, where voters will choose to cast a ballot when the benefits of voting outweigh the costs (Riker & Ordeshook, 1968). Empirical exam-

⁷This constituted 90,797 registered voters, less than half of all active voters who lacked a DMV record.

⁸While it is possible that a potential voter lacks a driver's license but possesses another form of valid ID, this likely represents a small portion of the population. In 2014, there were 214 million licensed driver's in the US compared to only 121.5 million passports in circulation (US Department of State, 2022; US Department of Transportation, 2014).

⁹Organizations include the NAACP, Virginia New Majority, Progress Virginia, and Americans for Prosperity (Schmidt, 2013).

ples for the calculus of voting include studies that show people are less likely to vote if their polling place moves or takes more time to access (Cantoni, 2020; Gimpel & Schuknecht, 2003; Haspel & Knotts, 2005), that people are more/less likely to register to vote when registering is made more/less convenient (Ansolabehere & Konisky, 2006; Holbein & Hillygus, 2016; Street, Murray, Blitzer, & Patel, 2015), and even that voters are less likely to vote if it rains on election day (Fraga, Hersh, et al., 2011; Fujiwara, Meng, & Vogl, 2016; Gomez, Hansford, & Krause, 2007; Hansford & Gomez, 2010).

While there is strong empirical support for the calculus of voting theory, there still remains debate on whether voter ID laws, which raise the cost of voting for individuals who don't already possess a valid ID, decrease voter turnout. Data limitations may be an important factor in mixed empirical results, as highlighted by the lack of consensus between Hajnal, Lajevardi, and Nielson (2017), Hajnal, Kuk, and Lajevardi (2018), and Grimmer, Hersh, Meredith, Mummolo, and Nall (2018). Hajnal et al. (2017) use data from the 2006-2014 CCES and find that voter ID laws disproportionately impact minority voters, which Grimmer et al. (2018) believe are ill-suited for estimating the effects of state election laws due to samples being unrepresentative of state voting populations and too small to be insufficiently powered. Though Hajnal et al. (2018) shows that both sets of authors find similar declines in minority turnout, studies that validate self-reported turnout from surveys find inaccuracies in individual and aggregate voter turnout due to overreporting and differential response rates across types of voters (Ansolabehere, Fraga, & Schaffner, 2022; Enamorado & Imai, 2019; Hur & Achen, 2013; Jackman & Spahn, 2019; Lahtinen, Martikainen, Mattila, Wass, & Rapeli, 2019), which limits their reliability for causal inference. A related data limitation for Cantoni and Pons (2021) and a study of voter ID laws in Kansas and Tennessee done by the Government Accountability Office (2014) is an inability to identify which voters are likely to lack a valid voter ID, so that estimates measure overall impacts across all voters in a state. It is possible that voter ID laws have significant deterrent effects on specific subpopulations while also having no detectable average effect

Another possible explanation for the mixed empirical results on voter ID laws is that the laws provide sufficient motivation for voters that dislike voting restrictions to overcome the increase in the cost of voting. Valentino and Neuner (2017) argue that voting restrictions bring about a strong emotional response among Democrats, counterbalancing the disenfranchisement effect, and find support for their hypothesis in an online survey. Biggers and Hanmer (2017), Endres and Panagopoulos (2018), and Valentino and Neuner (2017) offer mixed experimental results on whether or not the perception that voter ID laws will disenfranchise Black voters leads to a change in voter behavior.

The existing literature suggests that voter ID laws should discourage registration and voting among individuals who lack a valid photo ID by raising the cost of voting, but that this effect can be mitigated by information sharing and counter-mobilization. This may create a situation where the negative effect is too small to notice in aggregated data, or may be heavily concentrated in areas where information sharing and counter-mobilization efforts are scarce. Expending more resources on educating the public about voter ID laws may also shift resources away from more productive “get out the vote efforts” and could lead to less turnout among non-impacted voters (Biggers, 2019).

4 Empirical Framework

To estimate the effect of the photo ID law I estimate the following difference-in-difference model:

$$Y_{it} = \beta \cdot HighNDMV_i \cdot Post_t + X_i \cdot \delta_t + \gamma_{ct} + \lambda_i + \epsilon_{it} \quad (1)$$

where Y_{it} is either the logged number of votes/registered voters in voting precinct i or the number of votes/registered voters in a voting precinct divided by the 2010 population, $HighNDMV_i$ is an indicator for whether the number of registered voters in a precinct who lack a DMV record is above the median, X_i is a vector of precinct demographic controls, δ_t

is an election year fixed effect, γ_{ct} is a county-by-year fixed effect, and λ_i is a precinct fixed effect. Robust standard errors are clustered at the precinct level.

The coefficient of interest is β , which estimates the change in turnout/registration after HB1337 goes into effect between voting precincts with a relatively large proportion of voters who lack a DMV record and voting precincts with a relatively small proportion. Notably, this specification provides a relative comparison between groups of voters in different halves of the distribution as opposed to a continuous measure. A non-continuous measure is used to avoid concerns around difference-in-difference models using continuous treatment, which require stronger assumptions about parallel trends and can fail if observations with a high-dose of treatment are too dissimilar to observations with a low-dose of treatment (Callaway et al., 2021).¹⁰ Given the high degree of correlation between having a driver's license with income and race (Esposito et al., 2019), this assumption is likely violated in this setting. Specifications using different cutoffs aside from the median are included in the appendix and discussed in the results section.

The difference-in-difference model includes voting precinct fixed effects and county by year fixed effects. These control for any time-invariant shocks at the precinct level, as well as time-varying shocks within an individual county. While these fixed effects control for a wide-range of possible confounders, such as changes in election administration at the county level or differences in the number of eligible voters within a precinct, they are likely insufficient to control for all non-voter ID related variation in a dataset that covers multiple different election types. To model how turnout may have changed over time if not for the impact of the voter ID law on voters who lacked valid identification, I control for the racial and age distribution of the precinct, as well as the percent of the voting group that is urban, interacted with an election year fixed effect. This will control for any variation in turnout

¹⁰Specifically, Callaway et al. (2021) requires that the average change in outcomes over time for all units, if they had received a high dose, be the same as the average change in outcomes over time for the units that did experience a high dose. This would require that precincts with low shares of voters who lacked a DMV record would have had the same average response to the voter ID law as precincts with high shares, *if* they had had more voters who lacked a DMV record.

and registration rates that are correlated with differential turnout rates in different election types, as well as any changes in the probability of different types of voters participating over time as the state and national environments evolve.

While the range of controls and fixed effects used should account for changes in turnout and registration rates that are not associated with HB 1337, differential turnout over election types remains a concern. Virginia is one of five states that hold off-year gubernatorial elections, and one of four that hold off-year state legislative elections. This electoral setup allows for the comparison of state and federal elections in Virginia separately, avoiding concerns about the impact of the presidential race which often drives voter turnout (King & Hale, 2016), but also means that each election year in the sample is not a fair comparison for every other year. To ensure that differences across election types do not drive my results, I also run my main model on pairs of elections that are of the same type: state legislature elections in 2011 and 2015, presidential elections in 2012 and 2016, and gubernatorial elections in 2013 and 2017.¹¹

5 Data

To measure the impact of the voter ID law, I relate changes in registration rates and turnout between elections before and after Virginia's strict photo ID law was implemented in 2014. To assess the number of potential voters impacted by the law, Virginia's Department of Elections cross-referenced the state's voter rolls with state DMV records to identify voters likely to lack a photo ID to satisfy HB 1337. The total provides an upper-bound on the number of individuals who were registered to vote but lacked an acceptable photo identification document in 2014, as it is possible for voters to lack a driver's license but possess a different form of valid phot ID, such as a passport.

While voting, registration, and the number of impacted voters can all be measured at the

¹¹Due to redistricting between 2010 and 2011, voting precincts also change substantially and thus 2010 is not included in my sample.

Table 1: Summary Statistics

Variable	Below Median		Above Median		Difference t-stat
	Mean	S.D.	Mean	S.D.	
Share No DMV	0.022	0.006	0.054	0.035	-76.217
Share White	0.801	0.172	0.633	0.245	48.263
Share Black	0.127	0.144	0.224	0.240	-29.457
Share Hispanic	0.033	0.046	0.067	0.079	-31.844
Share Asian	0.024	0.050	0.057	0.074	-32.001
Share Under 30	0.160	0.046	0.220	0.113	-42.112
Share Over 65	0.192	0.072	0.171	0.084	16.328
Share Urban	0.443	0.450	0.751	0.410	-43.360
Dem Share in 2008	0.448	0.100	0.553	0.121	-57.475
<i>N</i>	7371		7364		14735

Data on race, age, and share urban are based on 2010 U.S. Census data. “Share No DMV” is the share of registered voters who lacked a DMV record according to the Commonwealth of Virginia in 2014. “Dem Share in 2008” is measured at the county level and comes from Virginia’s Department of Elections.

precinct level within a single year, election precincts are not constant over time and therefore are not valid units of observation for this study. To ensure that a voter that does not move between 2011 and 2017 is counted within the same observation in each election, I gathered information on precinct changes from each of Virginia’s 133 counties and independent cities for each year of the study. I then collapsed voting, registration, and demographic data to groups of precincts that separate or merge across elections. This provides me with stable units of observation across the length of my sample.

Table 1 contains summary statistics for the demographic data I gathered from the 2010 decennial census, measured at the precinct level. I used geographic information system software to link census blocks to voting precincts, and then collapsed the census data to the sets of voting precincts that are stable across time.¹² I use the racial distribution, age distribution, and share of houses that are urban within a census block, interacted with an election year fixed effect, as controls in my preferred specification. For results that use share

¹²Approximately 1% of census blocks do not lay completely within one voting precinct. In these instances, I use the percentage of the census block within a voting precinct to approximate the percentage of people in the census block who live in the precinct.

of population that voted/are registered to vote, I divided the number of votes/registered voters by the over 18 population of the voting group.¹³ Table 1 also lists the vote share for Barack Obama in 2008, measured at the county level, listed as “Dem Share in 2008.”¹⁴

Table 1 shows that there are significant differences across precincts with low- and high-shares of voters who lacked a DMV record prior to 2014, with the fourth column showing the t-stats for a series of individual t-tests comparing the means across precincts. This matches results from previous studies that Black, Hispanic, and young voters are more likely to be impacted by a voter ID law. The results also reinforce the value of my empirical strategy: using demographic share-by-year controls will ensure that the changes in turnout and registration I measure are not being driven by macro changes in voting behavior across demographic groups over time that happen to coincide with the voter ID law. The use of the median as a cutoff for treatment, as opposed to using a continuous measure, ensures that I don’t need to satisfy the stronger parallel trends assumptions, identified by Callaway et al. (2021), necessary for accurate identification.

6 Results

I begin with results on turnout and registration between voting precincts where the proportion of registered voters in a precinct who lacked a DMV record is above the median to those below the median. I show that precincts with more voters who lacked a DMV record, and therefore may have lacked valid ID to vote under HB 1337, experience a relative decline in turnout and registration in elections held after 2013. I then demonstrate that the differential effect between precincts is mitigated in counties with more Democratic support in 2008 and counties with higher shares of urban residents.

¹³Combining registration data and census data occasionally leads to weird results where a precinct has more registered voters than people over 18. To avoid introducing potential bias into my estimates, I keep all precincts in my sample for my main results. All analysis is replicated in a sample that drops precincts that contain more registered voters in 2010 than individuals over the age of 18, and those results are available upon request.

¹⁴As “Dem Share” is measured at the county level, I do not use it as a control in my regressions as it would be washed out by the county by year fixed effect I deploy in my preferred model.

Table 2: Change in Turnout and Registration

	Log(Votes)			Turnout as Share of Population		
	(1)	(2)	(3)	(4)	(5)	(6)
Above Median	-0.0112 (0.0071)	-0.0330*** (0.0071)	-0.0302*** (0.0078)	-0.0105*** (0.0021)	-0.0123*** (0.0027)	-0.0063** (0.0024)
Unit FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	No	Yes	No	No
County X Year FE	No	Yes	Yes	No	Yes	Yes
Demographic Controls	No	No	Yes	No	No	Yes
Observations	14,729	14,638	14,638	14,735	14,644	14,644
Adjusted R ²	0.968	0.970	0.983	0.895	0.942	0.952

	Log(Registration)			Registration as Share of Population		
	(1)	(2)	(3)	(4)	(5)	(6)
Above Median	-0.0207*** (0.0051)	-0.0181** (0.0059)	-0.0304*** (0.0061)	-0.0245*** (0.0039)	-0.0210*** (0.0049)	-0.0220*** (0.0045)
Unit FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	No	Yes	No	No
County X Year FE	No	Yes	Yes	No	Yes	Yes
Demographic Controls	No	No	Yes	No	No	Yes
Observations	14,735	14,644	14,644	14,735	14,644	14,644
Adjusted R ²	0.997	0.992	0.994	0.940	0.940	0.945

* $p < .1$, ** $p < .05$, *** $p < .01$

Robust standard errors are clustered at the precinct level; observations weighted by population of the precinct. Demographic controls include the racial distribution, age distribution, and percent urban within a precinct and are interacted with an election year fixed effect. Differences in observations across columns are caused by cities/counties where precinct lines were redrawn and the smallest stable precinct constitutes the entire city/county, and are thus dropped with the inclusion of “County X Year FE.”

6.1 Main Results

Table 2 shows results for voting and voter registration in elections between 2011 and 2017. Panels A and B show results for changes in turnout and registration, respectively, while columns 1-3 and columns 4-6 show results where the dependent variable is the logged value of votes/registered voters and the number of votes/registered voters divided by the precinct population, respectively. Columns 1 and 4 use precinct and year fixed effects, columns 2 and 5 use precinct and county by year fixed effects, and columns 3 and 6 add demographic by year controls to the precinct and county by year fixed effects.

My preferred specification, column 3, uses the most expansive set of controls and finds that precincts with an above median share of voters without a DMV record experience a decline in turnout of 3.02 log points, or $\approx 3.07\%$, and a decline in registration of 3.02 log

Table 3: Change in Turnout and Registration by Election

	Log(Votes)			Log(Registration)		
	2011 vs 2015 (1)	2012 vs 2016 (2)	2013 vs 2017 (3)	2011 vs 2015 (4)	2012 vs 2016 (5)	2013 vs 2017 (6)
Above Median	-0.0496** (0.0170)	-0.0281*** (0.0080)	-0.0255*** (0.0073)	-0.0415*** (0.0098)	-0.0307*** (0.0061)	-0.0276*** (0.0057)
Unit FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	No	No	No	No
County X Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,172	4,184	4,184	4,184	4,184	4,184
Adjusted R ²	0.961	0.991	0.991	0.986	0.992	0.993

* $p < .1$, ** $p < .05$, *** $p < .01$

Robust standard errors are clustered at the precinct level; observations weighted by population of the precinct. Demographic controls include the racial distribution, age distribution, and percent urban within a precinct and are interacted with an election year fixed effect. Differences in observations across columns are caused by cities/counties where precinct lines were redrawn and the smallest stable precinct constitutes the entire city/county, and are thus dropped with the inclusion of “County X Year FE.”

points, or $\approx 3.09\%$, compared to precincts with a below median share. Results from columns 4-6, which divide the raw number of votes/registered voters by the 2010 precinct population, show a comparable decline in registration and smaller, but still significant, decline in turnout. Appendix table 1 replicates the same results by comparing the top third and top quartile of precincts to the remainder of the sample, and finds comparably large declines in both turnout and registration.

The results in table 1 differ significantly from the previous study of Virginia’s voter ID law by Hopkins et al. (2017). Hopkins et al. (2017) study only the 2013 and 2014 elections, the last election before HB 1337 went into effect and first election after, and use a different set of demographic controls using proprietary data from the election data company Catalist. To ensure my results are not driven by differences in controls, I replicate my results using the set of controls used by Hopkins et al. (2017) in appendix table 2. Results using the same set of controls are similar to those in column 3 of table 1, showing a decline in turnout of 2.38 log points, or $\approx 2.4\%$, and in registration of 2.02 log points, or $\approx 2.04\%$.

To assuage any further concerns about differential turnout rates across election types, table 3 estimates equation (1) using only elections of the same type: state legislative elections in 2011 and 2015, presidential elections in 2012 and 2016, and gubernatorial elections in 2013 and 2017. Table 2 shows that the largest effect on turnout and registration occurred in 2015,

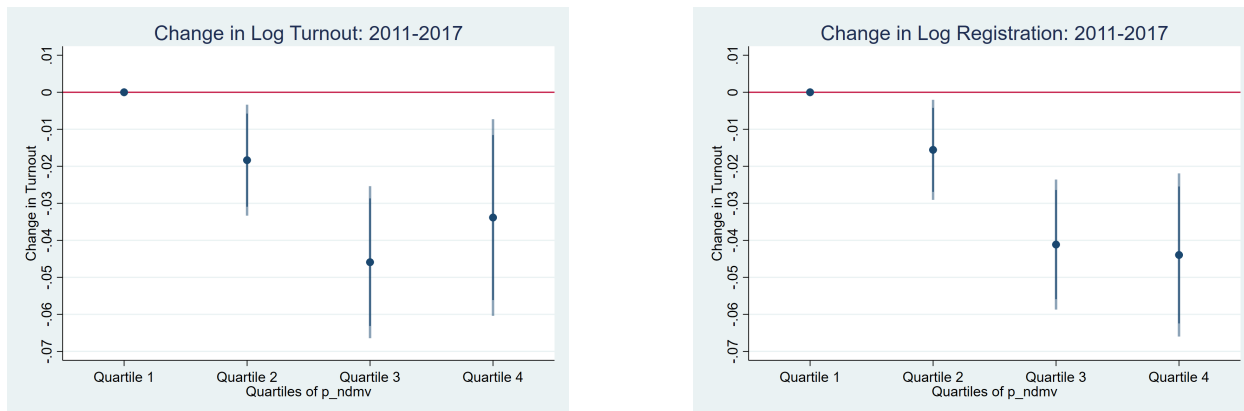


Figure 1: Change in Turnout and Registration by Quartile

with a diminishing effect in later elections when voters have had more time to obtain a voter ID. Appendix table 3 shows results for the same regression with votes/registered voters as a share of the precinct population as the dependent variable, with smaller but still statistically significant effects. Appendix table 4 shows results for table 2 without demographic controls, and finds similar negative effects in all election pairs except for 2013 and 2017, where the coefficient is insignificant and close to zero.

Tables 1 and 2 show significant declines in turnout and registration in voting precincts that have a larger share of individuals who lacked a DMV record. To test for additional heterogeneity across precincts, figure 1 shows the results of a quantile regression where precincts are split into quartiles of the share of voters who lacked a DMV record. There is a significant decline in higher quartiles of the independent variable compared to the first quartile, and a small attenuation in the top quartile of the distribution. This small attenuation may be suggestive of shifting resources across the state to areas with the most voters impacted by the voter ID law in an attempt to counteract the impact of HB 1337. I further test for a potential counter-mobilization effect by comparing my results across different county types.

6.2 Differences by County Type and Potential for Counter-Mobilization

In a world with limited resources, politicians and activists will target precincts where their efforts are the most effective (Arias, Balán, Larreguy, Marshall, & Querubín, 2019) and may

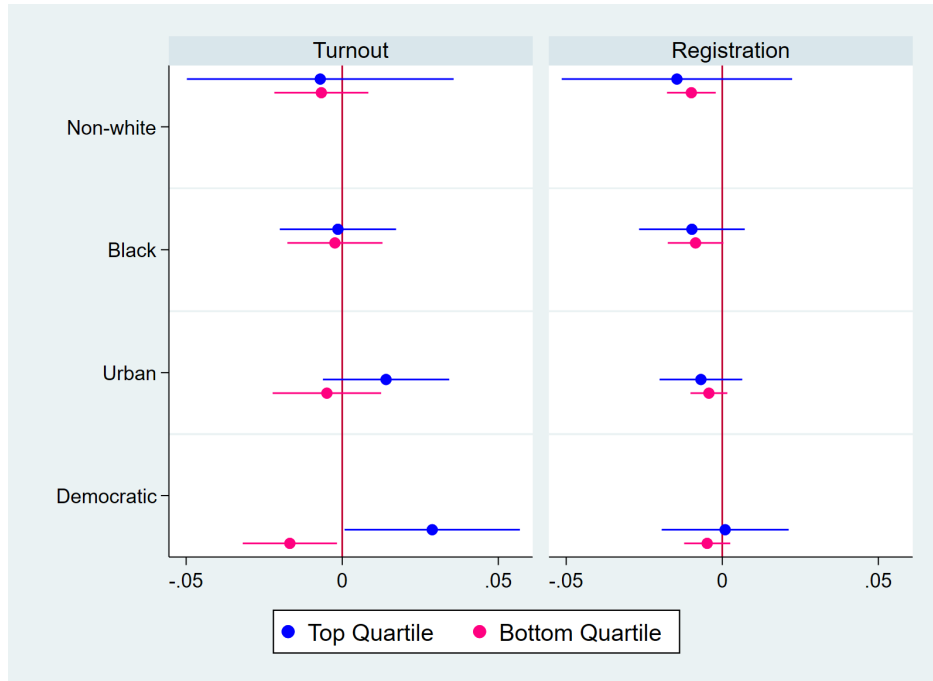


Figure 2: Differences by County Type

have shifted resources towards areas with the most voters impacted by the voter ID law in an attempt to counteract the impact of HB 1337. Voters who did have the required types of identification may have also been more likely to be swayed by messaging about the disenfranchisement effect of HB 1337 (Endres & Panagopoulos, 2018) if they are part of social networks with more voters impacted by the law and view voting as a moral or civic obligation (Arzheimer, Lewis-Beck, & Evans, 2016).

Figure 2 presents a series of tests for heterogeneous effects across types of counties, comparing the differential effect between precincts above and below the median share of voters who lack a DMV record in counties in either the top or bottom quartile of share non-white, share Black, share urban, or share that voted Democratic in the 2008 presidential election.¹⁵ Non-white voters are more likely to be impacted by voter ID laws (Ansolabehere & Hersh, 2017; Barreto et al., 2019, 2009) and may have been the focus of political activists who wished to mitigate the impact of HB1337. Information targeting within these counties

¹⁵The median value for lacking a DMV record is re-calculated for each regression based on the set of counties included.

may have been more effective if it successfully leveraged informal networks of voters with the same socio-economic status and similar cultural habits (Zuckerman, 2005). Black, Hispanic, and Asian voters may have also been more motivated by the threat of disenfranchisement (Biggers, 2019) and possible declines in collective group benefits (Uhlener, 1989). White voters are also more likely to be members of political networks with non-white voters as the share of the non-white population increases, which may increase the salience of the potential disenfranchising impact for white voters in counties with larger Black and non-white populations (Leighley & Matsubayashi, 2009). Despite these potential avenues for a differential effect between predominantly white and non-white counties, there is not an observable difference across counties by share non-white or share Black.

The bottom regressions within figure 2 shows that the relationship between the share of voters who lack a DMV record and change in turnout/registration flipped within high urban counties and counties with high levels of Democratic support. Democratic politicians have widely opposed voter ID laws, and every Democratic member of the Virginia state legislature voted against the passage of HB 1337. It is likely that voters who typically support the Democratic party would be more motivated to work against the disenfranchising effect of new voting laws and that Democratic political activists would be more likely to target voters within Democratic leaning counties and precincts.¹⁶

While the differential effect across precincts is mitigated in more urban counties and counties with higher Democratic support, these counties still felt the impact of HB 1337. Table 4 shows regression results for the change in turnout, collapsed to the county level, for elections before and after the implementation of HB 1337, in counties in the top quartile of share non-white, share Black, share urban, or share that voted Democratic in the 2008 election, compared to all other counties in Virginia. These counties did not experience a relative increase in turnout in elections after the vote ID law went into effect, suggesting that efforts to mitigate the impact of the law may have come at the cost of mobilizing other

¹⁶This result is robust to being run with above/below median being measured for the universe of precincts, as opposed to only the counties included in the regression, and are available upon request.

Table 4: Turnout by County

	Log(Turnout)			
	High share non-white (1)	High share Black (2)	High share urban (3)	High share Democratic (4)
Top Quartile Non-white	-0.0006 (0.0280)			
Top Quartile Black		-0.0275 (0.0331)		
Top Quartile Urban			0.0081 (0.0345)	
Top Quartile 2008 Democratic				0.0015 (0.0346)
Unit FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Demographic Controls	No	No	No	No
Observations	931	931	931	931
Adjusted R ²	0.985	0.985	0.985	0.985

* $p < .1$, ** $p < .05$, *** $p < .01$

Robust standard errors are clustered at the precinct level; observations weighted by population of the county.

voters. The success in informing and turning out voters who lacked a DMV record would then be washed out by the impact of spending less time contacting other voters (Arceneaux & Nickerson, 2009).

7 Conclusion

This paper examines the impact of Virginia’s 2013 voter ID law on turnout and registration across groups of voters more or less likely to be impacted by the law change. My estimates suggest that the move from a strict nonphoto ID law, where voters could satisfy the ID requirements with documents such as a utility bill or government check, to a strict photo ID law, where voters need to have an official government photo ID, led to a significant decrease in turnout and registration rates in precincts where more voters were likely to lack a valid photo ID. My results suggest that the primary driver of decreased turnout was a decrease in the total number of registered voters, as opposed to a decrease in turnout among registered voters. I then test for possible counter-mobilization against the law in different county types, and find that the differential effect on turnout across precincts is eliminated in

counties with higher support for Barack Obama in 2008 and higher shares of urban residents. These results suggest that the Democratic Party and civil rights organizations may have successfully targeted Democratic and urban counties for counter-mobilization, leading to a smaller aggregate effect on turnout. That these counties did not see a relative increase in turnout in aggregate suggests that counter-mobilization is costly and required shifting resources from targeting and registering other voters.

These results imply important nuances to the study of contemporary voting laws. While voter roll data is often considered the gold standard of voting analysis, successful counter-mobilization efforts may lead these analyses to underestimate the deterrent effect of new voting laws. Working to help previously registered voters navigate new laws will require tradeoffs and may shift resources away from registering new voters, an effect that is missed when examining turnout conditional on registration. Both approaches should be utilized to gain a full picture of contemporary voting laws and their impact.

That precincts with a larger number of voters likely to be impacted by HB1337 in Democratic leaning counties saw a relative increase in turnout, compared to precincts with a smaller number of likely impacted voters, also suggests import spillover effects from counter-mobilization. While we must also be careful in light of the ecological fallacy to not overstate my results, I do propose that using an ecological approach has value for estimating the impact of contemporary voting changes. Not only does an ecological approach allow for a better understanding of the impact of new laws on citizens who lack a voting record, it may also better identify the impacts of voting laws and counter-mobilization efforts that are inherently spatial. Both the removal of voting precincts and restriction of voting hours in the aftermath of *Shelby County v. Holder* (Komisarchik & White, 2021) and the increase in door-to-door canvassing efforts (Anderson, 2018) are likely to target specific neighborhoods as opposed to individuals. I therefore view this paper as providing further evidence on the deterrent effect of voter ID laws and showing the value of an ecological approach to studying voting laws.

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