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Abstention and Costly Information Acquisition in Elections

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ABSTENTION AND COSTLY INFORMATION ACQUISITION IN ELECTIONS

by

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Abstract

ABSTENTION AND COSTLY INFORMATION ACQUISITION IN ELECTIONS

by

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I develop and study a model of voter information acquisition about candidate preferences under both mandatory and optional voting schemes. I show theoretically that optional voting results in a more informed electorate, unless information acquisition is free or cheap relative to the cost of voting. I show this by characterizing the unique symmetric equilibria for information acquisition under both mandatory and optional voting schemes. 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.

(19 pages)

PUBLIC ABSTRACT

Abstention and Costly Information Acquisition in Elections

Jacob Meyer

Voter turnout rates are low in the United States. Even among citizens who show up to the polls, many do not vote in every race on the ballot. This is especially true for low-profile elections, and races where political party is not on the ballot. Both low turnout and incomplete ballots could be caused by high costs of information. Voters and non-voters have time constraints that can prevent them from researching every candidate or proposition on the ballot. One proposed solution to increase citizen informedness is to make voting mandatory. Mandatory voting imposes a penalty (usually a fine) if a citizen fails to turn out on election day. While the introduction of mandatory voting may increase turnout rates, it is unclear if it will lead to a more informed electorate. I explore the effects of mandatory voting on information acquisition by developing a model that compares citizen informedness in a costly election under both mandatory and optional voting schemes. I find that optional voting results in a more informed electorate, unless information acquisition is free or extremely cheap relative to the cost of voting. The model predicts that moderate citizens are less likely to learn about candidate preferences, compared to citizens with more extreme preferences.

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Jacob Meyer

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Chapter 1

Introduction

Voter turnout rates are low in the United States. In recent Presidential election years turnout has been around 60%, and in Midterm election years this drops to about 46% (Ballotpedia, 2019). Even among voters who show up to the polls, many do not vote in every race on the ballot. Selective abstention is pervasive in U.S. elections, especially for low-profile races and referendums. Both low turnout and selective abstention are likely driven by the high costs to become informed about every candidate or referendum (Ghirardato and Katz, 2006).

Becoming an informed voter is difficult in many elections. Aside from Presidential and a few other high-profile races, the majority of elections do not enjoy extensive media coverage. Instead, motivated citizens proactively attend debates, read candidate websites, and research policy issues in order to stay up to date with candidate platforms. Some citizens may choose to remain uninformed and/or not vote because the cost to become informed is too high. Others may choose to become informed in some elections, but remain uninformed in others. In these cases citizens may turn out to vote, but choose to abstain in certain races on the ballot rather than to vote for an unknown candidate or referendum that may upset the status quo (Bowler, Donovan, and Happ, 1992; Feddersen and Pesendorfer, 1999). This preference is manifest by higher abstention rates in races where political party is not on the ballot, such as elections for judges, city council members, county prosecutors, sheriffs, or natural resource managers (Ghirardato and Katz, 2006; DeAngelo and McCannon, 2019).

One proposed solution to increase citizen informedness in these scenarios is to make voting mandatory. Mandatory voting imposes a penalty (usually a fine) if a citizen fails to turn out on election day. Currently, 11 countries enforce mandatory voting, including Australia, Brazil, Luxembourg, and North Korea. While the introduction of mandatory voting may increase turnout rates (Hoffman, León, and Lombardi, 2017), it is unclear if it will lead to a more informed electorate. Previous studies find evidence for a causal effect of citizen informedness on turnout decisions (Lassen, 2005; Feddersen and Pesendorfer, 1999), but to my knowledge no study has found causality going the other direction.

I explore the effects of increased turnout on information acquisition by comparing voter informedness in a costly election under both mandatory and optional voting schemes. I find that optional voting results in a more informed electorate, unless information acquisition is free or extremely cheap relative to the cost of voting. I show this by characterizing the unique symmetric equilibria for information acquisition under both mandatory and optional voting schemes. Consistent with previous literature, 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.

Several studies also 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, Morton, and Palfrey (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 investigated the effects of mandatory voting laws, with varying results. 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. Krishna and Morgan (2012) study mandatory voting in a Condorcet setting, where voters have identical preferences but differing information, and find that optional voting is strictly welfare enhancing. To my knowledge, no study has addressed the effects of mandatory voting on citizen informedness.

I add to previous studies by interacting voter information acquisition choices with optional and mandatory voting schemes. My results confirm that moderate citizens have the least incentive to learn about candidate platforms, and predicts that a larger share of moderate citizens will become informed if abstention is allowed, unless information acquisition is free or extremely cheap relative to the cost of voting.

Chapter 2

The voting game

I investigate voters' information acquisition choices in a two-candidate election with an odd number of voters. Voter policy preferences v_i are random draws from a commonly known distribution $v(\cdot)$ over $(0,1)$. The two candidates A and B have randomly determined policy preferences defined by mirror distributions $a(\cdot)$ over $(0,.5)$, and $b(\cdot)$ over $(.5,1)$. The distributions $a(\cdot)$, $b(\cdot)$, and $v(\cdot)$ are known by all players, but individually realized policy preferences are private information. Furthermore, voters do not know which of the candidates is candidate A, and which is B.

The sequence of events in the game is as follows:

1. Voters' and candidates' policy preferences are determined and privately revealed
2. Voters may choose to learn the identity of candidates by paying a cost c
3. Voters cast votes and incur cost ε (abstention is allowed in the optional schema)
4. The winning candidate is determined by plurality rule with random tie breaking
5. Resultant payoffs are awarded

The payoff function for each voter v_i is given by

$$\pi_i(K, v_i, \gamma, e_i) = K - U(|v_i - \gamma|) - e_i c - w_i \varepsilon$$

where K is a positive constant, γ is the realized policy, c is the cost of acquiring information, and ε is some small cost of voting. $-U(|v_i - \gamma|)$ 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 acquire information, and $e_i = 0$ otherwise. Similarly,

$w_i = 1$ if the voter casts a vote, and $w_i = 0$ if v_i abstains (possible only under optional voting).

Although candidates are initially indistinguishable, each v_i has a candidate preference based on the known candidate distributions $a(\cdot)$ and $b(\cdot)$. Each v_i's candidate preference is determined by

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

For ease of reference, I denote players who prefer candidate A as v_i^a, candidate B as v_i^b, and those indifferent as v^s.

Each voter may choose to learn the identity of candidates by paying a cost c. This reflects the idea that candidates' announced platforms are cheap talk, and that candidates are only constrained by maintaining a policy position consistent with their party affiliation (Snyder and Ting, 2002). A voter v_i will pay to acquire information if

$$E[\pi_i|v_i, e_i = 1] - E[\pi_i|v_i, e_i = 0] \geq 0. \tag{2.1}$$

If all voters are best responding, eq.(2.1) implies the existence and uniqueness of a cutpoint information acquisition strategy, as outlined in Propostion 1.

Proposition 1. *Under both mandatory and optional voting schemes, there exists a perfect Bayes equilibrium in which each voter v_i follows the cutpoint strategy*

$$e_i = \begin{cases} 0 & \text{if} \quad v_i \in (v_l^*, v_r^*) \\ 1 & \text{if} \quad v_i \in (0, v_l^*) \bigcup (v_r^*, 1), \end{cases} \qquad \text{for } * = \{m, o\} \tag{2.2}$$

Proof. The proof for mandatory voting is given in section 2.1, and for optional voting in 2.2. ■

This equilibrium describes an interval of moderate voters who choose to remain uninformed about candidate identities. The cutpoints are denoted by indices m or o to allow the possibility of differing cutpoints between the mandatory and optional voting schemes. As I show in section 3, the relationship between the cutpoints in the two schemes will be determined by costs of voting and information acquisition.

2.1 Mandatory Voting

Under mandatory voting, eq. (2.1) for a voter v_i^a can also be written as

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

or rather

$$\begin{aligned}
&(K - E[U|v_i, \gamma \in (0, .5)] - c - \varepsilon) \cdot P\big(\gamma \in (0, .5)|e_i = 1\big)+ \\
&(K - E[U|v_i, \gamma \in (.5, 1)] - c - \varepsilon) \cdot P\big(\gamma \in (.5, 1)|e_i = 1\big) - \\
&\big[(K - E[U|v_i, \gamma \in (0, .5)] - \varepsilon) \cdot P\big(\gamma \in (0, .5)|e_i = 0\big)+ \\
&\ (K - E[U|v_i, \gamma \in (.5, 1)] - \varepsilon) \cdot P\big(\gamma \in (.5, 1)|e_i = 0\big)\big] \qquad \geq 0.
\end{aligned}$$

This is equivalent to

$$\begin{aligned}
&-E[U|v_i, \gamma \in (0, .5)] \cdot \Big(P\big(\gamma \in (0, .5)|e_i = 1\big) - P\big(\gamma \in (0, .5)|e_i = 0\big)\Big)+ \\
&\big[-E[U|v_i, \gamma \in (.5, 1)] \cdot \Big(P\big(\gamma \in (.5, 1)|e_i = 1\big) - P\big(\gamma \in (.5, 1)|e_i = 0\big)\Big)\big] \geq c.
\end{aligned} \tag{2.3}$$

The expected utilities from each candidates' election are

$$-E[U|v_i, \gamma \in (0, .5)] = \int_0^{.5} -U\big(|v_i - x|\big)a(x)\, dx \tag{2.4}$$

$$-E[U|v_i, \gamma \in (.5, 1)] = \int_{.5}^{1} -U\big(|v_i - x|\big)b(x)\, dx. \tag{2.5}$$

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 $e_i = 1$, player v_i^a will pay to get information, and consequently will correctly vote for candidate A. Candidate A's probability of election is determined by the number of the other players $v_{j \neq i}$ who vote in favor of candidate A, $\sum v_{j \neq i}^a$. Since all $v_{j \neq i} < v_l$

will vote for A, and in expectation one half of uninformed players will also vote for A, $\sum v^a_{j\neq i} \sim Binomial(p)$, where $p = V(v_l) + .5\big(V(v_r) - V(v_l)\big)$. Since I am restricting attention to symmetric distributions of v_i, with $a(\cdot)$ and $b(\cdot)$ being mirror images, $p = .5$.

$$\begin{aligned} P(\gamma \in (0,.5)|e_i = 1) &= P\Big(\sum v^a_{j\neq i} \geq \frac{n-1}{2}\Big) \\ &= 1 - P\Big(\sum v^a_{j\neq i} < \frac{n-1}{2}\Big) \\ &= 1 - \sum_{k=0}^{\frac{n-3}{2}} P\Big(\sum v^a_{j\neq i} = k\Big) \\ &= 1 - \sum_{k=0}^{\frac{n-3}{2}} \binom{n-1}{k} .5^{n-1} \end{aligned} \tag{2.6}$$

$$\begin{aligned} P(\gamma \in (.5,1)|e_i = 1) &= 1 - P(\gamma \in (0,.5)|e_i = 1) \\ &= \sum_{k=0}^{\frac{n-3}{2}} \binom{n-1}{k} .5^{n-1} \end{aligned} \tag{2.7}$$

$$\begin{aligned} P(\gamma \in (0,.5)|e_i = 0) &= P\Big(\sum v^a_{j\neq i} \geq \frac{n+1}{2}\Big) \bigcup P\Big(\sum v^a_{j\neq i} = \frac{n-1}{2} \ \textit{and}\ v_i = v^a_i\Big) \\ &= \sum_{k=\frac{n+1}{2}}^{n-1} P\Big(\sum v^a_{j\neq i} = k\Big) + .5P\Big(\sum v^a_{j\neq i} = \frac{n-1}{2}\Big) \\ &= \sum_{k=\frac{n+1}{2}}^{n-1} \binom{n-1}{k} .5^{n-1} + \binom{n-1}{\frac{n-1}{2}} .5^{n} \end{aligned} \tag{2.8}$$

$$\begin{aligned} P(\gamma \in (.5,1)|e_i = 0) &= 1 - P(\gamma \in (0,.5)|e_i = 0) \\ &= 1 - \sum_{k=\frac{n+1}{2}}^{n-1} \binom{n-1}{k} .5^{n-1} + \binom{n-1}{\frac{n-1}{2}} .5^{n} \end{aligned} \tag{2.9}$$

With the results in (2.4) - (2.9), the expression for (2.3) is

$$\int_0^{.5} -U\big(|v_i - x|\big)a(x)\ dx \times$$
$$\left[1 - \sum_{k=0}^{\frac{n-3}{2}} \binom{n-1}{k} .5^{n-1} - \left(\sum_{k=\frac{n+1}{2}}^{n-1} \binom{n-1}{k} .5^{n-1} + \binom{n-1}{\frac{n-1}{2}} .5^n\right)\right] -$$
$$\int_{.5}^{1} -U\big(|v_i - x|\big)b(x)\ dx \times$$
$$\left[\sum_{k=0}^{\frac{n-3}{2}} \binom{n-1}{k} .5^{n-1} - \left(1 - \left(\sum_{k=\frac{n+1}{2}}^{n-1} \binom{n-1}{k} .5^{n-1} + \binom{n-1}{\frac{n-1}{2}} .5^n\right)\right)\right] \geq c,$$

or rather

$$\left(\int_{.5}^{1} U\big(|v_i - x|\big)b(x)\ dx - \int_0^{.5} U\big(|v_i - x|\big)a(x)\ dx\right)\left[\binom{n-1}{\frac{n-1}{2}} .5^n\right] \geq c. \tag{2.10}$$

This is simply voter v_i^a's expected benefit from having their preferred candidate elected, weighted by the probability of being the pivotal voter. For ease of notation, I denote $LHS(2.10)$ as $F(v_i)$.

In equilibrium, a voter $v_i = v_l^m$ is indifferent to purchasing information for price c. Note that $F(0) > 0$ due to the concavity of U, and $F(v^s) = 0$ by the definition of v^s. Furthermore, via Leibniz's rule, $\frac{\partial F}{\partial v_l^m}$ is monotonically decreasing:

$$
\begin{aligned}
\frac{\partial F}{\partial v_l^m} &= \Bigg(\int_{.5}^{1} \frac{\partial U\big(|v_l^m - x|\big)}{\partial |v_l^m - x|} \frac{\partial |v_l^m - x|}{\partial v_l^m} b(x)\; dx - \Bigg[U\big(|v_l^m - v_l^m|\big) a(v_l^m) \frac{d(v_l^m)}{dv_l^m} - \\
&\qquad U\big(|v_l^m - 0|\big) a(0) \frac{d(0)}{dv_l^m} + \int_0^{v_l^m} \frac{\partial U\big(|v_l^m - x|\big)}{\partial |v_l^m - x|} \frac{\partial |v_l^m - x|}{\partial v_l^m} a(x)\; dx + \\
&\qquad U\big(|v_l^m - .5|\big) a(.5) \frac{d(.5)}{dv_l^m} - U\big(|v_l^m - v_l^m|\big) a(v_l^m) \frac{d(v_l^m)}{dv_l^m} + \\
&\qquad \int_{v_l^m}^{.5} \frac{\partial U\big(|v_l^m - x|\big)}{\partial |v_l^m - x|} \frac{\partial |v_l^m - x|}{\partial v_l^m} a(x)\; dx \Bigg] \Bigg) \left[\binom{n-1}{\frac{n-1}{2}} .5^n \right] \\
&= \Bigg(\int_{.5}^{1} \frac{\partial U\big(|v_l^m - x|\big)}{\partial |v_l^m - x|} (-1) b(x)\; dx - \Bigg[\int_0^{v_l^m} \frac{\partial U\big(|v_l^m - x|\big)}{\partial |v_l^m - x|} (1) a(x)\; dx + \\
&\qquad \int_{v_l^m}^{.5} \frac{\partial U\big(|v_l^m - x|\big)}{\partial |v_l^m - x|} (-1) a(x)\; dx \Bigg] \Bigg) \left[\binom{n-1}{\frac{n-1}{2}} .5^n \right] \\
&= \underbrace{\left(\int_{v_l^m}^{.5} \frac{\partial U}{\partial |v_l^m - x|} a(x)\, dx - \int_{.5}^{1} \frac{\partial U}{\partial |v_l^m - x|} b(x)\, dx - \int_0^{v_l^m} \frac{\partial U}{\partial |v_l^m - x|} a(x)\, dx \right)}_{<0 \forall\ v_l^m} \times \\
&\qquad \underbrace{\left[\binom{n-1}{\frac{n-1}{2}} .5^n \right]}_{\in (0,1)\ \forall\ n \in \mathbb{Z}^+}.
\end{aligned}
\tag{2.11}
$$

The intermediate value theorem establishes the existence and uniqueness of an equilibrium threshold $v_i = v_l^m$ where $F(v_l^m) = c$, for $c \in (0, F(0))$. Any voter in $(0, v_l^m)$ will pay to acquire information, and any voter in (v_l^m, v^s) will not. A similar 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 (v^s, v_r^m) will not. ■

2.2 Optional voting

Under optional voting, voters may choose to abstain from voting, in addition to choosing whether or not to acquire information about candidates' party affiliation. For a cost of voting $\varepsilon > 0$, no voter will choose to remain uninformed and to vote, since

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

Similarly, no voter will become informed and then not vote, since

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

Thus, under optional voting, eq. (2.1) becomes

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

which is equivalent to

$$\big[K - E[U|v_i, e_i = w_i = 1] - c - \varepsilon]\big] - \big[K - E[U|v_i, e_i = w_i = 0]\big] \geq 0.$$

This reduces to

$$E[U|v_i, e_i = w_i = 1] - E[U|v_i, e_i = w_i = 0] \geq c + \varepsilon. \tag{2.12}$$

The expected utility from getting informed and voting is

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

Inserting into (2.12) yields

$$\begin{aligned} &\bigg(\int_{.5}^{1} U\big(|v_i - x|\big)b(x)\,dx - \int_{0}^{.5} U\big(|v_i - x|\big)a(x)\,dx\bigg) \times \\ &.5\left[\sum_{t=0}^{\frac{n-1}{2}} \sum_{s=0}^{1} \binom{n-1}{t}\binom{n-1-t}{n-1-2t-s}\big(1 - 2V(v_l^o)\big)^{n-1-s-2t} V(v_l^o)^{2t+s}\right] \quad \geq c + \varepsilon \end{aligned} \tag{2.13}$$

Similar to the mandatory case, this is simply the expected benefit of v_i^a's preferred candidate being elected, weighted by the probability of being the pivotal voter. For ease of reference I denote LHS(2.13) as $G(v_i)$.

In equilibrium, a voter $v_i = v_l^o$ will be indifferent between abstaining and acquiring information and voting for cost $c+\varepsilon$. Note that $G(v_i = v_l^o = 0) > 0$ due to the concavity of U, and $G(v_i = v_l^o = v^s) = 0$, by the definition of v^s. Furthermore, via Leibniz's rule, $\frac{\partial G(v_i = v_l^o)}{\partial v_l^o} < 0$:

$$
\begin{aligned}
\frac{\partial G}{\partial v_l^o} = &\left(\int_{v_l^o}^{.5} \frac{\partial U}{\partial |v_l^o - x|} a(x)\, dx - \int_{.5}^{1} \frac{\partial U}{\partial |v_l^o - x|} b(x)\, dx - \int_{0}^{v_l^o} \frac{\partial U}{\partial |v_l^o - x|} a(x)\, dx \right) \times \\
& .5 \left[\sum_{t=0}^{\frac{n-1}{2}} \sum_{s=0}^{1} \binom{n-1}{t} \binom{n-1-t}{n-1-2t-s} \big(1 - 2V(v_l^o)\big)^{n-1-s-2t} V(v_l^o)^{2t+s} \right] + \\
& \left(\int_{.5}^{1} U\big(|v_l^o - x|\big) b(x)\, dx - \int_{0}^{.5} U\big(|v_l^o - x|\big) a(x)\, dx \right) \times \\
& .5 \left[\sum_{t=0}^{\frac{n-1}{2}} \sum_{s=0}^{1} \binom{n-1}{t} \binom{n-1-t}{n-1-2t-s} \times \right. \\
& \Big[(n-1-s-2t)\big(1 - 2V(v_l^o)\big)^{n-2-s-2t} (-2v(v_l^o)) V(v_l^o)^{2t+s} + \\
& \left. \quad \big(1 - 2V(v_l^o)\big)^{n-1-s-2t} (2t+s) V(v_l^o)^{2t+s-1} v(v_l^o) \Big] \right] \\
= & \underbrace{\left(\int_{v_l^o}^{.5} \frac{\partial U}{\partial |v_l^o - x|} a(x)\ dx - \int_{.5}^{1} \frac{\partial U}{\partial |v_l^o - x|} b(x)\ dx - \int_{0}^{v_l^o} \frac{\partial U}{\partial |v_l^o - x|} a(x)\ dx \right)}_{<0\ \forall\ v_l \in (0,.5)} \times \\
& \underbrace{.5 \left[\sum_{t=0}^{\frac{n-1}{2}} \sum_{s=0}^{1} \binom{n-1}{t} \binom{n-1-t}{n-1-2t-s} \big(1 - 2V(v_l^o)\big)^{n-1-s-2t} V(v_l^o)^{2t+s} \right]}_{\in (0,1)\ \forall\ V(v_l) \in (0,.5), n \in \mathbb{Z}^+} + \\
& \underbrace{v(v_l^o)^n .5 \left(\int_{.5}^{1} U\big(|v_l^o - x|\big) b(x)\ dx - \int_{0}^{.5} U\big(|v_l^o - x|\big) a(x)\ dx \right)}_{>0\ \forall\ v_l \in (0,.5)} \times \\
& \underbrace{\left[\sum_{t=0}^{\frac{n-1}{2}} \sum_{s=0}^{1} \binom{n-1}{t} \binom{n-1-t}{n-1-2t-s} \left(\big(1 - 2V(v_l^o)\big)^{n-2-s-2t} V(v_l^o)^{2t+s-1} \right) \times \right.}_{>0\ \forall\ V(v_l) \in (0,.5), n \in \mathbb{Z}^+} \\
& \underbrace{\left. \Big[(2t+s) - 2V(v_l^o)(n-1) \Big] \right]}_{<0\ \forall\ V(v_l) \in (0,.5), n \in \mathbb{Z}^+} .
\end{aligned}
\tag{2.14}
$$

The intermediate value theorem establishes the existence and uniqueness of an equilibrium cutpoint $v_i = v_l^o$ where $G(v_l^o) = c + \varepsilon$, for $c + \varepsilon \in (0, G(0))$. To confirm that voters in (v^{lo}, v^s) will follow the cutpoint strategy in (2.2), I note that $G(v_i = 0)$ is strictly positive, $G(v_i = v^s) = 0$, and $\frac{\partial G(v_i)}{\partial v_i} < 0$ (taking v_l^o as fixed):

$$\frac{\partial G(v_i)}{\partial v_i} = \underbrace{\left(\int_{v_i}^{.5} \frac{\partial U}{\partial |v_i - x|} a(x)\, dx - \int_{.5}^{1} \frac{\partial U}{\partial |v_i - x|} b(x)\, dx - \int_{0}^{v_i} \frac{\partial U}{\partial |v_i - x|} a(x)\, dx \right)}_{<0 \,\forall\, v_i \in (0,.5)} \times$$
$$\underbrace{.5 \left[\sum_{t=0}^{\frac{n-1}{2}} \sum_{s=0}^{1} \binom{n-1}{t} \binom{n-1-t}{n-1-2t-s} \left(1 - 2V(v_l^o)\right)^{n-1-s-2t} V(v_l^o)^{2t+s} \right]}_{\in (0,1)\,\forall\, V(v_l^o) \in (0,.5), n \in \mathbb{Z}^+}. \tag{2.15}$$

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, v^s) will not. A symmetric procedure yields v_r^o where voters in (v^s, v_r^o) will pay to acquire information, and those in $(v_r^o, 1)$ will not. ■

Chapter 3

Comparing optional and mandatory voting

The cutpoint strategy in Proposition 1 allows for equilibria where none, some, or all of the electorate will choose to become informed about candidate preferences. If the costs of voting and information acquisition are such that some voters are willing to purchase information, I can compare the equilibrium cutpoints between mandatory and optional voting to determine which voting scheme results in a more informed electorate.

Under mandatory voting, the proportion of the population that chooses to become informed is dependent only upon the cost of getting information, c. When voting is optional, the choice to become informed depends on the cost of getting information c as well as the cost of voting ε. I investigate whether mandatory or optional voting results in a more informed electorate for different costs of c and ε by comparing the two equilibrium solutions determined by (2.10) and (2.13). As I show below, allowing for abstention does not decrease voter informedness, unless information is free or extremely cheap relative to the cost of voting.

Proposition 2. *When* $c = \varepsilon = 0$, $v_l^o = v_l^m = .5$.

Proof. This is a natural result of the equilibrium conditions in both (2.10) and (2.13). ■

When the cost of voting and the cost of information acquisition are zero, every player gets informed and every player votes, independent of the ability to abstain. The choices to remain uninformed and to not vote are strictly dominated.

Proposition 3. *When* $\varepsilon = 0$ *and* $c > 0$, $v_l^m(c) \leq v_l^o(c)$.

Proof. Under mandatory and optional voting, $v_l^m(c)$ and $v_l^o(c)$ are implicitly defined by equations (2.10) and (2.13):

$$\left(\int_{.5}^{1} U\big(|v_l^m - x|\big)b(x)\,dx - \int_{0}^{.5} U\big(|v_l^m - x|\big)a(x)\,dx\right)\left[\binom{n-1}{\frac{n-1}{2}}.5^n\right] - c \quad = \quad 0 \quad (2.10^*)$$

$$\left(\int_{.5}^{1} U\big(|v_l^o - x|\big)b(x)\,dx - \int_{0}^{.5} U\big(|v_l^o - x|\big)a(x)\,dx\right)\times$$
$$.5\left[\sum_{t=0}^{\frac{n-1}{2}}\sum_{s=0}^{1}\binom{n-1}{t}\binom{n-1-t}{n-1-2t-s}\big(1-2V(v_l^o)\big)^{n-1-s-2t}V(v_l^o)^{2t+s}\right] - c - \varepsilon \quad = 0 \quad (2.13^*)$$

From **Proposition 2**, $v_l^m(0) = v_l^o(0) = .5$. Furthermore, $v_l^m(v_i^s) = v_l^o(v_i^s) = 0$, by the definition of v_i^s. I now turn attention to $\frac{dv_l^m}{dc}$ and $\frac{dv_l^o}{dc}$. For ease of notation, let $LHS(2.10^*) = H(v_l, c)$ and $LHS\ (2.13^*) = J(v_l, c)$. Total differentiation w.r.t. c yields:

$$\frac{\partial H}{\partial c}\frac{dc}{dc} + \frac{\partial H}{\partial v_l^m}\frac{dv_l^m}{dc} = 0 \qquad \text{and} \qquad \frac{\partial J}{\partial c}\frac{dc}{dc} + \frac{\partial J}{\partial v_l^o}\frac{dv_l^o}{dc} = 0$$
$$\Rightarrow \frac{dv_l^m}{dc} = -\frac{\frac{\partial H}{\partial c}}{\frac{\partial H}{\partial v_l^m}} = \frac{1}{H_{v_l^m}} \qquad\qquad \Rightarrow \frac{dv_l^o}{dc} = -\frac{\frac{\partial J}{\partial c}}{\frac{\partial J}{\partial v_l^o}} = \frac{1}{J_{v_l^o}}.$$

Recalling the solutions of $H_{v_l^m}$ and $J_{v_l^m}$ from (2.11) and (2.14), this results in

$$\frac{dv_l^m}{dc} = \frac{1}{(2.11)} \qquad \text{and} \qquad \frac{dv_l^o}{dc} = \frac{1}{(2.14)},$$

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

$$v_l^m < v_l^o \;\forall\, c \in \Big(0, max\{\lim_{v_i \to 0^+} F(v_i), \lim_{v_i \to 0^+} G(v_i) - \varepsilon\} = \lim_{v_i \to 0^+} G(v_i)\Big)$$

and

$$v_l^m = v_l^o = 0 \;\forall\, c \geq \lim_{v_i \to 0^+} G(v_i).$$

■

When the cost of voting is zero, and the cost of acquiring information is sufficiently small, a subset of the population will always choose to become informed. If abstention is allowed, the expected number of voters who cast votes will be less than the population total, thus increasing the probability of being pivotal. In these scenarios the equilibrium cutpoint v_l^o determined by (2.13*) will be less than v_l^m determined by (2.10*): mandatory voting will never result in a more informed electorate.

Note, for a cost of voting $c \in \left(\lim_{v_i \to 0^+} F(v_i), \lim_{v_i \to 0^+} G(v_i)\right)$, no voter will be informed if voting is mandatory, but some will choose to be informed if abstention is allowed. Furthermore, when the cost of information is sufficiently high, no one will pay to become informed, and allowing for abstention has no effect on voter informedness.

Proposition 4. *When* $\varepsilon > \lim_{v_i \to 0^+} G(v_i) - \lim_{v_i \to 0^+} F(v_i)$ *and* $c \geq 0$, $v_l^o(c) = 0 \leq v_l^m(c)$.

Proof. The introduction of a cost of voting $\varepsilon > \lim_{v_i \to 0^+} G(v_i) - \lim_{v_i \to 0^+} F(v_i)$ shifts $v_l^o(c)$ to the left by ε such that $v_l^o(0) < v_l^m(0)$, and $\lim_{v_i \to 0^+} G(v_i) - \varepsilon < \lim_{v_i \to 0^+} F(v_i)$. From the proof of **Proposition 3**, $\frac{dv_l^m}{dc} < \frac{dv_l^o}{dc} < 0$, which implies

$$v_l^o < v_l^m \; \forall \, c \in \left(0, max\{\lim_{v_i \to 0^+} F(v_i), \lim_{v_i \to 0^+} G(v_i) - \varepsilon\} = \lim_{v_i \to 0^+} F(v_i)\right)$$

and

$$v_l^o = v_l^m = 0 \; \forall \, c > \lim_{v_i \to 0^+} F(v_i).$$

■

When voting is sufficiently costly, allowing for abstention will never increase voter informedness. This is because the cost of voting is prohibitively costly; if abstention is allowed, no one is willing to turn out to vote, as the cost of voting exceeds any potential benefit from the election outcome. In turn, no one is willing to pay to become informed if abstention is allowed. However, for sufficiently low costs of information, mandatory voting may result in some voters becoming informed, since the cost of voting is treated as sunk.

Given that real-world turnout rates are greater than zero, this case does not seem likely. While the cost voting may dissuade some voters under optional voting, it is not likely to be so high that it entirely discourages voter participation.

Proposition 5. *When* $\varepsilon \in \left(0, \lim_{v_i \to 0^+} G(v_i) - \lim_{v_i \to 0^+} F(v_i)\right)$, $\exists \, \bar{c}$ *such that* $v_l^o(c) < v_l^m(c)$ *for* $c \in \left[0, \bar{c}\right)$, *and* $v_l^m(c) \leq v_l^o(c)$ *for* $c \geq \bar{c}$.

Proof. The arguments in the proof of **Proposition 3** establish the existence and uniqueness of $\bar{c}$. The introduction of a small cost of voting $\varepsilon \in \left(0, \lim_{v_i \to 0^+} G(v_i) - \lim_{v_i \to 0^+} F(v_i)\right)$ shifts $v_l^o(c)$ to the left by ε, such that $v_l^o(0) < v_l^m(0)$, and $\lim_{v_i \to 0^+} F(v_i) < \lim_{v_i \to 0^+} G(v_i) - \varepsilon$. Given the result in the proof of Proposition 3 that $\frac{dv_l^m}{dc} < \frac{dv_l^o}{dc} < 0$, the intermediate value theorem guarantees existence of a unique $\bar{c} \in \left(0, \lim_{v_i \to 0^+} G(v_i) - \varepsilon\right)$ where $v_l^m(\bar{c}) = v_l^o(\bar{c})$. ■

In situations where the cost of voting is positive, allowing for abstention may increase or decrease voter informedness relative to mandatory voting, depending on the cost of information acquisition. This situation is perhaps the most interesting to consider, as both voting and information acquisition are always costly to some degree.

When the cost of getting information about candidates is low relative to the cost of voting, allowing for abstention will decrease voter informedness. This is because under mandatory voting, voters are forced to treat the cost of voting as sunk while making their information acquisition choice. However, when the cost of voting is small, or the cost of becoming informed about candidate preferences is large (or both), the increased probability of being pivotal under optional voting can outweigh the cost of voting. In these scenarios, optional voting will result in a more informed electorate. This is likely the case for many elections.

Chapter 4
Conclusion

In real-world elections, both voting and information acquisition are costly. This scenario is captured in the equilibrium condition outlined in **Proposition 5**. In this case, allowing for abstention may increase or decrease voter informedness. The effect of abstention will depend on the relative costs of voting and information acquisition.

Mandatory voting increases informedness if it is easy to learn candidates' true preferences, or if voting is prohibitively costly. Since observed turnout rates are greater than zero in existing voluntary U.S. elections, it is not likely that voting is sufficiently costly so as to render optional voting strictly dominated. However, in certain elections with extensive media coverage, such as Presidential or other high profile elections, the cost of information may be sufficiently low that mandatory voting would result in a more informed electorate.

In elections where it is more difficult to learn the policy preferences of candidates, optional voting will produce a more informed electorate. This is the case for elections where information about candidate preferences is not broadly communicated, where political affiliation is not included on the ballot, or where a referendum is not well advertised. Further, this could be the case in broadly publicized elections where strategic candidates' use of cheap talk obscures their true policy preferences. This last case is arguably the most realistic, as candidates are likely to be strategic in their marketing strategies. Future research could explore these scenarios by comparing voter informedness between optional and mandatory voting when candidate platform choices are endogenous.

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