Abstention and informedness in nonpartisan elections[1]

Jacob Meyer
The Center for Growth and Opportunity
Utah State University
jacob.al.meyer@gmail.com

Lucas Rentschler
Department of Economics and Finance
Utah State University
lucas.rentschler@usu.edu

[1] We thank the Department of Economics and Finance at Utah State University, and the Center for Growth and Opportunity for generous financial support.

Abstract

We develop and experimentally test a model of voter information acquisition in nonpartisan elections, both with and without abstention. We theoretically demonstrate that allowing for abstention results in a (weakly) more informed electorate, unless information acquisition is cheap relative to the cost of voting. Our experimental data find, contrary to predictions, that voter informedness increases when voting is mandatory, even when the cost of information is high. Our data are well explained by Agent Quantal Response Equilibrium which accounts for the fact that uninformed voters are often observed to vote, even when it is not rational to do so.

Keywords: Mandatory voting; Information acquisition; Costly voting
JEL Classification: C70; C90; D72; D80

1 Introduction

Citizens often rely on the party affiliation of candidates when voting (Bonneau and Cann, 2015; Rahn, 1993; Schaffner and Streb, 2002). Indeed, Rahn states: "the most powerful cue provided by the political environment is the candidate's membership in a particular political party.... The cue provided by the party label is simple, direct, and...consequential in shaping individuals' perceptions and evaluations of political candidates".

However, there are many election in which the ballots do not provide this basic information. These so-called nonpartisan elections often involve choosing judges, city council members, county prosecutors, sheriffs, or natural resource managers (DeAngelo and McCannon, 2019). By withholding partisan cues, the belief is that voters are more likely to acquire information about candidates, and make informed decisions.[1]

However, Schaffner and Streb (2002) finds that only a small proportion of voters in such elections are willing to express preferences and that many of these voters are "guessing". In practice, voter participation in these elections is low relative to more high-profile races (Bowler et al., 1992; Feddersen and Pesendorfer, 1999; Ghirardato and Katz, 2006; Schaffner et al., 2001). This is especially interesting since a voter's probability of affecting electoral outcomes is significantly higher in most nonpartisan elections.

Low turnout and an uninformed electorate could (and perhaps do) lead to decreased government accountability, and a weak connection between voter preferences and implemented policy. One proposed solution is to enforce mandatory voting laws.[2] This begs the question: would requiring voter participation increase the number of voters who become informed about political issues? We address this question by developing a theory of information acquisition, which we then test in a laboratory experiment.

In our model we focus on whether voters will pay to acquire the information that is costlessly available in partisan elections: party affiliation. There is a unique symmetric

[1]For example, Lim and Snyder Jr (2015) find that nonpartisan judicial election outcomes are driven by candidate quality, rather than party affiliation.

[2]Currently, 11 countries enforce mandatory voting to some extent. In most countries these laws are enforced by imposing fines on those who fail to show up to the polls, but some go as far as to suspend passport privileges (Brazil) or freeze bank accounts (Bolivia).

equilibrium where mandatory voting law will increase informedness if information is cheap relative to the cost of voting. If the cost of information is high relative to the cost of voting, allowing for abstention increases informedness. Consistent with the previous literature (Gersbach, 1992; Ortoleva and Snowberg, 2015; Matějka and Tabellini, 2017), the model predicts moderate citizens to be rationally inattentive to candidate preferences, while more extreme citizens are willing to pay to acquire information about candidates.

Our 2×2 experiment closely mirrors our theoretical model. We vary the ability to abstain on a between subject basis, and the cost of information on a within-subject basis. We vary the cost of information such that under the low cost mandatory voting is predicted to result in a more informed electorate, while under the high cost mandatory voting is predicted to decrease informedness.

We find that subjects under both the mandatory and abstention voting schemes respond to changes in the price of information as theory would predict. However, information acquisition is higher under mandatory voting, regardless of the cost of information. To explain this behavior, we turn to agent quantal response equilibrium (AQRE). This model accounts for the systematic error-making observed at both the information acquisition and voting stages of the game. Further, we are able to account for differences in the complexity of decisions at each stage of the games by allowing for heterogeneous errors in ways that do not depend on the expected payoffs associated with a given action. That is, we allow errors to depend on the cognitive complexity of a choice, rather than restrict attention to the expected loss of each action. The essential insight provided by our experiment is that when abstention is permitted, error-prone uninformed voters dilute the value of information by reducing the probability of being pivotal in the election. As a result, information acquisition is reduced, such that we do not observe more informedness with abstention, even with a high cost of information.

These results have important implications for nonpartisan elections. Theoretically, when the cost of information is high, mandatory voting laws can decrease voter informedness, since allowing for abstention increases the probability of being a pivotal voter, and thus the value of information. However, our experimental data suggests that this effect is substantially diluted since uninformed voters often opt to vote, despite it being irrational to do so. As such, in nonpartisan elections, mandatory voting is likely to lead to a more informed electorate.

2 Related literature

While previous research has found that the introduction of mandatory voting may increase turnout rates (Hoffman et al., 2017), it is unclear if it will lead to a more informed electorate. Previous studies find empirical evidence for a causal effect of citizen informedness on turnout decisions (Lassen, 2005; Feddersen and Pesendorfer, 1999; Strömberg, 2004), but to our knowledge no study has found causality going the other direction.

Several studies have examined information acquisition in small group elections. Many of these studies find that moderate citizens are less likely to become informed voters or to vote at all. Gersbach (1992) finds that the median voter is the least likely to purchase information in an election. Feddersen and Pesendorfer (1999) model an election with costless voting and asymmetric information, finding that some of the less-informed voters always prefer to abstain. They also find that level increases in aggregate citizen informedness results in higher abstention rates for both the informed and uninformed. Battaglini et al. (2008) give experimental evidence that aggregate turnout is positively correlated with the number of informed voters. In a theoretical environment, Oliveros (2013) shows that information acquisition and turnout decisions may in fact be uncorrelated for some voters. Ortoleva and Snowberg (2015) show theoretically and empirically that moderate citizens have lower turnout rates compared to more ideologically extreme citizens. Matějka and Tabellini (2017) develop a theoretical model of voter information acquisition in a multi-dimensional policy election, finding that moderate voters invest less in information acquisition. They also point out that including party affiliation could lead to increased voter attention.

Other studies have compared voting laws with and without abstention, mostly with an eye to the welfare effects of mandatory voting. Borgers (2004) shows that in a costly voting environment with symmetric voter preferences, optional voting Pareto dominates mandatory voting in terms of welfare. Ghosal and Lockwood (2009) extend this work and find that mandatory voting may be welfare enhancing when facing uncertainty. Krasa and Polborn (2009) develop an alternative model which shows that mandatory voting can be welfare enhancing when the support groups for candidates are sufficiently different. Krishna and Morgan (2012) study mandatory voting in a Condorcet setting and find that optional voting is strictly welfare enhancing. To our knowledge, no study has directly addressed the effects of mandatory voting laws on citizen informedness.

We add to previous studies by interacting voter information acquisition choices with the ability to abstain from voting. Our study focuses on information acquisition as the outcome variable of interest, rather than focusing on welfare effects. We aim to add to the literature by providing novel insight as to how mandatory voting affects information acquisition, consciously abstracting from any welfare considerations.

3 Theory

There are $n \in \mathbb{N}$ risk-neutral voters participating in an election, where for simplicity we assume that n is odd. Each voter has a type that is an *i.i.d.* draw of a random variable with continuously differentiable density (distribution) v (V) on $[0, 1]$. Voter i's type is denoted as v_i, and is private information.

There are two candidates, A and B, who are running for office. Each candidate also has a type, which is private information. Candidate A's (B's) type is denoted γ_A (γ_B), and is independently drawn from a (b) with support on $[0, 0.5]$ $\big([.5, 1]\big)$. Voters are not initially able to distinguish which candidate is which, but can each pay $c \geq 0$ to do so.

Voter's first learn their type, and then simultaneously decide whether or not to pay to learn candidate identities. After this information is observed by those who opted to pay c, voters simultaneously make their voting decisions. Voting costs $\varepsilon \geq 0$. The candidate with the most votes wins, with ties broken by fair randomization. The policy implemented, γ, corresponds to the winning candidate's type.

The payoff function for voter i is

$$\pi_i(K, v_i, \gamma, e_i) = K - U\big(|v_i - \gamma|\big) - e_i c - w_i \varepsilon \tag{1}$$

where K is a positive constant, and $-U\big(|v_i - \gamma|\big)$ is a continuous, twice differentiable, weakly concave function with a single peak at $v_i = \gamma$. The indicator variable $e_i = 1$ if voter v_i opts to learn candidate identities. Similarly, $w_i = 1$ if the voter casts a vote.

Figure 1 illustrates the sequence of the game. We allow for voting schemes with and without abstention. In the interest of brevity, we add two assumptions. First, we restrict attention to environments in which v is symmetric around 0.5. We also assume that $\big|0.5 - E(\gamma_A)\big| = \big|E(\gamma_B) - 0.5\big|$. Each of these assumptions can be relaxed without substantively changing our results. Adding them allows us to focus on equilibria which involve symmetric behavior of voters with types equidistant from 0.5.

3.1 Equilibrium

In this environment, the value of learning candidate identities is higher for more extreme types. We focus on symmetric equilibria with a cutpoint information acquisition strategy in which only voters with types more extreme than the cutpoints become informed.

Fixing the strategies of all other voters, voter i will pay to acquire information if

$$E[\pi_i | v_i, e_i = 1] - E[\pi_i | v_i, e_i = 0] \geq 0. \tag{2}$$

Cutpoint types are defined by the pair of voter types who are perfectly indifferent to acquiring information, assuming that all other voters follow the cutpoint information acquisition strategy. Under mandatory voting, if an interior cutpoint pair exists, the corresponding values of v_i must satisfy the following equality for $\delta \in \{0, 0.5\}$:

$$.5\Bigg(\int_{\delta}^{.5+\delta} U\big(|v_i - x|\big) b(x)\, dx - \int_{.5-\delta}^{1-\delta} U\big(|v_i - x|\big) a(x)\, dx\Bigg)\binom{n-1}{\frac{n-1}{2}}.5^{n-1} = c. \tag{3}$$

The $LHS(2) \equiv F(v_i)$ is i's expected marginal benefit if their vote is pivotal (i.e., voter i's vote results in either a tie or their preferred candidate being elected), weighted by the probability that their vote is pivotal. Note that the probability of being pivotal is constant. As long as the cost of information is less than $\tilde{c}^m \equiv F(0)$, there is a single voter type which satisfies this equation for each $\delta \in \{0, .5\}$, which establishes the existence and uniqueness of this equilibrium under mandatory voting.

Proposition 1. *When voting is mandatory there exists a unique symmetric perfect Bayes Nash equilibrium in which each voter v_i follows a cutpoint information acquisition strategy in which*

$$e_i = \begin{cases} 0 & if \quad v_i \in (v_l^m, v_r^m) \\ 1 & if \quad v_i \notin (v_l^m, v_r^m). \end{cases} \tag{4}$$

In this equilibrium, informed voters vote for their preferred candidate, and uninformed voters randomize their vote.

Proof. See Appendix A. ■

A similar result follows when abstention is allowed. However, when voting is costly, uninformed voters will not vote in equilibrium. This means that the probability of being the pivotal voter will depend on the cutpoint types. We restrict attention to voter type distributions in which this probability of being pivotal is decreasing as the cutpoint types get closer to 0.5. Intuitively, this simply means that the probability of being the pivotal voter decreases as more voter types participate in the election.

If an interior cutpoint pair exists when abstention is possible, the two relevant types must satisfy the following equality for $\delta \in \{0, 0.5\}$:

$$\begin{aligned} &.5\bigg(\int_{\delta}^{.5+\delta} U\big(|v_i - x|\big) b(x)\, dx - \int_{.5-\delta}^{1-\delta} U\big(|v_i - x|\big) a(x)\, dx \bigg) \times \\ &\sum_{t=0}^{\frac{n-1}{2}} \sum_{s=0}^{1} \binom{n-1}{t} \binom{n-1-t}{n-1-2t-s} \big(1 - 2V(v_i^o)\big)^{n-1-s-2t} V(v_i^o)^{2t+s} \quad = c + \varepsilon. \end{aligned} \tag{5}$$

The $LHS(5) \equiv G(v_i)$ is again i's expected marginal benefit if their vote is pivotal, weighted by their probability of being the pivotal voter. For $c + \varepsilon \leq \tilde{c}^o \equiv \lim_{v_i \to 0^+} G(v_i)$, there is a single voter type which satisfies this equation, which establishes the existence and uniqueness of this equilibrium under optional voting.

Proposition 2. *When abstention is possible and $\varepsilon > 0$, there exists a unique symmetric perfect Bayes Nash equilibrium in which each voter v_i follows a cutpoint strategy in which*

$$e_i = \begin{cases} 0 & \text{if } \; v_i \in (v_l^o, v_r^o) \\ 1 & \text{if } \; v_i \notin (v_l^o, v_r^o). \end{cases} \tag{6}$$

In this equilibrium, informed voters vote for their preferred candidate, and uninformed voters do not vote.

Proof. See Appendix A. ■

When $\varepsilon = 0$, there is a continuum of equilibria, since uninformed voters are indifferent between voting or not. We focus attention on the unique limiting equilibrium as $\varepsilon \to 0^+$, in which uninformed voters opt not to vote.

3.2 Comparing voting schemes

The cutpoint strategies described in Propositions 1 and 2 allow for equilibria where none, some, or all of the electorate will choose to become informed about candidate preferences, depending on the magnitudes of c and ε. If these parameters are such that at least some voters are willing to purchase information in either voting scheme, we can compare the equilibrium cutpoints to determine if allowing for abstention results in a more informed electorate.[3] The costs of both voting and information acquisition will determine the relationship between the cutpoints in the two schemes.

[3]Our discussion focuses on informedness as the outcome of interest. The ex ante welfare implications of equilibrium behavior across voting schemes are straightforward in our model. Mandatory voting always reduces welfare when $\varepsilon > 0$, since all citizens are required to bear cost c, without changing the expected election outcome.

Denote the maximum equilibrium willingness to pay for information for the most extreme voter types ($v_i \in \{0,1\}$) when $\varepsilon = 0$ as $\tilde{c}^m$ for mandatory voting and $\tilde{c}^o$ when voting is optional (abstention is permitted). In both voting schemes, when $\varepsilon = 0$ and $c \in [0, \tilde{c}^o]$, a subset of the population will always choose to become informed when abstention is permitted. Thus, when abstention is possible, the expected number of voters who cast votes will be less than the population total, increasing the probability of voter i's vote would be pivotal. In these scenarios the interval of uninformed voters under mandatory voting is a proper subset of the corresponding interval when abstention is permitted: $[v_l^m, v_r^m] \subset [v_l^o, v_r^o]$. If $c > \tilde{c}^o$ or $c = 0$, then allowing for abstention has no effect on informedness: $[v_l^m, v_r^m] = [v_l^o, v_r^o] = [0,1]$. Thus, mandatory voting will never result in a more informed electorate when the cost of voting is zero.

Lemma 1. *When* $\varepsilon = 0$, $[v_l^o, v_r^o] \subseteq [v_l^m, v_r^m] \, \forall \, c \geq 0$.

Proof. See Appendix A. ■

When voting is sufficiently costly, many voters will abstain when permitted, in order to avoid incurring ε. In equilibrium, these voters also remain uninformed. Specifically, when $\varepsilon > \tilde{c}^o - \tilde{c}^m$ allowing for abstention will never increase voter informedness. Even when the cost of information is small or zero, the relatively high cost of voting results in a smaller proportion becoming informed than if voting is mandatory.

Lemma 2. *When* $\varepsilon > \tilde{c}^o - \tilde{c}^m$, $[v_l^m, v_r^m] \subseteq [v_l^o, v_r^o] \, \forall \, c \geq 0$.

Proof. See Appendix A. ■

In situations where ε is positive but small, allowing for abstention may increase or decrease voter informedness relative to mandatory voting. When c is low relative to ε, allowing for abstention will decrease voter informedness because voters will prefer to avoid ε, whereas ε does not affect information acquisition choices under mandatory voting. However, when c is large relative to ε, the increased probability of being pivotal when abstention is possible will lead to increased informedness. As a result, whether or not abstention results in a more informed electorate depends on the value of c when ε is small.

Specifically, given $\varepsilon \in \left(0, \tilde{c}^o - \tilde{c}^m\right]$, there exists a unique cost of information $\bar{c}$, such that for $c = \bar{c}$ information acquisition will be the same under either mandatory or optional voting laws. For $c \in [0, \bar{c})$ mandatory voting laws will result in a more informed electorate, and for $c \in (\bar{c}, \tilde{c}^o - \varepsilon]$ allowing for abstention will result in a more informed electorate. For $c > \tilde{c}^o$, no voters will become informed under either voting scheme.

Proposition 3. *When* $\varepsilon \in \left(0, \tilde{c}^o - \tilde{c}^m\right]$, $\exists\, \bar{c}$ *such that* $[v_l^m, v_r^m] \subset [v_l^o, v_r^o]$ *for* $c \in \left[0, \bar{c}\right)$, *and* $[v_l^o, v_r^o] \subseteq [v_l^m, v_r^m]$ *for* $c \geq \bar{c}$.

Proof. See Appendix A. ■

To summarize, when $\varepsilon \in \left(0, \tilde{c}^o - \tilde{c}^m\right)$, mandatory voting results in more informed voters for $c < \bar{c}$, since the effective equilibrium cost of information is c under mandatory voting, and $c + \varepsilon$ with abstention. However, since uninformed voters don't vote when not required to do so, the probability of being a pivotal voter is higher with abstention. Thus, as c increases, so does this probability of being pivotal. At $\bar{c}$, these effects balance each other. For $c \in \left(\bar{c}, \tilde{c}^o - \varepsilon\right]$ the increased effective cost of information under abstention has a smaller effect on information acquisition than the increased probability of being a pivotal voter, and allowing for abstention increases voter informedness. For any $c > \tilde{c}^o - \varepsilon$ no voters become informed under either voting scheme.

4 Experimental design

Each session consisted of 15 subjects. The subjects were randomly sorted into groups of five, and these groups were randomly re-matched in each of the 50 rounds. Identities were anonymous within and across rounds.

The sequence of events in each round is displayed in Figure 1. Each subject was assigned a type, v_i that was an *i.i.d.* draw from a discrete uniform distribution on $\{1, 2, ..., 100\}$. Types were private information.

Each group was tasked with selecting either Option A or Option B via majority vote (ties were broken randomly). The per-subject cost of voting was 2 points. The selection of

Option A (B) would result in a policy, γ, that was an *i.i.d.* draw from a discrete uniform distribution on $\{1, 2, ..., 50\}$ $\big(\{51, 52, ..., 100\}\big)$. The policy associated with each Option was not known to subjects when they voted. Further, the two Options were indistinguishable unless a subject paid $c > 0$.

Each subject's payoff for the round was

$$\pi_i = 100 - |v_i - \gamma| - e_i c - 2w_i \tag{7}$$

where e_i (w_i) is equal to one if a subject paid to get information (vote).

After learning their types, subjects simultaneously decided whether or not to pay to observe Option identities, and then proceeded to the voting stage. If a subject chose not to pay, then the Options were both labeled as "Option ?". To ensure that Option identities could not be inferred, the order of the Options was randomized in each round, and this was common knowledge. If a subject paid to learn Option identities, then the corresponding labels were revealed during the voting stage. After votes were cast, each subject observed which Option won the election, as well as the resulting γ. They also observed their own payoff for the round.

We employed a 2×2 design. The cost of learning Option identities was either 3 or 9 points, and was varied on a within-subject basis. Whether or not abstention was permitted was varied on a between-subject basis. When $c = 3$, we refer to the treatments with and without abstention as AL and ML, respectively. Similarly, when $c = 9$ the treatments with and without abstention are denoted by AH and MH.

The cost of learning Option identities was constant within the first and second half of the experiment. We varied the order of this within-subject treatment to control for order effects, and this is balanced across the 12 sessions. At the end of the 50 rounds, 20 rounds were randomly chosen for payment.

The parameters of the experiment where chosen such that for $c = 3$, mandatory voting is predicted to result in a strictly more informed electorate, while when $c = 9$ voters are predicted to be more informed when abstention is allowed. Theoretical predictions for these parameters under each voting scheme are are illustrated in Figure 2. Table 1 contains the theoretical predictions for each treatment.

Subjects were seated at terminals with dividers and communication was not allowed. Physical copies of instructions were administered and read aloud by the experimenter. The same experimenter conducted every session of the study. After reading the instructions, the experimenter administered a quiz, and each subject was required to correctly answer every question of the quiz before the session could advance. Sessions lasted about an hour. At the conclusion of a session, subjects were called individually to receive payment. All subjects received \$5 as a show-up fee, in addition to their in-game earnings. Earnings throughout the experiment were denominated in points, which were exchanged for dollars at a rate of one USD per 70 points. Average total earnings was \$24.14, with a range of $[\$20.04, \$28.41]$. Participants were recruited from the student population at Utah State University. No participant had any experience with any type of voting experiment. The experiment software was coded in z-Tree (Fischbacher, 2007).

5 Results

In each session, subjects faced one cost of information in the first half of the experiment, and another cost in the second half. We refer to the 25 rounds in which the cost of information was held constant within a session as a block. In all non-parametric tests, we take the average of an individual's decisions within a block as an observation. For each test, we report a two-tailed p-value.

Summary statistics for information acquisition choices are reported in Table 2. First note that subjects respond to increases in c by decreasing information acquisition, as predicted. This is true both with abstention (Wilcoxon matched-pairs, $p < 0.001$) and with mandatory voting (Wilcoxon matched-pairs, $p < 0.001$).

Notice that when $c = 3$ voters are under-informed in both voting schemes, but the prediction that allowing for abstention reduces informedness holds true. When c increases to $c = 9$, theory predicts that the reduction in informedness will be smaller under abstention, since an increased probability of being pivotal attenuates some of the effect of the cost increase. In our data, however, the observed magnitudes of the change in informedness are similar across voting schemes. In fact, the observed ranking of informedness by voting scheme does not flip, contrary to theory. Thus, holding the cost of information fixed, allowing abstention decreases informedness. This is true both when $c = 3$ (Mann-Whitney, $p = 0.009$), and when $c = 9$ (Mann-Whitney, $p = 0.021$). As we will show below, this result can be explained by the irrational voting decisions of uninformed voters in the abstention treatment.

To better understand voter decisions, we break them down by voter type. Figure 3 illustrates treatment comparisons of information acquisition choices, with voter types aggregated in bins of ten, as well as the relevant equilibrium predictions. Across all treatments, the qualitative prediction that more extreme types are more likely to become informed is borne out. As previously mentioned, treatment comparisons are in line with predictions, except for the comparison of AH and MH.

Since the choice to acquire information depends on beliefs regarding voting behavior, we now turn attention to the voting stage of the game. Table 3 contains summary statistics of voting behavior conditional on information acquisition. We observe relatively few instances in which informed voters vote for the Option that does not maximize their expected payoff (the "incorrect" Option). Similarly, informed voters only infrequently abstain from voting when permitted to do so. Since uninformed voters are unable to distinguish which Option is which, the only possible error they can make is to incur a cost by voting when they need not. Interestingly, uninformed voters are quite prone to this type of error: 13.7% of uninformed voters vote in AL, and 17.6% in AH.

These errors interact with predictions in different ways. When uninformed voters vote when abstention is allowed, the value of information is effectively diluted, and the interval of voter types who would rationally respond by becoming informed shrinks. When $c = 3$ this works in favor of the prediction that allowing abstention reduces informedness. When $c = 9$, however, this cuts against the prediction that allowing abstention will increase informedness.

To explain our data we need to account for two important features of behavior. First, that when abstention is possible uninformed voters frequently vote, despite it being irrational to do so. Second, that more extreme voter types are more likely to become informed, but that these information acquisition decisions are more noisy than Nash predictions suggest. Agent quantal response equilibrium (AQRE) can explain both of these features, by allowing for systematic errors in decision making.

5.1 Agent quantal response equilibrium

Standard quantal response equilibrium (QRE) generalizes Nash equilibrium by allowing for systematic decision-making errors where the likelihood of making an error depends on its costliness (McKelvey and Palfrey, 1995). Logit QRE is frequently applied to normal form games with a single binary decision (Goeree and Holt, 2005). The parameter λ in logit QRE determines the level of noise in the decision-making process. For example, in a game where subjects decide between $Z = 0$ and $Z = 1$, the logit QRE predictions for each player i would be

$$Z_i = \frac{1}{1 + e^{-\lambda(E[\pi_i|i,Z_i=1]-E[\pi_i|i,Z_i=0])}}.$$

If $\lambda = 0$, then each decision is equally likely. As $\lambda \to \infty$, each player is predicted to make the profit maximizing decision with certainty.

The analogous extensive form equilibrium refinement is known as agent quantal response equilibrium (McKelvey and Palfrey, 1998). AQRE assumes that players make choices that account for expected errors made by both other players and by themselves in subsequent decisions.

As mentioned, a quantal choice model assumes that the probability of making an error depends on the costliness of the error. We argue that the complexity of a decision, strategic or otherwise, will also affect this probability. Since the cognitive complexity of decisions may vary within an extensive form game, allowing the probability of errors to vary across information sets may be appropriate.

In our context, we model decisions at a given information set using a logit response function. A distinct "agent" makes each separate choice in an AQRE, and allowing λ to vary with each choice is a parsimonious way of allowing choice probabilities to depend on the underlying complexity. This is most obvious when comparing (a) the likelihood of an informed voter voting for the wrong candidate to (b) the likelihood of getting informed to begin with. The expected marginal benefit of voting for the wrong candidate is obviously negative (relative to voting for the correct candidate or abstaining), whereas the expected marginal benefit from becoming informed is ambiguous, with the calculation requiring much more sophistication. As such, in our analysis, we allow λ to vary across decision stages of the game.[4] Since the complexity of decision making also differs between voting schemes, we also allow λ to differ by treatment. We use the AIC and BIC for model selection.

In the interest of brevity, we relegate the details of both computing the AQRE predictions and the maximum likelihood procedure of selecting parameters to Appendix B. In short, we find that allowing λ to vary by treatment and by decision provides the best fit for our data.[5]

First, consider the effect of increasing the cost of information, holding the voting scheme constant.

Figure 4 illustrates the observed decisions at each stage of the game for both ML and MH, as well as the corresponding Nash and AQRE predictions, all broken down by voter type. The AQRE predictions provide a much closer fit to the data than Nash, while also being consistent with the observed decrease in informedness as c increases.[6] It is important to note that the AQRE predictions regarding information acquisition fit the data the best on the tails of voter types. This is because the cost of making an error with a moderate type is much lower than for an extreme type, and the maximum likelihood procedure thus prefers parameters that fit these extremes.[7]

Figure 5 illustrates observed decisions at each stage of the game for AL and AH. In these cases, the possibility of abstention means there are more potential errors to account for. In particular, informed voters can choose to abstain, or to vote for the "incorrect" Option.

[4]We do not allow λ to vary by voter type, as this would introduce a large number of free parameters.

[5]The resultant values of lambda are reported in Table A1.

[6]Of course, the AQRE selection process nests Nash predictions, so they must provide at least as good a fit.

[7]This could be corrected for by allowing λ to vary by voter type. However, as mentioned in Footnote 4, we felt this would introduce too many free parameters.

Additionally, uninformed voters can choose not to abstain, thus incurring a cost of ε. AQRE can account for each of these errors. Indeed, AQRE predictions for information acquisition provide a tight fit, matching best in the tails. The predictions are also consistent with our finding that informedness decreases as c goes up. Turning attention to the voting decisions of uninformed voters, AQRE provides a good fit for observed errors, where neither the data nor AQRE predictions depend on voter type.

Next, consider the results holding c constant, and varying the voting scheme. Figure 6 illustrates these treatment predictions for information acquisition decisions by voter type, containing the observed behaviors as well as the corresponding AQRE and Nash predictions. Note that the AQRE predictions are consistent with the observed behavior on the tails of the distribution of voter types. This is particularly important for $c = 9$ (panel 2), where Nash equilibrium is not able to explain our data.

The best fit to our experimental data is achieved by utilizing a model of behavior that allows voters to account for the errors made by themselves and others at each stage of the game. This insight is particularly important when abstention is allowed, since allowing voters to account for errors at the voting stage is essential for understanding whether or not a vote is likely to be pivotal, and thus the expected value of information.

The central take-away from the AQRE predictions is that the differential complexity and the costliness of any given error should not be ignored. The information decision under voting when abstention is possible is much more complex, because the decision involves anticipating the effect of errors at the voting stage on the likelihood of being pivotal. Figure 7 shows that by incorporating differential errors we are able to get very close fits to our data.

6 Conclusion

This paper investigates how mandatory voting laws affect information acquisition in non-partisan elections. In our model, voters have single-peaked preferences over policy outcomes, which are independent draws from a common-knowledge distribution (types are private information). There are two candidates in the election, each of which is associated with different expected policy outcomes. The outcome associated with one candidate is on the left half of the support of voter types, while the other candidate is associated with the right half of this support (candidate types are unknown ex ante). Candidates are also indistinguishable to each voter, unless they incur a cost. After the information acquisition stage, costly voting takes place. We consider environments with and without abstention.

Our model predicts that mandatory voting laws will increase citizen informedness when information is cheap relative to the cost of voting, and decrease citizen informedness when information is relatively expensive. The primary theoretical mechanism that predicts higher informedness when abstention is allowed is the increased probability of being the pivotal voter, since in equilibrium uninformed voters abstain when permitted to do so.

To evaluate these predictions we conducted a laboratory experiment with a 2×2 design. We varied whether or not abstention was permitted on a between-subject basis, and the cost of information on a within-subject basis. The two costs appearing in our design were chosen such that mandatory voting was predicted to result in a more informed electorate in the low cost treatment, and abstention was predicted to result in a more informed electorate when the cost was high.

Our experimental results show that voters do respond to price changes as theory would predict: fixing the election structure, an increase (decrease) in the cost of information lead to decreased (increased) informedness. However, decision-making errors at the voting stage effectively mute responses to price changes when abstention is allowed.[8] Consequently, allowing abstention caused subjects to consistently become less informed, regardless of the cost of information.

These results are explained using agent quantal response equilibrium, which accounts for the observed errors that voters make in these games. Most importantly, AQRE predicts (in line with our data) that uninformed voters will sometimes vote, even when abstention is permitted and it is irrational to do so. This lowers the incentive to become informed at the information acquisition stage of the game, since the probability of being the pivotal voter is reduced. AQRE also allows us to account for heterogeneous susceptibility to error across

[8]Around 15.0% of uninformed voters choose to vote in the abstention treatments.

games and across decisions, to account for differences in the cognitive complexity of each choice.

Nonpartisan elections play a key role in determining public policy, especially at a local level. Often, voters are unable to distinguish between candidates, and there is no partisan cue to guide their decision. This leads to reduced election participation, which may reduce the effective accountability of these officials to voters. As such, finding ways to increase the informedness of voters in these elections is an important issue. Our results suggest that making voting mandatory in such elections may be an effective mechanism to accomplish this, even when the cost of becoming informed is relatively high.

Variation in observed voting schemes is relatively rare. Thus, experimental and theoretical advances can help guide policy experiments to study the effects of mandatory voting in real-world environments. This paper is a first step in this direction. Moving forward, a particularly fruitful avenue for future research would be experiments studying the effect of differences in the cost of voting itself, or allowing candidates to endogenously select platforms in an environment in which these platforms are only observed at a cost.

References

Battaglini, M., Morton, R. B., and Palfrey, T. R. (2008). Information aggregation and strategic abstention in large laboratory elections. *American Economic Review*, 98(2):194–200.

Bonneau, C. and Cann, D. (2015). Party identification and vote choice in partisan and nonpartisan elections. *Political Behavior*, 37(1):43–66.

Borgers, T. (2004). Costly voting. *American Economic Review*, 94(1):57–66.

Bowler, S., Donovan, T., and Happ, T. (1992). Ballot propositions and information costs: Direct democracy and the fatigued voter. *Western Political Quarterly*, 45(2):559–568.

DeAngelo, G. and McCannon, B. C. (2019). Political competition in judge and prosecutor elections. *European Journal of Law and Economics*, 48(2):167–193.

Feddersen, T. J. and Pesendorfer, W. (1999). Abstention in elections with asymmetric information and diverse preferences. *American Political Science Review*, 93(2):381–398.

Fischbacher, U. (2007). z-tree: Zurich toolbox for ready-made economic experiments. *Experimental economics*, 10(2):171–178.

Gersbach, H. (1992). Allocation of information by majority decisions. *Journal of Public Economics*, 48(2):259 – 268.

Ghirardato, P. and Katz, J. N. (2006). Indecision theory: Weight of evidence and voting behavior. *Journal of Public Economic Theory*, 8(3):379–399.

Ghosal, S. and Lockwood, B. (2009). Costly voting when both information and preferences differ: is turnout too high or too low? *Social Choice and Welfare*, 33(1):25–50.

Goeree, J. K. and Holt, C. A. (2005). An explanation of anomalous behavior in models of political participation. *American political science Review*, pages 201–213.

Hoffman, M., León, G., and Lombardi, M. (2017). Compulsory voting, turnout, and government spending: Evidence from austria. *Journal of Public Economics*, 145:103 – 115.

Krasa, S. and Polborn, M. K. (2009). Is mandatory voting better than voluntary voting? *Games and Economic Behavior*, 66(1):275–291.

Krishna, V. and Morgan, J. (2012). Voluntary voting: Costs and benefits. *Journal of Economic Theory*, 147(6):2083 – 2123.

Lassen, D. D. (2005). The effect of information on voter turnout: Evidence from a natural experiment. *American Journal of Political Science*, 49(1):103–118.

Lim, C. S. and Snyder Jr, J. M. (2015). Is more information always better? party cues and candidate quality in us judicial elections. *Journal of public Economics*, 128:107–123.

Matějka, F. and Tabellini, G. (2017). Electoral competition with rationally inattentive voters.

McKelvey, R. and Palfrey, T. (1995). Quantal response equilibria for normal form games. *Games and economic behavior*, 10(1):6–38.

McKelvey, R. and Palfrey, T. (1998). Quantal response equilibria for extensive form games. *Experimental economics*, 1(1):9–41.

Oliveros, S. (2013). Abstention, ideology and information acquisition. *Journal of Economic Theory*, 148(3):871 – 902.

Ortoleva, P. and Snowberg, E. (2015). Overconfidence in political behavior. *American Economic Review*, 105(2):504–35.

Rahn, W. (1993). The role of partisan stereotypes in information processing about political candidates. *American Journal of Political Science*, 37:472–496.

Schaffner, B. and Streb, M. (2002). The partisan heuristic in low-information elections. *Public Opinion Quarterly*, 66(4):559–581.

Schaffner, B., Streb, M., and Wright, G. (2001). Tearns without uniforms: The nonpartisan ballot in state and local elections. *Political Research Quarterly*, 54(1):7–30.

Strömberg, D. (2004). Radio's impact on public spending. *The Quarterly Journal of Economics*, 119(1):189–221.

7 Tables and Figures

Table 1: Information acquisition predictions

	$[v_l^*, v_r^*]$	$P(pivotal)$	$E[\pi_{\text{round}}]$
AL	$[37, 63]$	0.41	71.90
AH	$[21, 79]$	0.53	69.53
ML	$[42, 58]$	0.38	70.84
MH	$[10, 90]$	0.38	66.64

Informed types always vote for their preferred candidate. When abstention is possible, only informed types vote.

Table 2: Information acquisition - Predicted and observed

	$P_{\text{BNE}}(informed)$	$P_{\text{obs}}(informed)$
AL	0.73	0.55 (0.09)
AH	0.42	0.41 (0.08)
ML	0.84	0.60 (0.06)
MH	0.20	0.47 (0.07)

Means by treatment, with standard deviations in parentheses.

Table 3: Summary statistics of observed behavior at the voting stage

	$P(VC \mid e_i = 1)$	$P(VI \mid e_i = 1)$	$P(abs \mid e_i = 1)$	$P(vote \mid e_i = 0)$	$P(abs \mid e_i = 0)$
AL	0.98	0.02	0.01	0.14	0.86
AH	0.96	0.03	0.01	0.18	0.82
ML	0.97	0.03	0.00	0.00	1.00
MH	0.98	0.02	0.00	0.00	1.00

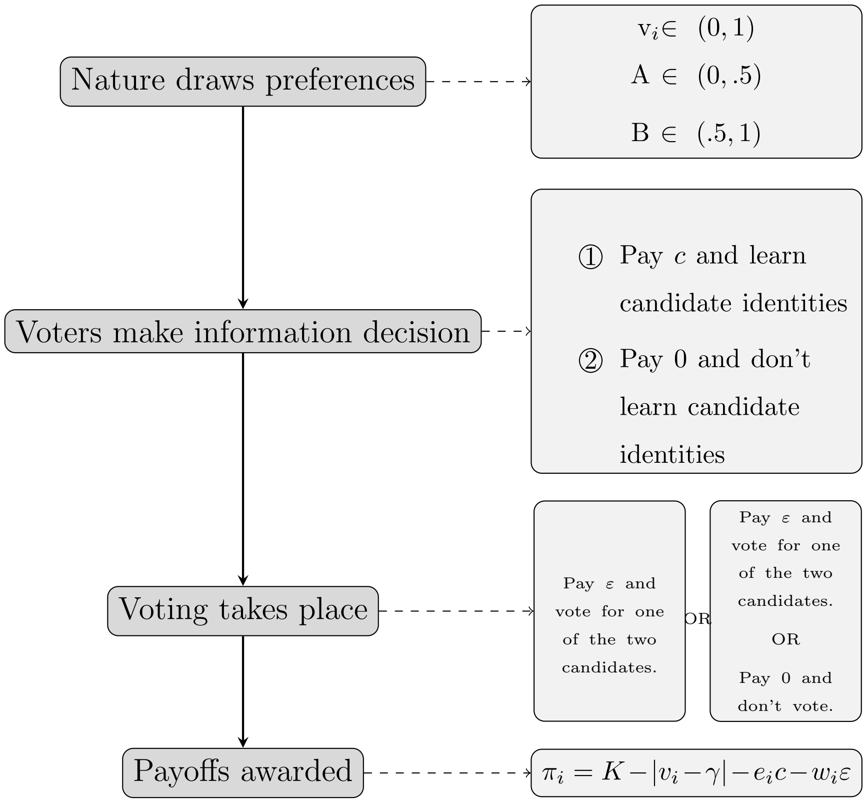
VC indicates a vote for the "correct" Option, and VI a vote for the "incorrect" Option. abs indicates a voter chose to abstain. e_i is an indicator variable that is equal to one if a subject voted.

Table 4: Payoffs - Predicted and observed

	$E[\pi_{\text{BNE}}]$	$E[\pi_{\text{AQRE}}]$	π_{obs}
AL	71.90	70.66	68.66 (0.88)
AH	69.53	66.90	65.33 (0.91)
ML	70.84	69.23	67.63 (1.02)
MH	66.64	65.63	63.72 (1.08)

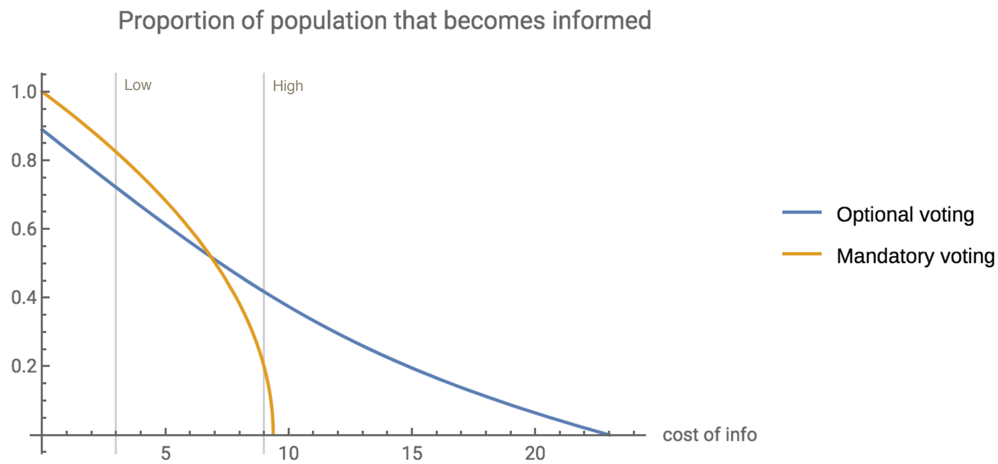
Means by treatment, with standard deviations in parentheses.

Figure 1: Voting game sequence.



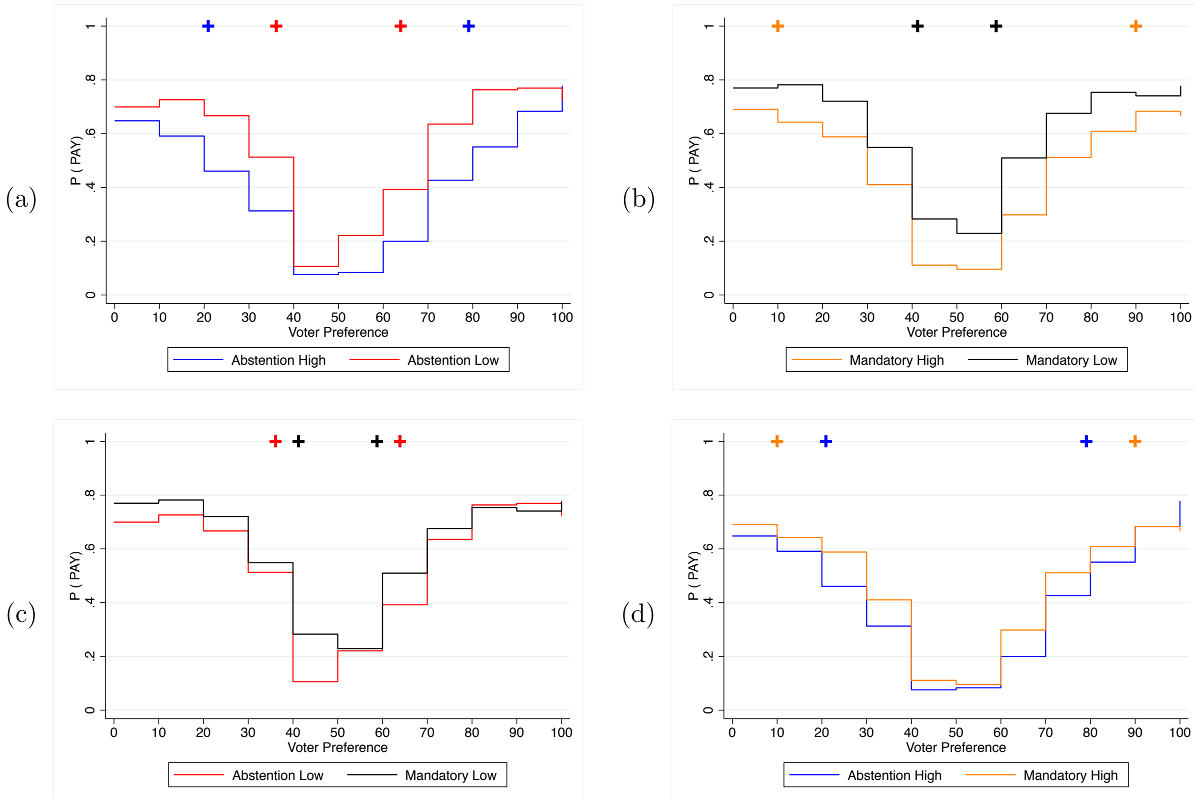
At the voting stage, players can vote between the two candidates under mandatory voting, and have the additional option to abstain under the abstention treatment.

Figure 2: Predicted information acquisition



Information acquisition predictions for the parameterized experiment. $v \sim U[0,1]$, $a \sim U[0,.5]$ and $b \sim U[.5,1]$, with $\varepsilon = 2$ and $n = 5$.

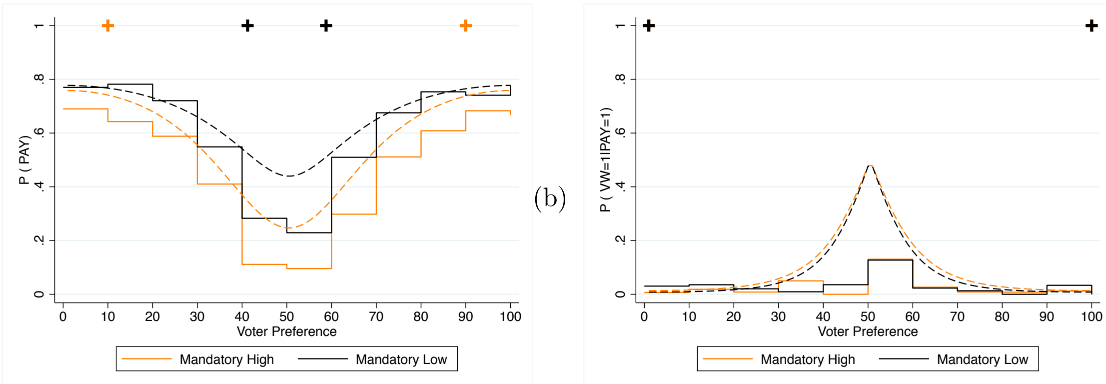
Figure 3: Predicted and actual data acquisition.



Data are averaged in blocks of ten by voter type. BNE cutpoint predictions are indicated by plus signs, where voter types outside the interval formed by the cutpoints are predicted to take the action indicated with probability one, and those inside the interval with probability zero.

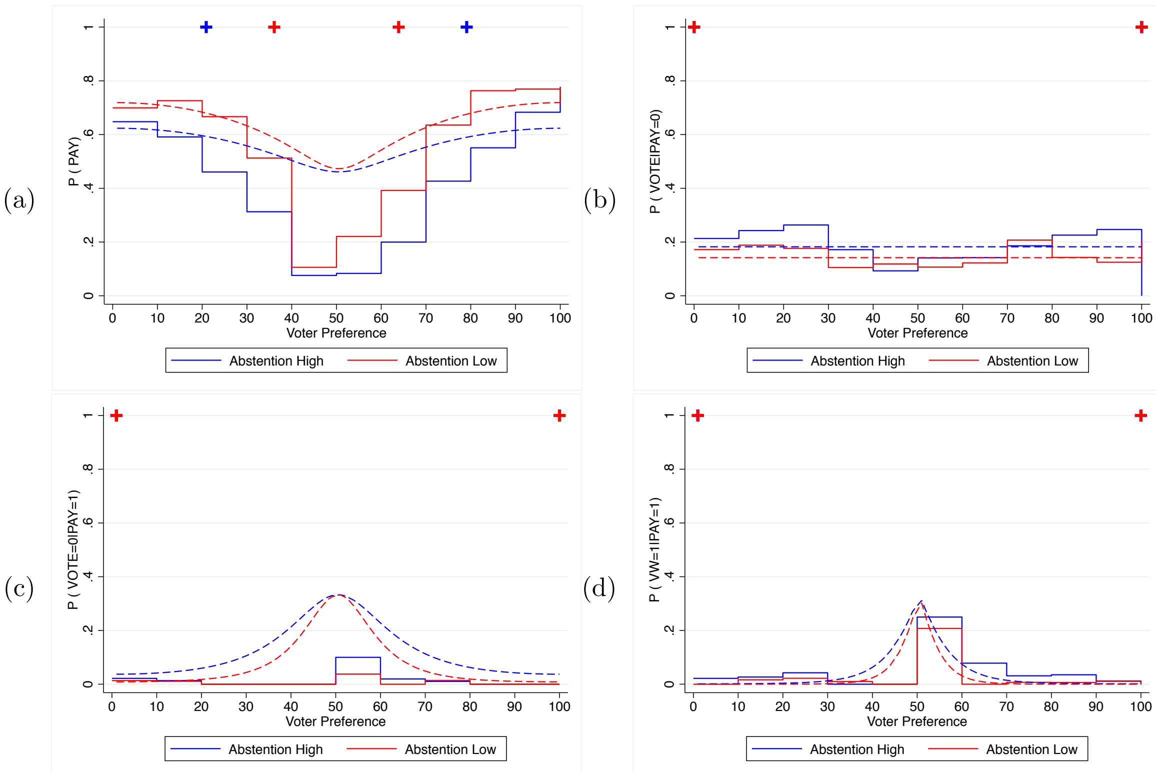
Figure 4: All decisions - mandatory

(a) (b)



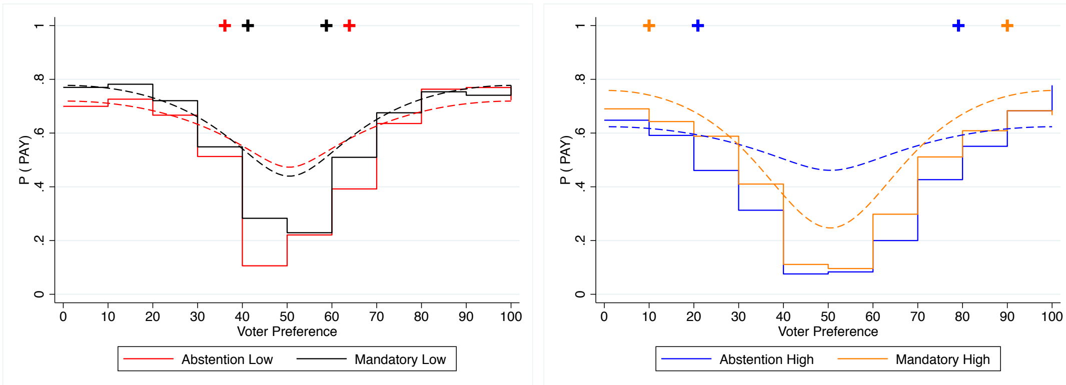
Data are averaged in blocks of ten by voter type. BNE cutpoint predictions are indicated by plus signs, where voter types outside the interval formed by the cutpoints are predicted to take the action indicated with probability one, and those inside the interval with probability zero.

Figure 5: All decisions - abstention



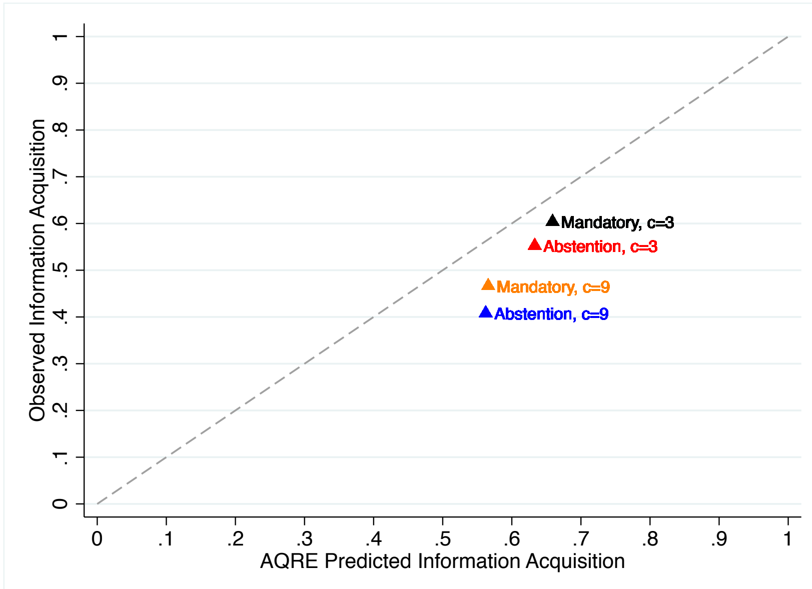
Data are averaged in blocks of ten by voter type. BNE cutpoint predictions are indicated by plus signs, where voter types outside the interval formed by the cutpoints are predicted to take the action indicated with probability one, and those inside the interval with probability zero.

Figure 6: Information acquisition with and without abstention



Data are averaged in blocks of ten by voter type. BNE cutpoint predictions are indicated by plus signs, where voter types outside the interval formed by the cutpoints are predicted to take the action indicated with probability one, and those inside the interval with probability zero.

Figure 7: Information acquisition - predicted and observed



Average information acquisition for each treatment, against AQRE predictions.

A Proofs

A.1 Proof of Proposition 1

Each v_i's candidate preference is determined by

$$\begin{cases} E\big[\pi_i|v_i,\gamma\in[0,.5)\big]-E\big[\pi_i|v_i,\gamma\in(0.5,1]\big]>0 & v_i \text{ prefers candidate } A\\ E\big[\pi_i|v_i,\gamma\in[0,.5)\big]-E\big[\pi_i|v_i,\gamma\in(0.5,1]\big]<0 & v_i \text{ prefers candidate } B\\ E\big[\pi_i|v_i,\gamma\in[0,.5)\big]-E\big[\pi_i|v_i,\gamma\in(0.5,1]\big]=0 & v_i \text{ indifferent to election outcome.}\end{cases}$$

For ease of reference, we denote voters who prefer candidate A as v_i^a, and candidate B as v_i^b.

Under mandatory voting, eq. (2) for a voter v_i^a can be written as

$$\begin{aligned} &E\big[\pi_i|v_i,e_i=1,\gamma\in[0,0.5)\big]\cdot P\big(\gamma\in[0,.5)|e_i=1\big)+\\ &E\big[\pi_i|v_i,e_i=1,\gamma\in(0.5,1]\big]\cdot P\big(\gamma\in(0.5,1]|e_i=1\big)-\\ &\big[E\big[\pi_i|v_i,e_i=0,\gamma\in[0,0.5)\big]\cdot P\big(\gamma\in[0,.5)|e_i=0\big)+\\ &\ E\big[\pi_i|v_i,e_i=0,\gamma\in(0.5,1]\big]\cdot P\big(\gamma\in(0.5,1]|e_i=0\big)\big] \quad \geq 0, \end{aligned}$$

which can be rewritten as

$$\begin{aligned} -E\big[U|v_i,\gamma\in[0,0.5)\big]\cdot\Big(P\big(\gamma\in[0,.5)|e_i=1\big)-P\big(\gamma\in[0,.5)|e_i=0\big)\Big)+\\ \big[-E\big[U|v_i,\gamma\in(0.5,1]\big]\cdot\Big(P\big(\gamma\in(0.5,1]|e_i=1\big)-P\big(\gamma\in(0.5,1]|e_i=0\big)\Big)\big]\geq c. \end{aligned} \tag{8}$$

The expected utility for voter i conditional on Candidate A being elected is

$$E[U|v_i,\gamma\in[0,0.5)]=\int_0^{.5}-U\big(|v_i-x|\big)a(x)\,dx. \tag{9}$$

Similarly, the expected utility for voter i conditional on Candidate B being elected is

$$E[U|v_i,\gamma\in(0.5,1]]=\int_{.5}^{1}-U\big(|v_i-x|\big)b(x)\,dx. \tag{10}$$

The probability of each candidate's election depends on the information acquisition choice of voter v_i^a and the expected votes cast by other $v_{i \neq j}$.

When $e_i = 1$, voter v_i^a will pay to get information and then vote for candidate A. Candidate A's probability of election is determined by the number of the other voters $v_{j \neq i}$ who vote in favor of candidate A, $\sum v_{j \neq i}^A$.

Suppose all voters $v_{j \neq i}$ follow a strategy that involves information acquisition for all types $v_{j \neq i} \leq v_l^m$ or $v_{j \neq i} \geq v_r^m = 1 - v_l^m$, for some $v_l^m \in [0, 0.5]$. Types that acquire information vote for their preferred candidate, while the remaining types randomize their vote.

Thus, $\sum v_{j \neq i}^A \sim Binomial(p)$, where $p = V(v_l^m) + .5\big(V(v_r^m) - V(v_l^m)\big)$. Since we restrict attention to symmetric distributions of v, and distributions of a and b such that $\big|0.5 - E(\gamma_A)\big| = \big|E(\gamma_B) - 0.5\big|$, $p = 0.5$.

The probabilities that the implemented policy falls above or below 0.5, both when $e_i = 1$ and when $e_i = 0$ are

$$P\big(\gamma \in [0, 0.5] | e_i = 1\big) = 1 - \sum_{k=0}^{\frac{n-3}{2}} \binom{n-1}{k} .5^{n-1} \tag{11}$$

$$P\big(\gamma \in [.5, 1] | e_i = 1\big) = \sum_{k=0}^{\frac{n-3}{2}} \binom{n-1}{k} .5^{n-1} \tag{12}$$

$$P\big(\gamma \in [0, .5] | e_i = 0\big) = \sum_{k=\frac{n+1}{2}}^{n} \binom{n}{k} .5^{n} \tag{13}$$

$$P\big(\gamma \in [.5, 1] | e_i = 0\big) = 1 - \sum_{k=\frac{n+1}{2}}^{n} \binom{n}{k} .5^{n} \tag{14}$$

Incorporating (9) - (14) into equation (8) yields

$$.5\bigg(\int_{.5}^{1} U\big(|v_i - x|\big) b(x)\, dx - \int_{0}^{.5} U\big(|v_i - x|\big) a(x)\, dx \bigg) \binom{n-1}{\frac{n-1}{2}} .5^{n-1} \geq c, \tag{15}$$

which is simply voter v_i^a's expected marginal benefit if their vote is pivotal (i.e. voter i's vote results in either a tie or their preferred option being chosen), weighted by the probability of being the pivotal voter. For ease of notation, we denote $LHS(15)$ as $F(v_i^a)$.

To find v_l^m, note that if this cutpoint exists, it is where voter $v_i^a = v_l^m$ is indifferent to purchasing information for price c. Note that $F(0) > 0$ due to the concavity of U, and $F(0.5) = 0$. Furthermore, via Leibniz's rule, $\frac{\partial F}{\partial v_l^m}$ is monotonically decreasing over $(0, 0.5)$:

$$\frac{\partial F}{\partial v_l^m} = \underbrace{.5\left(\int_{v_l^m}^{.5} \frac{\partial U}{\partial |v_l^m - x|} a(x)\,dx - \int_{.5}^{1} \frac{\partial U}{\partial |v_l^m - x|} b(x)\,dx - \int_{0}^{v_l^m} \frac{\partial U}{\partial |v_l^m - x|} a(x)\,dx\right)}_{<0\ \forall\ v_l^m \in (0,0.5)} \times \underbrace{\binom{n-1}{\frac{n-1}{2}} .5^{n-1}}_{\in (0,1)\ \forall\ n \in \mathbb{Z}^+}. \tag{16}$$

The intermediate value theorem establishes the existence and uniqueness of an equilibrium threshold $v_i^a = v_l^m$ where $F(v_l^m) = c$, for $c \in \left[0, \tilde{c}^m \equiv F(0)\right]$. Any voter in $[0, v_l^m]$ will pay to acquire information, and any voter in $(v_l^m, 0.5]$ will not. An analogous proof for v_i^b yields a unique solution for v_r^m, where any voter in $[v_r^m, 1]$ will pay to acquire information, and any voter in $[0.5, v_r^m)$ will not. ■

A.2 Proof of Proposition 2

Under optional voting, voters may choose to abstain from voting, in addition to choosing whether or not to acquire information about candidates' party affiliation. When $\varepsilon \geq 0$ no voter has an incentive to be uninformed and to vote, since

$$E[\pi_i | v_i, e_i = 0, w_i = 0] - E[\pi_i | v_i, e_i = 0, w_i = 1] = \varepsilon.$$

Similarly, for $c \geq 0$ no voter has an incentive to become informed and then not vote, since

$$E[\pi_i | v_i, e_i = 0, w_i = 0] - E[\pi_i | v_i, e_i = 1, w_i = 0] = c.$$

Thus, under optional voting, eq. (2) becomes

$$E[U|v_i, e_i = w_i = 0] - E[U|v_i, e_i = w_i = 1] \geq c + \varepsilon. \tag{17}$$

Suppose all voters $v_{j\neq i}$ follow a strategy that involves information acquisition for all types $v_{j\neq i} \leq v_l^o$ or $v_{j\neq i} \geq v_r^o = 1 - v_l^o$, for some $v_l^o \in [0, 0.5]$. Types that acquire information vote for their preferred candidate, while the remaining types do not vote. If all voters $v_{j\neq i}$ follow this strategy, the expected utility for voter i from getting informed and voting is

$$\begin{aligned} E[U|v_i, e_i = w_i = 1] = E[U|v_i, e_i = w_i = 0] \; - & \\ & .5\left(\int_{.5}^{1} U\big(|v_i - x|\big)b(x)\,dx - \int_{0}^{.5} U\big(|v_i - x|\big)a(x)\,dx\right)\times \\ & \sum_{t=0}^{\frac{n-1}{2}}\sum_{s=0}^{1}\binom{n-1}{t}\binom{n-1-t}{n-1-2t-s}\big(1-2V(v_l^o)\big)^{n-1-s-2t}V(v_l^o)^{2t+s}. \end{aligned}$$

Inserting into (17) yields

$$\begin{aligned} & .5\left(\int_{.5}^{1} U\big(|v_i - x|\big)b(x)\,dx - \int_{0}^{.5} U\big(|v_i - x|\big)a(x)\,dx\right)\times \\ & \sum_{t=0}^{\frac{n-1}{2}}\sum_{s=0}^{1}\binom{n-1}{t}\binom{n-1-t}{n-1-2t-s}\big(1-2V(v_l^o)\big)^{n-1-s-2t}V(v_l^o)^{2t+s} \quad \geq c + \varepsilon \end{aligned} \tag{18}$$

Similar to the mandatory case, this is simply voter v_i^a's expected marginal benefit if their vote is pivotal, weighted by the probability of being the pivotal voter. For ease of reference we denote $LHS(18)$ as $G(v_i^a, v_l^o)$.

To find v_l^o, note that if this cutpoint exists, it is where voter $v_i^a = v_l^o$ is indifferent to purchasing information for price c, and incurring the cost ε to vote. Note that when $v_l^o = 0$, $G(v_l^o, v_l^o) > 0$ due to the concavity of U. When $v_l^o = 0.5$, $G(v_l^o, v_l^o) = 0$. Furthermore, via Leibniz's rule, $\frac{\partial G(v_l^o, v_l^o)}{\partial v_l^o} < 0$:

$$\frac{\partial G}{\partial v_l^o} = \underbrace{.5\Bigg(\int_{v_l^o}^{.5} \frac{\partial U}{\partial|v_l^o - x|}a(x)\,dx - \int_{.5}^{1} \frac{\partial U}{\partial|v_l^o - x|}b(x)\,dx - \int_{0}^{v_l^o} \frac{\partial U}{\partial|v_l^o - x|}a(x)\,dx\Bigg)}_{<0\ \forall\ v_l \in (0,.5)} \times$$
$$\underbrace{\sum_{t=0}^{\frac{n-1}{2}}\sum_{s=0}^{1}\binom{n-1}{t}\binom{n-1-t}{n-1-2t-s}\big(1-2V(v_l^o)\big)^{n-1-s-2t}V(v_l^o)^{2t+s}}_{\in(0,1)\ \forall\ V(v_l)\in(0,.5),n\in\mathbb{Z}^+} +$$
$$\underbrace{v(v_l^o)^n.5\Bigg(\int_{.5}^{1} U\big(|v_l^o - x|\big)b(x)\,dx - \int_{0}^{.5} U\big(|v_l^o - x|\big)a(x)\,dx\Bigg)}_{>0\ \forall\ v_l\in(0,.5)} \times$$
$$\underbrace{\sum_{t=0}^{\frac{n-1}{2}}\sum_{s=0}^{1}\binom{n-1}{t}\binom{n-1-t}{n-1-2t-s}\big(1-2V(v_l^o)\big)^{n-2-s-2t}V(v_l^o)^{2t+s-1}\big((2t+s)-2V(v_l^o)(n-1)\big)}_{<0\ \forall\ V(v_l^o)\in(0,.5),n\in\mathbb{Z}^+} \tag{19}$$

Recall that we assume that the probability of being a pivotal voter increases as less voter types participate in the election. This assumption allows the last line of 19, and consequently the sign of the entire expression, to be signed as strictly negative. The intermediate value theorem establishes the existence and uniqueness of a cutpoint $v_i^a = v_l^o$ where $G(v_l^o) = c + \varepsilon$, for $c + \varepsilon \in [0, \tilde{c}^o \equiv \lim_{v_i \to 0^+} G(v_i)]$.

To confirm that voters in $[0, v_l^o]$ will follow the cutpoint strategy in (6), note that for any given $v_l^o \in [0, .5)$, $G(0, v_l^o)$ is strictly positive, $G(0.5, v_l^o) = 0$, and $\frac{\partial G}{\partial v_i} < 0$:

$$\frac{\partial G}{\partial v_i} = \underbrace{.5\Bigg(\int_{v_i}^{.5} \frac{\partial U}{\partial|v_i - x|}a(x)\,dx - \int_{.5}^{1} \frac{\partial U}{\partial|v_i - x|}b(x)\,dx - \int_{0}^{v_i} \frac{\partial U}{\partial|v_i - x|}a(x)\,dx\Bigg)}_{<0\ \forall\ v_i\in(0,.5)} \times$$
$$\underbrace{\sum_{t=0}^{\frac{n-1}{2}}\sum_{s=0}^{1}\binom{n-1}{t}\binom{n-1-t}{n-1-2t-s}\big(1-2V(v_l^o)\big)^{n-1-s-2t}V(v_l^o)^{2t+s}}_{\in(0,1)\ \forall\ V(v_l^o)\in(0,.5),n\in\mathbb{Z}^+}. \tag{20}$$

Thus, voters have no incentive to deviate from the cutpoint strategy, and all voters in

$[0, v_l^o]$ will pay to acquire information, and those in $(v_l^o, 0.5]$ will not. A symmetric procedure yields v_r^o where voters in $[v_r^o, 1]$ will pay to acquire information, and those in $[0.5, v_r^o)$ will not. ■

A.3 Proof of Lemma 1

Under mandatory and optional voting, $v_l^m(c)$ and $v_l^o(c, \varepsilon)$ are implicitly defined by equations (15) and (18):

$$.5\Big(\int_{.5}^{1} U\big(|v_l^m - x|\big)b(x)\,dx - \int_0^{.5} U\big(|v_l^m - x|\big)a(x)\,dx\Big)\binom{n-1}{\frac{n-1}{2}}.5^{n-1} - c \quad = \; 0 \qquad (15^*)$$

$$\begin{aligned} &.5\Big(\int_{.5}^{1} U\big(|v_l^o - x|\big)b(x)\,dx - \int_0^{.5} U\big(|v_l^o - x|\big)a(x)\,dx\Big)\times \\ &\sum_{t=0}^{\frac{n-1}{2}}\sum_{s=0}^{1}\binom{n-1}{t}\binom{n-1-t}{n-1-2t-s}\big(1-2V(v_l^o)\big)^{n-1-s-2t}V(v_l^o)^{2t+s} - c - \varepsilon \end{aligned} \; = 0 \qquad (18^*)$$

From (15^*) and (18^*), $v_l^m(0) = v_l^o(0,0) = 0.5$. Furthermore, $v_l^m(\tilde{c}^m) = v_l^o(\tilde{c}^o, 0) = 0$. We now turn attention to $\frac{dv_l^m}{dc}$ and $\frac{dv_l^o}{dc}$. Total differentiation of equations (15^*) and $(18^*\ )$ w.r.t. c yields

$$\frac{dv_l^m}{dc} = \frac{1}{(16)} \qquad \text{and} \qquad \frac{dv_l^o}{dc} = \frac{1}{(19),}$$

which can be readily compared to yield $\frac{dv_l^m}{dc} < \frac{dv_l^o}{dc} < 0$. For $\varepsilon = 0$ this implies

$$v_l^m < v_l^o \;\forall\, c \in \Big(0, max\big\{\tilde{c}^m, \tilde{c}^o\big\} = \tilde{c}^o\Big)$$

and

$$v_l^m = v_l^o = 0 \;\forall\, c \geq \tilde{c}^o.$$

These results, together with an analogous proof for the right cutpoints v_r^m and v_r^o imply that for $\varepsilon = 0$, $[v_l^o, v_r^o] \subseteq [v_l^m, v_r^m]\ \forall c \geq 0$.

A.4 Proof of Lemma 2

The introduction of a cost of voting $\varepsilon > \tilde{c}^o - \tilde{c}^m$ shifts $v_l^o(c, \varepsilon)$ by ε such that $v_l^o(0) < v_l^m(0)$, and $\tilde{c}^o - \varepsilon < \tilde{c}^m$. And, from the proof of **Lemma 1**, $\frac{dv_l^m}{dc} < \frac{dv_l^o}{dc} < 0$. This implies

$$v_l^o < v_l^m \,\forall\, c \in \Big(0, max\big\{\tilde{c}^m, \tilde{c}^o - \varepsilon\big\} = \tilde{c}^m\Big)$$

and

$$v_l^o = v_l^m = 0 \,\forall\, c > \tilde{c}^m.$$

These results, together with an analogous proof for the right cutpoints v_r^m and v_l^m imply that for $\varepsilon > \tilde{c}^o - \tilde{c}^m$, $[v_l^m, v_r^m] \subseteq [v_l^o, v_r^o] \,\forall\, c \geq 0$.

A.5 Proof of Proposition 3

The arguments in the proof of **Lemma 1** establish the existence and uniqueness of $\bar{c}$. The introduction of a small cost of voting $\varepsilon \in (0, \tilde{c}^o - \tilde{c}^m)$ shifts $v_l^o(c, \varepsilon)$ by ε, such that $v_l^o(0, \varepsilon) < v_l^m(0) = 0.5$. From (15*) and (18*), $v_l^m(\tilde{c}^m) = v_l^o(\tilde{c}^o - \varepsilon, \varepsilon) = 0$, with $\tilde{c}^m < \tilde{c}^o - \varepsilon$. And from **Proposition 3** $\frac{dv_l^m}{dc} < \frac{dv_l^o}{dc} < 0$. The intermediate value theorem guarantees existence of a unique $\bar{c} \in (0, \tilde{c}^o - \varepsilon)$ such that $v_l^m(\bar{c}) = v_l^o(\bar{c})$ and $v_l^o(c) < v_l^m(c)$ for $c \in \big[0, \bar{c}\big)$, and $v_l^m(c) \leq v_l^o(c)$ for $c \geq \bar{c}$.

A symmetric result follows for v_r^m and v_l^m, implying that when $\varepsilon \in \big(0, \tilde{c}^o - \tilde{c}^m\big)$, $\exists\, \bar{c}$ such that $[v_l^m, v_r^m] \subset [v_l^o, v_r^o]$ for $c \in \big[0, \bar{c}\big)$, and $[v_l^o, v_r^o] \subseteq [v_l^m, v_r^m]$ for $c \geq \bar{c}$.

B AQRE predictions

In this section we derive the logit agent quantal response equilibrium (AQRE) for the voting games.

The AQRE predictions are found by solving a system of equations that accounts for each possible decision at each node, for each voter type. Given the symmetry in voter types and candidate types in our game, we proceed to solve for the AQRE predictions for a voter v_i^a, noting that predictions for each voter types $v_i^b = 1 - v_i^a$ will be same as for a voter type v_i^a.

B.1 Mandatory voting

Under Mandatory voting, AQRE allows for error-making at the information decision, as well as the vote decision when PAY=1. The game tree in Figure A1 visualizes these decisions and their associated probabilities of error.

The AQRE conditions are

$$P_i = \frac{1}{1 + e^{-VP(i)\lambda}} \tag{21}$$

$$Q_i = \frac{1}{1 + e^{-VQ(i)\lambda}} \tag{22}$$

where P_i represents the probability of paying to get information about candidate identities and Q_i is the probability of voting for the candidate that does not maximize v_i's expected payoff (the "incorrect" candidate) after paying to get information, for each $i \in \{1, 2, ..., 50\}$. $VP(i)$ represents a voter v_i's net expected profit from paying to learn about candidate preferences, and $VQ(i)$ is the net expected profit from voting for the "incorrect" candidate after learning candidate preferences. For a voter v_i^a,

$$VP(i) = .5ppiv\Big(E\big[U_i|\gamma = \gamma_b\big] - E\big[U_i|\gamma = \gamma_a\big]\Big) - \varepsilon - c$$
$$VQ(i) = -.5ppiv\Big(E\big[U_i|\gamma = \gamma_b\big] - E\big[U_i|\gamma = \gamma_a\big]\Big)$$

where the probability of being the pivotal voter $ppiv$ is

$$ppiv = \binom{n-1}{\frac{n-1}{2}} .5^{n-1}.$$

The AQRE predictions for P_i and Q_i under mandatory voting are found for a given lambda (or set of lambdas) by simultaneously solving the 100 equations from (21) and (22). This is discussed further in section B.3.

B.2 Optional voting

With optional voting, AQRE accounts for error-making at each node in the game. Figure A2 displays all of the possible decisions a given type makes, as well as the corresponding choice probabilities. P_i retains the same interpretation as under mandatory voting. Q_i also still represents the probability of voting for the "incorrect" candidate after purchasing information, but now it is the case that $M_i+Q_i+R_i = 1$, where M_i is the probability of voting for the preferred candidate after learning candidate identities, and R_i is the probability of abstaining after learning candidate identities. Z_i is the probability of voting for any candidate after opting not to learn candidate identities. The AQRE conditions under optional voting are

$$P_i = \frac{1}{1 + e^{-VP(i,\vec{P}_{j\neq i},\vec{Q}_{j\neq i},\vec{R}_{j\neq i},\vec{M}_{j\neq i},Z_i)\lambda}} \tag{23}$$

$$Q_i = \frac{1}{1 + e^{-VQ(i,\vec{P}_{j\neq i},\vec{Q}_{j\neq i},\vec{R}_{j\neq i},\vec{M}_{j\neq i},Z_i)\lambda}} \tag{24}$$

$$R_i = \frac{1}{1 + e^{-VR(i,\vec{P}_{j\neq i},\vec{Q}_{j\neq i},\vec{R}_{j\neq i},\vec{M}_{j\neq i},Z_i)\lambda}} \tag{25}$$

$$M_i = \frac{1}{1 + e^{-VM(i,\vec{P}_{j\neq i},\vec{Q}_{j\neq i},\vec{R}_{j\neq i},\vec{M}_{j\neq i},Z_i)\lambda}} \tag{26}$$

$$Z_i = \frac{1}{1 + e^{-VZ\lambda}} \tag{27}$$

where $VP(\cdot), VQ(\cdot), VR(\cdot), VM(\cdot)$ and $VZ(\cdot)$ are a voter i's net expected profit from paying to learn about candidate preferences, voting for the "incorrect" candidate given $PAY = 1$, abstaining given $PAY = 1$, voting for the "correct" candidate given $PAY = 1$, and voting for any candidate given $PAY = 0$. For a voter v_i^a,

$$VP(\cdot) = .5ppiv\Big(E\big[U_i|\gamma = \gamma_b\big] - E\big[U_i|\gamma = \gamma_a\big]\Big)(M_i - Q_i) - c - (M_i + Q_i)v$$

$$VQ(\cdot) = .5ppiv\Big(E\big[U_i|\gamma = \gamma_b\big] - E\big[U_i|\gamma = \gamma_a\big]\Big)$$

$$VR\cdot) = .5ppiv\Big(E\big[U_i|\gamma = \gamma_b\big] - E\big[U_i|\gamma = \gamma_a\big]\Big)$$

$$VM(\cdot) = -.5ppiv\Big(E\big[U_i|\gamma = \gamma_b\big] - E\big[U_i|\gamma = \gamma_a\big]\Big)$$

$$VZ = -2.$$

Allowing for abstention, the probability of being the pivotal voter *ppiv* is

$$ppiv = \sum_{t=0}^{\frac{n-1}{2}} \sum_{s=0}^{1} \binom{n-1}{t} \binom{n-1-t}{n-1-2t-s} \big(1 - 2\tilde{P}\big)^{n-1-s-2t} \tilde{P}^{2t+s},$$

where

$$\tilde{P} = .5\big[p(1-r) + (1-p)z\big]$$

and

$$p = \frac{1}{N}\sum_{i=1}^{N} P_i$$
$$r = \frac{1}{N}\sum_{i=1}^{N} R_i$$
$$z = \frac{1}{N}\sum_{i=1}^{N} Z_i$$

for $i \in \{1, 2, ..., 50\}$.

The AQRE predictions for P_i, Q_i, R_i, M_i and Z_i under optional voting are found for a given lambda (or set of lambdas) by simultaneously solving the 250 equations from (23) - (27).

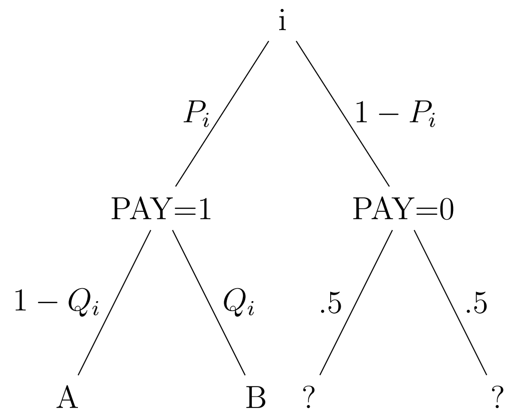
B.3 Lambda selection

We consider cases in which lambda differs by treatment, as well as by decision stage. Specifically, we allow lambda to differ between the decision to pay to learn candidate identities and the voting decision, as well as across election structure. Note that we do not allow lambda to vary by type, as this would result in an extremely large number of free parameters.

Our ex-ante model selection criteria among the possible methods for calculating lambda was AIC/BIC. We solved the system of equations in (21) - (22) and (23) - (27) for a unified lambda, lambdas that varied by election structure, lambdas that varied by decision, and interactions of these cases. Within each case, we selected the optimal lambda or lambda vector by maximum likelihood using the data from our experiment.

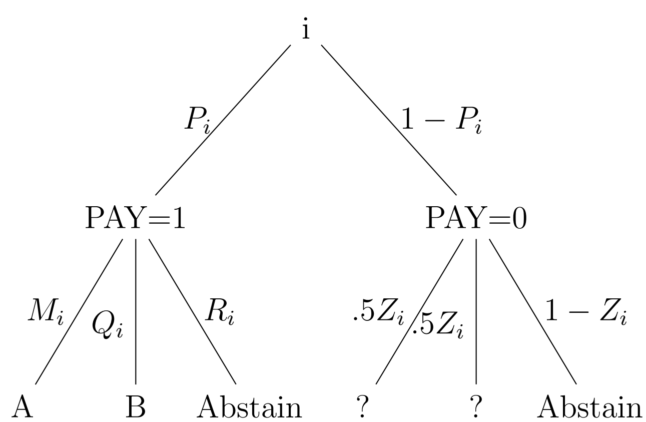
After selecting the lambda or lambda vector by maximum likelihood, we calculated AIC/BIC for each method. AIC/BIC values are both minimized when we allowed the lambda to vary both by treatment and by decision. The resultant lambda values are reported in Table A1.

Figure A1: Decision sequence - Mandatory



Sequence of decisions for a given type, with the corresponding choice probabilities. PAY=1 indicates that a voter has paid for information.

Figure A2: Decision sequence - Abstention



Sequence of decisions for a given type, with the corresponding choice probabilities. PAY=1 indicates that a voter has paid for information.

Table A1: Lambda values by treatment and by decision

	λ_{info}	$\lambda_{vote\|PAY=1}$	$\lambda_{PAY=0}$
AH	0.015	0.070	0.750
AL	0.025	0.110	0.900
ML	0.081	0.128	-
MH	0.124	0.114	-

λ_{info} reports the lambda at the information acquisition decision. $\lambda_{vote|PAY=1}$ reports the lambda at the voting stage, conditional on paying for information, and $\lambda_{vote|PAY=0}$ conditional on remaining uninformed.

C Instructions from experiment

Introduction

Welcome to this experiment. The following instructions will explain how you can earn money. We will go over these instructions with you.

It is important that you remain silent and do not look at other people's work. If you have any questions, or need assistance of any kind, please raise your hand and an experimenter will come to you. If you talk, laugh, exclaim out loud, etc., you will be asked to leave and you will not be paid. We expect and appreciate your cooperation.

For today's experiment, you will receive \$5 for participating, plus additional earnings during the experiment that depend on your decisions and the decisions of others. Your earnings in the experiment are expressed in points. 70 points are worth \$1. At the end of the experiment, your total earnings in points will be exchanged into dollars and paid to you in cash, privately.

The experiment consists of two parts, labeled Part 1 and Part 2. Each part has 25 decision rounds. We will read you the instructions for Part 1 now. After completing Part 1 we will read instructions for Part 2. After we have read the instructions, there will be time to ask clarifying questions. When we are done going through the instructions for Part 1, each of you will have to answer a few brief questions to ensure everyone understands.

Instructions Part 1

Groups

At the beginning of each round, all participants will be randomly divided into groups of 5. You will only interact with your group through the computer interface. You will not know who the other members of your group are. Within each round you will have no interaction with participants who are randomly assigned to other groups.

Groups are randomly determined *every round*, so that the participants in your group are probably not the same between rounds.

Instructions Part 1

BEST OUTCOMES

Each round the computer randomly selects a BEST OUTCOME for each participant. Each participant's BEST OUTCOME will be an integer from 1-100. Each of the values 1-100 are equally likely. Different group members will generally have different BEST OUTCOMEs.

You can think of the process of selecting the BEST OUTCOME for a participant as the computer putting 100 numbered balls in a bag, thoroughly mixing them, and drawing one out at random. To select the BEST OUTCOME for another participant, the computer puts the previously chosen ball back in the bag, mixes the balls again, and then randomly draws a ball. This process is followed for every participant in each round. BEST OUTCOMEs are independent across rounds and participants.

You receive the highest benefits if the GROUP OUTCOME equals your own BEST OUTCOME, and receive lower benefits the further the GROUP OUTCOME is from your own BEST OUTCOME. We will explain more about the GROUP OUTCOME shortly.

Instructions Part 1

GROUP OUTCOMES

In each round the GROUP OUTCOME is determined in part by the group choice, and in part by chance.

In each round, your group will choose between OPTION A and OPTION B. This is done by majority vote. In the event of a tied vote, the group choice is determined randomly, with each OPTION being equally likely. All group members are able to submit a vote, but are not required to do so. Submitting a vote costs 2 points.

If your group chooses OPTION A, the computer will randomly select a GROUP OUTCOME that is an integer between 1-50. Each of the values 1-50 will be equally likely if OPTION A is chosen.

If your group chooses OPTION B, the computer will randomly select a GROUP OUTCOME that is an integer between 51-100. Each of the values 51-100 will be equally likely if OPTION B is the chosen.

The GROUP OUTCOME selected by the computer is not affected by the GROUP OUTCOME in any other group or any other round. GROUP OUTCOMEs are selected independently.

Instructions Part 1

Information Decision

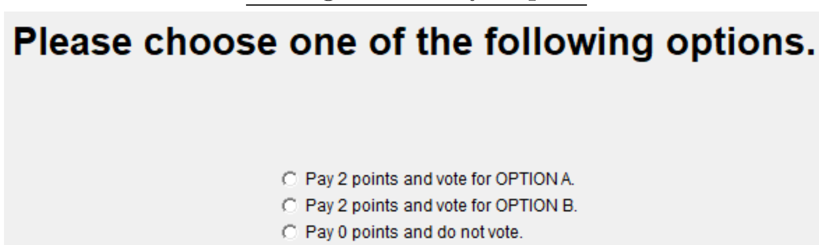
In each round, there will be two OPTIONS on the computer screen, OPTION A and OPTION B. The ordering of the OPTIONs will be randomized. That is, in one round OPTION B may be listed first, but in another round OPTION A may come first. This random ordering is determined each round, and is not affected by the ordering in any other round.

Initially, the two OPTIONs are indistinguishable. That is, the computer screen will display two identical buttons labeled OPTION ? and OPTION ?. Which one of these buttons is OPTION A, and which is OPTION B, is not revealed.

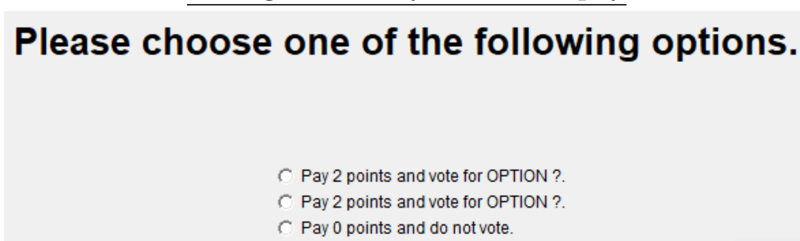
In each round, before voting, each participant may pay to learn which OPTION is OPTION A and which is OPTION B. The cost of paying is 9 points.

Example of information purchase:

<u>Voting screen if you paid</u>



<u>Voting screen if you did not pay</u>



Instructions Part 1

Decision-Making Stages

Each round consists of 2 stages: Stage 1 and Stage 2.

Stage 1

The computer randomly selects the individual BEST OUTCOME for each group member. Remember that each BEST OUTCOME can be any number from 1-100, and that BEST OUTCOMES are independent from one another.

Each group member chooses whether or not to pay to learn OPTION identities in that round. The cost of learning OPTION identities is 9 points.

Stage 2

The OPTIONs are indicated on each group member's computer screen. If a group member has not paid to learn OPTION identities, the decision buttons will be labeled OPTION ? and OPTION ?. If a participant has paid to learn OPTION identities, he/she will see the true labels: one will be OPTION A and one will be OPTION B. The ordering of these OPTIONs will be randomized.

Each group member is able to submit a single vote for one of the OPTIONs, by clicking on the respective button. Submitting a vote costs 2 points. If a participant decides not to submit a vote, they indicate this by clicking the button label "Pay 0 and do not vote".

The OPTION with the most votes in your group is the group choice. In the event of a tied vote, the group choice is determined randomly, with each OPTION being equally likely.

If OPTION A is the group choice, the computer randomly determines a GROUP OUTCOME between 1-50. Each of the values 1-50 is equally likely.

If OPTION B is the group choice, the computer randomly determines a GROUP OUTCOME between 51-100. Each of the values 51-100 is equally likely.

Instructions Part 1

Your Round PAYOFF

Your round PAYOFF will depend on 3 factors: the distance between your own BEST OUTCOME and the GROUP OUTCOME, whether you chose to pay to learn OPTION identities, and whether you chose to vote.

If you paid to learn the OPTION identities and decided to vote, your PAYOFF is

$$100 - |\text{YOUR BEST OUTCOME} - \text{GROUP OUTCOME}| - 9 - 2$$

If you paid to learn the OPTION identities and decided not to vote, your PAYOFF is

$$100 - |\text{YOUR BEST OUTCOME} - \text{GROUP OUTCOME}| - 9$$

If you did not pay to learn the OPTION identities, and you decided to vote your PAYOFF is

$$100 - |\text{YOUR BEST OUTCOME} - \text{GROUP OUTCOME}| - 2$$

If you did not pay to learn the OPTION identities, and you decided not to vote, your PAYOFF is

$$100 - |\text{YOUR BEST OUTCOME} - \text{GROUP OUTCOME}|$$

Instructions Part 1

Example 1

At the beginning of a round, the computer selects 60 as your BEST OUTCOME.

You pay to learn OPTION identities, which costs 9 points.

You vote, which costs 2 points.

OPTION A is the group choice. The computer then randomly selects 15 as the GROUP OUTCOME

Your round PAYOFF is

$$100 - |60 - 15| - 9 - 2 = 44$$

Instructions Part 1

Example 2

In the next round, you are randomly placed in a new 5-person group.

The computer selects 80 as your new BEST OUTCOME.

You choose not to pay to learn OPTION identities.

You do not vote.

OPTION B is the group choice. The computer then randomly selects 70 as the GROUP OUTCOME.

Your round PAYOFF is

$$100 - |80 - 70| = 90$$

Instructions Part 1

Example 3

In the next round, you are randomly placed in a new 5-person group.

The computer selects 15 as your new BEST OUTCOME.

You choose to not pay to learn OPTION identities.

You vote, which costs 2 points.

OPTION B is the group choice. The computer then randomly selects 90 as the GROUP OUTCOME.

Your round PAYOFF is

$$100 - |15 - 90| - 2 = 23$$

Example 4

In the next round, you are randomly placed in a new 5-person group.

The computer selects 15 as your new BEST OUTCOME.

You choose to pay to learn OPTION identities.

You do not vote.

OPTION A is the group choice. The computer then randomly selects 25 as the GROUP OUTCOME.

Your round PAYOFF is

$$100 - |15 - 25| - 9 = 81$$

Instructions Part 1

Selecting periods for payment

Once all 50 rounds of *the experiment* have been completed, 20 rounds will be randomly chosen for payment. Each of the 50 rounds are equally likely to be chosen for payment.

Your total earnings for the experiment are equal to the sum of the PAYOFFs in the 20 randomly chosen rounds. You will learn which of these 50 rounds have been selected for payment at the end off the experiment.

Instructions Part 1

Summary

1. In each round the computer randomly assigns each participant a BEST OUTCOME, and randomly sorts players into groups of 5.
2. In each round, group members must decide between two OPTIONs, OPTION A and OPTION B. However, group members do not know which OPTION is which. Each group member may choose to learn OPTION identities for a cost of 9 points.
3. After all members have decided whether or not to pay to learn OPTION identities, voting takes place. Every group member can vote, but is not required to do so. Voting costs 2 points.
4. The group choice is the OPTION which gets the majority of votes (ties are broken randomly). If OPTION A is the group choice, the GROUP OUTCOME will be between 1-50. If OPTION B is the group choice, the GROUP OUTCOME will be between 51-100.
5. The PAYOFF for group members who pay to learn OPTION identities and who vote is

$$100 - |\text{BEST OUTCOME} - \text{GROUP OUTCOME}| - 2 - 9$$

6. The PAYOFF for group members who pay to learn OPTION identities and who do not vote is

$$100 - |\text{BEST OUTCOME} - \text{GROUP OUTCOME}| - 9$$

7. The PAYOFF for group members who do not pay to learn OPTION identities and who vote is

$$100 - |\text{BEST OUTCOME} - \text{GROUP OUTCOME}| - 2$$

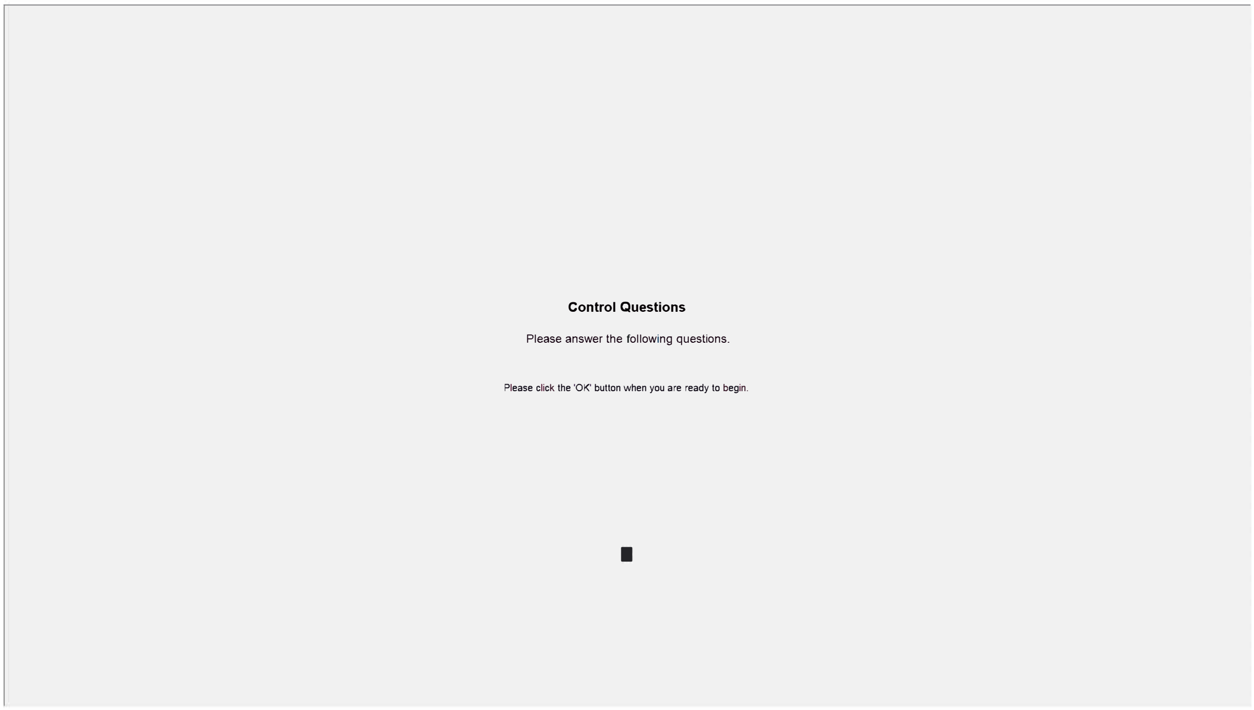
8. The PAYOFF for group members who do not pay to learn OPTION identities and who do not vote is

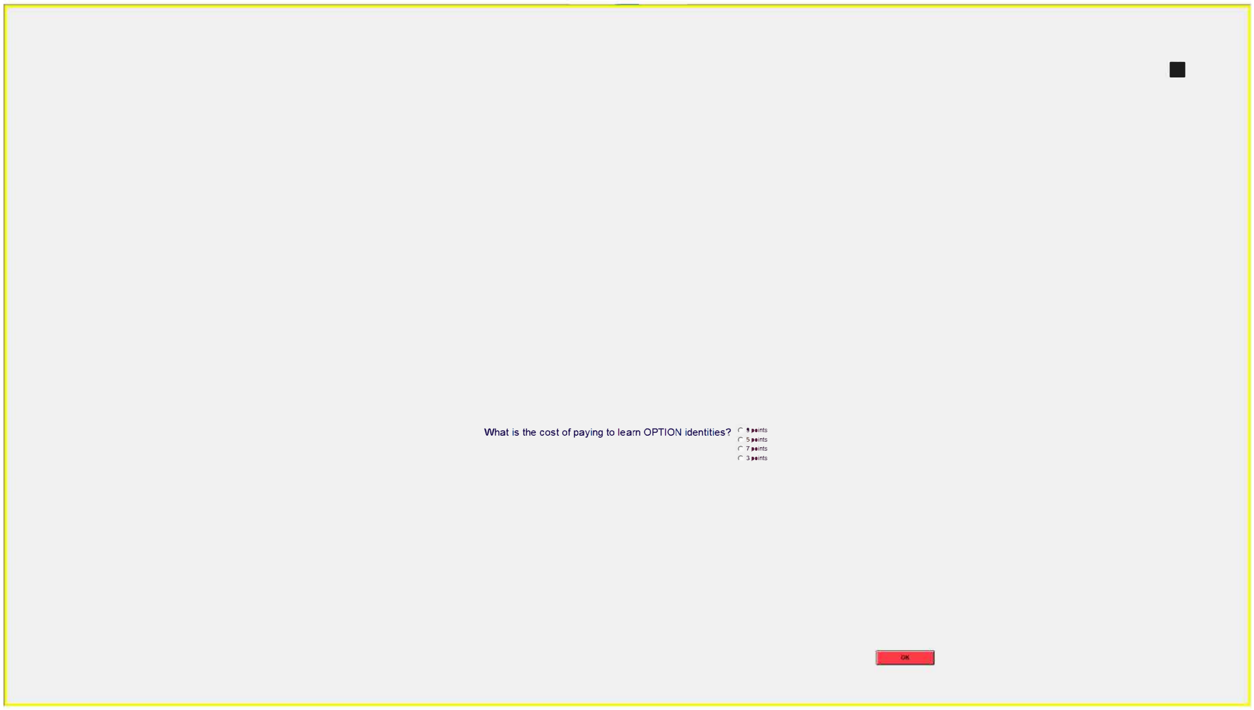
$$100 - |\text{BEST OUTCOME} - \text{GROUP OUTCOME}|$$

Instructions Part 2

Part 2 of the experiment has 25 decision rounds. Part 2 is the same as Part 1, except that the cost of paying to learn OPTION identities is 3 points.

D Quiz from experiment




What is the cost of paying to learn OPTION identities?
9 points
5 points
7 points
3 points
OK


What are the possible GROUP OUTCOMES if your group chooses OPTION A?
1-50
51-100
25-75
1-100
OK


Suppose that in a round, your BEST OUTCOME is 22. You then choose to pay to learn OPTION identities, for a cost of 9 points. You then vote for OPTION A, which costs 2 points. The group chooses OPTION A, and the computer randomly determines a GROUP OUTCOME of 32. What is your PAYOFF for the round (in points)?
100 - |22-32| - 9 - 2 = 79
100 - |22-50| - 9 - 2 = 61
100 - |22-32| - 2 = 88
100 - |22-32| - 9 = 81
OK


Suppose that in a round, your BEST OUTCOME is 63. You then choose to not pay to learn OPTION identities. You then vote for OPTION ?, which costs 2 points. The group chooses OPTION A, and the computer randomly determines a GROUP OUTCOME of 12. What is your PAYOFF for the round (in points)?
100 - |63-12| - 2 = 47
100 - |63-50| - 9 - 2 = 76
100 - |63-12| - 9 - 2 = 38
100 - |63-12| - 9 = 40
OK

You have successfuly completed the questions.

Please wait quietly until everyone has completed the questions
When everyone has finished, we will begin.