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Costly voting with multiple candidates under plurality rule ☆

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ABSTRACT

We analyze a costly voting model with multiple candidates under plurality rule. In equilibrium, the set of candidates is partitioned into a set of "relevant candidates" (which contains at least two candidates) and the remaining candidates. All relevant candidates receive votes and have an equal chance of winning, independent of their popular support levels. The remaining candidates do not receive any votes. Furthermore, all voters who cast votes do so for their most preferred candidate, i.e., there is no "strategic voting."

1. Introduction

The literature analyzing the decision whether or not to vote when voting is costly generally focuses on settings in which there is an election between exactly two candidates (Palfrey and Rosenthal, 1983, 1985; Ledyard, 1984 and the literature discussed in Section 2 below). The advantage of assuming that only two candidates compete in the election is that there are only two weakly undominated strategies for each citizen: Abstain, or vote for one's favorite candidate.

However, many real-life elections involve competition between more than two parties or candidates. In this paper, we analyze a costly voting model with multiple candidates, in which all citizens have the same structure of preferences (i.e., value their favorite candidate winning at 1, their second-favorite candidate at λ_2 etc., and their least favorite candidate at 0), but differ in how they rank the candidates. Specifically, citizens' preferences over candidates are drawn from a distribution that is common knowledge, but each citizen only knows his own realized type. Citizens decide strategically whether to vote at all (in which case they have to pay a voting cost c), and if they choose to vote, also which candidate to vote for.

This is a potentially very complicated setting because, in addition to the participation decision, we allow for citizens to vote strategically for other candidates than their most preferred one, and it is well known that only voting for one's least-preferred candidate is a dominated strategy in a multi-candidate election. In spite of this, the model remains surprisingly tractable. Our analysis focuses on the case of three candidates, but it will be clear that our qualitative results generalize to the general case of m candidates.

We characterize a quasi-symmetric equilibrium (i.e., one in which all voters with the same type play the same mixed strategy) in which the set of candidates is partitioned in a set of "relevant candidates" (who receive a positive expected number of votes, and all have a positive winning probability), and the remaining "irrelevant" candidates, who do not. The set of relevant candidates can be any subset of size greater or equal to 2 of the set of candidates.

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For the case of three candidates, we can completely characterize the set of quasi-symmetric equilibria, and it is also easiest to describe the set of equilibria intuitively for the case of three candidates. First, there is an equilibrium in which all three candidates receive the same positive expected number of votes, and each wins with probability 1/3. Second, there are equilibria in which the set of relevant candidates is equal to a subset of two candidates, who receive a positive expected number of votes, and each of these relevant candidates wins with probability 1/2; there are three different equilibria of this second type equilibrium, one for each subset of two candidates (i.e., one in which candidates A and B are the relevant candidates; another one in which A and C are the relevant candidates, and a last one in which B and C are the relevant candidates).

Interestingly, in all equilibria, all voters vote sincerely, that is, for their most preferred candidate. This result contrasts with the literature on strategic voting in settings where the set of participating voters is exogenous (see Myerson and Weber, 1993; Messner and Polborn, 2011) and where there are generally many equilibria in which strategic voting occurs.

Intuitively, the reason for our result that "strategic voting" (i.e., voting for a candidate who is not the voter's most preferred one) does not occur in equilibrium when voting is costly is as follows: In a sufficiently large society, those citizen types who vote with positive probability must randomize whether to participate (because, otherwise, their probability of deciding the election would go to zero, and then it would not be worthwhile to incur the participation cost), and therefore must be indifferent between participating and not. A citizen who ranks, say, candidate A highest and votes for A has a higher expected marginal benefit from potentially swinging the election to A than a citizen who ranks A lower and only votes for him "strategically." Because, in equilibrium, the sincere voter is indifferent between voting and not voting, the second type of voter must strictly prefer participation over abstention.

The paper proceeds as follows: Section 2 places our paper in the literature. We present the model in Section 3, and our results in Section 4 and in Section 5. Section 6 concludes.

2. Related literature

Our paper contributes to the literature on costly voting (and, more generally, endogenous participation models) pioneered by Ledyard (1984) and Palfrey and Rosenthal (1983, 1985), and developed further by a large number of papers.

In particular, the costly voting framework has been used and modified to understand stylized facts about participation in elections (Feddersen and Sandroni, 2006; Herrera and Martinelli, 2006; Levine and Palfrey, 2007), as well as the more normative question whether a social planner should encourage citizens to participate in elections (Börgers, 2004; Krasa and Polborn, 2009; Taylor and Yildirim, 2010a,b; Krishna and Morgan, 2012, among others). These models, and – to the best of our knowledge – all other costly voting models assume that citizens have to choose between only two candidates if they vote.

Clearly, focusing on the two candidate case simplifies the analysis because voters effectively only have to decide whether to participate, while their vote decision if they participate is trivial. Focusing on the case of two candidates thus enables these authors to focus on other interesting questions in the framework. We complement this literature by focusing on the basic costly voting model, and analyzing the case of more than two candidates.

Our paper also contributes to another literature, namely the one analyzing strategic voting in multi-candidate elections. It is well known that, in voting games with multiple candidates, the only weakly dominated strategy for voters is to vote for one's least preferred candidate. Even iterated elimination of weakly dominated strategies usually does not narrow down the set of possible equilibrium outcomes (Dhillon and Lockwood, 2004). Myerson and Weber (1993) and Messner and Polborn (2011) consider different trembling refinements, and Messner and Polborn (2007) consider refinements based on coordination between different voter groups. These models primarily aim to increase our understanding of "Duverger's Law" which states that, under plurality rule, most voters vote for one of two "main" candidates, with all other candidates receiving very few votes because those voters who like them expect that a vote for their favorite candidate would be wasted because he has no chance of winning. Therefore, these voters are better off voting for the main candidate whom they like better than his main competitor.

A similar effect is present in those equilibria of our model in which only two candidates receive a positive expected vote share: However, in contrast to the models above, the supporters of the third candidate in such an equilibrium abstain completely, rather than vote for one of the two main candidates. Our model also admits an equilibrium in which all three candidates receive a positive vote share and even have the same probability of winning. In contrast, in Messner and Polborn (2007, 2011), this cannot happen in equilibrium. Myerson and Weber (1993) also obtain an equilibrium in which all three candidates receive votes and tie; however, this equilibrium is based on a reduced form modeling of the pivot event.[1]

3. The model

We consider a game with K candidates. The voting system is plurality rule, i.e., there is a single round of voting, and the candidate who receives the most votes is elected.

[1] The equilibrium concept of Myerson and Weber (1993) is based on a vector of pivot beliefs held by the voters (essentially summarizing their beliefs that any pair of candidates will be tied). Myerson and Weber allow for the pivot belief to take any value between 0 and 1 if two candidates are tied (and not just 1/2), and this feature is essential to support their 3 candidate equilibria.