Choice Fatigue: The Effect of Making Previous Choices on Decision Making

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Abstract

This paper addresses the impact of making multiple previous choices on decision making, which we call "choice fatigue." We exploit a natural experiment in which different voters in San Diego County are presented with the same contest decision at different points on the ballot, providing variation in the number of previous decisions made by the voters. We find that increasing the position of a contest on the ballot increases the tendency to abstain and to rely on decision shortcuts, such as voting for the status-quo or the first candidate listed in a contest. Our estimates suggest that if an average contest was placed at the top of the ballot (when voters are "fresh"), abstentions would decrease by 10%, the percentage of "no" votes on propositions (a vote for the status-quo) would fall by 2.9 percentage points, and the percentage of votes for the first candidate would fall by .5 percentage points. Interestingly, if this occurred, our results suggests that 22 (6.25%) of the 352 propositions in our dataset would have passed rather than failed. Implications of the results range from the dissemination of information by firms and policy makers to the design of electoral institutions and the strategic use of ballot propositions.

Keywords: Contextual Choice, Choice Fatigue, Voter Participation

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1 Introduction

Do people really find the pure act of decision-making to be exhausting or effort-consuming? If so, how do a person's decisions change after they have just made other decisions? In this paper, we answer this question by exploiting a natural experiment that generates conditionally random variation in the number of decisions a voter must make before reaching her decision on a certain contest on the ballot. We provide evidence that making more decisions prior to a particular decision increases the likelihood of abstention from the decision as well as the reliance on heuristics (such as choosing the status-quo) in decision-making. We label this effect "choice fatigue," which we define broadly to describe the effects of cognitive exertion from making multiple decisions, such as annoyance or physical fatigue.

Choice fatigue is economically important because decisions in many economic domains are made in sequential order. The effect of cognitive load on different decisions has been discussed in other recent work in behavioral economics and consumer psychology. For example, Levav et.al. (2007) find in a field experiment that German car buyers customizing their Audi are more likely to rely on defaults – and thus spend more money on the car – if decisions with larger numbers of alternatives are placed at the beginning of the sequence of customization decisions. Also, Iyengar & Kamenica (2007) find that employees at firms with more funds to choose from in their 401(k) plan ultimately allocate more money to bond funds and less to equity funds. Although these papers provide motivation for our hypothesis, they cannot directly address the pure role of fatigue due to a lack of exogenous variation in the position of certain decisions.

For example, in previous research on voting, the phenomenon of "roll-off" describes voters as less likely to cast a vote as they move down the ballot (Burnham 1965). While there is no debating this stylized fact, the explanation for it is unclear. Voters may indeed become fatigued as they make more and more decisions, but contest saliency also generally decreases between top-of-the-ballot contests such as President and Governor and lesser-known statewide and local offices and propositions (Bowler, Donovan & Happ 1992, Bullock & Dunn 1996). Thus, if voters become less motivated to participate in contests further down the ballot due to a decrease in the saliency of the contest, then the effects of fatigue cannot be separated from those of saliency. Therefore, one of the main contributions of this paper is the analysis of choice fatigue by using variation in decision order that is uncorrelated with other potential explanatory variables.

The ability to disentangle the role of fatigue from other informational hypotheses is important. For instance, if people hesitate to make decisions because they find it costly to gather information, a benevolent policy maker might shower them with free information. On the other hand, if people hesitate to make decisions because they find the act of making decisions inherently fatiguing, the policy maker might restrict their decision set or even deprive them of information. It is possible that people are better off making all of their decisions in a slightly uninformed way rather than making only some of their decisions in a fully informed way.[1] Or, from a different perspective, a firm with a less benevolent interest

[1] This behavior is completely consistent with the characterization of survey-takers as moving from an optimizing behavior to a satisficing behavior as they move through a survey (Krosnick 1999).

in consumer welfare may find it profitable to exploit fatigue in consumer decision-making, as demonstrated by the Audi example.

In addition to providing the necessary variation to identify choice fatigue, the voting application provides an ideal environment to study these issues for several reasons. First, a person who is in a voting booth has already voluntarily invested her time in registering to vote, going to the polls and standing in line, so it is clear that the voter is motivated to make some decisions.[2] Second, the voter knows that there is no opportunity to delay decision-making since the contests are only open for voting on Election Day. Finally, it is relatively easy for the voter to not make a decision by *undervoting* (choosing to not vote) on a particular contest or make a decision using a variety of choice heuristics.

With these motivations in mind, the main result of this paper is that the number of prior decisions made affects both the level of abstention and the chosen decision. In particular, we find that lowering a given contest by one position on the ballot increases precinct-level undervotes by .13 percentage points. Given the average ballot position (15.7) and level of undervotes of contests in our data (21.6%), this suggests that choice fatigue is responsible for 9.3% of undervotes in these contests. We also find that voters are more likely to use decision shortcuts as they become fatigued. For example, in statewide and local propositions ("yes-no" decisions), lowering a given proposition by one position increases votes for the status-quo ("no" votes) by .11 percentage points.[3] In statewide and local office races (multi-candidate decisions), lowering a given contest by one position increases the tendency to vote for the first candidate listed for that contest by .05 percentage points. To understand the economic impact of these results, consider that the average propositions is presented 26.8 positions from the top of the ballot. This estimate suggests that "no" votes would decrease by an average of 2.9 percentage points if these contests appeared at the top of the ballot. Therefore, given the average ballot position of each proposition, we calculate that *22 of the 352 propositions (6.25%) in our dataset would have passed rather than failed* if the proposition was presented to voters as the first contest on the ballot.

To further motivate the central idea and natural experiment, consider Proposition 35, a California statewide ballot measure in the 2000 general election regarding the removal of certain restrictions on the use of private contractors in public works projects.[4] This proposition appeared on every ballot in the state, but because of the constitutionally-mandated ordering of contests and the differences in local ballot composition across the state, voters were presented with different numbers of previous decisions before seeing Proposition 35. For example, voters in San Diego County saw Proposition 35 listed anywhere between 9th and 19th on the ballot.[5] Figure 1 illustrates the within-election variation in the ballot position

[2] I also contrast the results for polling precinct voters with absentee voters. A significant selection problem exists in the assignment of voters to the two groups and this likely passes through to the effects of ballot position on participation and choice.

[3] Although some states have propositions in which a "yes" vote is the status quo, a "no" vote always maintains the status-quo for California propositions.

[4] The title of the proposition that appeared on the ballot is "Public works projects. Use of private contractors for engineering and architectural services."

[5] Aside from variation generated by the set of overlaying local political jurisdictions, the staggering of even and odd State Senate contests across presidential and gubernatorial elections also provides down-ballot variation in ballot position. This is discussed further in section **??**.

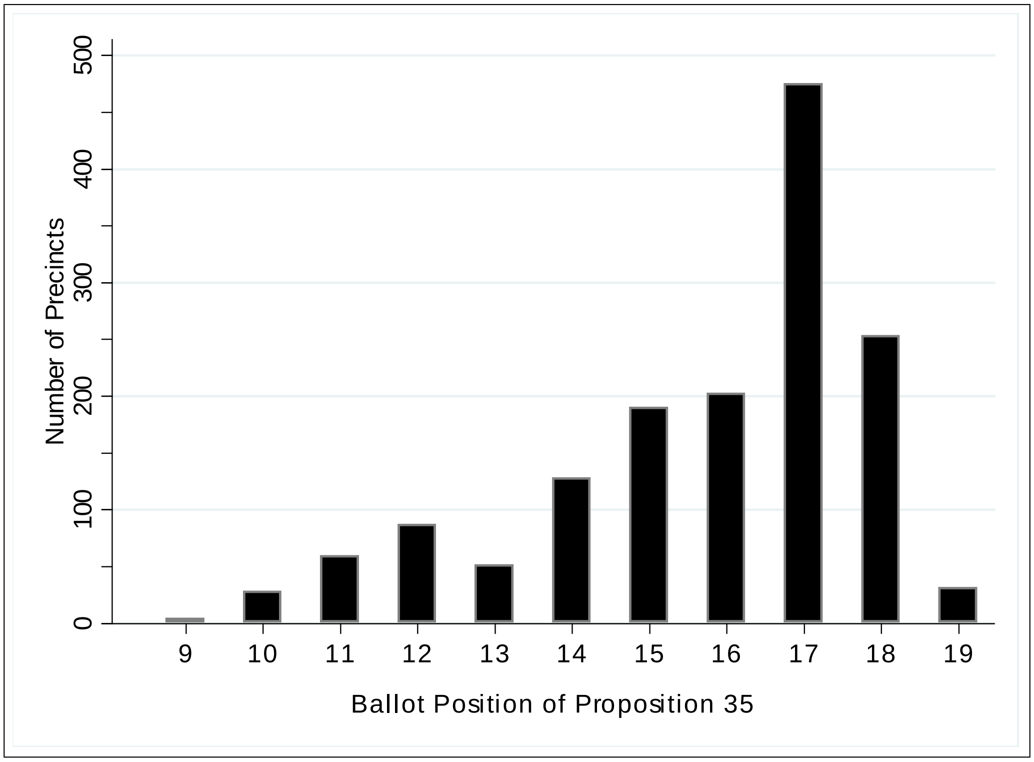

Figure 1: Distribution of Number of Precincts with Proposition 35 at Different Ballot Positions

of Proposition 35 across precincts. From the perspective of the standard economic model of decision-making, we would not expect a contextual variable, such as ballot position, to affect outcomes. However, as Proposition 35 moved down the ballot, the choice behavior of voters changed. Figure 2 shows a positive and significant association between the ballot position of Proposition 35 and the percentage of "no" votes and undervotes (i.e., abstentions) in the respective precincts. The figure also shows that no such positive relationship exists across the same precincts in the average fraction of undervotes for the U.S. Senator race, which was the last contest appearing at a common ballot position across the precincts. While this example only illustrates a simple relationship for one contest, it highlights the central contribution of this paper: providing econometric evidence of the pure role of choice fatigue and how it exacerbates the reliance on shortcuts in decision-making.

To better understand the relevance of this paper's research contribution, the next section discusses the relevant previous literature on decision-making and rolloff. Section **3** then briefly provides a theory of choice fatigue. The empirical results are broadly broken into two categories. In section **5**, we investigate the effect of choice fatigue on undervotes, which represented the "decision to decide." In section **6**, we discuss the effects of choice fatigue on the actual decision, given that a decision was made. The implications of the results for political economics and theories of decision-making, as well as practical concerns for the design of electoral institutions are discussed in section **7**.

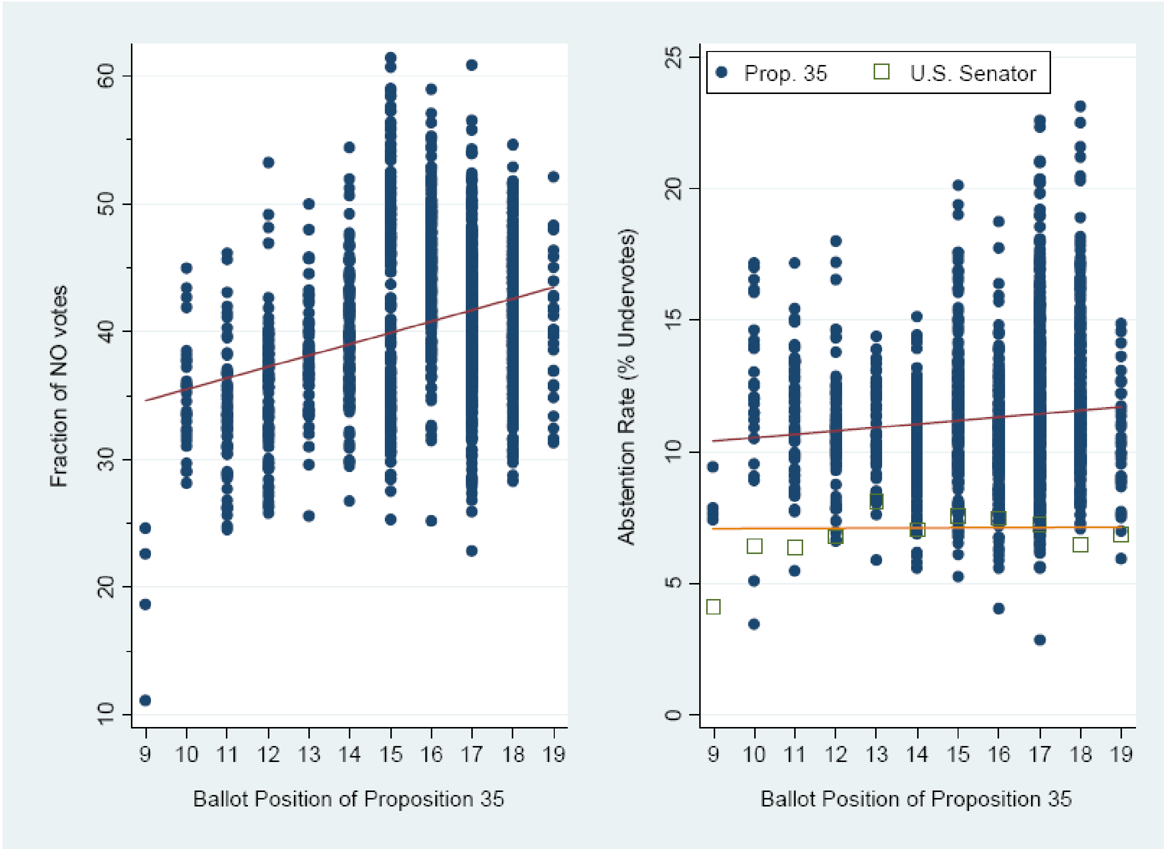

Figure 2: Undervotes and "No" Votes Increase with the Ballot Position of Proposition 35

2 Previous Literature

The central hypothesis of this paper is that a contextual variable, the number of previous decisions made in the choice environment, can affect decision outcomes. As we are concerned with the effect of this variable on both abstentions and the decision itself, we will review the relevant literature in both of these areas. In both cases, given that the application in this paper is voter decision-making, we first briefly discuss relevant research in this area and later return to more broadly motivating work in consumer psychology and economic choice.

The Effect of Fatigue on "Deciding to Decide"

Three explanations are offered in the existing literature on the effects of ballot composition on participation in individual contests: information, confusion and fatigue. Within this body of work the fatigue effects cannot be disentangled from other participation hypotheses due to methodological limitations that disallow any sort of causal inference. We discuss two representative papers here. First, Darcy and Schneider (1989) study the 1986 Oklahoma gubernatorial general election in which the usage of fill-in-the-bubble optical voting technology by some counties placed the high-salience U.S. Senator contest in obscure or unusual places on the ballot. While their data analysis is simple (e.g., no standard errors are given or hypothesis tests performed) and no causality can be established, the data on a superficial level suggest that counties using optical voting technology are associated with 3 to 7 percentage points more undervotes compared to other counties using lever machines.[6] Clearly no inferential conclusions can be made to explain the difference, but the authors do present an example of how the relative position of a contest on the ballot may be important for voter choice.

Second, Bowler, Donovan & Happ (1992) discuss how voter fatigue may influence abstentions. They refer to Downs (1957) in arguing that motivations for voting are driven by a cost-benefit analysis. These benefits and costs are directly affected by informational and political economic channels such as contest controversy, expected winning margin and campaign expenditures (Downs 1957, Magleby 1989, 1984). If informational costs exceed the benefits of voting, then voters may resort to cheap decisions such as abstaining. Bowler, Donovan & Happ's empirical approach to identifying fatigue uses a state-level dataset of votes on California ballot propositions for 1974-1988 to analyze how voters behave as they move down the ballot. In their analysis, differences in the ballot positions of different propositions provides the variation in the number of previous decisions made by a voter. Clearly, if information demands increase as voters move down the ballot, then any evidence of voter fatigue is confounded with explanations regarding information and saliency.[7] Consequently, they cannot separate proposition-specific factors from the effects of ballot position. Given these limitations, a main contribution of this paper is to disentangle fatigue from other contest-level participation covariates such as the level of available information or contest saliency.

Apart from fatigue, several authors look directly at the role of information in abstention. For example, Coupé and Noury (2004) use data from a survey experiment to find the "pure" effect of information on the decision to abstain. While not an application based on empirically observed voter choice behavior, their conclusions are intuitive and suggest that those with less information about a particular survey question are more likely to abstain. Another example is Wattenberg, McAllister & Salvanto (2000). They characterize voters as "treat[ing] voting as if it were a test, picking out the questions that they can answer." While they argue that voters with less information are more likely to abstain, their empirical approach uses survey data which likely overreports participation and provides noisy measures of a voter's level of information. These issues are avoided with our approach since our data are observed voter choices and contest saliency is controlled for by analyzing within-contest variation in ballot position.[8]

[6] Beyond the statistical limitations, characteristics of the three 'treated' counties are confounded with the effect of the change in voting technology.

[7] In fact,propositions appear on the ballot according to the following categories: general obligation bond measures (e.g., education, transportation, earthquake retrofitting, etc.), legislative bond measures, legislative constitutional amendments, referenda, and citizen's initiatives. Within these categories, propositions appear on the ballot in the order in which they qualified. Both of these factors make the ordering of propositions endogenous.

[8] A table in Wattenberg, McAllister & Salvanto further highlights one major shortcoming in this literature and the corresponding innovation in our work. Table 1 (p. 237) lists contests on the California statewide

As there are many economic environments in which sequential decisions are made in a choice environment, there is previous work in behavioral economics and consumer psychology regarding the role of similar contexts in decision-making. For example, Boatwright and Nunes (2001) provide additional evidence that decisions made sequentially can be affected by the attributes of individual choices. They find in a natural experiment at an online grocer that reductions in assortment within 42 product categories increase sales by an average of 11%. Additionally, 75% of the grocer's customers increased their overall expenditures. Although the evidence points to a general story that simpler decision contexts may be associated with less choice fatigue, it is not clear whether the observed increase in purchases (decisions) is due to within-category or across-store variety reductions. The alternate explanation that within-product (and not necessarily across-product) decreases in variety increase sales is in line with the choice overload literature, spearheaded by Iyengar & Lepper (2000).[9] They find in experiments on the variety of jams (and separately, chocolates) in a tasting booth and the number of ideas for extra-credit essays that decisions with more alternatives are associated with more choice overload, i.e., less actions taken. Dhar (1997a, 1997b) finds that preference for a "no-choice" option (i.e., choice deferral) increases when there is no single alternative in the choice set that has a clear advantage.

Effect of Fatigue on Decisions

For motivation on understanding how voters' decisions are affected by choice fatigue, it is first useful to discuss the literature on voter choice in low information environments. Having no information about candidates or a proposition does not imply that voters will choose a candidate randomly. Instead, there are myriad contest characteristics available to them that they can use to make a low-information decision about how to vote. Contexts which can serve as a cue or heuristic to the voter in individual decisions are candidate ordering (Meredith & Salant 2007, Koppell & Steen 2005), ballot configurations/design (Walker 1966), and candidate cues such as gender (McDermott 1997), ballot designation/incumbency (McDermott 2005), race/ethnicity (Washington 2006, Engstrom & Caridas 1991, Vanderleeuw& Utter 1993) and partisanship (Sniderman, Brody & Tetlock 1991). Additionally, these effects may be exacerbated in the absence of other cues (Miller & Krosnick 1998). Our goal is not to examine the effect on these cues on decisions, but how these types of characteristics might *interact with fatigue* to affect voter decision-making. Specifically, we will focus on the effect of fatigue level on choosing the status-quo or the first candidate, as these are arguably the cues that require the least effort to determine.[10]

ballot in the 1994 general election, with the ballot position of the last statewide elective office (Superintendent of Public Schools) at 15th and the first statewide proposition (Prop. 181) at 16th. However, a potentially long list of local candidate contests are sandwiched between these contests on the ballot. If this variation is not taken into account, the ordering of contests does not accurately measure the number of decisions previously made (even if one controls for contest-specific saliency effects)

[9] Other references in this literature include Bertrand et. al. (2005), and Gourville and Soman (2001). Furthermore, theoretical arguments (Kamenica 2008) and experimental evidence (Salgado 2005) exist for why consumers may prefer smaller choice sets over larger ones.

[10] Candidates are listed in a particular order, and this order is observed with virtually no effort. Similarly, the status quo option on propositions is always "no," and requires no effort to determine. On the other hand,

More broadly, previous research has examined the effect of cognitive exertion on the ability to make decisions and the potential resulting bias in observed choice in a variety of domains. For example, Levav et.al. (2007) find in a field experiment with buyers of Audi cars in Germany that the sequencing of car customization decisions affects final outcomes. Customers in their experiment are randomly assigned to treatments in which the first 8 of 67 decisions over car attributes are ordered either in increasing or decreasing order of the number of attributes available for each decision. Levav et.al. find that customers in the "Hi-Lo" treatment (decisions with more alternatives first) are more likely to take the default choices than those in the "Lo-Hi" (decisions with less alternatives first) treatment. In addition, the reliance on default options cause the "Hi-Lo" customers to spend more money on the car. Note that although this experiment has random variation in the number of car characteristics presented before arriving at a particular decision, there are only two orderings and these are constructed purely with the attributes of individual decisions in mind.

Complementing the evidence in political science, economics and marketing, survey researchers have examined similar issues with regard to how survey respondents behave as they navigate through a survey. Krosnick (1999) describes another perspective in his survey of recent convergences and discoveries in the survey literature. Dating back to Simon (1953), Krosnick describes survey subjects as falling into two categories: optimizers and satisficers. While optimizers are thorough in their decision-making, other types of people are less thoughtful as they provide responses to questions. Krosnick describes these people as "agree[ing] merely to provide answers, with no intrinsic motivation toward high quality." These "respondents may satisfy their desires to provide high-quality data after answering a few questions, and become increasingly fatigued and distracted as a questionnaire progresses." As a result, these respondents rely more on shortcuts as such as choosing the status quo or "no opinion" for questions appearing later on in a questionnaire (Ying 1989).

3 A Simple Theory of Choice Fatigue

The theory of choice fatigue in voter decision-making presented in this chapter is provided to serve as a guide to motivate the estimated reduced-form regressions in the subsequent chapters. To reiterate the research's primary motivation, we hypothesize that the process of making decisions induces a "fatigue" on an individual, decreasing the likelihood that she will take action and increasing the likelihood she will rely on choice heuristics in a subsequent decision. Note that in the model, and in the regression specifications, we assume that voters make their ballot decisions in the order in which the contests appear on the ballot.[11]

The model focuses on a rational voter that receives utility from voting according to her

to make a decision based on the candidates' gender, the voter must read each candidates name, determine the likelihood that the candidate is male, and compare these likelihoods across candidates.

[11] Unfortunately in my dataset there is no way to know how many voters fill out their ballots by jumping around rather than moving sequentially from the first contest to the last contest. One type of data that could help determine this could be electronic voting records. If an electronic voting machine were designed to keep track of all of the voter's click behavior, and the time spent on each contest, this would surely be a very valuable data source.

preferences. However, her preferences are costly to determine, and become more costly as she makes more decisions. As a result, she optimally decides to abstain from a decision or rely on less-accurate information when making a decision. Obviously, it would be possible to design a similar model in which the voter makes a "mistake," in the sense that they make sub-optimal decisions as a result of naiveness about the effect of fatigue on their decisions. However, as we can not distinguish between these models in our data, we will remain agnostic about the level of "mistakes" and focus on the simpler, rational-choice, model.

In the model, there is a representative voter who is presented a ballot with n contests, indexed by $i \in \{1, 2, ..., n\}$, each with alternatives 0 and 1. The voter's decision for contest i is denoted as $d_i \in \{0, 1\}$. Before voting begins, nature chooses a state of the world $s_i \in \{0, 1\}$ for all of the contests. The voter does not know these states of the world, but for each contest she has the same prior $\Pr(s_i = 0) = p > 0.5$. The objective of the voter is to match her decision for each contest with the state of world. That is, her utility for each decision after the state of the world is revealed is

$$u(d_i) = \begin{cases} 1 & \text{if } d_i = s_i \\ 0 & \text{otherwise} \end{cases} \tag{1}$$

and total utility is then $\sum_{i=1}^{n} u(d_i)$.

Prior to making a decision, the voter may obtain exactly one costly signal of s_i with which she updates her prior. Choosing to make a "thoughtful" decision results in signal t_i, whereas making a "quick" decision results in signal q_i. Although both signals on average return the true state of the world, thoughtful decision-making provides a more accurate signal than quick decision-making. Specifically, $T_i \sim N(s_i, \sigma_T^2)$ and $Q_i \sim N(s_i, \sigma_Q^2)$, with $\sigma_Q^2 > \sigma_T^2$ and t_i and q_i being realizations of the two distributions, respectively. The cost of receiving the signal q_i is 0 and the cost of signal t_i is $c(F_i) > 0$, where $c(\cdot)$ is differentiable and F_i is the stock of "fatigue" or "mental depletion" at decision i. To capture the idea that choice fatigue increases with the number of decisions made, it is true that $c'(\cdot) > 0$, i.e., the cost of obtaining a thoughtful signal increases with the stock of fatigue.

F_i evolves according to the following rules:

- $F_1 = 0$
- $F_i = F_{i-1} + 1$ if the signal at decision $i - 1$ was a thoughtful one (t_{i-1})
- $F_i = F_{i-1} + a$ if the signal at decision $i - 1$ was a quick one (q_{i-1}), with $0 < a < 1$

Since c is a function of F_i and F_i is strictly increasing in the number of decisions made, the evolution of F_i tells us that the cost of obtaining a thoughtful signal increases in not only the stock of fatigue, but also in the number of decisions made.

Once a signal is observed, the voter chooses to take an action $d_i \in \{0, 1\}$ or to allow a random process to make the decision for her. In particular, the random process decides according to $\Pr(d_i = s_i) = r > 0.5$. This random process serves as the ability for the voter to abstain and allow other voters to decide for her. We assume that $r > 0.5$ so that the random process is more likely to provide the "correct" decision than chance.

After observing the signal, the voter updates her prior. If the signal x is a realization from the distribution $X \sim N(s_i, \sigma^2)$ with corresponding pdf $\phi(x)$, the voter uses Bayes' rule to determine the posterior distribution:

$$\Pr(s_i = 0 \mid X = x) = \frac{p\phi(\frac{x}{\sigma})}{p\phi(\frac{x}{\sigma}) + (1-p)\phi(\frac{x-1}{\sigma})} \equiv p^*(x) \tag{2}$$

Given the utility mapping and this updated belief about whether the state of the world is 0, then the optimal decision rule is decided by choosing the action with the highest expected value:

- $E(d_i = 0 \mid X = x) = p^*(x)(1) + (1 - p^*(x))(0) = p^*(x)$
- $E(d_i = 1 \mid X = x) = p^*(x)(0) + (1 - p^*(x))(1) = 1 - p^*(x)$
- $E(\text{random}) = r(1) + (1 - r)(0) = r$

The cost of the signal can be ignored while evaluating the expected value to each action since it is the same across actions. These expected benefits lead to the decision rule:

- choose $d_i = 1$ if

$$\begin{aligned} E(d_i &= 1 \mid X = x) > E(\text{random}) > 0.5 > E(d_i = 0 \mid X = x) \\ &\Leftrightarrow 1 - p^*(x) > r > 0.5 > p^*(x) \\ &\Leftrightarrow p^*(x) < 1 - r \end{aligned}$$

- choose $d_i = 0$ if

$$\begin{aligned} E(d_i &= 0 \mid X = x) > E(\text{random}) > 0.5 > E(d_i = 1 \mid X = x) \\ &\Leftrightarrow p^*(x) > r > 0.5 > 1 - p^*(x) \\ &\Leftrightarrow p^*(x) > r \end{aligned}$$

- otherwise, choose to let the random process decide, i.e., $r < p^*(x) < 1 - r$

Given this decision rule, our goal is to determine how the probability of each action changes (since it is a function of the signal x) as the voter makes more and more decisions. Since thoughtful decisions provide more accurate signals of the state of the world and only become more costly, they will be frontloaded and at some point only quick decisions will subsequently be made. Thus, to see how the probability of each action being taken changes as the voter makes more and more decisions, it is really only necessary to see how these probabilities change as the variance of the signal increases, i.e., moving from thoughtful to quick decision-making. Intuitively, a thoughtful signal provides more accuracy around the true state of the world s_i, which in turn makes the voter less likely to undervote and also less likely to vote her prior. Thus, the opposite is then true: if the signal is more noisy, then the voter is more likely to undervote and also more likely to rely on her prior (vote zero/no).

Proposition 1 *As the voter moves through the sequence of decisions, the probabilities of choosing $d_i = 0$ and letting the random process decide both increase.*

This theory of voter decision-making describes voters as less likely to make careful decisions as they become more fatigued, and thus also more likely to rely on abstaining and following their prior. If we think of reliance on the status quo as a prior, and that voting "no" is a vote against change (i.e., for the status quo), then the voter will become more likely to vote "no" as she becomes more fatigued. Similarly, abstention can be though of as another heuristic which the voter uses to aid decision-making. With this theory in mind, we now move on to a discussion of the institutional and empirical details necessary to clearly understand the validity of the natural experiment used in the identification strategy.

With this theory of contest-specific voter participation in mind, we now move on to a discussion of the empirical strategy used to test the assertions of the theory.

4 Data

The analysis uses a precinct-level panel dataset of participation and number of votes cast for every federal, statewide and local contest on the primary and general election ballot in San Diego County, California between 1992 and 2006. This dataset is unique and novel. Importantly, it depicts the number of votes across the *entire menu* of contests on the ballot, which is the main reason why the ballot position effects can be identified.

Constructing the dataset was a major endeavour: data for each election are reported in varying formats and identifiers for candidate vote totals (and thus contests and jurisdictions) were created manually. In total, there are 3.1 million precinct-contest-option observations. As undervotes are determined at the contest-level, the analysis in section 5 uses a collapsed dataset of 1.1 million precinct-contest observations, which includes participation and number of votes cast for every contest. The ballot position for every precinct-contest observation is inferred from the rules in §13109 of the Elections Code of the California State Constitution (the exact rules are discussed in detail in section 5.1).

The source of the data is the Statement of the Vote/Official Canvas published by the San Diego County Registrar of Voters on their website.[12] San Diego County was chosen due to data availability and the large variation across precincts and elections in the number of overlaying local political jurisdictions. Official canvas data are also available for other counties, but obtaining electronic or paper files has proven difficult, mainly for lack of preservation of records and limitations on public access. Electronic precinct-level data are available for San Francisco, for example, but due the lack of special districts within the City and County, it is not feasible to exploit the necessary variation to identify ballot position effects.

Unfortunately, the turnout data by party in the 2004 primary, 2004 general and 2006 primary elections are unreliable due to an aggregation of absentee and polling voters. We drop these elections due to difficulty in separating the polling precinct voters from the absentee

[12] http://www.sdcounty.ca.gov/voters/Eng/Eindex.html

voters. Thus, the analyses focus on 1992-2002, except for the California judicial retention questions, for which we use data from the 2006 general election.[13]

Another concern with the data is that precinct borders may change over time and thus the longitudinal dimension of the data may not be tracking a consistent unit of observation. For instance, the precinct "ALPINE 553110" in the 1992 primary may have different geographical boundaries than the precinct with the same label in the 1998 general election. This may be especially true in the 2002 and 2006 elections, which took place after the usual post-2000 Census redistricting. Conversations with the San Diego Registrar of Voters have suggested that this is not a significant problem since precinct boundaries change primarily to keep the number of registered voters within a precinct roughly equal and any changes will stay geographically and demographically close to the old boundaries.[14]

A similar concern is the identification of consistent precincts for absentee voters, which is important as we use precinct-level fixed effects. While it is possible to track the same *polling* precinct across elections, this is not possible for absentee voters because absentee precincts are defined by ballot types (all voters with the exact same ballot) rather than all voters in the same area. Given that multiple precincts use the same ballot type and this group of precincts (somewhat) change over time, there is no way to assign a consistent precinct to each absentee precinct. As an imperfect substitute, we find 646 groups of the 3825 polling precincts that often use similar ballot types over time to create a set of "grouped" precincts, which have a composition that is relatively consistent across time.

Finally, there are some changes in the set of overlaying political districts across time due to the 2000 Census redistricting and the creation and merging of local districts. This is a small issue since it does not affect our primary source of variation within an election.

5 Choice Fatigue and the "Decision to Decide"

In this section, we focus on how the number of previous decisions in the electoral choice environment affects a voter's decision to *participate* in voting on a particular contest, ignoring the actual decision made. As discussed in detail in the following section, this is accomplished by analyzing a natural experiment in which different voters see the same contest in different ballot positions as a result of differences in the number of contests in the overlaying local political jurisdictions in which a voter resides.

5.1 Empirical Strategy

The estimates of the effect of ballot position on the decision to cast a vote in a particular contest are identified by exploiting exogenous variation in ballot position across precincts. The natural experiment providing the exogenous variation in ballot position is characterized by the structure of all voting ballots in California. Namely, §13109 of the Elections Code of

[13] Judicial retention contests appear in my data during the 1994, 1998, 2002 and 2006 general elections.

[14] A related issue is the attrition and creation of precincts over the dataset due to population growth.

the California State Constitution dictates that contests appear in the same ordering across ballots.[15] Federal, statewide and local offices always appear above the statewide propositions, which in turn appear above the local propositions. Additionally, statewide propositions are ordered by type[16] and listed in the order in which they were qualified for the ballot[17], e.g., Proposition 53, Proposition 54, Proposition 55, etc. This order is the same for all voters across the state.

As different precincts contain (potentially) different contests in various sections of the ballot, voters in these precincts will see *the same contest* (e.g. Proposition 35) in later sections *in different ballot positions.*[18] This variation is primarily due to the local contests, but the State Senate districts also provide some variation. Beyond the local political jurisdictions and State Senate districts, a third source of within-contest differences in ballot position across voters is partisan ballots. In primary elections, it may be that the Democratic Party is running candidates in fewer statewide contests than the Republican party (this effect is more pronounced with "third" parties who run candidates in generally only a few statewide contests). In this case, Republican voters will have made more decisions by the time they decide on the first statewide proposition. Unfortunately there is no by-party breakdown of votes cast for propositions and nonpartisan offices. However, we can use the variation by constructing ballot position for partisan voters in the same precinct as a registration-weighted average of the within-precinct ballot position for a given contest, across parties.

These factors generate significant variation in the ballot position of the *same contest across different voters.* Note that some contests (such as Governor, President, Secretary of State, etc.) will appear at the same position (the top of the ballot) for all voters. These contests are dropped. To illustrate the variation that remains, Figure 3 describes the distribution of deviations from the mean ballot position in each contest for the four types of contests (this implicitly assumes the use of contest fixed-effects, which are discussed below). Note that statewide propositions contain the most variation, followed by local propositions, elected offices, and statewide judicial offices. Furthermore, note that statewide propositions and judicial offices contain the most precinct-level observations per contest, as every voter observes these contests on their ballot.

There are many contest-level factors that both affect voter behavior and are potentially correlated with the ordering of the contest, such as saliency, expected contest closeness, and

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[15] Charter cities and counties are allowed flexibility in their elections code. Of the 4 charter cities in my dataset, the only deviation from the state elections code that is relevant to my dataset is discussed in section 6.1.1: the City of San Diego rotates city contest candidates in a different way than the state elections code.

[16] §13115 of the California Elections Code states that proposition types appear on the ballot in the following order: bond measures, constitutional amendments, legislative measures, initiative measures and referendum measures.

[17] A proposition qualifies for the ballot when the Secretary of State approves the submission of the required number of signatures petitioning to put the proposition on the ballot. The number of signatures required is 5% and 8% of the number of votes in the previous gubernatorial general election for initiatives and constitutional amendments, respectively.

[18] Variation in the ballot across precincts arises from differences in contests in the following sections: State Senator, County Board of Education Members, Community College Board Members, Unified School Board Members, High School Board Members, Elementary School Board Members, Board of Supervisors, Mayor, City Council, Other City Offices, Other District Offices

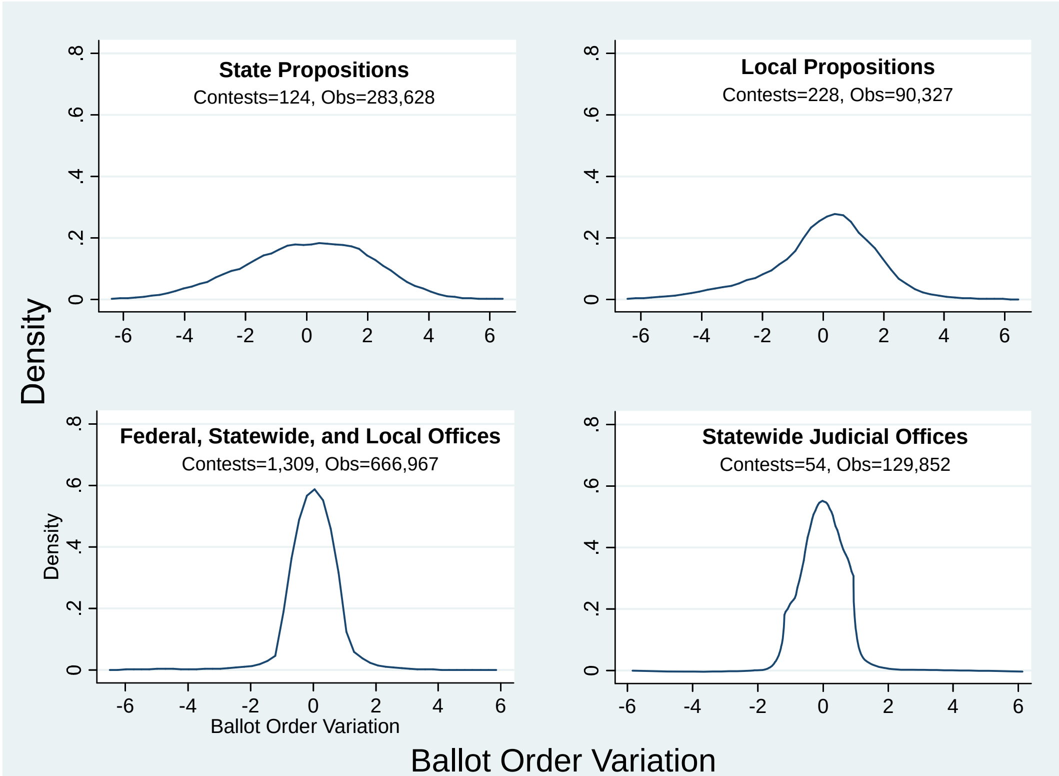

Figure 3: Kernal Density of variation from mean ballot position of a contest (separated by type of contests)

the size of polity. If each of these factors are not controlled for, any estimate of the effect of ordering on voter outcomes will be potentially biased. However, controlling for these factors is extremely difficult using observable contest characteristics. Fortunately, the natural experiment in this paper avoids this problem by permitting the identification and inclusion of contest-specific fixed effects, which fully control for all observable and unobservable contest-specific factors that might affect voting behavior. The inclusion is a key contribution of this paper as it allows us to untangle the effect of choice fatigue from the multiple explanations for voter behavior in a particular contest on the ballot.

One story which potentially voids this part of the identification strategy is that there may be a selection bias generated by our primary source of exogenous variation. Consider a contest which appears 10^{th} on the ballot for some voters and 15^{th} for others. The contest appears 15^{th} as a result of more local offices appearing higher up on the ballot. If that characteristic of the ballot – more local offices – causes the less informed voters to turnout, then the down-ballot fatigue effects we purport to exist may actually be driven by the selection bias of voters who are more likely to undervote to the polls. Unfortunately, there is no way to directly control for this effect. However, we do not believe this is a threat to the identification strategy for two reasons. First, we don't find it likely that this type of selection would be so consistently applied so as to bias the results exactly in the same way as our priors for the fatigue coefficients. Second, in the results to follow we still find fatigue effects for the contests highest up on the ballot (statewide judicial retention questions). These contests have variation of only one or two positions, and this variation is not caused by local political jurisdictions.

A similar concern is that there are precinct-level factors that both affect voter behavior and are potentially correlated with the ordering of the contest. For example, it may be that certain precincts tend to both participate less and also to have more local offices on the ballot. In this case, statewide propositions will appear relatively further down the ballot and observed increases in abstention will be caused by precinct differences rather than position effects. Fortunately, the longitudinal nature of the data permits the addition of precinct fixed effects, which capture all observable and unobservable precinct-level factors that might affect voter behavior.

Note that this approach assumes that the precinct-level effects are constant over time. For example, consider a group of precincts that become wealthier and more educated over time (perhaps by gentrification). If this causes a change in the number of local elected contests on the ballot in these precincts *as well as* changes in voter behavior, then the effects of ballot position on voter behavior could be mistaken for the effects of changing demographics. In a similar manner to the potential concerns with contest fixed-effects, we cannot control for this effect. However, we find it unlikely to be particularly important as the direction of this effect is not obvious and the ballot position effects are mainly identified by the within-election variation in ballot position

With these points in mind, we claim that the ballot position of a given contest in a particular precinct is an exogenous determinant of the likelihood that a voter will abstain. The main results in this section come from the estimation of the parameter β_{UV} in the following equation:

$$UV_{ci} = \alpha_{UV} + \beta_{UV} \cdot POSITION_{ci} + \rho_c^{UV} + f_i^{UV} + \upsilon_{ci} \tag{3}$$

where UV_{ci} denotes the percentage of undervotes in contest c and precinct i as a percentage of turnout in precinct i. Note that election dates are implicitly indexed by c because we define a contest as a contest in a particular election, which appears on the ballot only once. $POSITION_{ci}$ refers to the ballot position of contest c in precinct i. For all regression results we include proposition and precinct fixed effects ρ_c and f_i, respectively. υ_{ci} contains is the unobservable predictors of UV_{ci} and is uncorrelated with any of the included regressors.

5.2 Results

Column 1 in Table 1 provide the estimate of equation 3. This benchmark specification estimates that moving a particular contest down one position (thus increasing the number of decisions a voter makes prior to observing this contest by one) increases the number of undervotes by .129 percentage points. Given that an average contest in the dataset appears at ballot position 15.7, this estimate suggests that undervotes would decrease by an average of 2 percentage points if these contests appeared at the top of the ballot. As the average level of undervotes is 21.6%, this suggests that choice fatigue is responsible for 9.3% of undervotes in these contests.

Column 2 cuts the results by contest type (with separate precinct level fixed effects for each type, which we do throughout the paper for all regressions with different types of contests, elections, or voters). The results for statewide propositions, local propositions, and offices have very similar point estimates of .07-.08 percentage points. However, the estimate for judicial races (.411) is clearly significantly larger than those for the other contest types. This is not surprising as judicial races induce more than twice the percentage of undervotes than other races (39% vs. 19%), presumably because statewide judicial retention contests are some of the lowest-salience contests on the ballot.[19] Similar logic to above (with type-specific statistics) suggests that undervotes for local propositions, statewide propositions, statewide judicial races, and offices would be reduced by 14.8%, 19.7%, 5.4%, and 8.9% if the contests appeared at the top of the ballot, respectively. [20]

The regressions in Column 3 estimate primary and general election-specific coefficients. The primary coefficient is not significantly different from zero, suggesting that the majority of the effects of choice fatigue occur in general elections (where the coefficient is .18). This is not surprising if, as described in Brockington (2003), primary voters are more motivated than general election voters and high motivation mediates the effects of choice fatigue.

Finally, Column 4 separates the sample by the absentee status of voters. Somewhat surprisingly, the coefficient for the absentee voters is nearly three times that of voters that vote in polling places. One might predict a smaller or negligible choice fatigue effect for absentee voters, as they have more time to vote, potentially more information at their disposal, and have been characterized as of a higher socioeconomic status and more politically active (Karp and Banducci 2001). As we will see in the following section, absentee voters are also more likely to choose the status quo when making a decision. Our dataset does not allow us to determine the precise reason for this effect, although selection effects might play a role (absentee status is usually self-chosen by the voter).

6 Choice Fatigue and Choice Across Alternatives

The previous section analyzed the effect of the number of previous decisions on the "decision to decide." While this result provides evidence of choice fatigue, the economic impact is unclear. If voters that choose to abstain vote similarly to those that choose to vote, the abstentions will not affect the final result of the election. Consequently, in this

[19] This is due to a couple of main factors. First, the institution of electing judges is one of retention rather than competition. As a result, in the words of the California Courts' homepage, "Appellate court justices generally do not actively campaign for retention." Thus, voters likely have very low levels of information regarding these contests. Second, information provided on the ballot in these statewide judicial contests provides voters with no cues regarding ballot designation, partisan identification, endorsements or incumbency. Instead, voters are simply asked questions such as, "Shall Presiding Justice Judith McConnell be elected to the office for the term provided by law?"

[20] Local propositions, statewide propositions, statewide judicial races, and offices appear on average at ballot positions 33.1, 24.8, 18.6, and 8.4, respectively, and have average undervote rates of 16.9%, 10.1%, 24.1%, and 39%, respectively.

section, we look at the changes in the actual decisions made by voters (conditional on making a decision) as they become fatigued by previous choices. Specifically, we examine the impact of fatigue on the likelihood of making decisions that maintain the status-quo (voting "no" on propositions) or are extremely easy to process (voting for the candidate that is listed first). The empirical strategy, which is discussed separately for these two outcomes, is similar to that in the previous section.

6.1 The Effect of Fatigue on Maintaining the Status Quo in Propositions

In California, a "No" vote on statewide and local propositions always represents maintaining the status quo. Voters may have no information about changes implied by a particular proposition, or any desire to expend cognitive effort to uncover this information. However, they are likely more familiar with the status quo given that they have lived in the status quo environment for at least some time. In this section, we analyze the *impact of fatigue* on the tendency to vote "no" on propositions.

6.1.1 Empirical Strategy

As discussed in section 5.1, the structure of the California ballot provides exogenous variation in ballot position of particular propositions, which we assume impacts the number of previous decisions made by a voter before confronting that proposition. In order to determine the effect of ballot position on voting "no", we use the following general specification:

$$NO_{ci} = \alpha_{NO} + \beta_{NO} \cdot POSITION_{ci} + \rho_c^{NO} + f_i^{NO} + \eta_{ci} \tag{4}$$

where NO_{ci} is defined to be the number of "no" votes in a contest as a fraction of the total votes cast in the contest (yes + no votes). In order to identify the parameter of interest β_{NO}, the identification strategy employed for this model is exactly the same as in equation 3. Note that as the dependent variable is a fraction of the total yes and no votes cast in the contest, this equation is determined conditional on voting in the contest since .

In addition, we will use a specification similar to 4 with an interaction of the ballot position variable with (log) total campaign expenditures. This captures the effect of contest-specific campaign expenditures on the ballot-position effect. The expenditures data were taken from California Secretary of State's Cal-Access database as well as past issues of the now-defunct "Campaign Finance Reports" series.

6.1.2 Results

Column 1 in Table 1 provide the estimate of equation 4. This benchmark specifications estimate that moving a particular contest down one position increases the number of "no" votes by .11 percentage points. Given that an average proposition race in our dataset appears at ballot position 26.8, this estimate suggests that "no" votes would decrease by an average of 2.9 percentage points if these contests appeared at the top of the ballot. Interestingly, given the average ballot position of each proposition, we calculate that *22 of the 352 propositions in our dataset would have passed rather than failed* if the proposition was presented to voters as the first contest on the ballot.

Column 2 compares the coefficients for local and state propositions. The coefficients are very economically similar, estimated at .125 and .102 respectively. Similarly, Column 3 displays primary and general election-specific coefficients. As with the estimated coefficients on the effect of choice fatigue on undervotes in Section 5, the coefficient for the general elections is significantly higher than that for all elections, and the coefficient for primary elections is lower (and, in this case, significantly *lower* than zero). Again,this suggests that the high motivation associated with primary voters reduces the effects of choice fatigue. The impact of absentee status is shown in Column 4. The estimate for absentee voters is higher than for those that vote in polling places, which is surprising, although consistent with the estimated coefficients on undervotes for absentee voters in Section 5.

Finally, Column 5 provides the estimation of equation 4 with an added term that interacts ballot position with the log of campaign expenditures for state propositions.[21] Presumably, this variable provides a reasonable proxy for contest saliency, as we would expect that higher campaign spending would cause a contest to be better known and better known races would receive more contributions (leading to higher spending). Our results suggest that higher expenditures lead to a mitigation of choice fatigue effects, represented by the negative coefficient on the "BP * Expend" term. To understand the economic impact of this coefficient, first note that the log of expenditures are somewhat binary: zero expenditures occur in 25% of races, while log expenditures range from 10 and 17 (representing expenditures of $22,000 and $24 Million, respectively) for the other 75% of the races (the full histogram is show in Figure 4). Figure 4 shows the estimated ballot position coefficient for these expenditure levels. The coefficient for races with zero expenditures is relatively large at .324, while the coefficient is relatively close to zero for the majority of races with positive expenditures. One obvious explanation of this finding is that voters have not yet made decisions on election day on low-saliency elections, leaving them more susceptible to choice fatigue. This suggests that the estimates in previous sections are conservative, as they include situations in which voters have previously made a decision and therefore are not subject to choice fatigue.

6.2 The Effect of Fatigue on Voting for the First Candidate in Elections

As opposed to the "yes/no" questions of propositions, voters participating in elected office contests vote for one or more candidates. In this section, we will analyze the effect of choice fatigue on the tendency to choose the first candidate in the ordering, which is presumably the lowest-effort decision shortcut possible.[22]

[21] We focus on state propositions due to data availability.

[22] This Follows strong evidence seen in previous literature on ballot order effects (Meredith and Salant 2007, Miller and Krosnick 1998, Koppel and Steen 2004, etc.)

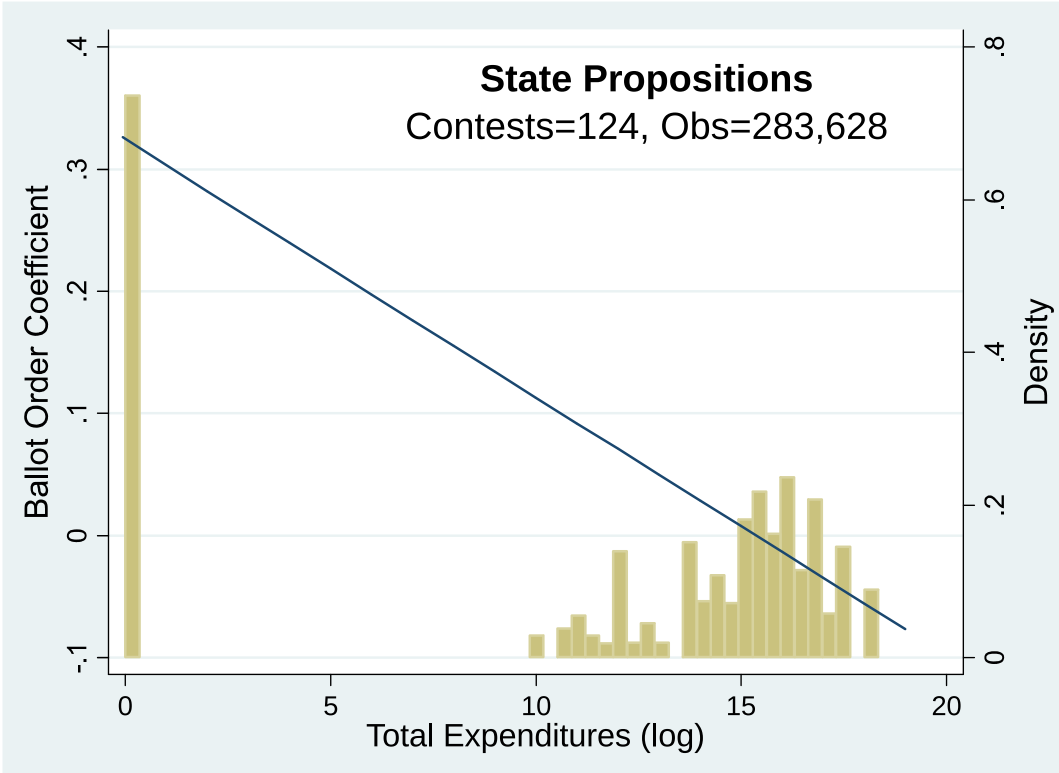

Figure 4: The histogram shows the distribution of the total expenditures (log) variable. The line is the estimated ballot order coefficient for different value of this variable.

6.2.1 Empirical Strategy

As in section **??**, in order to separately identify ballot position coefficients, fixed effects for each contest and precinct are included in each specification. In addition, another natural experiment permits the addition of candidate-specific fixed effects in this section. For almost all elected offices on the ballot, the ordering of candidates is determined by the drawing of a random alphabet by the Secretary of State.[23] For some of these offices, candidates are rotated across certain subsets of precincts within the office's political jurisdiction.[24] This rotation

[23]The only exception in our dataset is the City of San Diego, whose city charter dictates that city office candidates are to be forward-rotated across city council districts.

[24]For statewide contests (e.g., Insurance Commissioner), county-wide contests (e.g., Sheriff), congressional or State Board of Equalization districts, the candidates are backward-rotated (first moves to last, second moves to first, third moves to second, etc.) across State Assembly districts. The statewide contests are rotated throughout all of the state's assembly districts, whereas the other rotation contests are rotated only through those assembly districts which appear within the county. There is no rotation otherwise, except for two special cases. The first is charter cities and counties with elections codes that are potentially different from the state's. In San Diego County, the only relevant deviation from the state's elections code is the City of San Diego, which forward-rotates city office candidates across city council districts. The other exception is when a State Assembly or State Senate district appears in more than one county. In this case, a random alphabet is drawn in each county to determine the candidate ordering. All other contests are not rotated and follow the random alphabet drawn by the Secretary of State.

places the same candidate at different within-contest positions in different precincts, allowing the estimation of candidate-specific fixed effects in order to control for all candidate-specific observables and unobservables. Figure 5 describes the distribution of deviations from the mean within-contest position in each candidate, demonstrating that this variation is sufficient to identify the candidate fixed effects.

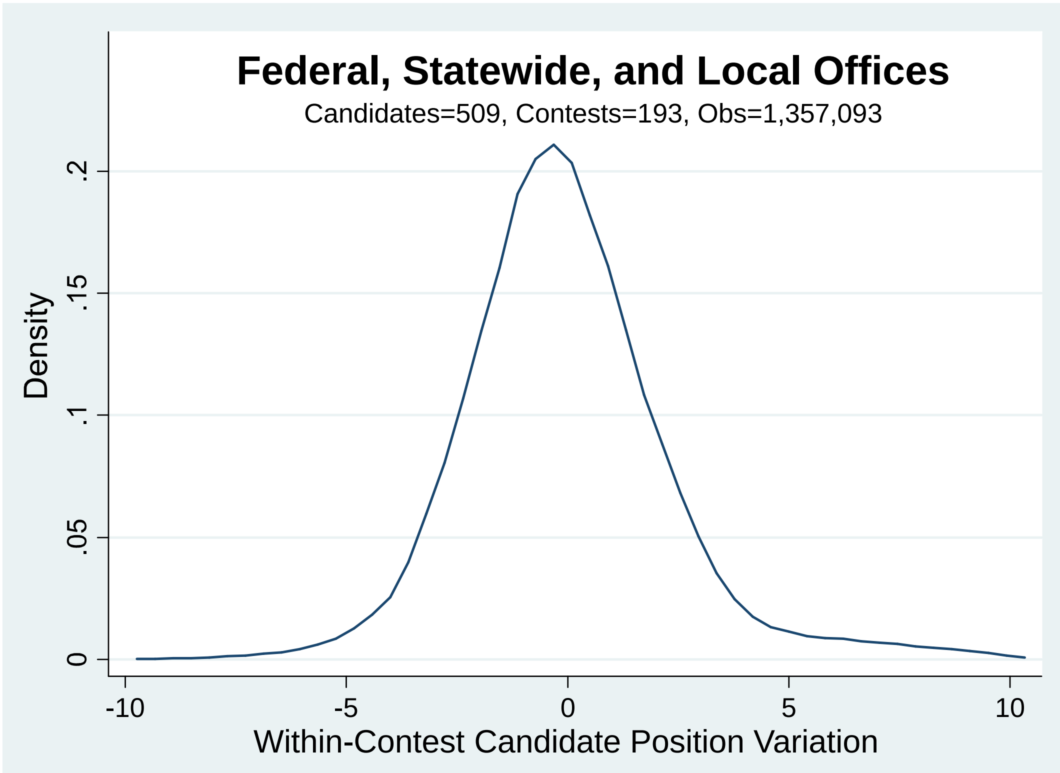

Figure 5: Kernal Density of variation from mean contest-specific ordering of a candidate

This three-way fixed effects model is quite a large computational task, with 950,482 polling precinct observations, 408,990 absentee precinct observations, 3473 precinct effects, 509 candidate effects and 195 contest effects in the dataset. With these three sets of fixed effects included in the regression, the primary goal is to estimate the coefficient on the interaction term between ballot position and a dummy variation $FIRST$ that represents that a candidate is that the top of the within-contest ordering:

$$voteshare_{coi} = \alpha + \beta \cdot POSITION_{ci} \cdot FIRST_{coi} + \gamma \cdot FIRST_{coi} + \psi_c + \rho_o + f_i + \eta_{coi} \quad (5)$$

where $voteshare_{coi}$ is the percentage of the total votes cast in contest o that candidate c receives in precinct i, and ρ_c, f_i, ψ_c represent proposition, precinct, and candidate fixed effects, respectively. We interpret the coefficient γ as the effect to a candidate's vote share of appearing first in the contest ordering, while the coefficient β is interpreted as the additional effect on candidate's voteshare of appearing first *for each single change in ballot position of the contest*. Note that $POSITION$ does not enter the equation by itself. Given that this analysis is conditional upon a vote being cast in the contest, $POSITION$ does not belong in the regression model as a predictor of candidate vote share in a particular contest because it is constant within a contest. As a result, it only acts as a conduit to examine the interactions of fatigue with the tendency to vote for the first candidate listed.

6.2.2 Results

Column 1 in Table 3 provide the estimate of equation 5. This benchmark specifications demonstrates both that appearing first in the intra-contest ordering has a significant positive impact on the candidate's voteshare of .50 percentage points, and that choice fatigue has a significant impact on the tendency to use this shortcut. Specifically, moving the contest down one position increases the expected voteshare of the first candidate by .057 percentage points. As the average office race in our dataset appears at ballot position 8.9, this estimate suggests that the first candidate receives, on average, an additional .51 percentage points as a result of choice fatigue.

Column 2 estimates a separate coefficient for state and local offices, suggesting similar effects across contest types. Column 3 displays the effect by election type, suggesting (as in the previous regressions above) that the effect is larger for voters in general elections than primary elections. Finally, Column 4 separates the effect for polling and absentee voters. Unlike in the previous regressions above, we find no significant difference in the effect across different types of voters.

7 Discussion and Conclusion

7.1 Discussion

Even though the empirical application in this paper focuses on voter behavior, the strength of the identification strategy and established evidence suggest that it is reasonable to extrapolate the results to a broader set of consumer and economic choice problems in which a person makes a bundle of decisions. If firms or policy makers know about this characteristic of decision behavior, then this may influence their strategy in how they order decisions or disseminate information.

For example, it is not unusual for consumers shopping online for electronics to be offered the possibility to compare the attributes of a handful of similar items. If consumers experience fatigue while comparing a long list of attributes, then a retailer may strategically place attributes at particular positions in the comparison sequence so as to mitigate or exacerbate fatigue. Evidence of the importance of this type of strategic behavior is highlighted in Levav et.al. (2007), which focuses on the full customization of a single product rather than the comparison of products. Presumably, a firm's optimal strategy is dependant on level of naiveness of the consumer about this behavioral tendency, which we are unable to estimate with our dataset.

Portfolio choice and diversification is another commonly-studied task that involves bundled decisions. If decision-making among investors in 401(k) funds is susceptible to fatigue, a benevolent planner will take care in the dissemination of information regarding the investment options and the ordering of decisions. In particular, if certain decisions carry more weight in terms of utility (i.e., equity fund investments), then these decisions should be placed towards the beginning of the decision sequence so as to minimize the likelihood that the investor is fatigued and making less-than-careful decisions. Similarly, the results also potentially have implications for other applications in decision-making such as health plan selection (see, e.g., McFadden 2005), car insurance interviews and the physical arrangement of items in a store.

As our result directly concerns voting behavior, we will discuss several theoretical and practical implications relevant this context.

First, special interest groups may want to exploit the control that they have over the position in which their proposition appears on the ballot. For example, citizens' initiatives appear in the order in which they qualify and thus it may be optimal for the group to qualify their proposition as early as possible if they wish to minimize the "no" effect from voter fatigue.[25] Alternatively, it also makes sense for these actors to consider proposition placement across elections, given that the top of the ballot is significantly longer in gubernatorial elections.

Second, and in a similar vein to the first point, the evidence provided may contribute to the literature on the endogenous timing of school bond elections (Romer & Rosenthal 1978, Meredith 2006). This research suggests that an agenda setter may find it optimal to put a school bond proposition on the ballot in off-year special elections when the electorate who chooses to turn out will be relatively motivated in favor of passage of the bond. The evidence in this paper suggests another reason to take this strategy: propositions listed towards the end of the ballot are more likely to experience "yes" votes when placed on a relatively short special election ballot.

Third, a theoretical result by Besley and Coate (2000) finds that there are welfare gains to the unbundling of policies from candidates, i.e., the addition of initiatives to the ballot as a separate contest to the candidate election. Our result suggests a potential problem with this method, as an increase in the number of decisions will increase choice fatigue.

Fourth, if the documented fatigue effect is undesirable, then elections officials could consider randomizing the order in which the contests appear on the ballot in order to remove the position effects. While this may be impractical for the entire ballot, even a within-block randomization would partially mitigate the effects. A large body of previous work on the effects of candidate position within a contest (Krosnick & Miller 1998, Koppell and Steen 2004) is in line with our work and confirms that order matters. A number of states have begun to randomize candidate orderings across precincts in an election, suggesting that elections officials may be open to the idea.

[25] Initiatives qualify for the ballot in two steps. First, the initiative is approved and phrased by the Attorney General. Second, the proponents of the initiative must collect signatures from registered voters. For initiative statutes, the number of necessary signatures is equal to 5% of the number of votes in the last gubernatorial contest. Initiative constitutional amendments require 8%.

Fifth, if voters experience choice fatigue and this affects their ability to participate in the democratic process, then elections officials may want to think about either limiting the length of ballots or holding more frequent elections. As an example, Canada holds national and local elections on separate dates.

Finally, if having the ballot at home for a length of time mitigates the position effects, elections officials may want to increase efforts to convert citizens from polling station voters to absentee voters. However, while this solutions seems intuitive, our results suggest that absentee voters are actually *more likely* to be affected by choice fatigue. This might be a result of selection (most absentee voters choose this status), which we cannot distinguish in our data.

7.2 Conclusion

This paper isolates the effect of choice fatigue on individual decision-making through a natural experiment in which the same ballot contest appears at different positions across voters. Through this exogenous variation in the number of previous decisions that voters makes before deciding on a particular contest, we are able to separate the effects of choice fatigue from other competing explanations of choice behavior. We find that voters are more likely to abstain and more likely to rely on decision shortcuts, such as voting for the status quo or the first candidate listed in a race, as the ballot position of a contest falls. In terms of economic impact, we estimate that if an average contest was placed at the top of the ballot, undervotes would decrease by 10%, the percentage of no votes on propositions would fall by 2.9 percentage points, and the percentage of votes for the first candidate would fall by .5 percentage points.

As discussed in section 7.1, the results have broad implications for economic choice and for the design of electoral institutions, which offer opportunities for future work. For example, this paper does not distinguish between decisions with different levels of complexity, which presumably affects the level of choice fatigue induced by making the decision. This suggests a possible interaction between for the fatigue effects documented here and the "choice overload" phenomenon discussed in Iyengar and Lepper (2000).

The fact that decision outcomes are dependant on the number of previous decisions made is presumably useful to creators of decision-making environments, such as a company or policy maker. For example, as we estimate that 6% of propositions would have different outcomes if placed at the top of the ballot, governments might consider enacting policies to limit the number of decisions on an individual ballot or take action to encourage spreading these decisions over a larger period of time.

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Table 1: Regressions of Undervoting on Ballot Position

	(1) OLS Undervotes	(2) Contest Type† Undervotes	(3) Election Type† Undervotes	(4) Voter Type† Undervotes
Ballot Pos. (BP)	0.129***			
	(10.56)			
BP - State Prop		0.0757***		
		(4.24)		
BP - Local Prop		0.0804***		
		(13.13)		
BP - Offices		0.0711		
		(1.91)		
BP - State Judge		0.411***		
		(5.15)		
BP - General			0.188***	
			(21.70)	
BP - Primary			0.0000433	
			(0.00)	
BP - Polling				0.126***
				(8.62)
BP - Absentee				0.363***
				(13.29)
Observations	910,498	910,498	910,498	910,498

Note: t statistics in parentheses $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$
All specifications include contest and precinct fixed effects
†Precinct fixed effects calculated separately for groupings

Table 2: Regressions of "No" Votes on Ballot Position

	(1) OLS "No" Votes	(2) Contest Type† "No" Votes	(3) Election Type† "No" Votes	(4) Voter Type† "No" Votes	(5) Expenditures "No" Votes
Ballot Pos. (BP)	0.112***				0.324***
	(14.70)				(17.29)
BP - State Prop		0.102***			
		(12.11)			
BP - Local Prop		0.125***			
		(6.83)			
BP - General			0.258***		
			(19.37)		
BP - Primary			-.0857***		
			(6.29)		
BP - Polling				0.135***	
				(19.97)	
BP - Absentee				0.230***	
				(8.22)	
BP * Expend					-0.0211***
					(15.28)
Observations	610,146	610,146	610,146	610,146	229,799

Note: t statistics in parentheses $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$
All specifications include contest and precinct fixed effects
†Precinct fixed effects calculated separately for groupings

Table 3: Regressions of Candidate Vote Share on Appearing First * Ballot Position

	(1) OLS Vote Share	(2) Contest Type† Vote Share	(3) Election Type† Vote Share	(4) Voter Type† Vote Share
Appears First	0.503 ***	0.341 ***	0.433 ***	0.378 ***
	(14.42)	(9.46)	(10.44)	(13.44)
Ballot Pos.*First (BP*F)	0.057 ***			
	(17.16)			
BP*F - State Offices		0.0723***		
		(12.02)		
BP*F - Local Offices		0.0647***		
		(10.98)		
BP*F - General			0.0747***	
			(19.09)	
BP*F - Primary			0.0450***	
			(8.90)	
BP*F - Polling				0.058***
				(17.46)
BP*F - Absentee				0.050***
				(4.78)
Observations	1,101,159	1,101,159	1,101,159	1,101,159

Note: t statistics in parentheses $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$
All specifications include contest and precinct fixed effects
†Precinct fixed effects calculated separately for groupings