ELECTION LAW JOURNAL
Volume 16, Number 3, 2017

DOI: 10.1089/elj.2016.0390

Articles

The Effect of Mandatory Mail Ballot Elections in California

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ABSTRACT

Proponents argue that universal vote-by-mail (VBM) reforms increase voter turnout and decrease compositional disparities in the electorate, but studies have found negative effects of VBM on turnout in California. We exploit a natural experiment in which small precincts in California may be assigned to conduct elections solely by mail. Using the largest California VBM dataset to date, we find that turnout among registered voters in VBM precincts is discernibly lower than traditional precincts in general elections, though we are unable to detect an effect in primary elections. The negative effect is generally consistent across ethnic groups, but we find a positive effect for young voters. We argue that differences in the implementation of VBM in California may have led to effects unlike those in Oregon and Washington. We conclude with a call for states to increase investment in voter outreach when pursuing VBM policies.

Keywords: vote-by-mail, voter turnout, election reform

VOTE-BY-MAIL, TURNOUT, AND COMPOSITIONAL DISPARITIES

Oregon, Washington, and Colorado have eliminated the in-person polling place and now conduct elections entirely by mail. Reformers have pointed to cost savings and increased voter turnout in these states as justification for the adoption of all-mail elections across the country. California may be the next state to move to universal vote-by-mail (VBM). The California Voter's Choice Act, signed into law in 2016, authorizes counties to conduct all-mail elections beginning in 2018.[1] The law comes on the heels of legislation passed in 2014 that established a pilot VBM program in two counties.[2] Preliminary reports from the state's 2015 election suggest the pilot led to a significant increase in turnout, particularly among minorities and young people—groups that have traditionally turned out at lower rates than white and older voters (Kinney 2015). The apparent success of VBM in the country's most populous and ethnically diverse state seems to provide further evidence of its ability to remedy both voter apathy and political inequality. As a recent *Washington Monthly* cover story put it: "Vote from Home, Save Your Country" (Kiesling 2016).

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[1]The law permits counties to automatically send mail ballots to all registered voters 28 days before Election Day, so long as they provide voters with multiple ballot-return options, including consolidated in-person vote centers and drop boxes. Fourteen counties have been authorized to opt in to the new system in 2018; all other counties may join beginning in 2020.

[2]California Assembly Bill 2028 directs Yolo and San Mateo counties to hold all-mail elections through 2017, with the exception of the 2016 general election, for the purposes of studying the effects of vote-by-mail (VBM) on turnout. While the counties automatically provided mail ballots to all registered voters, they also offered limited opportunities to cast ballots in person at centralized voting locations.

Political scientists, however, are more ambivalent. Estimates of the effect of VBM on voter turnout differ widely across geography, time, election type, and research design, in both direction and magnitude. There is evidence that VBM has led to higher turnout in Oregon and Washington (Southwell and Burchett 2000; Richey 2008; Southwell 2009; Gerber, Huber, and Hill 2013), but studies of VBM in California counties suggest the effect is negative (Kousser and Mullin 2007; Bergman and Yates 2011). Conclusions regarding VBM's effect on the composition of the electorate are similarly mixed. While several studies find that VBM boosts turnout by encouraging minorities and other groups with historically low turnout rates (Gerber, Huber, and Hill 2013; Herron and Smith 2014), others argue that VBM magnifies compositional disparities by primarily increasing participation in high-turnout groups (Karp and Banducci 2000; Berinsky, Burns, and Traugott 2001; Berinsky 2005; Bergman and Yates 2011). The range in estimates reflects not only the diversity of samples and inferential strategies employed by researchers but also the difficulty of measuring the impact of convenience voting reforms like VBM. Because the decision to use VBM is almost always voluntary at either the individual or county level, researchers must work to overcome selection bias.[3]

In this article, we evaluate the effect of VBM on aggregate and subgroup turnout in California with a matching strategy. We exploit a feature of the California Elections Code allowing county officials to declare precincts with 250 or fewer registrants VBM-only (Kousser and Mullin 2007; Meredith and Malhotra 2011; Bergman and Yates 2011; Arceneaux, Kousser, and Mullin 2012). Voters in these precincts are automatically sent a postage-paid mail ballot for statewide elections and do not have the option of voting in person. This unique electoral institution establishes conditions approximating a natural experiment in which voter turnout in "treated" (VBM-only) precincts may be compared to similar "control" (traditional) precincts.

We execute the most comprehensive study of VBM in California to date by bringing to bear considerably more, and more recent, data than any other study of the state. Where previous work primarily relies on a handful of large counties over one or two elections, we analyze much larger samples, covering nearly the entire state, over five election cycles: the 2004, 2008, and 2012 general elections, and the 2004 and 2012 primary elections. The comparison of many treatment and control observations alleviates concerns of confounding by over-time differences on unobserved covariates, such as electoral context, and also enables us to look into the potentially heterogeneous effect of VBM on turnout across different racial and age groups, a matter that has not been addressed in previous studies of California.

We present three main findings. First, we show that VBM suppresses turnout among registered voters in California by roughly one percentage point in general elections. We are unable to detect an aggregate effect for primary elections. Second, we find similar negative effects across racial subgroups. Third, we find that the effect of VBM on turnout is positive for young registered voters (ages 18 to 24) in both general and primary elections.

Although research on VBM in Oregon and Washington provides evidence of positive effects on turnout, we affirm earlier work on California that finds a negative effect of VBM on aggregate turnout. What could explain these differences? In Oregon and Washington, election administrators appear to have invested critical resources in the statewide implementation of VBM. In California, however, the policy of allowing small individual precincts to adopt universal VBM is less likely to be accompanied by large investments in assisting voters with the transition from in-person voting to VBM. The disparity between the results in these states suggests that the effect of VBM on turnout may therefore be mediated by the quality of get-out-the-vote (GOTV) efforts and electoral administration. Consistent with this explanation, we find some evidence that the negative effect of VBM in California may be driven in part by mail voters delivering their ballots past the ballot-receipt deadline, rendering otherwise valid votes uncountable. Overall, this study suggests that policymakers in California and elsewhere should take caution before instituting universal VBM reforms with the aim of improving voter

[3]This may be especially problematic given that voters who elect to use VBM are often demographically distinct. In California, for instance, where a majority of votes are cast by mail, voters over the age of 55 are the only subgroup to use VBM at a rate exceeding 50% (California Civic Engagement Project 2014). Latino Californians, moreover, are greatly underrepresented among VBM users, while Asians, despite turning out at lower rates relative to white and black voters, use VBM at higher rates than other racial groups in California.

Table 1. Estimates of Effect of Vote-by-Mail on Turnout

	Method	*State*	*Estimate*
Magleby (1987)	TSCS	CA	19
Karp and Banducci (2000)	TS	OR	1.8
Southwell and Burchett (2000)	TS	OR	10.2
Gronke, Galanes-Rosenbaum, and Miller (2007)	TSCS	Multiple	4.7
Krouser and Mullin (2007)	Matching	CA	–2.7
Richey (2008)	TSCS	OR	10
Southwell (2009)	TS	OR	3.9
Bergman and Yates (2011)	TSCS	CA	–13.2
Larocca and Klemanski (2011)	CS	Multiple	11.5
Gerber, Huber, and Hill (2013)	Diff-in-diff	WA	6.9
Menger, Stein, and Vonnahme (2015)	CS	CO	1.8

This table is an extension of Table 1 from Gerber, Huber, and Hill (2013).
CS, cross-sectional; TS, time series; TSCS, time-series cross-sectional.

turnout and reducing compositional disparities, especially if such programs are carried out in the absence of accompanying voter education and awareness campaigns.

THEORIES OF CONVENIENCE VOTING

VBM has been utilized by policymakers as a means to encourage political participation since at least the 1970s. Rooted in the logic of rational choice models of voting that posit that citizens will only turn out to vote when the expected benefits of doing so outweigh the costs (Downs 1957; Riker and Ordeshook 1968), VBM and other convenience voting reforms should reduce the cost of voting. VBM allows voters who do not have the time or the economic means to physically attend a polling place on Election Day the convenience of voting from home at the time of their choosing. The receipt of a mail ballot itself may also serve as a reminder to vote for those who otherwise are not inclined to pay attention to the election calendar.

However, other theories suggest that reforms like VBM may depress turnout by decreasing the social pressure to vote. By shifting the act of voting away from the polling place, VBM removes "social accountability" from the decision to vote (Gerber, Green, and Larimer 2008; Arceneaux, Kousser, and Mullin 2012). The inability to publicly signal one's civic virtue to one's neighbors may decrease individuals' propensity to vote because the decision to vote is greatly affected by the voting norms of one's social network (Wolfinger and Rosenstone 1980; Highton and Wolfinger 2001; Fowler 2005; Rolfe 2012). Moreover, VBM may make it more expensive for political campaigns to mobilize voters. Since VBM allows voters to cast ballots weeks before Election Day, GOTV strategies may be too costly to implement over extended periods (Fitzgerald 2005; Burden et al. 2014). Scholars interested in the effect of VBM face conflicting theoretical expectations.

Empirical results from previous research are also at odds. Researchers have focused their attention on three states in which mandatory VBM systems have proliferated: Oregon, which has conducted its elections entirely by mail since 1998 and partially before that; Washington, which moved to universal VBM in 2011; and California, which allows small precincts to conduct their elections entirely by mail (Alvarez, Beckett, and Stewart 2013).[4] As Table 1 shows, these studies have yielded a surprising lack of consensus on the effect of VBM on turnout. We thus approach the question of VBM's effect on turnout with an agnostic prior.

In addition to studies of VBM's effect on overall turnout, a smaller body of literature has examined whether convenience reforms reduce compositional disparities in turnout between traditionally high turnout groups (e.g., white and elderly voters) and traditionally low turnout groups (e.g., racial minorities, young people, the poor). VBM and convenience voting reforms are expected to have their greatest effect on low turnout groups because such voters are most sensitive to the cost of voting. By this logic, increased use of VBM should lead to a more demographically representative electorate (Berinsky 2005; Rigby and Springer 2010).

[4]Colorado moved to all-mail elections in 2014, though this new data source has not yet been exploited by researchers.

There is again little consensus among researchers. While Gerber, Huber, and Hill (2013) find that universal VBM increased turnout foremost among the "rarely participating registrants" in Washington, others find that VBM has no effect on, or may even exacerbate, compositional disparities in the electorate (Karp and Banducci 2000; Berinsky, Burns, and Traugott 2001; Berinsky 2005). In their study of California, for instance, Bergman and Yates (2011) estimate that mandating VBM decreases Latinos' odds of voting by 20 percent, and by 24 percent for Asians. According to Berinsky (2005), if VBM and other convenience voting reforms increase turnout overall, they do so by retaining voters that are already engaged in the political process—and thus are the most likely to already be rich in political and economic resources—rather than by stimulating unengaged and resource-poor citizens.

IDENTIFICATION STRATEGY AND DATA

Exploiting California's Elections Code

Our identification strategy relies on California Elections Code Section 3005, which stipulates that county election officials may declare precincts with 250 or fewer registered voters a VBM-only precinct (Kousser and Mullin 2007; Meredith and Malhotra 2011; Bergman and Yates 2011; Arceneaux, Kousser, and Mullin 2012).[5] Unlike absentee voters, registered voters in VBM-only precincts are automatically mailed a ballot—whether they request one or not—and a postage-paid return envelope.[6] These voters do not have the option of voting in person. We define the treatment as a precinct having VBM-only status, such that treated precincts conduct their elections entirely by mail. Control precincts are defined as those that conduct their elections through a combination of in-person polling place voting and absentee mail-ballot voting, where the choice between voting in person and absentee lies with the individual registrant.

Section 3005 provides for an advantageous inferential strategy as it presumably allows for exogenous treatment assignment.[7] Because voters who request absentee ballots are more expected to turn out to vote in general, comparing turnout rates among absentee voters and polling-place voters likely overestimates the effect of VBM. A design in which (treated) VBM-only precincts are compared to similar traditional (control) precincts, however, overcomes this selection problem and reduces bias in estimation of treatment effects.[8]

Data

We construct precinct-level data for the 2004, 2008, and 2012 general elections and the 2004 and 2012 primary elections, resulting in nearly 46,000 precinct observations covering over 25 million cast votes.[9] Figure 1 displays all counties included in each election year's sample.

We obtained voter registration, turnout, and demographic data at the county, precinct, and census

[5]Section 3005 states: "Whenever, on the 88th day before the election, there are 250 or less persons registered to vote in any precinct, the elections official may furnish each voter with a vote by mail ballot along with a statement that there will be no polling place for the election. The elections official shall also notify each voter of the location of the two nearest polling places in the event the voter chooses to return the ballot on election day. The voter shall not be required to file an application for the vote by mail ballot and the ballot shall be sent as soon as the ballots are available. No precinct shall be divided in order to conform to this section" (California Elections Code).

[6]As Meredith and Malhotra (2011) describe in detail, the application of Section 3005 is more complicated than the law suggests. Differences in the ways county election officials determine the number of registrants in a precinct, for example, can lead to incongruities between reported registrant counts and counts used by officials to determine VBM-only status. Moreover, precincts with more than 250 registrants may be declared VBM-only for security reasons, or for a lack of suitable polling places. We observe this "noncompliance" in our data: roughly two percent of the sample consists of noncomplying precincts, the vast majority of which are precincts that had more than 250 registrants but were designated as VBM-only.

[7]The 250-registrant cut point established by Section 3005 would appear to offer a ripe opportunity for a regression discontinuity design (RDD). However, in addition to the noncompliance problem described above, a McCrary test shows a discontinuity in the density of precincts around the 250-registrant cutoff, where there are more precincts just below the threshold than just above. This discontinuity could exist for innocuous reasons, but it leaves open the possibility that precinct officers are able to voluntarily assign their precincts to VBM status. The exclusion restriction is violated if (voluntary) assignment is correlated with an unobserved variable that affects voter turnout. Nevertheless, we check the results of a fuzzy RDD design using the 250-registrant cutoff as an instrument in a two-stage least-squares regression. The results are highly consistent with our matching and regression analyses.

[8]Within our sample, the number of registrants in a precinct was not strongly correlated with voter turnout in either VBM-only precincts (coefficient p-value = 0.70) or traditional precincts (coefficient p-value = 0.26).

[9]We drop precincts with fewer than five registered voters and precincts with implausible turnout rates (> 100%) from our analysis. We also drop counties that could not verify the treatment status of their precincts, as well as counties that had either all treated precincts or no treated precincts. *See* Appendix A for more details.

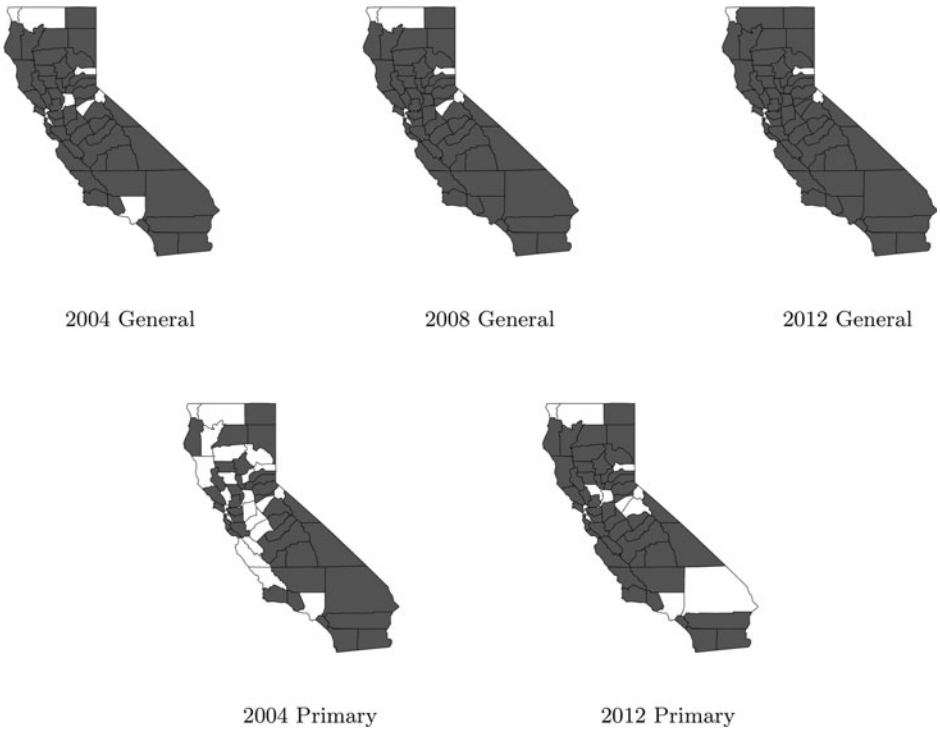

FIG. 1. Counties included in sample.

block levels from the Statewide Database at the University of California (UC), Berkeley. For 2008 and 2012, this data was supplemented by block-level citizen voting age population (CVAP) estimates from the 2006–2010 five-year American Community Survey (ACS), which was used to measure the ethno-racial composition of precincts. We constructed the precinct-level CVAP estimates by aggregating block-level data into the 2008 General Election precinct boundaries provided by the Statewide Database. Because the ACS provides CVAP estimates over a rolling five-year period, our CVAP numbers for 2008 and 2012 do not necessarily represent the exact number of voting age citizens in a given precinct, but rather the average over that period. For 2004, we are only able to construct VAP estimates, without knowledge of citizenship, using demographic data from the 2000 Census. Precinct treatment status was identified through county Statements of Votes or through records supplied by county election officials.

EMPIRICAL STRATEGY

We use genetic matching to match VBM precincts to traditional precincts on a series of demographic and political characteristics, including age, racial composition, and party registration.[10] This approach generates pairs of treated and control precincts that are most similar to each other, allowing us to compare turnout in precincts that observably differ only in their treatment status.[11] To ensure treated precincts are matched with control precincts from the same county, we enforce exact matching on this variable. Control precincts that did not match any treated precincts were dropped; in the event of ties, multiple control observations were averaged.

Throughout the analysis, we pool election years and analyze primary and general elections separately. Models are constructed using the full sample of precincts as well as subsets of the data near the 250-registrant cutpoint. To estimate the effect of VBM on turnout within subgroups, we also construct models using turnout among Asians, Latinos, 18- to 24-year-old registrants, and registrants over

[10]We follow the standard practice of matching with replacement (Sekhon 2011).

[11]The iterative method of genetic matching is usually able to achieve superior balance on covariates across treatment and control—and thus reduce bias conditional on these covariates—than other methods, such as nearest-neighbor matching (Sekhon 2011).

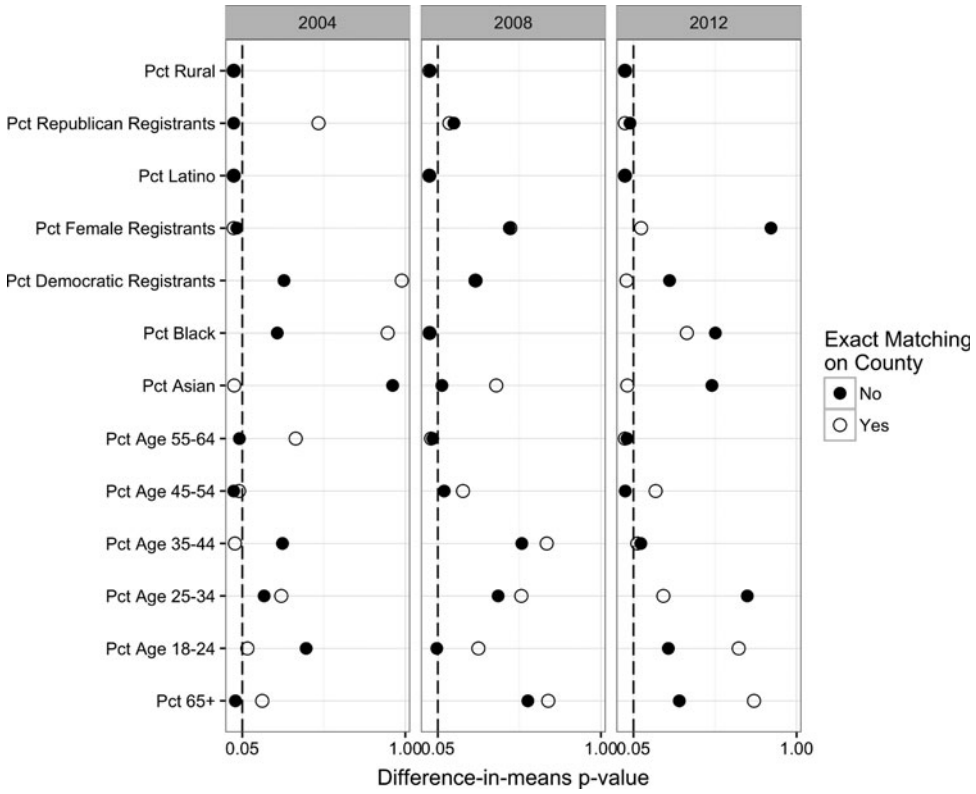

FIG. 2. General election covariate balance after matching.

the age of 65 as dependent variables. We calculate the average treatment effect on the treated (ATT), which estimates the effect of VBM-only status on treated precincts, for each set of matched data:

$$ATT = \frac{1}{N_1} \sum_{(i|T=1)} E(Y_{i1}\text{-}Y_{i0} \mid X_i)$$
$$= \frac{1}{N_1} \sum_{(i|T=1)} (\mu_1(X_i)\text{-}\mu_0(X_i))$$

Figure 2 reports covariate balance for a matching model using the full sample of precincts for general elections, and Figure 3 reports balance for primary elections. Because we exact-match observations by election cycle (to avoid confounders related to electoral context), we report corresponding covariate balance within each election cycle. Overall, we find that our matching approach is successful in improving balance between matched treatment and control units. We observe statistically insignificant differences between treated and control precincts for most covariates.

We are, however, unable to achieve good balance on several covariates, including percent of the VAP in each precinct that is black and the percent that is Latino, as well as the percent of each precinct designated by the census as rural. VBM precincts are more rural and have larger proportions of Latinos and smaller proportions of blacks. Due to a lack of support in the data, balance on these covariates can only come at the cost of significantly reduced balance on other covariates.

Latino and rural Americans vote at lower rates than non-Latinos and urban and suburban Americans, so their greater concentration in VBM precincts heightens concern of downward bias in the matching results. The mean values of these covariates are very similar across matched precincts, however (see Tables A6 and A7 in the Appendix). The most difficult covariate to balance in our sample, percent Latino, never has a difference in means that exceeds 1.4 percentage points. Other covariates for which we observe statistically significant differences between matched pairs have absolute differences in means smaller than 0.3 percentage points. These relatively small *substantive* differences bolster our confidence in our matching approach and suggest that statistically significant differences observed may reflect the statistical precision afforded

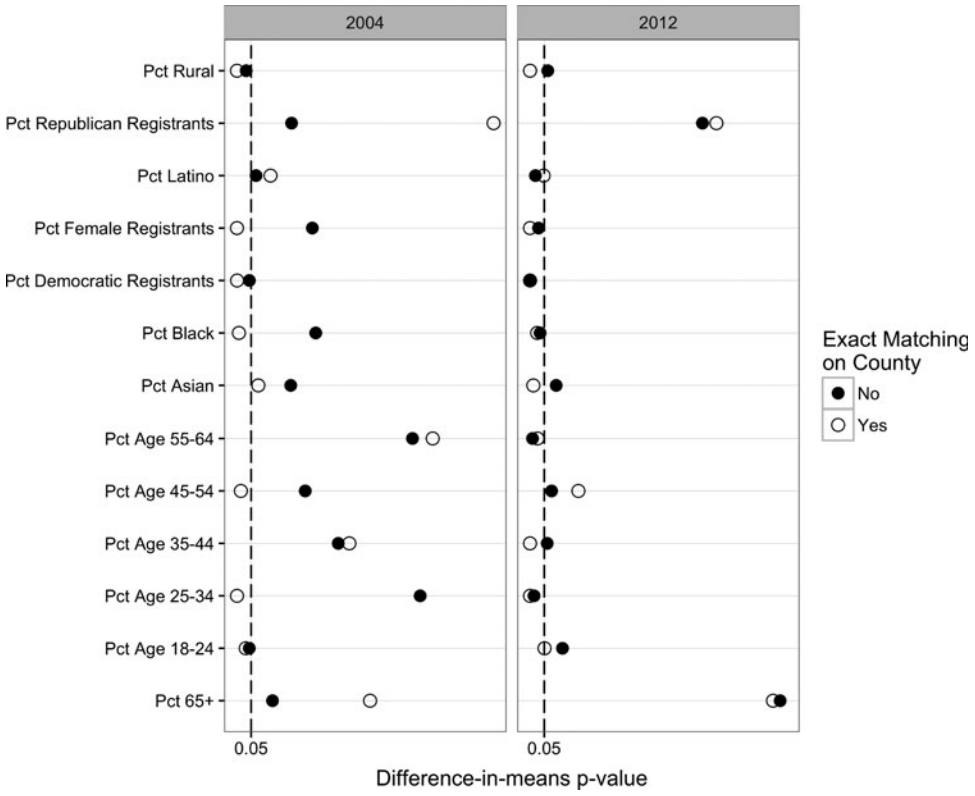

FIG. 3. Primary election covariate balance after matching.

by our large sample size rather than substantive imbalance (Hartman and Hidalgo 2011). For comparison, we include in the Appendix an analogous balance plot using data from Kousser and Mullin's (2007) matching study of VBM in California for the 2000 general election. In contrast to the balance we achieve, all but two covariates in the Kousser and Mullin matching model significantly differ across treatment and control groups at the $p < 0.05$ level. Again, because our data includes many more observations, we are more likely than this study to find statistically significant differences in covariates across treatment and control for the same absolute difference-in-means. We therefore argue that our matching models are the least vulnerable to bias of any existing model of the effect of VBM on turnout in California.

As a robustness check, we supplement our matching approach with regression analyses. In contrast to matching, these parametric models can utilize all the data in our sample and estimate the effect of VBM while holding constant all covariates, including the variables in which small imbalances persist after matching. Similar to the matching models, we control for a vector of demographic and political covariates and pool election years for primary and general elections. We also include county and year fixed effects and weight models by the total VAP in each precinct.

RESULTS

Matching analysis

Figure 4 summarizes our matching results. We find that the effect of VBM on overall turnout is negative in general elections and statistically indistinguishable from zero in primary elections. We report the ATT estimates in Table 2.

The subgroup results are more varied. For Latinos and Asians, the effect of VBM on turnout mirrors the aggregate patterns in the general election. Latinos experience the same drop in turnout as the full population, as do Asians, though their smaller numbers result in a nearly identical point estimate with a confidence interval that nevertheless slightly overlaps with zero.

In primaries, Latinos and Asians experience similar drops in turnout, but again the confidence

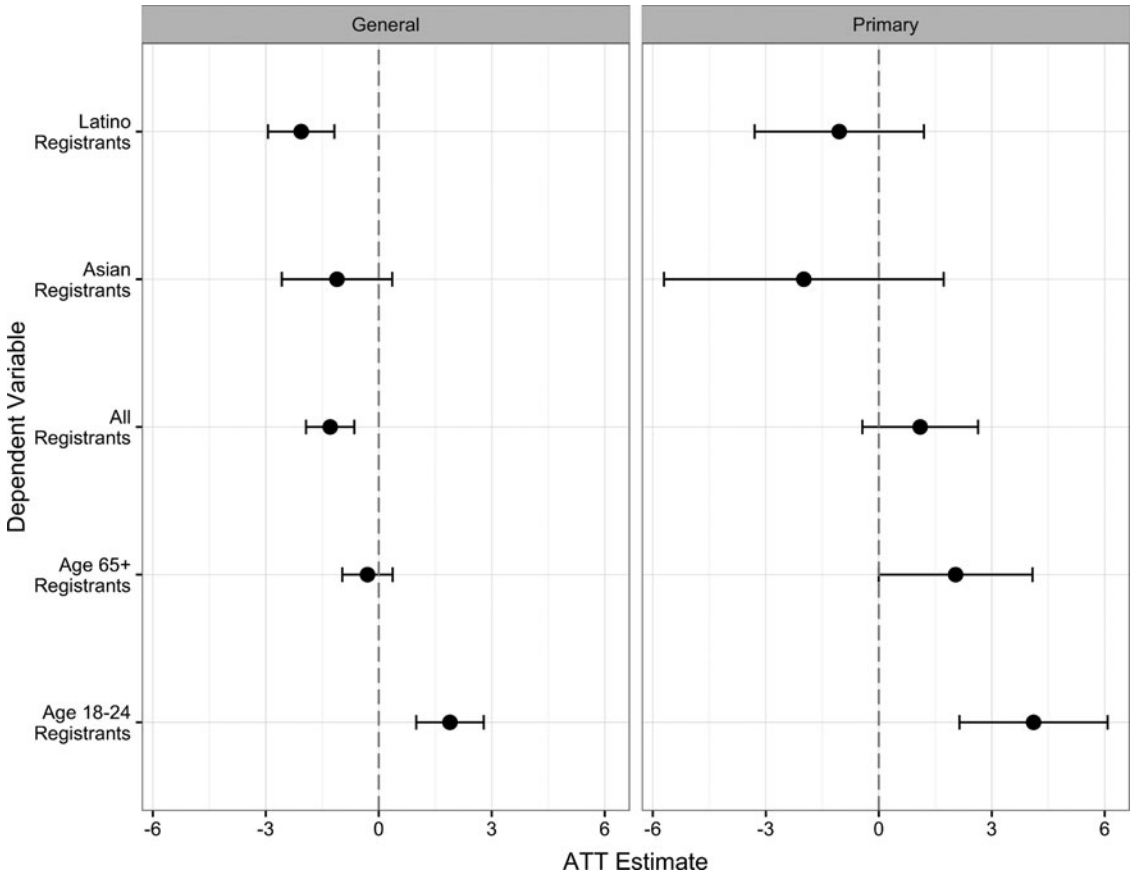

FIG. 4. Estimated average treatment effects on the treated (ATTs) in general and primary elections.

intervals on these estimates slightly overlaps with zero due to the smaller number of observations in our primary data. There is a statistically insignificant, slightly positive effect for all registered voters. While these primary election estimates are not significantly different from each other, it is somewhat suggestive that the effect size for Latinos and Asians is more negative than that of the full population. In fact, we observe a statistically significant difference when combining Latinos and Asians and comparing

Table 2. Average Treatment Effect on the Treated Point Estimates from Matching Analysis

	Election			
	General		*Primary*	
	(1)	*(2)*	*(3)*	*(4)*
Total registrants	−1.29*	−1.07*	1.10	1.09
	(0.33)	(0.30)	(0.78)	(0.71)
Latino registrants	−2.06*	−1.48*	−1.05	−0.37
	(0.45)	(0.38)	(1.15)	(0.92)
Asian registrants	−1.11	−0.30	−1.99	−0.43
Non-Asian/Latino registrants	(0.75) −1.46*	(0.61) −1.02*	(1.89) 2.44*	(1.45) 3.43*
Age 18–24 registrants	(0.33) 1.89*	(0.39) 2.26*	(0.97) 4.11*	(0.89) 3.48*
	(0.46)	(0.45)	(1.00)	(0.90)
Age 65+ registrants	−0.30	1.41*	2.04*	1.76
	(0.34)	(0.36)	(1.04)	(0.94)
Exact matching on county	*Yes*	*No*	*Yes*	*No*

Estimates are from paired *t*-tests. Standard errors in parentheses.
*$p < 0.05$.

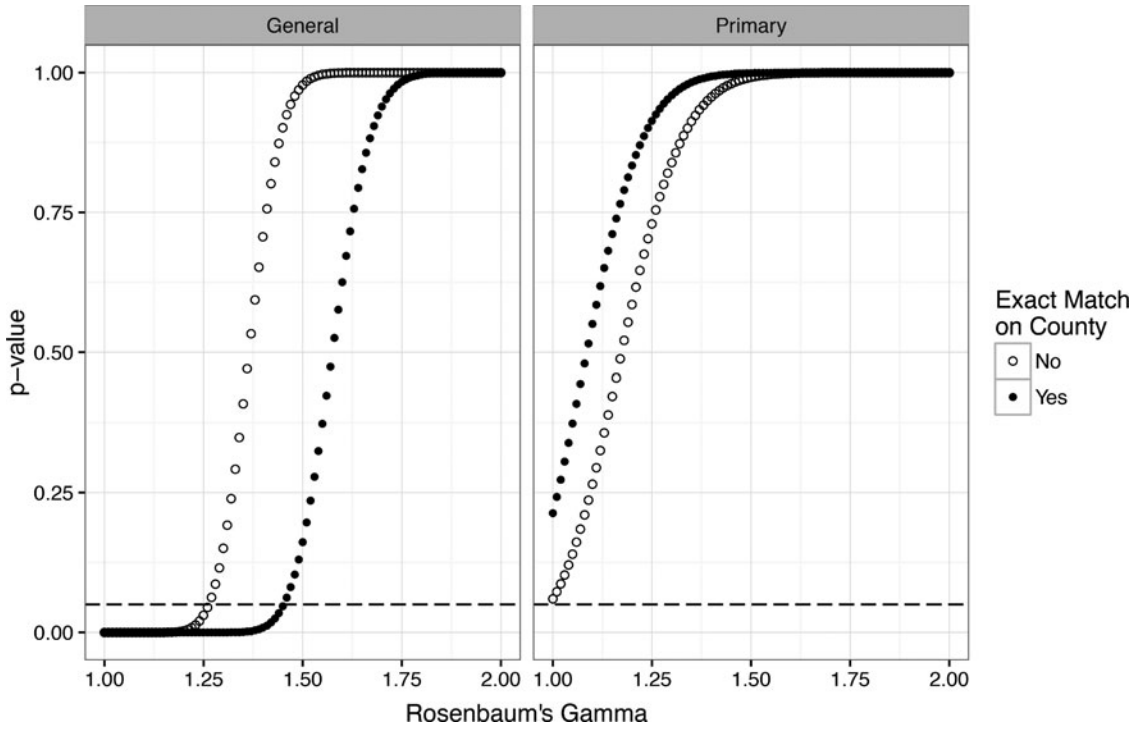

FIG. 5. Sensitivity analysis of matching results.

them to the residual subpopulations (whites, blacks, and other). VBM increases non-Latino/Asian turnout by 2.5 percentage points, while VBM decreases Latino/Asian turnout by 1.5 points. There is therefore some evidence that, at least in the case of primary elections, VBM may disadvantage Latinos and Asians relative to other ethnic groups.

Lastly, our matching analysis provides evidence of positive effects of VBM on turnout among young voters. General election turnout among 18- to 24-year-old registrants in VBM-only precincts is about two percentage points higher than in traditional precincts. In primary elections, the result is twice as large. By comparison, the effect of VBM on turnout among registrants over the age of 65 is smaller and statistically insignificant. While the effect on older voters is null in the general election, it is marginally significant and positive in primary elections. The results suggest VBM may be especially effective in turning out young and, possibly, older voters during primary elections.

The matching results are robust to subsetting around the 250-registrant cutpoint and disaggregating the data by election year. The results are also similar when eliminating the restriction on matching exactly on county and when excluding noncompliers. In addition, we execute a placebo test in which we use the same matching strategy to test for differences in turnout between non-VBM precincts above and below the 250-registrant threshold, regardless of actual VBM assignment. The results are provided in Appendix D. The placebo test shows no significant differences between large (above 250 registrants) and small (below 250 registrants) precincts, with the largest difference-in-means being 1.1 percentage points for primary elections.

In Figure 5, we also provide the results of a sensitivity analysis (Rosenbaum 2002). Estimating ATTs via matching relies on the assumption that there are no unmeasured confounders that may account for the differences in turnout we observe between treatment and control precincts. To assess the plausibility of this assumption, we allow our matched observations to differ in their likelihood of being assigned to treatment (VBM-only status) by a factor of Γ. The plots display how the maximum p-value for our results changes upon the introduction of an unobserved covariate that is correlated with treatment assignment. Results are considered relatively insensitive to a potential unobserved confounder if the p-value remains under 0.05 as Γ increases; Keele (2010) recommends a Γ threshold of 1.5 for social science data. We find that our p-values cross the 0.05 threshold at Γ values of

about 1.5 (when exact-matching on county) in general elections, suggesting that our matching estimates are relatively insensitive to hidden bias for this subset of the data. For primary elections, *p*-values cross at Γ values of about 1.25. This suggests that the matching results for our primary election data are less robust to unobserved differences between VBM and non-VBM precincts.

As a robustness check, we supplement our matching analysis with ordinary least squares (OLS) regression using a variety of model specifications. The OLS estimates are consistent with the matching estimates. The main models, which include demographic controls and county fixed effects, corroborate the negative finding for all registrants, Asian registrants, and Latino registrants. Appendix C provides the full regression estimates.

Election administration and selection bias

Although we argue our research design is considerably less vulnerable to bias than previous studies of VBM in California, there is still the potential for selection bias if election officials are able to designate VBM precincts based on unobserved factors that are negatively correlated with turnout. For example, officials may systematically under- or over-count the number of registrants in precincts in order to ensure that precincts with lower administrative capacity are designated VBM. Such low-capacity precincts may mail information and ballots to residents in less timely and effective ways that lead to lower turnout.

In turn, we analyze the effect of VBM within each individual county, provided that the county has enough usable observations. We find some evidence of heterogeneous treatment effects. While the average general election effect is a one percentage point decrease in turnout, and most counties are within several points of this estimate, some counties have much larger negative effects (as much as a 13-point decrease), while others, particularly rural counties, have large positive effects (as much as a 30-point increase). The counties with the most negative effects tend to be counties containing at least one large urban center, but we find no other significant relationships between effect sizes and county characteristics such as geographic size or location, demographics, or the percentage of adults registered to vote.

To investigate whether differences between counties were due to differences in administration, we contacted the clerk or recorder from each county in our sample. Clerks' responses indicate that there is very little variation across counties in the administration of VBM. There appears to be consistency in terms of when ballots are sent out and when constituents are reminded to vote, thereby assuaging concerns about selection bias.

However, we do find evidence of differences in the receipt of late ballots across counties. In counties in which the effect of VBM was positive, very few ballots were received past the ballot deadline, but in counties with negative effects, a large number were received after. For example, in Riverside County, which had a negative VBM effect, over six percent of the nearly 350,000 returned mail ballots were late, while in Inyo county, which had a positive effect, only a small number of ballots were reportedly returned late. Riverside's clerk estimated that while roughly half of those uncounted ballots were merely undeliverable ballots returned by the U.S. Postal Service (USPS), the rest were genuine votes that were received too late. If mail balloting leads individuals that otherwise intend to vote to forget to do so on Election Day, this could explain some portion of the negative effect we find. A back-of-the-envelope calculation suggests that if delayed ballots constitute three percent of all mail ballots received, and mail ballots constitute 60 percent of all votes, then this phenomenon alone could have an effect of a one to two percentage-point decline in votes.

DISCUSSION AND CONCLUSION

We utilize data from primary and general elections in California between 2004 and 2012—data covering more voters than any study of VBM to date—to estimate the effect of VBM on voter turnout in the full electorate, as well as for ethnic and age subgroups. We find a small negative effect of VBM on aggregate turnout in general elections. The negative findings are consistent with previous studies of VBM in California (Kousser and Mullin 2007; Meredith and Malhotra 2011; Bergman and Yates 2011; Michelson et al. 2012), bolstering claims that state legislators should be wary of drawing lessons from Oregon and Washington's experience with universal VBM.

At the same time, we find that VBM *improves* turnout among young registered voters. Turnout

among young registrants increases in both primary and general elections, suggesting that these voters may be less "disrupted" by compulsory VBM. Michelson et al. (2012), for example, find that mailing postage-paid envelopes to permanent absentee voters in California had the effect of decreasing the likelihood that these individuals voted by mail—particularly voters who had the most experience using VBM—because the receipt of the postage-paid envelope served as a disruption to their standard voting routine. Since young voters have yet to establish such a routine, they may be more likely to take advantage of reforms like VBM. We also find evidence of a positive effect for older registrants in primary elections. This finding is consistent with conventional wisdom that predicts elderly turnout would be stimulated by VBM due to mobility concerns. The effect may show up more clearly for primary elections if the types of mobility assistance provided to elderly citizens in general elections are not provided or funded at similar levels in the primaries.

The results of our analysis for primary elections should be taken with caution, however, given potential sensitivity to unobserved confounders in our matching strategy as indicated by the Rosenbaum test. That said, they suggest that the effect of VBM may be mediated by election type. While we find some evidence that VBM is especially effective at turning out young and elderly voters in these less salient election contexts, we also find that VBM may exacerbate compositional disparities in primary electorates by depressing Latino and Asian turnout relative to other ethnic subgroups. Differences between general and primary election VBM effects suggest that the results of the ongoing all-VBM pilot in Yolo and San Mateo counties, which specifically excluded the 2016 general election, should be taken with a grain of salt; any positive turnout effects they find in these smaller elections may not extend to the general. The heterogeneity of VBM effects on general and primary electorates across ethnic groups should be investigated in future research.

We also find preliminary evidence that the negative effect of VBM on turnout may partially result from voters turning in otherwise legitimate ballots past the official cutoff point. This underscores the need for more robust investments in voter education about VBM policies. Unlike Oregon and Washington, where VBM has been deployed statewide and necessitated meaningful investments in voter education, California's VBM program is relatively obscure given its deployment in small precincts. It is possible that California can mitigate or eliminate the negative effect we find simply by making similar investments in voter outreach upon moving to an all-VBM system. On the other hand, it suggests that maintaining a VBM program that covers only a fraction of the state and is poorly understood or known by the affected voters is an inefficient half-measure between voluntary absentee balloting and full VBM implementation. The California Voter's Choice Act, which gives counties the option to implement all-mail elections or retain their current system, may thus fail to boost turnout in line with policymakers' objectives. Voter resistance to VBM may also hinder California's effort. A recent study of polling-place voters in California found that many African Americans are skeptical of mail voting due to a lack of confidence that their mail ballots will be counted and a desire to enjoy the visibility and social benefits that accompany in-person voting (California Civic Engagement Project 2016). Efforts to implement universal VBM should thus be mindful of voters' concerns about mail balloting.

Our findings offer caution to California legislators and advocates of universal VBM. Despite the apparent success of VBM in Oregon and Washington, VBM alone may not be a remedy for low turnout or unequal political participation in California. In fact, our findings suggest that VBM may further suppress turnout overall and skew turnout toward specific subgroups at the expense of others. Legislative efforts to institute universal VBM throughout the state should be conscious of this negative association between VBM and turnout and plan accordingly.

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(*Appendix follows* →)

APPENDIX

A. Counties excluded from sample

TABLE A1. 2004 GENERAL

County	*Reason for exclusion*
Alpine	All precincts in county treated
Calaveras	No precincts in county treated
Colusa	No precincts in county treated
Del Norte	No precincts in county treated
Los Angeles	Unable to identify treated precincts
Sacramento	Unable to identify treated precincts
Sierra	All precincts in county treated
Siskiyou	Unable to identify treated precincts

TABLE A2. 2004 PRIMARY

County	*Reason for exclusion*
Alpine	Unable to identify treated precincts
Calaveras	No precincts in county treated
Colusa	Unable to identify treated precincts
Del Norte	No precincts in county treated
Los Angeles	Unable to identify treated precincts
Mendocino	Unable to identify treated precincts
Merced	Unable to identify treated precincts
Monterey	Unable to identify treated precincts
Napa	Unable to identify treated precincts
Plumas	Unable to identify treated precincts
Sacramento	Unable to identify treated precincts
San Benito	Unable to identify treated precincts
San Joaquin	Unable to identify treated precincts
San Luis Obispo	Unable to identify treated precincts
Sierra	All precincts in county treated
Siskiyou	Unable to identify treated precincts
Stanislaus	Unable to identify treated precincts
Tehama	Unable to identify treated precincts
Trinity	Unable to identify treated precincts
Yuba	Unable to identify treated precincts

TABLE A3. 2008 GENERAL

County	*Reason for exclusion*
Alpine	All precincts in county treated
Calaveras	No precincts in county treated
Del Norte	No precincts in county treated
Sierra	All precincts in county treated
Siskiyou	Unable to identify treated precincts

TABLE A4. 2012 GENERAL

County	*Reason for exclusion*
Alpine	All precincts in county treated
Del Norte	No precincts in county treated
Sierra	All precincts in county treated

TABLE A5. 2012 PRIMARY

County	*Reason for exclusion*
Alpine	All precincts in county treated
Del Norte	No precincts in county treated
San Bernardino	Unable to identify treated precincts
Sierra	All precincts in county treated
Tuolumne	Unable to identify treated precincts
Yolo	Unable to identify treated precincts

B. Matching: Covariate balance

Table A6. After-Matching Treatment and Control Means (General Elections)

	2004		*2008*		*2012*	
	Treatment mean	*Control mean*	*Treatment mean*	*Control mean*	*Treatment mean*	*Control mean*
Exact matching on county						
Pct Democrat registrants	0.36728	0.36735	0.4073	0.39291	0.37404	0.37975
Pct Republican registrants	0.4233	0.42149	0.39800	0.38253	0.36548	0.35581
Pct female registrants	0.49681	0.5042	0.52495	0.51490	0.50303	0.50611
Pct black	0.022507	0.022406	0.042752	0.040496	0.031778	0.030967
Pct Asian	0.044311	0.048297	0.07568	0.076504	0.067664	0.072491
Pct Latino	0.16629	0.15332	0.24234	0.22946	0.21956	0.20698
Pct age 18–24	0.10628	0.10406	0.093329	0.094662	0.097918	0.09833
Pct age 25–34	0.12464	0.12655	0.14023	0.14107	0.13949	0.1382
Pct age 35–44	0.17054	0.17369	0.15325	0.15515	0.12795	0.13053
Pct age 45–54	0.21564	0.21206	0.2065	0.20505	0.18369	0.18475
Pct age 55–64	0.17148	0.17023	0.1967	0.18461	0.20958	0.20208
Pct 65+	0.19092	0.19413	0.2218 4	0.22106	0.23627	0.23679
Pct rural	0.52488	0.47799	0.45861	0.45189	0.44765	0.38359
Without exact matching on county						
Pct Democrat registrants	0.36728	0.36936	0.39436	0.39826	0.36878	0.37144
Pct Republican registrants	0.4233	0.41786	0.39800	0.38497	0.37447	0.36761
Pct female registrants	0.49686	0.4999	0.50525	0.50697	0.50171	0.50154
Pct black	0.022507	0.021923	0.036177	0.033587	0.031778	0.031286
Pct Asian	0.044311	0.044388	0.073547	0.071962	0.062337	0.063268
Pct Latino	0.16629	0.16021	0.24234	0.23783	0.22515	0.21385
Pct age 18–24	0.10588	0.10475	0.11446	0.10951	0.098289	0.097127
Pct age 25–34	0.12464	0.12648	0.14383	0.14151	0.14011	0.14046
Pct age 35–44	0.17054	0.16841	0.15325	0.15551	0.12738	0.12847
Pct age 45–54	0.21600	0.20871	0.21730	0.20661	0.1839	0.18712
Pct age 55–64	0.17195	0.16866	0.19787	0.19596	0.20779	0.20517
Pct 65+	0.19090	0.19445	0.21202	0.2078	0.23811	0.23936
Pct rural	0.52488	0.50946	0.45861	0.45662	0.44821	0.43664

Table A7. After-Matching Treatment and Control Means (Primary Elections)

	2004		*2012*	
	Treatment mean	*Control mean*	*Treatment mean*	*Control mean*
Exact matching on county				
Pct Democrat registrants	0.401018	0.41966	0.40101	0.43539
Pct Republican registrants	0.39334	0.39289	0.39334	0.38971
Pct female registrants	0.51127	0.52509	0.51127	0.5458
Pct black	0.037382	0.043968	0.037382	0.04674
Pct Asian	0.085894	0.095449	0.085894	0.10098
Pct Latino	0.19495	0.18663	0.19495	0.18094
Pct age 18–24	0.10760	0.11551	0.1076	0.11593
Pct age 25–34	0.14617	0.15571	0.14617	0.17164
Pct age 35–44	0.18278	0.18472	0.18278	0.20104
Pct age 45–54	0.20662	0.21154	0.20662	0.2122
Pct age 55–64	0.16401	0.16487	0.16401	0.15577
Pct 65+	0.18374	0.18561	0.18374	0.18491
Pct rural	0.31964	0.29379	0.31964	0.06789
Without exact matching on county				
Pct Democrat registrants	0.4008	0.39573	0.38263	0.38432
Pct Republican registrants	0.39337	0.38892	0.42718	0.39997
Pct female registrants	0.51109	0.51260	0.54238	0.52816
Pct black	0.03702	0.03491	0.06499	0.04403
Pct Asian	0.08559	0.08161	0.10047	0.09800
Pct Latino	0.19406	0.18932	0.20837	0.20868
Pct age 18–24	0.10722	0.10492	0.10127	0.09420
Pct age 25–34	0.14578	0.14664	0.13814	0.14285
Pct age 35–44	0.18210	0.18328	0.17488	0.16740
Pct age 45–54	0.20632	0.20805	0.19195	0.19949
Pct age 55–64	0.16488	0.16430	0.18036	0.17191
Pct 65+	0.18459	0.18708	0.19849	0.20071
Pct rural	0.32439	0.31655	0.32643	0.31754

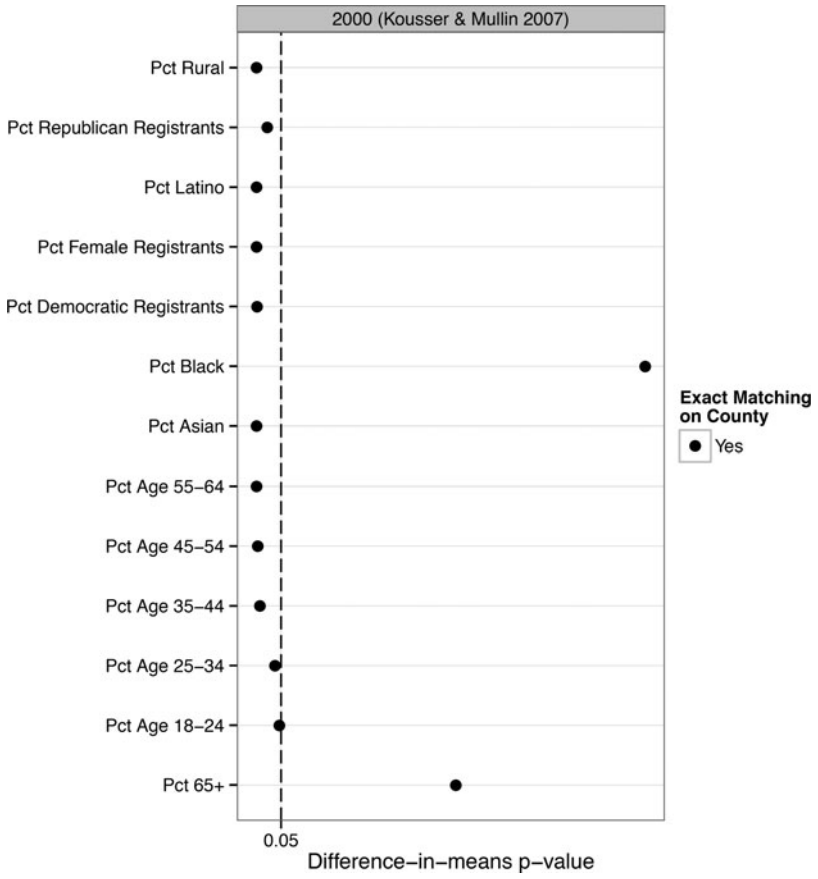

FIG. A1. Covariate balance after matching (Kousser and Mullin 2007).

C. Regression analysis

Table A8. Population-Weighted OLS: General Election Voter Turnout

	Registrant turnout			
	(1)	*(2)*	*(3)*	*(4)*
VBM	–0.050	–1.372***	0.063	–0.694**
	(0.473)	(0.356)	(0.380)	(0.319)
Democratic registrants		–20.435***		–10.112***
		(1.096)		(1.081)
Republican registrants		–29.702***		–4.049***
		(0.999)		(1.129)
Female registrants		11.451***		–5.764***
		(1.487)		(1.453)
% Asian (VAP)		–13.691***		–18.138***
		(0.418)		(0.392)
% Latino (VAP)		–21.801***		–20.648***
		(0.356)		(0.355)
% black (VAP)		–13.882**		–13.926***
		(0.622)		(0.588)
Age 25–34 (Reg)		–32.770***		–26.368***
		(1.220)		(1.136)
Age 35–44 (Reg)		49.529***		39.718***
		(1.477)		(1.331)
Age 45–54 (Reg)		5.580**		–3.711**
		(1.782)		(1.621)
Age 55–64 (Reg)		37.489***		36.386***
		(1.849)		(1.662)
Age 65+ (Reg)		10.262***		3.027***
		(0.968)		(0.910)
% Rural		0.575*		0.336
		(0.334)		(0.308)
Constant	72.099***	71.796***	68.375***	78.043***
	(0.071)	(0.216)	(0.235)	(0.272)
County FEs	*No*	*No*	*Yes*	*Yes*
Election FEs	*No*	*No*	*Yes*	*Yes*
Observations	32,410	32,410	32,410	32,410
R^2	0.000	0.465	0.391	0.593
Adjusted R^2	–0.00003	0.465	0.390	0.592
Residual std. error	467,041 (df = 3240 8)	341,693 (df = 32394)	364,774 (df = 32352)	298,342 (df = 32340)
F statistic	0.011 (df = l; 32408)	1,876.845*** (df = 15; 32394)	364.476*** (df = 57; 32352)	682.330*** (df = 69; 32340)

Coefficients are estimated with ordinary least squares (OLS), weighted by the number of members of the voting age public in the precinct. Standard errors in parentheses.
*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.
FEs, fixed effects; VAP, voting age population; VBM, vote-by-mail.

Table A9. Population-Weighted OLS: Primary Election Voter Turnout

	Registrant turnout			
	(1)	*(2)*	*(3)*	*(4)*
VBM	–0.055	1.386*	1.068	2.814***
	(1.114)	(0.755)	(0.841)	(0.601)
Democratic registrants		–7.386***		6.107***
		(2.100)		(1.968)
Republican registrants		–7.970***		6.169**
		(1.788)		(1.930)
Female registrants		–23.361***		–17.800***
		(2.907)		(2.441)
% Asian (VAP)		–18.309***		–18.417***
		(0.887)		(0.768)
% Latino (VAP)		–38.518***		–34.603**
		(0.929)		(0.838)
% Black (VAP)		–5.622***		–16.596***
		(1.366)		(1.193)
Age 25–34 (Reg)		–26.995***		–23.195***
		(2.213)		(1.871)
Age 35–44 (Reg)		3.196		11.510**
		(2.308)		(1.931)
Age 45–55 (Reg)		23.455***		25.421***
		(2.916)		(2.407)
Age 55–64 (Reg)		28.145***		43.631***
		(3.010)		(2.496)
Age 65+		29.787***		30.160**
		(1.615)		(1.384)
% Rural		1.212**		0.580
		(0.548)		(0.460)
Constant	36.285***	56.542***	43.455***	43.591***
	(0.131)	(1.641)	(0.334)	(1.678)
County FEs	*No*	*No*	*Yes*	*Yes*
Election FEs	*No*	*No*	*Yes*	*Yes*
Observations	12,420	12,420	12,420	12,420
R^2	0.000	0.571	0.449	0.736
Adjusted R^2	–0.0001	0.570	0.447	0.734
Residual std. error	507.068 (df = 12418)	332.362 (df = 12405)	377.119 (df = 12371)	261.383 (df = 1 2359)
F statistic	0.002	1,178.512***	209.990***	572.910***
	(df = l; 12418)	(df = 14; 12405)	(df = 48; 123 71)	(df = 60; 12359)

Coefficients are estimated with ordinary least squares (OLS), weighted by the number of members of the voting age public in the precinct. Standard errors in parentheses.
*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

Table A10. Population-Weighted OLS: General Election Voter Turnout (Subgroup Coefficients)

	Coefficient on VBM			
	(1)	*(2)*	*(3)*	*(4)*
Latino registrants	–1.475***	–1.183***	–1.476***	–1.539***
Asian registrants	0.903*	0.162	–0.314	–1.133**
Non-Asian/Latino registrants	–0.72188	–1.5888**	–0.4172***	–0.7174
Age 18–24 registrants	0.292	0.997***	1.442***	0.796**
Age 65+ registrants	4.444***	2.169***	0.944***	0.200
Demographic controls	*No*	*Yes*	*No*	*Yes*
County fixed effects	*No*	*No*	*Yes*	*Yes*

Coefficients are estimated with ordinary least squares (OLS), weighted by the number of members of the voting age public in the precinct.
*p < 0.05, **p < 0.01, ***p < 0.001.

TABLE A11. POPULATION-WEIGHTED OLS: PRIMARY ELECTION VOTER TURNOUT (SUBGROUP COEFFICIENTS)

	Coefficient on VBM			
	(1)	*(2)*	*(3)*	*(4)*
Latino registrants	–2.657***	1.370**	–1.441*	1.129*
Asian registrants	0.659	3.092***	1.243	3.210***
Non-Asian/Latino registrants	2.01	2.4089*	2.0928*	4.55485***
Age 18–24 registrants	2.031***	4.325***	3.369***	3.750***
Age 65+ registrants	–3.974***	–1.996***	–3.716***	–1.773**
Demographic controls	*No*	*Yes*	*No*	*Yes*
County fixed effects	*No*	*No*	*Yes*	*Yes*

Coefficients are estimated with ordinary least squares (OLS), weighted by the number of members of the voting age public in the precinct.
*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

D. Placebo test

TABLE A12. AVERAGE TREATMENT EFFECT ON THE TREATED POINT ESTIMATES FROM MATCHING ANALYSIS (PLACEBO)

	Election			
	General		*Primary*	
	(1)	*(2)*	*(3)*	*(4)*
Total registrants	–0.14	–1.05	1.10	0.55
	(1.36)	(1.68)	(0.97)	(1.03)
Exact matching on county	*Yes*	*No*	*Yes*	*No*

Estimates are from paired *t*-tests. Standard errors in parentheses.
*$p < 0.05$.