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Does Voting by Mail Increase Participation? Using Matching to Analyze a Natural Experiment

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Would holding elections by mail increase voter turnout? Many electoral reform advocates predict that mail ballot elections will boost participation, basing their prediction on the high turnout rate among absentee voters and on the rise in voter turnout after Oregon switched to voting by mail. However, selection problems inherent to studies of absentee voters and Oregon give us important reasons to doubt whether their results would extend to more general applications of voting by mail. In this paper, we isolate the effects of voting in mail ballot elections by taking advantage of a natural experiment in which voters are assigned in a nearly random process to cast their ballots by mail. We use matching methods to ensure that, in our analysis, the demographic characteristics of these voters mirror those of polling-place voters who take part in the same elections. Drawing on data from a large sample of California counties in two general elections, we find that voting by mail does not deliver on the promise of greater participation in general elections. In fact, voters who are assigned to vote by mail turn out at lower rates than those who are sent to a polling place. Analysis of a sample of local special elections, by contrast, indicates that voting by mail can increase turnout in these otherwise low-participation contests.

1 Introduction

Can holding mail ballot elections—which feature no polling places and ask everyone to vote by mail over a specified period—increase voter participation? Electoral reform advocates assert that it can (Rosenfield 1995; Bradbury 2005; Davis 2005). Residents of Oregon have voted by mail since 1995, and policymakers at all levels of government are considering proposals to introduce this fundamental shift in the administration of elections. Legislation to allow vote-by-mail elections was introduced during the past session in Congress (HR 1835) and in the California Legislature (AB 867 and AB 1309), whereas

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voters in Arizona recently rejected a ballot proposition that would have instituted voting by mail. Proposals for local adoption have appeared before the governing bodies of San Diego, California (Elections Task Force, City of San Diego 2006), and King County, Washington (Roberts 2006). A key rationale behind these policy efforts is the conventional wisdom that vote-by-mail elections will significantly boost turnout. This conventional wisdom stems from findings about the behavior of absentee voters and the experiences of Oregon, but there are important reasons to doubt whether these findings will extend to more general applications of voting by mail.

Studies of people who have chosen to vote absentee (Patterson and Caldeira 1985; Oliver 1996; Dubin and Kalsow 1996a, 1996b; Karp and Banducci 2001) cannot be used to predict the impact of a shift to mail ballot elections because these studies examine a subgroup of registered voters who are especially likely to turn out. Voluntary absentee voters tend to be older and better educated than other registrants (Barreto et al. 2006) and more politically active (Oliver 1996; Karp and Banducci 2001). Simply comparing their behavior to that of precinct voters may be misleading because the characteristics that lead them to vote by mail also make it more likely that they will turn out to vote, regardless of the voting process. A second stream of scholarship contrasts traditional elections with contests recently held in Oregon in which all voters are required to vote by mail (Southwell and Burchett 1997, 2000; Karp and Banducci 2000; Berinsky, Burns, and Traugott 2001; Hanmer and Traugott 2004). In these studies, those who vote by mail are similar to the comparison group that casts ballots in a polling place. Yet the problem with drawing general policy lessons from this research is that the studies do not hold electoral conditions constant. It is difficult to determine whether observed increases in turnout should be attributed to the shift to mail ballot elections or to the changes in political context and election administration that occurred at the same time.

An ideal research design would solve these problems by randomly assigning a group of registrants to vote by mail, whereas others just like them are allowed to go to polling places or to request absentee ballots, just as in most current elections. A natural experiment quite close to this takes place during every election in California, when county election officials assign registrants in less populous precincts to vote by mail. These mail ballot precincts, products of the intersections of California's many jurisdictional and voting district boundaries, contain voters whose demographic and partisan characteristics are quite similar to those of voters in adjoining polling-place precincts. Our study takes advantage of California's natural experiment to measure the impact of mandatory mail ballot elections on voter participation. Since this natural experiment does not perfectly mimic random assignment, we use matching methods to pair each mail ballot precinct with traditional precincts containing voters with similar demographic and political attributes. We compare voter participation between the two sets of precincts in several different elections, estimating the effect of voting by mail while holding political context and voter characteristics constant.

Based on findings from this natural experiment, we predict that shifting to mail ballot elections will not increase voter participation in statewide general elections, counter to the conventional wisdom that is often cited in the current policy debate. In fact, we estimate that it will produce a decline in turnout of up to 3 percentage points. This finding is statistically significant, consistent across two general elections, and robust to multiple estimation strategies. The effect of voting by mail appears to be contingent on the context of elections, however. Analysis of a smaller sample of precincts shows that mail balloting may heighten turnout in local special elections, which typically receive less attention than regularly scheduled general elections and feature lower turnout.

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This essay begins by discussing previous research about the effects of voting by mail on turnout and describing in greater detail the problems with using that research to predict the impact of shifting to mail ballot elections. We then introduce the California natural experiment and show how matching methods can ensure that we are comparing similar populations of registrants who vote using different methods. The first empirical section makes this comparison for the 2000 and 2002 general elections, providing estimates of the effect of voting by mail through both nonparametric and parametric techniques. Next, we look at the effects of voting by mail on participation in seven recent special elections held in three counties. We conclude by discussing possible mechanisms that produced these conflicting findings and exploring the lessons of our findings for the current policy debate over mail ballot elections.

2 What Prior Research Can (and Cannot) Tell Us about Mail Ballot Elections

A wealth of studies identify the factors that influence political participation, highlighting the importance of both individual characteristics and the political context and rules that govern elections. Personal attributes such as education, age, and residential stability (Wolfinger and Rosenstone 1980) as well as feelings of political efficacy (Abramson and Aldrich 1982) and civic skills (Verba, Schlozman, and Brady 1995) exert powerful influences on people's political activity. Studies of the overall political context find that voter turnout increases with partisan competition (Caldeira and Patterson 1982; Patterson and Caldeira 1983; Jackson 1993) and mobilization by candidates and parties (Cox and Munger 1989; Rosenstone and Hansen 1993). Recent field experiments reinforce the importance of mobilization and identify the most effective strategies (Gerber and Green 2000a, 2000b, 2001; Gerber, Green, and Shachar 2003; Green, Gerber, and Nickerson 2003; Green and Gerber 2004). Finally, participation levels can be affected by administrative rules and practices such as registration deadlines (Wolfinger and Rosenstone 1980; Powell 1986; Highton 1997), the availability of registration materials (Highton and Wolfinger 1998), the provision of sample ballots and polling-place location information (Wolfinger, Highton, and Mullin 2005), and polling-place consolidation (Brady and McNulty 2004). It is individual-level factors that matter the most in explaining turnout, however, so the key to evaluating the effects of an administrative innovation such as mail ballot elections lies in controlling for the individual characteristics of potential voters.

Comparing turnout between voters who request an absentee ballot and other registrants fails to hold these characteristics constant. Predicting the effects of mail-in voting by looking only at those voters who request absentee ballots is a bit like studying the effects of a medicine only upon healthy patients. Members of the treatment group differ systematically from the rest of the population. Compared to other registrants, those who choose to vote by absentee ballot are more likely to be Republicans (Patterson and Caldeira 1985), male, and politically conservative (Newton 1989), as well as older and better educated (Barreto et al. 2006). What is more, they are likely to be free from exactly the symptom that mail ballot elections are designed to cure: a low propensity to turn out. Oliver (1996) and Karp and Banducci (2001) find that registrants who choose to vote absentee are among the most likely to vote anyway. The same holds true for those who take advantage of opportunities to vote early (Stein 1998). Because of the systematic differences between polling-place voters and absentee and early voters, comparing their behavior is not a reliable way to predict the impact of mail ballot elections.

An alternative research strategy is to study elections that have been conducted entirely by mail. In California, state law permits vote-by-mail elections under some circumstances.

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Monterey County conducted the nation's first mail ballot election in 1977, and jurisdictions throughout the state have experimented with the system for local special elections. Examples of these elections include San Diego's 1981 convention center proposition, Burbank's 2001 Restore Our Airport Rights initiative (Dobuzinskis 2004), the 2003 Modesto mayoral race (Sbranti 2003), and a 2005 race for a seat on the Oakland city council (Wildermuth 2006). In Washington, 34 of the state's 39 counties vote entirely by mail (Roberts 2006). But the largest and best studied experiment with mail ballot elections has taken place in Oregon, which in 1995 became the first state to conduct a statewide election entirely by mail. Three years later, voters approved a measure to permanently implement vote-by-mail in all statewide primary and general elections. Voting by mail has proved very popular among the public: polls show widespread approval of the Oregon system (Southwell and Burchett 1997). Supporters argue that the move to mail ballot voting makes it easier to vote and therefore leads to increased turnout.

To determine whether this policy shift boosted participation in Oregon, Southwell and Burchett (2000) examined aggregate turnout figures in 48 statewide candidate elections and found that mail ballot elections increased turnout of registered voters by 10%, controlling for the level and competitiveness of the race. An individual-level study conducted by Berinsky, Burns, and Traugott (2001) estimated the net effect at 6 percentage points. Using a duration model to investigate turnover in the electorate, they found that mail elections succeed at retaining existing voters within the electorate but not at mobilizing nonvoters. Karp and Banducci (2000) showed turnout effects that vary across election contexts, with mail voting demonstrating the greatest impact in low-salience elections for ballot measures and local offices. Turnout increased the most in precincts already expected to have high participation—those with larger percentages of residents who are white, educated, older, and have high incomes. To the extent that vote-by-mail is effective in promoting participation, it does so among those that already are most likely to vote.

The strength of the Oregon studies for making inferences about the effects of vote-by-mail elections is that they eliminate the selection problem inherent to analyses of absentee voting, allowing scholars to separate the act of voting at home from the characteristics of people who choose to do so. They fairly and accurately report the changes in voter participation that have occurred in Oregon. Yet the problem with using these findings to predict the effects of a shift to mail ballot elections elsewhere is that the Oregon studies do not hold constant the political context and the ways in which elections are administered. It is possible that unique features of Oregon's recent statewide elections account for the turnout effects that researchers have uncovered. The 1995 Senate primary and 1996 Senate general elections that initiated Oregon's experiment with voting by mail featured a tight race between Portland Congressman Ron Wyden and multimillionaire Gordon Smith for what had been Senator Robert Packwood's safe seat. The level of competition in this contest, the spending it generated, and the intense statewide and national attention it received could account for the heightened turnout in these elections.

Another unique feature that accompanied Oregon's shift to mail ballot elections was the practice of providing campaigns with continually updated lists of those who have voted so they could contact those who had not and ask them to participate.[1] Since other jurisdictions may not have the capacity or willingness to engage in this practice, it is important not to combine its effects with the impact of voting by mail. Also conflated with the effects of

[1]Oregon's election officials use a bar code system to enter immediately the names of voters who have returned their ballot and provide campaigns with daily updates so that they can contact those who are yet to turn in their ballots.

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voting by mail is the impact of the new administrative practice to purge those who do not have a valid postal address from the registration rolls. This practice, which generated much controversy in Oregon because of its disproportionate impact on low-income and homeless voters (Suo 2000), increases the turnout proportion not by adding to its numerator but by subtracting from its denominator. Finally, the shift in policy itself in Oregon may have affected the size and composition of the electorate, since publicity about the transition to mail ballot elections might have played a role in the initial boost in turnout. Thus, although the Oregon studies track the impact of voting by mail on similar sets of voters, they do not control for potentially important aspects of politics and election administration.

In order to predict how mail elections will affect the behavior of voters, we need to disentangle the procedural effects of voting at home from differences in behavior that result from a specific election context or individuals' predispositions to vote. The ideal design would hold constant the election context and randomly assign registrants to a treatment group required to vote by mail or a control group that can make the traditional choice of visiting a polling place or requesting and submitting an absentee ballot. This would create an opportunity to assess whether voting by mail reduces the costs of voting enough to produce an increase in turnout. Although it is impossible to randomly assign individuals to different election rules, the natural experiment analyzed here comes close to this ideal design.

3 Setting: California's Mail Ballot Precincts

The design takes advantage of a state law in California that allows county registrars to designate any precinct with fewer than 250 registrants as a mandatory mail ballot precinct. In these precincts, voters do not have the option to cast their ballots in a polling place; instead, they vote exclusively by mail. Unlike absentee voters, they receive ballots automatically.[2] Since all precincts in California's two smallest counties, Alpine and Sierra, contain fewer than 250 registrants, those counties conduct all their elections entirely by mail.

Mail ballot precincts have received little attention from scholars or political observers. An exception is Patterson and Caldeira's (1985) investigation of absentee voting in California and Iowa, in which the authors attribute their finding of rural bias in absentee voting at least partially to the existence of mail ballot precincts.[3] Whereas precincts are most likely to fall short of the polling-place threshold in rural areas, many small precincts exist in urban and suburban communities as well. California's liberal use of district elections and special districts creates a mosaic of overlapping jurisdictions and district boundaries, isolating small pockets of voters throughout the state. Whether a household gets assigned to a mail ballot precinct can change with each election, based on voter registration figures and the races that appear on the ballot. The more races at different levels of local and state government, the more likely it is that political boundaries will intersect in such a way as to create small mail ballot precincts.[4] Figure 1 shows the location

[2]Under the legislation that enables counties to create mail ballot precincts, county election officials must notify each voter of the location of the two nearest polling places in case the voter chooses to return the mail ballot on election day (California Elections Code §3005).

[3]At the time of Patterson and Caldeira's study, registrars did not report the existence of mail ballot precincts and combined the votes from these precincts with absentee ballots.

[4]Mail ballot precincts received a flurry of attention in 2002, after state redistricting created even more complex political boundaries by breaking apart previously nested legislative districts. In advance of the primary election, a number of media outlets reported on the significant rise in use of these precincts and the disapproving response of voters who would no longer be able to cast their ballots at a polling place (Davidow 2002; Keith 2002; Pool 2002; Trevilo 2002).

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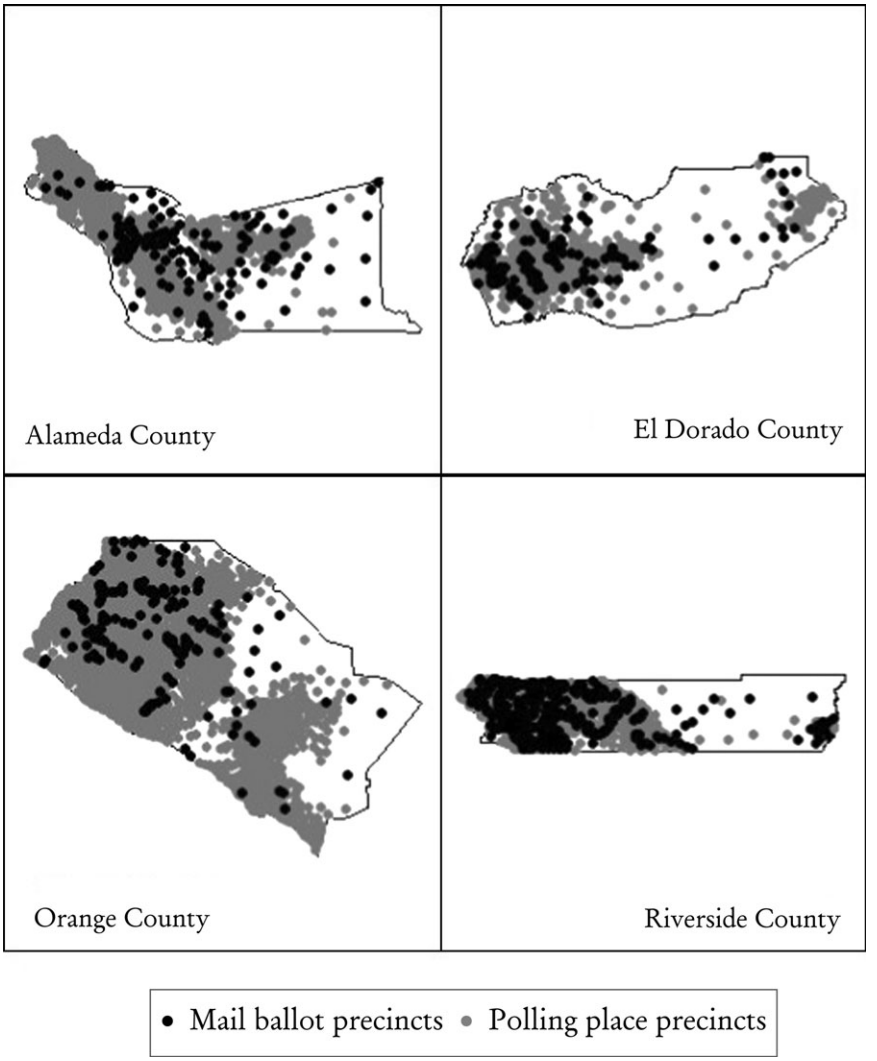


Fig. 1 Examples of mail ballot precinct location, 2002 general election.

of mail ballot precincts for the 2002 general election in four counties. As the figure demonstrates, these precincts are scattered among the traditional polling-place precincts in each county.

The assignment of the mail ballot treatment in this natural experiment is not purely randomized, but it comes close for observational data. Treatment assignment is based on precinct size, a variable that has little relationship with political participation.[5] Conversations with county election officials indicate that the establishment of district boundaries is a purely administrative process and, therefore, that the small mail ballot precincts should not differ systematically from polling-place precincts apart from being more rural. Indeed,

[5]Within our sample, the number of registrants in a precinct was not strongly correlated with turnout among traditional precincts (correlation of −0.18) or among mail ballot precincts (−0.01).

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state law prohibits county election officials from dividing a precinct in order to establish a mail ballot precinct (California Elections Code §3005). The literature on voter turnout provides little evidence that residence in a rural area has an impact on participation after controlling for an individual's demographic and political characteristics. Nevertheless, we must account for a precinct's population density in order to ensure that the rural setting of many mail precincts does not confound our estimate of the effects of voting by mail. In the analyses that follow, we use data on the location of precincts as well as their demographic and partisan composition to help overcome any bias that might exist in the process of assigning some precincts to the mail ballot treatment.

To measure the effect of mail voting on turnout, we examined consolidated precinct-level voting data for two general elections: the 2000 presidential election and California's 2002 gubernatorial election. Information about the demographic and partisan composition of the precincts came from the Statewide Database, housed in the Institute of Governmental Studies at the University of California, Berkeley. The redistricting database for California, the Statewide Database aggregates voter registration data, election returns, and U.S. Census data to the precinct level. We contacted county registrar offices to obtain information identifying mail ballot precincts. Finally, we supplemented this precinct-level data with information about electoral competition and ballot propositions in the two elections.

The 2000 analysis includes data from 18 of California's 58 counties, ranging from tiny Tuolumne County, comprising 56,000 residents living in the foothills of the Sierra Nevada, to the enormous Los Angeles County with a population approaching 10 million. The 18 counties encompass two-thirds of California's total population, and they contain portions of 45 of the state's 52 Congressional districts and 66 of the 80 state Assembly districts. Data availability restricts our 2002 analysis to just nine counties, but this smaller sample similarly covers a large geographic scope and includes a diverse set of demographic profiles.[6] Comparing turnout in our sampled counties to that of all California voters shows that the sample matches the population closely in participation rates among registrants. Turnout in 2000 was 70.91% in our sample and 70.94% statewide, whereas in 2002 it registered 52.00% in our sample and 50.57% statewide.

4 Estimating the Effect of Mail Ballots through Matching

Treating California's assignment of small precincts to vote by mail as a natural experiment avoids the inference problems that occur when extrapolating from vote-by-mail elections held in a specific political context or from voters who elect to cast their ballots absentee. Instead, we can compare two groups of nearly identical registrants who are voting in the same election—one group required to vote by mail, and the other group with the more typical choice to vote in a polling place or cast a ballot absentee. Assignment to a mail precinct can be seen as an experimental "treatment" with a measurable effect on political participation.

[6]Counties were selected primarily based on how they treated voting returns from absentee voters. If we are to use this natural experiment to draw inferences about the likely effect of elections conducted entirely by mail, it is important that we compare voting returns from assigned mail precincts to a full set of voting returns from traditional precincts, including both polling place voters and voters who elected to cast their ballots absentee. However, many counties count absentee ballots and record them separately, without reassigning those ballots to the voters' home precincts. Those counties are ineligible for inclusion in our sample. Fewer counties tallied absentee ballots separately in 2000 than in 2002, likely because vote returns from the 2000 election would be used for redistricting.

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Although we examine data at the precinct level, our estimates of the effect of residing in a mail ballot precinct do not require ecological inference. Every voter in a mail ballot precinct must vote by mail, and every voter in a control precinct is free to make the traditional choice between absentee and polling-place voting. (California allows any voter to request an absentee ballot, without requiring any justification of need.) The treatment affects either all or none of the voters in a precinct, and its estimated impact therefore provides a reliable prediction of what would happen if all registrants in a jurisdiction were asked to vote by mail.

Since the mail ballot policy in California is not a true experiment and mail precincts might differ from traditional precincts in systematic ways, we use matching estimation to compare voting rates in mail ballot precincts with traditional precincts that have similar observable characteristics. Let T_i denote whether or not all individuals in the precinct i received the treatment of mandatory mail voting. In mail precincts, T_i takes a value of 1, and it has a value of 0 where precinct i is untreated. The potential outcome—in this context, turnout—is Y_i, with Y_{i1} indicating the outcome for precincts that received the mail balloting treatment and Y_{i0} denoting outcomes for the control group. The treatment effect for precinct i is the difference between the two potential outcomes: $\tau_i = Y_{i1} - Y_{i0}$. Precincts are only observable after they have received or not received treatment; however, we do not observe their outcomes in the counterfactual state. Thus, we only observe the outcome $Y_i = T_i Y_{i1} + (1 - T_i) Y_{i0}$.

In an experiment with random assignment, it is straightforward to estimate the treatment effect from observable outcomes. With observational data, estimation is more difficult because we cannot assume that the only systematic differences between groups are attributable to treatment. In the present case, we know that mail ballot precincts contain fewer registrants than traditional precincts. If precinct size is correlated with other variables X, those other variables may account for some of the variation in outcomes we observe. The typical approach is to account for these covariates using a parametric model with a specific functional form. Using parametric analysis, estimation results are highly dependent on the researcher's assumptions about the form of the relationship between independent and dependent variables.

Matching induces greater balance between treatment and control groups in an observational setting and thereby reduces model dependence when estimating treatment effects. We used matching to select those precincts in the control group that were most similar to the precincts that require voting by mail. We then estimated the effect of mail voting by comparing mail precincts only with traditional precincts that have similar values on observable covariates, ignoring those that are very different from precincts that have received the mail ballot treatment. It is possible that the distribution of demographic and partisan characteristics in the small precincts that make up the treatment group differs from the distribution in traditional precincts. If that is the case, then our estimate of the effect of mail balloting would be influenced by cases that lie outside the range of data for our treatment group. By creating closer balance in the distributions of covariates between treatment and control groups, matching lessens the importance of these outlying control observations and improves causal inference (Rosenbaum and Rubin 1983; Imbens 2004; Abadie and Imbens 2006; Ho et al. 2007).

We used nearest-neighbor matching to pair each precinct in the treatment group with three traditional precincts within the same county that are nearest to the mail precinct based on a set of observed covariates X. Nearly all the covariates are continuous variables, reducing the likelihood of ties. After discarding the control precincts that did not match to any mail precincts, we then carried out two different procedures to estimate the effect of

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mail balloting on turnout. First we calculated the average treatment effect on the treated (ATT):

$$\text{ATT} = \frac{1}{N_1} \sum_{i|T=1} E[Y_{i1} - Y_{i0} \mid X_i] \tag{1a}$$

$$= \frac{1}{N_1} \sum_{i|T=1} \mu_1(X_i) - \mu_0(X_i), \tag{1b}$$

where N_1 is the number of mail precincts. The ATT indicates the effect of mail voting on those precincts that received the mail ballot treatment. In addition to ATTs, we also estimated parametric models with controls for the same covariates used to match precincts. Performing parametric analysis only on the observations retained after matching reduces model dependency and helps account for any remaining imbalance between treatment and control groups (Ho et al. 2007).

Control variables used for matching and for the parametric models include political and demographic characteristics of the precincts, an indicator for whether the precinct is located in an urban area, and measures of each precinct's political context that would likely influence turnout among its residents. We calculate racial composition as percentages of the precinct's voting-age population, using 2000 Census block-level data aggregated to the precinct level. Partisan registration and a precinct's age and gender composition come from voter registration files. In order to designate precincts as urban, we overlaid a map of Census-designated urbanized areas and urban clusters onto boundary maps for the consolidated precincts in our sampled counties during each election year. The Census classifies a territory as urban if the territory's core has a density of at least 1000 people per square mile and surrounding areas contain at least 500 people per square mile. Precincts in this analysis are coded as urban if any part of the precinct overlaps or is adjacent to a Census-designated urban area.

Measures of political competition include the margin of victory between the top two contestants in the precinct's congressional and state Assembly races, taken from official election results compiled by the Secretary of State, and the total amount of money raised during the calendar year by all candidates in the congressional and Assembly races. Contribution data come from the Institute on Money in State Politics.[7] We do not include variables such as education and income that are available only at the level of block groups because aggregating block group–level data to the precinct level requires the often unrealistic assumption that these population characteristics are evenly distributed throughout the block group. Since the other demographic variables in our analysis are highly correlated with education and income, they serve as proxies in the matching process.

Table 1 shows the improvement in sample balance obtained from matching.[8] The first column for each year displays the mean values for each variable among mail precincts. The center columns show variable means for the full sample of traditional polling-place precincts, and the right columns include means only for those traditional precincts matched to a mail precinct. Prior to matching, the treated subsamples in both 2000 and 2002 had

[7]The Institute on Money in State Politics is more thorough in its reporting than the Cal-Access system operated by the California Secretary of State, reporting expenditure totals for more low-spending campaigns.

[8]Diagnostics in Table 1 are based on 3:1 nearest-neighbor matching without replacement using a logistic regression-based propensity score. Matching was performed using *MATCHIT* software in *R* (Ho et al. forthcoming). The matched samples shown here are used in the parametric models of turnout reported in Table 3.

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Table 1 Balance between treatment and control groups

	2000 general election			*2002 general election*		
	Treatment mean	*Prematch control mean*	*Postmatch control mean*	*Treatment mean*	*Prematch control mean*	*Postmatch control mean*
Percent non-Hispanic white (of VAP)	69.6	56.8	70.5	71.4	60.5	69.2
Percent non-Hispanic black (of VAP)	3.5	7.5	3.9	3.1	7.6	3.8
Percent non-Hispanic Asian (of VAP)	7.4	13.2	8.5	4.8	14.0	6.8
Percent Hispanic (of VAP)	18.3	22.9	17.0	16.1	14.3	16.7
Percent multirace or other (of VAP)	3.6	3.6	3.2	5.8	4.8	4.6
Percent male (of registrants)	47.1	45.7	46.6	49.5	48.6	47.9
Percent aged 18–24 years (of registrants)	9.0	10.0	9.2	7.3	7.5	7.7
Percent aged 25–34 years (of registrants)	13.1	17.4	13.7	11.4	17.2	13.4
Percent aged 35–44 years (of registrants)	20.1	21.2	20.7	16.9	19.8	18.8
Percent aged 45–54 years (of registrants)	22.7	19.4	22.0	22.1	20.2	21.2
Percent aged 55–64 years (of registrants)	14.9	11.5	13.9	18.6	13.9	15.2
Percent aged 65+ years (of registrants)	16.4	14.3	16.5	23.6	21.4	23.7
Percent registered Democrats (of registrants)	37.7	46.8	38.4	36.9	47.0	39.9
Percent registered Republicans (of registrants)	42.5	33.3	42.7	43.7	29.4	40.4
Percent registered minor parties (of registrants)	6.0	5.3	5.3	5.0	5.1	4.6
Proportion of precincts that are urban	0.79	0.98	0.93	0.61	0.96	0.92
Congressional vote margin	34.1	41.2	34.7	40.8	49.1	41.9
Congressional contributions (all candidates, in millions)	1.6	1.5	1.6	0.8	0.9	0.8
Assembly vote margin	31.7	39.6	32.5	29.3	46.2	32.3
Assembly contributions (all candidates, in millions)	0.6	0.9	0.7	0.7	0.6	0.7
Number of precincts	1026	12,980	3078	412	2460	1236

Note. The left columns for each election show mean values for each variable among mail precincts. The center columns show means among all traditional precincts, and the right columns show mean values among the sample of traditional precincts retained after matching. VAP, voting-age population.

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higher percentages of white residents and older, Republican registrants, and they were much less likely to be located in urban areas. Moreover, Congressional and state Assembly races were more competitive on average in mail precincts. After matching, little difference remains in the covariate distributions between treatment and control groups. The one covariate on which the treatment and control groups still differ is the percentage of precincts in urban areas. As Table 1 indicates, nearly all traditional precincts are urban, which puts a limit on the balance we can achieve while simultaneously matching on other variables. However, the results reported below about the effects of mail voting are robust to exact matching on the urban indicator.[9]

5 The Effect of Voting by Mail on Turnout in General Elections

As we have seen, existing research suggests that the opportunity for voting at home—-provided by either a mail ballot election or liberalized absentee laws—is effective in increasing turnout because it lowers the costs of voting for those who already are more likely to participate. Our research design allows us to test whether turnout is higher among voters assigned to mail ballot precincts than among voters located in traditional polling-place precincts. We also investigated whether the effect of voting by mail varies between a presidential and an off-year election, when the marginal voter has different initial likelihoods of participating in the election.

We estimated the effect of mail ballots using both ATTs and a weighted least-squares analysis on the matched sample.[10] Neither identification strategy produced a positive estimate for the effect of mail balloting on turnout in either election year. Indeed, it appears that voting by mail has a negative impact on participation in the context of a general election. Table 2 reports within-sample ATTs for 2000 and 2002.[11] Results are consistent across the two elections: assigning precincts to vote by mail produces a 2.6–2.8 percentage point decline in turnout.[12] If a precinct's turnout rate among registrants in 2000 was equal to the sample mean of 71.5%, the effect of requiring people to vote by mail is to reduce that rate to 68.7% of registrants casting ballots.

Table 3 reports similar results from a parametric analysis of the matched sample, controlling for the same set of covariates that we used to create the match, along with county fixed effects. Why conduct parametric analyses of these matched samples in addition to calculating ATTs? It checks the robustness of our findings and allows two additional steps that may improve our estimates of the impact of voting by mail. First, as Ho et al. (2007) note, even after matching, the mail ballot and polling-place precincts in our sample still differ slightly in the demographic and contextual covariates that we have

[9]The robustness check involved exact matching on the urban variable while using the same nearest-neighbor matching algorithm on all other covariates. The matched data produced essentially the same estimate of the effect of voting by mail. In parametric models analogous to the ones reported in Table 3, the coefficients on mail ballot precincts were −2.72 (with an SE of 0.37) in 2000 and −1.16 (0.74) in 2002.

[10]Compliance with treatment does not pose the same challenge in this context as in other natural experiment settings (see Imbens and Angrist 1994), but some counties do make provisions for small precincts to opt out of mail balloting treatment. This is exceedingly rare, however, and removing the few precincts with fewer than 250 registrants from the control group prior to matching produced no change in results.

[11]The sample includes the full universe of precincts from each of the counties in our analysis, but we omitted those precincts with fewer than five registrants so that the extreme output values for some of these precincts did not overly influence the estimation of treatment effects for the full sample. Deleting these small precincts had a modest influence on the size of the effect estimates but not their direction or significance.

[12]Estimates in Table 2 were obtained by 3:1 nearest-neighbor matching on all covariates and exact matching within counties using an inverse variance weighting matrix. Using the *nnmatch* program in Stata (Abadie et al. 2004), we adjusted ATT estimates for bias (Abadie and Imbens 2006) and calculated robust SEs. Altering the specification to include more or fewer matches and different bias adjustments did not affect the results.

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Table 2 The effect of mail balloting on turnout

	Effect of mail balloting, 2000 general election		*Effect of mail balloting, 2002 general election*	
	ATT	*Mail precincts*	*ATT*	*Mail precincts*
All counties	−2.81 (0.38)***	1026	−2.59 (0.57)***	412

Note. The left column for each election shows sample average treatment effects on precincts with five or more registrants that received the mail ballot treatment. The right column shows the number of mail precincts in each county. Estimates are significant at ***$p < .001$.

measured. The models in Table 3 include controls for those covariates, ensuring that the small differences are not driving the apparent negative effect of voting by mail. Second, these models weight each precinct by its number of registered voters. Because the precincts vary greatly in size, it is likely that the predictions from an ordinary least-squares estimation would be much worse in the smaller (and exclusively mail ballot) precincts.

Table 3 Parametric models of general election turnout in matched samples

	2000 general election	*2002 general election*
Mail ballot precinct	−2.70 (0.37)***	−1.54 (0.71)*
Partisanship of registrants		
Percent Democrat	0.58 (0.03)***	0.13 (0.06)*
Percent Republican	0.51 (0.03)***	0.12 (0.05)*
Percent minor party	−0.44 (0.06)***	−0.12 (0.08)
Demographic characteristics		
Percent black	−0.28 (0.01)***	−0.27 (0.03)***
Percent Asian	−0.02 (0.01)	−0.08 (0.02)***
Percent Hispanic	−0.24 (0.01)***	−0.24 (0.01)***
Percent multirace	−1.26 (0.22)***	−0.50 (0.06)***
Percent male	−0.09 (0.02)***	−0.09 (0.04)*
Percent aged 25–34 years	−0.19 (0.02)***	−0.13 (0.05)**
Percent aged 35–44 years	0.16 (0.02)***	0.14 (0.04)***
Percent aged 45–54 years	0.22 (0.02)***	0.30 (0.06)***
Percent aged 55–64 years	0.19 (0.03)***	0.39 (0.05)***
Percent aged 65 years and over	0.03 (0.01)***	0.32 (0.03)***
Local political context		
Congressional vote margin	0.02 (0.01)***	0.09 (0.02)***
Congressional contributions	−0.01 (0.04)	5.21 (0.55)***
Assembly vote margin	0.03 (0.01)***	0.12 (0.02)***
Assembly contributions	−0.30 (0.12)	1.55 (0.27)***
Urban precinct	0.64 (0.31)*	−2.79 (0.63)***
County fixed effects	Included	Included
Intercept	32.92 (2.79)***	25.33 (6.22)*
Number of observations	4576	1716
Adjusted R^2	0.69	0.73

Note. Dependent variable is the percentage of a precinct's registered voters who participated in the 2000 or 2002 general election. Coefficients are from weighted least-squares regression, weighted by the number of registered voters in the precinct. Estimates are significant at *$p < .05$; **$p < .01$; ***$p < .001$.

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To avoid the problems created by a systematic pattern in error variances, we estimate weighted least-square regressions for each election.

Included in these regressions are measures of the race and ethnicity, party affiliations, age, and gender of voters in the precinct, along with local political context, a measure of urban location, and county fixed effects. Note that the coefficients for these control variables should not be interpreted as the best possible estimates of causal effects because the variables measure aggregate precinct characteristics. The models thus make ecological inferences about individual behavior based upon aggregate evidence. Since plenty of data sets with individual voter characteristics exist, there is no reason to make this sort of inference, but the closeness of our estimates to those typically found in individual studies give us confidence in the model's overall validity (Jackson 1996; Timpone 1998).[13]

Consistent with the results of our ATT analysis, such a policy shift will, if anything, reduce participation rates. Voters in mail ballot precincts turned out at a level that was an estimated 2.7 percentage points lower than the level of turnout in similar polling-place precincts during the 2000 presidential election. This effect is clearly statistically significant, yielding a coefficient more than seven times the size of its SE. In the model for the 2002 gubernatorial contest, voting by mail led to an estimated 1.5 percentage point decline in turnout, again a statistically significant effect. The robust finding from all models runs counter to the conventional wisdom about the impact of mail ballot elections. Rather than delivering a sizable increase in voter participation, shifting elections from the polling place to the mailbox risks producing a decline in turnout for regularly scheduled general elections.

6 The Effect of Voting by Mail on Turnout in Local Special Elections

Although we do not find any evidence that voting by mail increases turnout in presidential or gubernatorial general elections, it is possible that this reform may boost participation levels in special elections. These are contests held off of the traditional election calendar, often to fill a vacant seat or to consider a local proposition. Because of their timing and because they usually do not feature high-profile, hotly contested candidate races, special elections typically attract very low participation. As a consequence, voting by mail could have a different effect on turnout in special elections. When turnout falls in the range of 20%–50% of registrants, the marginal voter who might be encouraged to participate by a more convenient method is different from the marginal voter in a general election with a 60%–70% turnout rate. Special elections receive less press coverage than general elections, so receiving a ballot in the mail may therefore be a more important reminder for voters than it is in a presidential race that generates lots of media attention and water cooler conversation. To predict the effects of this limited version of the reform, we analyzed the impact of voting by mail on participation in local special elections.

Precinct maps were not available for these local special elections, and thus, we were not able to calculate precinct-level measures of demographic and political characteristics and

[13]In precincts where more voters affiliated with one of the major parties, turnout was higher than it was for districts with more minor party registrants or nonaffiliates. This effect is consistent with Jackson's (1996) finding of a positive relationship between strength of party identification and turnout of the registered. Participation was significantly lower in precincts with more Hispanic, Asian, black, or multiethnicity residents than it was for areas with more whites, and we see the expected nonlinear relationship between the age composition of a precinct and electoral participation. Consistent with both Jackson's (1996) and Timpone's (1998) findings that female registrants are more likely to vote, we see lower turnout in precincts with greater numbers of men, all else held constant. More surprisingly, the only significant positive correlation between campaign spending and turnout came from Assembly races in 2002, and wider margins of victory in Congressional and Assembly races actually correlated with higher turnout in 2000. Together, these factors explained 71% of the variation in turnout rates in 2000 and 75% in 2002.

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use them to match mail precincts with comparable traditional precincts. Instead, we focus on a smaller group of counties in which mail ballot precincts are most equivalent to polling place precincts. Using the demographic data from our 2000 and 2002 analyses, we identified three California counties in which voters in polling place and mail ballot precincts were quite similar in their partisanship, ethnicity, urban location, and age distribution. We assume that county election officials used the same criteria for drawing precinct boundaries for special elections as they did for the 2000 and 2002 general elections and that no major demographic changes occurred in one type of precinct but not the other between 2002 and the more recent special elections. Since the composition of mail precincts does not differ much from that of polling place precincts in these counties, we feel more confident in estimating the effects of voting by mail by simply comparing turnout levels across the two types of precincts. This constraint does introduce some degree of uncertainty to our conclusions, however.

The analysis focuses on a set of recent special elections held in El Dorado, Orange, and Sonoma counties. These counties represent a diverse mix of geographic locations and include rural, urban, and suburban voters. The races contested in the special elections include a contest to fill a vacant Congressional seat and a variety of local propositions. The elections were held in both even and odd years, during different months. To confirm that the treatment and control groups indeed contain comparable sets of voters in these elections, we first examined voting choices across precinct types. Vote returns were comparable for mail and polling place precincts. In five of the seven contests, returns fell within 3 percentage points of each other, and the biggest difference (in Sonoma's 2004 special election) was 6 percentage points. The fact that mail ballot and polling place voters made similar political choices increases our confidence that the precinct assignment process did not introduce any confounding factors.

Table 4 presents the results of our turnout analysis. We find that voting by mail did lead to a significant increase in turnout in these local special elections. Participation rates for those who were assigned to vote by mail were higher in all seven special elections, with the size of the effect averaging 7.6 percentage points. Although the boost in turnout that resulted from voting by mail fluctuates across elections, it is substantively quite large in all but the two West Sonoma County School District proposition elections that took place in 2005. Tests of statistical significance provide confidence that the turnout effect is unlikely to be due to random chance alone in five of the seven elections.[14] Overall, these findings support the optimistic predictions of vote-by-mail advocates about the likely impact of this electoral reform in low-profile elections. Although our analysis shows that a shift to mail balloting would not raise participation rates in general elections, a more limited application of this reform could be expected to increase turnout in special elections by nearly 8 percentage points.

7 Discussion

California's approach to administering elections in small precincts provides a valuable opportunity to isolate and measure the turnout effects of voting by mail.[15] Our analysis of vote returns across a set of elections reveals important and surprising findings that

[14] As an additional check, we compared turnout in the 2000 general election between polling place and mail ballot precincts without matching. In all three counties, matching did not have a substantial impact on our results.

[15] This research design opportunity is not unique to California. As Harris (1999, 5) reports, elections are held by mail in some precincts or local jurisdictions in Washington, Minnesota, Nevada, and North Dakota, whereas voters in the rest of the state have the option to go to polling places.

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Table 4 Turnout in special elections

	Turnout in polling place precincts	*Turnout in mail ballot precincts*	*Increase in turnout (%)*
El Dorado County			
March 8, 2005, Measure D: Highway 50 Congestion	43.6% (42,741 of 98,034)	54.7% (3431 of 6272)	11.1*
Orange County			
October 4, 2005, Congressional Primary	22.8% (91,269 of 400,427)	28.0% (442 of 1579)	5.2*
December 6, 2005, Congressional General	25.7% (103,845 of 403,959)	33.0% (560 of 1696)	7.3*
Sonoma County			
April 13, 2004, Measure G: North Sonoma County Hospital District	47.8% (12,399 of 25,917)	59.1% (877 of 1485)	11.2*
March 8, 2005, Measure B: West Sonoma County School District	42.6% (13,078 of 30,705)	44.9% (873 of 1946)	2.3
June 7, 2005, Measure K: West Sonoma County School District	46.1% (14,189 of 30,751)	47.4% (612 of 1291)	1.3
April 11, 2006, Measure B: Rincon Valley School District	37.7% (6132 of 16,248)	52.2% (3956 of 7579)	14.5*
Average increase in turnout			7.6

Note. Numbers in parentheses indicate the number of ballots cast out of the number of total registered voters in each type of precinct. Effect estimates are significant at $*p < .05$.

challenge election reformers' predictions that mail voting will heighten political participation. In statewide general elections, voters assigned to cast their ballots by mail participate at a lower rate than voters in similar precincts who are able to visit a polling place. The negative effect of mail balloting is modest but statistically significant, reducing turnout by 2–3 percentage points. In contrast, conducting local special elections by mail appears to have a positive and substantial impact on turnout. We find that turnout rates among mail precincts are approximately 8 percentage points higher on average than in traditional precincts, an effect size that is consistent with those that appear in studies of Oregon's vote-by-mail system (Southwell and Burchett 2000; Berinsky, Burns, and Traugott 2001).

What explains these conflicting results? The impact of mail voting appears to be conditional on an election's salience.[16] For low-profile local elections, receiving a ballot in the mail has a substantial marginal effect for the voter at the threshold of participating in the election. The ballot serves as a reminder that the election is taking place and eliminates the need to visit a polling place in order to cast a vote on a single ballot measure. When

[16]When Karp and Banducci (2000) compared mail elections conducted in Oregon with earlier polling place elections of the same type, they obtained a similar result. Mail balloting produced little difference in turnout for statewide general elections, but seemed to offer substantial benefits in special elections for statewide ballot measures as well as local races.

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participation levels are low, the information and convenience benefits of mail voting can produce large boosts in turnout. These benefits have less value in high-visibility elections in which voters perceive that more is at stake. The marginal voter in high-turnout elections has a lower overall propensity to participate than the marginal voter in a local special election; thus, election processes that affect the costs of voting will make a bigger difference in the low-turnout context.

The more puzzling question is why mail voting produces negative effects on turnout in highly salient general elections.[17] The answer to that question lies outside the scope of this paper, but we propose that the explanation might be related to mail management, both before and after a ballot arrives at the home of a registrant. The success of a vote-by-mail system depends on the quality of address information for registrants. Voters who request absentee ballots make sure to report changes of address with election officials, but those who typically vote in a polling place might continue to visit the same poll location even after a move. It is also possible that their address information contains errors that go unnoticed. Either way, we can expect some proportion of mail ballots never to reach their intended recipients. Ballots that arrive in the proper mailbox might still get lost among glossy attack ads and other unsolicited mail. Rather than reduce the cost of participation, it is possible that all-mail elections make voting more difficult by presenting the ballot before voters are ready. As election day approaches and people begin to think about their vote decisions, their ballots might be long discarded.

More generally, our results suggest that for high-profile elections, a loss of options for voters produces a loss of voters participating in the election. In a traditional election, motivated registrants with schedule conflicts can request an absentee ballot to cast from home, and those who begin to pay attention only in the campaign's final days have the opportunity to visit a polling place. Keeping track of a mail ballot for days or weeks after receiving it might be the added cost that keeps the marginal voter from participating.

It is possible that this negative effect on turnout would disappear with full implementation of mail elections. Our natural experiment design offers the opportunity to measure the effect of mail voting while holding constant voter characteristics and political context. But in all the elections we observe, voters required to cast their ballots by mail make up a small percentage of the electorate. Campaigns have little incentive to develop strategies that specifically target voters casting ballots from home. With a full transition to mandatory mail voting, we expect that parties, candidates, and civic groups would conduct outreach designed to mobilize mail voters. Studies of absentee and early voting have demonstrated the importance of campaign mobilization activities in the context of liberalized voting laws (Oliver 1996; Stein and García-Monet 1997). Alerting registrants to the imminent arrival of their ballot and designing phone call and canvassing efforts to address the earlier schedule of a mail ballot election may go far to diminish the negative effect that we have observed.

Taken as a whole, our results demonstrate the importance of designing causal research carefully and considering election context when drawing inferences about the possible

[17]We considered the possibility that mail ballot elections might increase participation of another form in general elections by reducing roll-off in downballot candidate and proposition races. Our analysis indicates that if voting by mail has an effect on roll-off, the effect is to increase roll-off and thus suppress participation in downballot races. Designated mail voters were significantly more likely than polling place voters to abstain from all the ballot proposition and candidate races we examined in 2000. Voting by mail had no apparent effect on roll-off in 2002. We believe this difference between 2000 and 2002 has a simple explanation: in a lower turnout election, there are fewer marginal voters who would be most influenced by a change in voting procedures. Results from the analysis of ballot roll-off are available at http://weber.ucsd.edu/~tkousser/votebymail.htm.

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benefits of voting reform. Mail ballot elections offer a number of potential benefits, including cost savings in election administration and improved access for voters with disabilities, and they receive enthusiastic endorsement from jurisdictions that have implemented them. Our aim has been to examine their effects on voter turnout, and our findings indicate that holding elections by mail will not on its own fulfill the promise of heightened participation in general elections. Their benefits in low-profile elections are substantial, however, and with full implementation and adaptation by campaigns, these benefits may extend to all election contexts.

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