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Multicandidate elections: Aggregate uncertainty in the laboratory ☆

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ABSTRACT

The rational-voter model is often criticized on the grounds that two of its central predictions (the *paradox of voting* and *Duverger's Law*) are at odds with reality. Recent theoretical advances suggest that these empirically unsound predictions might be an artifact of an (arguably unrealistic) assumption: the absence of *aggregate uncertainty* about the distribution of preferences in the electorate. In this paper, we propose direct empirical evidence of the effects of aggregate uncertainty in multicandidate elections. Adopting a theory-based experimental approach, we explore whether aggregate uncertainty indeed favors the emergence of non-Duverger's law equilibria in plurality elections. Our experimental results support the main theoretical predictions.

1. Introduction

Saying that the rational-voter model is not consensual may be an understatement. Voter rationality has been at the center of a heated debate for decades.[1] Its detractors attack this modeling approach on the grounds that some central predictions of the rational voter model are, as summarized by Ledyard (1984, pp. 7–8), "obviously contradicted by the facts". First, rational-voter models of costly voting highlight the *paradox of voting*: in a large election, "If each person only votes for the purpose of influencing the election outcome, then even a small cost to vote (...) should dissuade anyone from voting. Yet, it seems that many people will put up with long lines, daunting registration requirements and even the threat of physical violence or arrest in order to vote" (Feddersen, 2004, p. 99). Second, rational-voter models of multicandidate elections predict a strong version of *Duverger's Law*: in large plurality elections, all votes should go to the top-two contenders.[2]

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[1] See e.g. Ledyard (1984), Greene and Shapiro (1994), Dhillon and Peralta (2002), Feddersen (2004), Degan and Merlo (2009), Kawai and Watanabe (2013), and Ashworth and Bueno de Mesquita (2014).

[2] See, among others, Riker (1982), Palfrey (1989), Myerson and Weber (1993), Cox (1997) and Fey (1997). This literature underlines that, even though they exist, non-Duverger's Law equilibria are typically "expectationally unstable" (Fey, 1997), and therefore irrelevant, in that setup.

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Instead, Fisher and Myatt (2014, p. 2) argue that "Duverger's Law (...) sits uncomfortably with the fact that plurality-rule systems generally exhibit multi-candidate support".[3] From these discrepancies, it is tempting to conclude that the rational voter model should be discarded altogether (e.g. Greene and Shapiro, 1994; Caplan, 2007).

However, recent theoretical advances suggest that the empirically unsound predictions of the rational-voter model could be an artifact of a simplifying assumption. It is typically assumed that there is *no aggregate uncertainty* about the distribution of preferences in the electorate. Then, by the law of large numbers, the vote shares of each candidate become known as electorate size grows. As soon as we relax that (unrealistic) assumption, the predictions of the rational-voter model are much more in line with reality. First, this augmented model predicts turnout levels orders of magnitude higher than without aggregate uncertainty (Good and Mayer, 1975; Castanheira, 2003a; Myatt, 2012). Second, stable non-Duverger's Law equilibria (in which three candidates receive a positive fraction of the votes) can be proved to exist in many situations (Myatt, 2007; Dewan and Myatt, 2007; Bouton and Castanheira, 2012; Bouton et al., 2014).

From a theoretical standpoint, aggregate uncertainty alone is thus sufficient to bring the rational voter model much more in line with facts. Yet, competing theories can claim similar achievements (see e.g. Feddersen and Sandroni, 2006a, 2006b; Bendor et al., 2011). It is thus fundamental to test empirically whether aggregate uncertainty alone may produce a change in voting behavior that is qualitatively important. This is the main purpose of this paper: we propose direct empirical evidence of the effect of aggregate uncertainty on voting behavior. Our focus is on multicandidate elections under plurality. We adopt a theory-based experimental approach to explore whether aggregate uncertainty indeed favors the emergence of non-Duverger's Law equilibria. And we find that its effects are substantial.

Our main theoretical contribution is to propose a simplified model that captures the effects of aggregate uncertainty in a tractable manner. A fixed number of voters are divided into two groups: a majority and a minority. The majority has two candidates. Each majority voter thus faces the choice of either voting for her preferred candidate (aka voting sincerely) or supporting the other majority candidate (aka voting strategically). Such a *divided majority* setting is ubiquitous in the literature on strategic voting in multicandidate elections.[4]

To understand the theoretical argument, consider first a voter who faces *no aggregate uncertainty*: she knows the parameters of the distribution of preferences in the population. Her only uncertainty is about the actual number of voters who support each candidate. As electorate size grows large, for any voting strategy, she almost surely knows which candidate will emerge as first, second and third. In this world, her incentive to abandon the third candidate is immense. This is the *psychological effect of Duverger's Law*: "In cases where there are three parties operating under the simple majority single-ballot system the electors soon realize that their votes are wasted if they continue to give them to the third party" (Duverger, 1951, p. 226, cited in Palfrey, 1989, p. 70). Thus, the only stable equilibria are such that all majority voters coordinate their ballots on a same candidate, while the other one receives no vote at all.

Now, what happens if voters expect pre-election polls to be imprecise, i.e. if there is aggregate uncertainty? To capture this, we introduce a second state of nature, in which the other majority candidate has stronger support in the population. Then, for some voting strategies, each of the two majority candidates could end up "being third". Should majority voters abandon one of them? We show that voters will want to vote for the majority candidate who wins by the *smallest* margin in her state (technically, this produces the largest pivot probability). The intuition is that they thereby insure themselves against the risk of losing to the minority in the event this candidate turns out to be their best chance to win. This is the "negative feedback loop" identified by Myatt (2007), which operates against the "positive feedback loop" operating in Duverger's Law. Because of the negative feedback loop, there *also* exists a stable equilibrium in which all three candidates receive a strictly positive vote share. Using Duverger's words, no candidate is a "wasted ballot".

Testing the aggregate uncertainty hypothesis in real-world elections is extremely challenging: one would need detailed information on both voter preferences and beliefs (beliefs about aggregate uncertainty and about the other voters' behavior) that is hard – if not impossible – to obtain from surveys and/or observational data. This is why we propose to test this hypothesis through a controlled laboratory experiment.

We consider two treatments. The only difference between them is that there is no aggregate uncertainty in one (subjects learn the expected distribution of preferences) and there is aggregate uncertainty in the other (subjects do not learn this distribution). Together, the following two pieces of evidence would validate the empirical relevance of the theoretical results: without aggregate uncertainty, subjects should correctly anticipate the expected ranking, and coordinate on the strongest majority candidate. With aggregate uncertainty, they should massively vote sincerely.

Our experimental results provide strong evidence in favor of this joint prediction: the amount of sincere voting under aggregate uncertainty, 63%, is substantially higher than with no aggregate uncertainty, 28%. Conversely, the fraction of votes consistent with the "Duvergerian" strategy of voting for the strongest candidate independently of one's preference are respectively 32% and 72%. All these differences are statistically significant. These aggregate data nevertheless hide the issue of equilibrium selection, on which theory is silent. In line with theory, all groups select a Duverger's Law equilibrium under no aggregate uncertainty. Interestingly, they all select the welfare maximizing equilibrium of voting for the candidate with

[3] Recent empirical evidence based on observational data underlines that "Duvergerian forces" do operate in plurality, and lead some (but not all) voters to abandon their most-preferred candidate (Fujiwara, 2011; Kawai and Watanabe, 2013; Spenkuch, 2014, 2015). For evidence based on survey data, see e.g. Blais et al. (2001).

[4] See, e.g., Palfrey (1989), Myerson and Weber (1993), Cox (1997), Fey (1997), Piketty (2000), Myerson (2002), Dewan and Myatt (2007), Myatt (2007), Bouton and Castanheira (2012), Bouton (2013), Bouton et al. (2014).

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