Information Disclosure in Elections with Sequential Costly Participation

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Abstract

Electoral legislation varies across countries and within countries across different types of elections with respect to its stance to making intermediate election results such as turnout and candidates' vote shares public knowledge during election days. In this paper, using a pivotal costly voting model of elections where voters act sequentially, I study how different information regimes (no information disclosure, turnout only disclosure, turnout and vote shares disclosure) affect voters' decisions to cast votes and what impact they have on the quality of public decisions as well as candidates' and voters' welfare.

Introduction

Should we disclose more or less information to voters about the actions of other voters during election day? Electoral legislation varies a lot, both across countries and within countries over time or different types of elections, with respect to its attitude towards making public intermediate election results such as turnout and candidates' vote shares during the election day. Some countries, including Germany, France, Italy, India and Russia, **do not allow for announcing the results of exit-polls** but every few hours **announce cumulative turnout**. In some elections, like in the case of the 2012 US presidential elections and president elections in Finland, not only cumulative **turnout but also the exit polls are regularly announced during the day of elections**. Contrariwise, in countries like China, **any information disclosure until the end of the election day is illegal**. Though it is clear that information on the actions of early voters affects the actions of later voters, the exact mechanism behind this relationship and, thus, its consequences for election outcomes and welfare are not obvious.

Main Questions

In this paper, using a pivotal costly voting framework, I answer:

1. How different regimes of information disclosure in elections with sequential participation affect voters' decisions to cast votes?
2. What impact different regimes have on the quality of public decision as well as candidates' and voters' welfare?
3. Which regime should be adopted?
4. Who benefits from different amounts of the disclosed information?
5. Why do we observe different disclosure regimes in the reality?

Analytical Framework

Pivotal costly voting model (Palfrey and Rosenthal 1983; Ledyard, 1984; Borgers, 2004; Krasa and Polborn, 2009; Taylor and Yildirim, 2010): Two candidates, A and B, and two groups of voters of sizes K and $N-K$ who vote sequentially. A voter may support candidate A with commonly known probability $\alpha \in [0,1]$ or candidate B with probability $1-\alpha$. Each voter has an individual specific voting cost c independently drawn from a commonly known distribution F over $[c_{min}, c_{max}]$. If a voter's preferred candidate wins, the voter gains utility 1 if he did not vote, and $1-c$ otherwise. If his favored candidate loses, the voter gains utility 0 if he abstained, and $-c$ if he voted. Elections are run under majority rule and a tie is resolved with a coin flip.

Three regimes to analyze:

- **N-regime**: no information is disclosed to later voters. Equivalent to simultaneous voting.
- **P-regime**: information is partially disclosed (turnout only). Later voters condition their actions on the observed turnout.
- **F-regime**: information is fully disclosed (number of votes for each candidate). Later voters condition their actions on the observed vote difference.

Analysis:

- Find equilibrium under each regime having all parameters the same.
- Compare voters' welfare, candidates' winning probabilities and likelihood of making the correct decision under different regimes.
- Closed-form solution for two-voter model.
- Numerical solution for general model.

Some Equations

No disclosure regime

Suppose that all A-supporters adopt voting strategy c_A, i.e. an A-voter votes if his voting cost is below c_A and abstains otherwise. Similarly, suppose B-voters adopt strategy c_B. Then, the probability that a randomly picked voter votes is $F(c_A)$ and $F(c_B)$ for A-types and B-types respectively.

Denote $P_i^j(k) = \binom{j}{i} k^i (1-k)^j$ for shorter notation. Then, the probability that there are a A-types among other $N-1$ voters is $P_a^{N-1}(1-\beta)$. The probability that l of them participate in elections is $P_l^a(F(c_A))$. An A-supporter is pivotal whenever the number of B-participant is equal to or exceeds by 1 the number of A-participants. The probability that an A-supporter is pivotal is then:

$$\Pi_A(c_A, c_B) = \sum_{a=0}^{N-1} \sum_{l=0}^{a} P_a^{N-1}(\alpha) P_l^a\left(F(c_A)\right)\left(P_l^{N-a-1}\left(F(c_B)\right) + P_{l+1}^{N-a-1}\left(F(c_B)\right)\right).$$

Similarly, one can construct a pivotal probability function for a B-supporter $\Pi_B(c_A, c_B)$. Hence, equilibrium values of c_A and c_B are the solution for the following system of equations:

$$0.5\Pi_A(c_A, c_B) \geq c_A,$$
$$0.5\Pi_B(c_A, c_B) \geq c_B,$$

with equalities when $c_A < c_{max}$ and $c_B < c_{max}$ respectively.

Partial and full disclosure regimes

Voters from group acting the second condition their actions on the observed number of the first period participants $d \in \{0, .., K\}$. Consider the first period A-supporter who takes as given the participation probabilities of early voters and anticipating that his action would change later voters' action through the changed d. His expected benefit from voting is:

$$B_A^1 = \sum_{a_1=0}^{K-1} \sum_{l=0}^{a_1} \sum_{m=0}^{K-a_1-1} \sum_{a_2=0}^{N-K} \sum_{i=0}^{a_2} \sum_{v=0}^{a2} P_{a_1}^{K-1}(\alpha) P_l^{a_1}\left(F(c_A^1)\right) P_m^{K-a_1-1}\left(F(c_B^1)\right) P_{a_2}^{N-K}(\alpha)$$
$$P_i^{a_2}\left(F(c_A^2(l+m))\right) P_v^{a_2}\left(F(c_A^2(l+m+1))\right)(X+Y+Z),$$

where

$$X = \frac{1}{2} \sum_{j=l-m+i+1}^{N-K-a_2} P_j^{N-k-a_2}\left(F(c_B^2(l+m))\right) P_{l-m+1}^{N-k-a_2}\left(F(c_B^2(l+m+1))\right),$$

the utility from the cases when the voter's participation turns a draw into victory;

$$Y = \frac{1}{2} \sum_{w=0}^{l-m+v+2} P_{l-m+i}^{N-k-a_2}\left(F(c_B^2(l+m))\right) P_w^{N-k-a_2}\left(F(c_B^2(l+m+1))\right),$$

the utility from the cases when the voter's participation turns a loss into draw;

$$Z = \sum_{j=l-m+i+1}^{N-K-a_2} \sum_{w=0}^{l-m+v+2} P_j^{N-k-a_2}\left(F(c_B^2(l+m))\right) P_w^{N-k-a_2}\left(F(c_B^2(l+m+1))\right),$$

the utility from the cases when the voter's participation turns a loss into victory.

Similarly, one may construct benefit functions for $B_B^1, B_A^2(0), .., B_A^2(K), B_B^2(0), .., B_B^2(K)$. The equilibrium is then given by the system of 2(K+1)+2 equations. Under the **full disclosure regime**, later voters condition their actions on the difference in the number of votes between the candidates after the first round, $df \in \{-K, .., K\}$. The equilibrium is thus given by the system of 2(2K+1)+2 equations.

Some Results

Key underlying mechanism:

- Information shifts participation burden from early voters to later voters.
- Overall participation decreases with more information.

From two-voter model:

- No disclosure is dominated, full and partial disclosure are equivalent in terms of voters' welfare.
- Full disclosure results in higher probability of correct decision.
- Full disclosure benefits the majority candidate, no disclosure benefits the weak minority candidate, partial disclosure benefits the strong minority candidate.

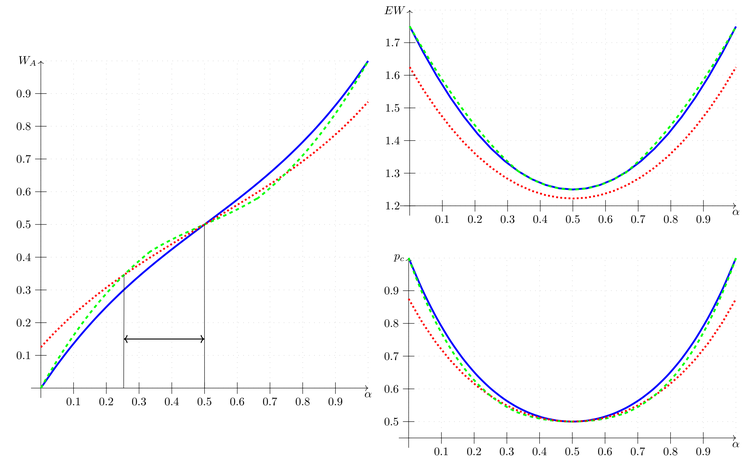

Figure 1: Two-voter model: A's winning probability (left), voters' welfare (top right) and probability of correct public decision (bottom right). No information (dotted), partial information (dashed), full information (solid).

With larger number of voters:

- Full information dominates the other regimes in terms of voters' welfare and decision quality.
- Full information benefits the candidate with higher support, while candidates with lower support prefer no disclosure.
- Partial and no disclosure regimes converge in terms of welfare, candidates' winning probabilities and decision quality.

Conclusions

- More disclosure is more likely to deliver correct outcome and higher voters' welfare.
- Full disclosure benefits the candidate with strong ex-ante support and hurts the candidate with low support.
- There is no reason to adopt anything but full disclosure system unless the agenda setting candidate has weak support or information manipulation is a concern.
- Particular choice of agenda may signal the ruling candidate's perceived strength.