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(When and how) do voters try to manipulate?

Experimental evidence from Borda elections

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Abstract We study strategic voting in a laboratory experiment using a Borda mechanism. We find that manipulation rates are surprisingly low, even for individuals who know that they possess superior information about the other agents' preferences. Exploring possible explanations, we find that manipulation rates rise significantly if individuals are not only informed about the other agents' preferences but also about their actual votes. This suggests that uncertainty plays a key role in understanding strategic behavior in elections. By contrast, distributional concerns, e.g., in the form of inequality aversion, are found to play a negligible role in our context.

Keywords Strategic voting · Manipulation · Borda rule · Mechanism design · Laboratory experiment · Satisficing · Bounded rationality

JEL Classification D71 · C91 · D81 · D63 · D72

1 Introduction

Strategy-proofness, or "non-manipulability," is commonly held to be a very desirable property of a voting mechanism; it requires that no individual can benefit from insincerely reporting his preferences, for any given distribution of the other agents' votes. Unfortunately, the well-known Gibbard-Satterthwaite theorem tells us that no voting mechanism except dictatorship is strategy-proof on an unrestricted preference domain provided that there are at least three alternatives. Thus, in many cases of interest, all reasonable voting mechanisms

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are susceptible to potential strategic manipulations. But do people in fact try to manipulate if they can? And if so, how do they manipulate?

In this paper, we study these questions in a laboratory experiment using the Borda count, a voting mechanism that is known to be highly vulnerable to strategic manipulations.[1] In our experiment, voters' preferences over a set of alternatives are induced by assigning a fixed monetary payoff to each alternative for each player.[2] One of the players in our voting game is informed not only about his own, but also about the other players' preferences and thus has a distinctive opportunity to manipulate the final outcome by casting an insincere vote. We will refer to a strategic manipulation that aims to bring about an outcome with a higher payoff than the outcome resulting from sincere behavior as an *outcome manipulation*.[3] The uninformed players do not have a comparable opportunity to manipulate, because they are only informed about their own payoffs.

We find that despite the theoretical possibilities, the occurrences of such outcome manipulations are overall surprisingly low. Only in the absence of any uncertainty, i.e., when a player is not only informed about the others' preferences but in addition about their actual votes, do we find that the rate of manipulations that change the outcome of the election rise significantly. Interestingly, this does not mean that informed voters always submit their true preference rankings under uncertainty. A significant fraction of informed subjects votes insincerely not in order to bring about their best possible outcome, but apparently in order to increase the winning probability of the outcome that would have also resulted from sincere voting (in our case, their second-best alternative). We refer to such behavior as *satisficing* strategic voting.[4]

Our findings are robust with respect to variations of the underlying payoff distribution that keep the ordinal ranking of alternatives fixed for each player. In particular, shifting the equal payoff distribution among players from the sincere outcome to the competing strategic outcome does not affect the behavior of the informed players. This suggests that distributional concerns do not play a significant role in our voting context. Our paper thus provides further evidence for classifying economic contexts in terms of the impact of distributional considerations and social preferences.

To the best of our knowledge, the present paper provides the first experimental test of strategic behavior under a Borda mechanism. Earlier experimental studies have focused on other voting mechanisms (see, e.g., Felsenthal et al. 1988 for simple majority voting, Cherry and Kroll 2003 for primary elections, and Blais et al. 2007 for one-round plurality voting

[1] There are numerous contributions to the literature that study the manipulability of the Borda count theoretically; see, among many others, Black (1976), Barbie et al. (2006), Favardin et al. (2002), Felsenthal (1996), Lehtinen (2007), Ludwin (1978), or Saari (1990).

[2] Control over people's preferences is a major advantage of the experimental approach when one tries to describe and understand voting behavior, because in the field "we hardly ever know the exact preference orderings of every individual decision-maker" (Kurrild-Klitgaard 2001, p. 137).

[3] More precisely, a vote of individual i represents an outcome manipulation if, given i's belief of the other voters' behavior, it induces an outcome with higher payoff for i than the payoff associated with the outcome resulting from sincere behavior of individual i.

[4] Recently, Dowding and van Hees (2007) have introduced the concept of "sincere" manipulation which occurs, roughly, if an individual votes for an alternative in order to increase the probability that *this* alternative will win the election, and if this alternative is strictly preferred to the sincere outcome. Our notion of satisficing manipulation is related to this concept in spirit but not in a strict formal sense: in the specific satisficing manipulations that we observe, individuals insincerely submit a preference ranking in order to increase the winning probability of the outcome that would have also resulted from sincere voting, but which is only their second-best alternative (see Sect. 3 below).

versus two-round majority runoff elections). While most of these studies also find relatively low manipulation rates, the reasons for the observed behavior remain unclear because the implemented information structure was always symmetric. By contrast, we facilitate manipulation by providing some voters with superior information about others' preferences. Therefore, the low manipulation rates reported below seem all the more surprising. In addition, our specific experimental design allows us to distinguish between what we have called "outcome manipulations" and strategic behavior due to "satisficing" motives.

2 Experimental setup

2.1 Experimental design

Our game features a small committee consisting of 3 players (A, B and C) who have to vote on a set of four alternatives (a, b, c and d) under a Borda scoring rule. Each player has to assign 4, 3, 2 or 1 point(s) to the alternatives (with each score occurring exactly once). The sum of scores over all players is computed for each alternative, and the one receiving the most points wins (see Fig. 1). In case that two or more alternatives tie for the highest score, the winner is determined by a fixed tie-breaking rule, say in alphabetical order.

The final monetary payoff Π_i of player i depends on the winning alternative. The payoff structure is chosen so as to induce the preferences given in Fig. 1. The specific values of the payoffs are our first treatment variable. As can be seen from Table 1, we induce the same ordinal preferences in all treatments but vary the underlying cardinal payoff structure (i.e., we change the absolute values keeping their relative position constant for each player). In the treatments Sequ1 and Sim1 the values are chosen so that the first-best alternative of player A (alternative a in Table 1) leads to an equal distribution of payoffs amongst the players, whereas the same is true for his second-best alternative in treatments Sequ2 and Sim2 (alternative b in Table 1).

Fig. 1 Induced preferences

$$\begin{matrix} A & B & C \\ \begin{pmatrix} a \\ b \\ c \\ d \end{pmatrix} & \begin{pmatrix} b \\ a \\ c \\ d \end{pmatrix} & \begin{pmatrix} c \\ b \\ a \\ d \end{pmatrix} \end{matrix} \Rightarrow \begin{matrix} a = 4+3+2 = 9 \\ b = 3+4+3 = 10 \\ c = 2+2+4 = 8 \\ d = 1+1+1 = 3 \end{matrix} \Rightarrow \begin{matrix} b \succ a \succ c \succ d \\ b \text{ wins} \end{matrix}$$

Table 1 Payoffs (in thaler)

Player A	Player B	Player C
Treatments Sequ1 and Sim1		
$\Pi_A(a) = 14$	$\Pi_B(b) = 17$	$\Pi_C(c) = 19$
$\Pi_A(b) = 9$	$\Pi_B(a) = 14$	$\Pi_C(b) = 16$
$\Pi_A(c) = 3$	$\Pi_B(c) = 6$	$\Pi_C(a) = 14$
$\Pi_A(d) = 0$	$\Pi_B(d) = 0$	$\Pi_C(d) = 0$
Treatments Sequ2 and Sim2		
$\Pi_A(a) = 14$	$\Pi_B(b) = 9$	$\Pi_C(c) = 15$
$\Pi_A(b) = 9$	$\Pi_B(a) = 7$	$\Pi_C(b) = 9$
$\Pi_A(c) = 3$	$\Pi_B(c) = 6$	$\Pi_C(a) = 6$
$\Pi_A(d) = 0$	$\Pi_B(d) = 0$	$\Pi_C(d) = 0$

Table 2 Treatments

Treatment	Sequ1	Sim1	Sequ2	Sim2
Position of equal outcome (for *A*)	1st-best	1st-best	2nd-best	2nd-best
info about others' preferences	*A*	*A*	*A*	*A*
info about others' decisions	*A*	–	*A*	–
only own info	*B* & *C*	*B* & *C*	*B* & *C*	*B* & *C*
move order	sequential	simultaneous	sequential	simultaneous

In order to make successful outcome manipulations possible, we give some players additional information about other players' preferences and/or decisions. Accordingly, our second treatment variable is the information structure. In one version of the game, before taking a decision, player A is informed about the preferences of players B and C, who are only informed about their own preferences. The three subjects then cast their votes simultaneously (treatments Sim1 and Sim2).

By contrast, in treatments Sequ1 and Sequ2, players vote sequentially. After player B and C made their decisions (simultaneously), player A is in addition informed about their decisions and can thus condition his choice on their actual votes. In all treatments, an uninformed person knows only his own preferences. Moreover, while uninformed persons can infer the *possibility* that another person has superior information from the instructions, they do not *know* whether or not someone else actually received this superior information. By contrast, the informed player A knows that he is the only one receiving additional information about the others. Table 2 lists a summary of all treatments.

The computerized experiments were run at the University of Bonn in 2006. In total, 144 subjects were randomly recruited out of approximately 3000 persons from the BonnEconLab's subject pool.[5] Subjects were only allowed to participate once, i.e., in a single treatment. For each treatment, we conducted two sessions with 18 subjects each. The subjects were randomly divided into matching groups of six. Within each group, two committees consisting of three players were randomly formed at the beginning of each period. We played a total of three periods, so that every participant was once in the role of player A, B and C, respectively.

In order to guarantee (quasi-)independence, the committees were reshuffled each period, and the labeling of the alternatives changed in each period. Moreover, subjects neither knew the number of periods nor the matching-group sizes. In addition, they were informed about the outcome of each period only at the end of the experiment. We thus treat each subject's decision as an independent observation (one in the role of the informed player A and two in the role of the uninformed players B and C), resulting in 36 informed decisions and 72 uninformed decisions in total per treatment.

Each session lasted approximately one hour. Upon arriving, subjects were randomly assigned to private cubicles. Written instructions were distributed and read out aloud by the experimenter. The instructions were written in a meaningful language avoiding loaded terms (the exact wording of the instructions is available from the authors upon request). Subjects then could pose questions in private to ensure understanding of the game and the computer

[5]The mean age of the recruited subjects was 23.4. The fraction of male participants was 44%. Almost all subjects were undergraduate students from a variety of fields, including Economics, Law, Politics, Physics, Mathematics, Computer Science, Linguistics, History, Psychology, Medicine, Philosophy, Geography, Biology, Agronomy.

Fig. 2 An example of an outcome manipulation

$$\begin{array}{cc} A & B+C \\ \text{manip.} & \text{original} \\ \begin{bmatrix} a \\ d \\ c \\ b \end{bmatrix} & \begin{pmatrix} b & c \\ a & b \\ c & a \\ d & d \end{pmatrix} \end{array} \Rightarrow \begin{array}{l} a = 4+3+2 = 9 \\ b = 1+4+3 = 8 \\ c = 2+2+4 = 8 \\ d = 3+1+1 = 5 \end{array} \Rightarrow \begin{array}{c} a \succ b \succ c \succ d \\ a \text{ wins} \end{array}$$

program.[6] After the experiment subjects received their accumulated earnings at a conversion rate of 0.30 Euro per thaler and a show-up fee of 3 Euro. Average earnings of subjects in informed (uninformed) periods were 3.28 Euro (4.65) in Sim1, 2.68 (2.62) in Sim2, 3.61 (4.44) in Sequ1, and 3.53 (2.28) in Sequ2.

2.2 Behavioral predictions

If all committee members vote sincerely, we obtain $b \succ a \succ c \succ d$ according to the Borda method (cf. Fig. 1). To assume that players B and C vote sincerely seems natural since they are informed only about their own preferences. By contrast, A might use the superior information to maximize his monetary gains; i.e., he can achieve his first-best alternative a with a payoff gain of five thalers (see Fig. 2 for an example).

On the other hand, it is also possible that participants have other objectives besides the maximization of their own monetary payoff. In particular, empirical evidence suggests that, in many contexts, subjects care about efficiency and/or inequality (see, among many others, Kirchsteiger 1994, Fehr and Schmidt 1999, Bolton and Ockenfels 2000, Charness and Rabin 2002). In our setup, if a player is sufficiently inequality-averse, his preferences over the money distribution might differ from the one induced by self-centered preferences. For instance, if a player A has self-centered preferences, he will always prefer a over b due to the higher payoff associated with a. However, if a player A is inequality-averse, it is possible that he prefers alternative b in treatments Sim2 and Sequ2 due to the inequality associated with alternative a (cf. Table 1). Concretely, consider a person with the following type of utility function (see Fehr and Schmidt 1999):

$$U_i(x) = x_i - \frac{1}{n-1}\left[\alpha_i \sum_j \max\{x_j - x_i, 0\} - \beta_i \sum_j \max\{x_i - x_j, 0\}\right],$$

where $n = 3$ is the number of committee members, x_i and x_j are the payoffs of members i and j, and α_i and β_i are the individual "envy" and "guilt" parameters, respectively. In this model, it can be shown that players with strong feelings of guilt prefer b to a because the higher payoff associated with a cannot compensate for the "cost" of the greater inequality resulting from a, provided that $\beta \geq 2/3$. Thus, if there are players (of type A) with a sufficiently high guilt parameter β, we should observe lower frequencies of manipulation in Sim2 and Sequ2 than in Sim1 and Sequ1.

To abstract from possible efficiency concerns, the total amount of money distributed is kept constant between alternatives a and b in each treatment. In Sim1 and Sequ1 the sum of thalers in state a ($\Pi_A(a) + \Pi_B(a) + \Pi_C(a) = 14 + 14 + 14 = 42$) equals the sum in state b ($\Pi_A(b) + \Pi_B(b) + \Pi_C(b) = 9 + 17 + 16 = 42$). The same holds for Sim2 and Sequ2 (27 each). Efficiency considerations should thus not influence the decision between a and

[6] The program was written in PASCAL using the RATImage-Units by Abbink and Sadrieh (1995).

b, and any difference in the manipulation rate between Sim1 and Sim2, as well as between Sequ1 and Sequ2, should be attributable to distributional concerns.

With respect to our other treatment variable (information about others' preferences (Sim) versus information about others' preferences *and* actual decisions (Sequ)), there seems to be no reason why it should have an impact on *rational* agents' behavior. While common knowledge of rationality does, of course, not by itself imply that uninformed players will vote sincerely in equilibrium, there seems to be no plausible story of why they should indeed not do so, given their lack of information about the other players' preferences. For instance, sincere voting is easily seen to be optimal under the belief of a uniform distribution of the others players' votes. One would therefore expect uninformed players always to report their true preferences, and informed players to anticipate this and try to manipulate in order to achieve a higher monetary payoff under both information structures.

However, once we move away from the assumption of full rationality and allow for uninformed players to *make mistakes* or *tremble*, the behavior of informed players in Sim and Sequ might differ. Clearly, the same applies if the informed players *believe* only that uninformed players do not always vote sincerely. Informed players in the Sim treatment face a situation of uncertainty, and might be afraid ending up with their third- or fourth best alternative if they (try to) manipulate. Indeed, giving only one point to the second-best alternative *b* (as in the specific manipulation shown in Fig. 2 above) not only increases the probability of getting the first-best alternative but also decreases the probability of receiving the second-best alternative and increases the risk of getting a worse alternative than *b*. Thus, compared to the sincere outcome *b*, an informed player might win five thalers by manipulating but at the same time risks losing (at least) six thalers. Depending on the likelihood that the informed player assigns to the corresponding events, he might refrain from manipulating if he is sufficiently risk-averse.

An alternative hypothesis, which would induce informed players not to manipulate in the way suggested in Fig. 2 is that they exhibit *satisficing* behavior (see the seminal work by Simon 1959). The hypothesis behind satisficing behavior is that subjects, rather than trying to achieve their highest possible payoff, are satisfied with a certain "acceptable" payoff. Intuitively, the rationale for satisficing behavior seems to be the stronger the more uncertain the environment becomes (see, e.g., Ben-Haim 2006 for an argument along these lines). In our setup, this suggests that, in face of the uncertainty about the uninformed subjects' behavior, informed players might simply be satisfied with the payoff resulting from the sincere outcome *b* which represents their second-best alternative. Interestingly, this motivation does not necessarily imply sincere voting behavior, as we shall see presently.

Either behavioral assumption (uncertainty-aversion or satisficing) is effective only in the Sim treatments but not in the Sequ treatments. Here, informed players face a situation of certainty as they are also informed about the other players' decisions (and, in particular, whether they have voted sincerely). Informed players can thus decide to manipulate without risk, and we might therefore find a higher rate of outcome manipulations in the Sequ treatments than in the Sim treatments.

3 Experimental results

For obvious reasons, we focus on the informed subjects in the description of our results. We start by presenting the differences in the behavior of informed versus uninformed subjects. As one would expect, the frequency of sincere votes is significantly higher if subjects are uninformed rather than informed. Subsequently, we analyze the potential influence of information and inequality on the decisions. As we shall see, the degree of outcome manipulation

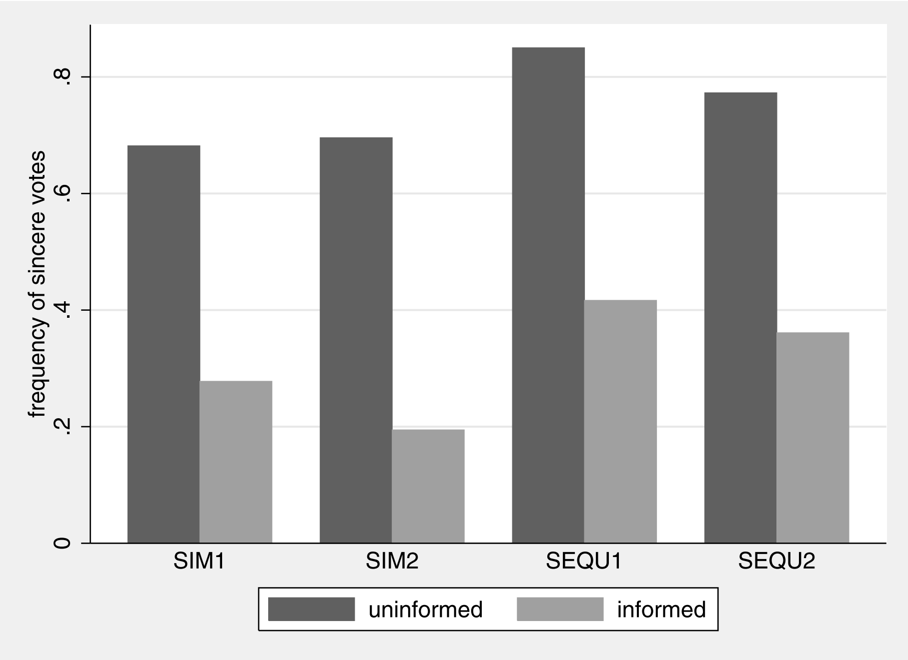

Fig. 3 Frequency of sincere votes

is sensitive to variations in the information structure, but not to inter-subject inequality. Yet, the overall frequency of outcome manipulation is unexpectedly low, so we finally try to identify possible motivations for the behavior that we observe. At the end of this section, we describe the experimental results from a follow-up treatment that was run to shed more light on the motives of uninformed subjects who do not vote sincerely.

Figure 3 shows the total frequency of sincere votes of uninformed and informed players per treatment. Overall, the total frequency of sincere votes is 31% if informed and 75% if uninformed.[7] In all but two groups, the frequency of uninformed sincere decisions is higher than of informed sincere decisions. This also holds at the level of treatments (signrank-test, 2-sided, $p = 0.0269$ in Sim1, $p = 0.0273$ in Sim2, $p = 0.0747$ in Sequ1, and $p = 0.0747$ in Sequ2). Although the frequency of insincere votes of uninformed players is not zero (we will discuss this issue in more detail at the end of this section), it seems safe to say that informed

[7] For the informed players, we simply count the total number of sincere votes and divide by the total number of informed decisions per treatment (= 36). For the uninformed players, we count the total number of sincere votes in the *first period* that are not random (as classified from the questionnaire answers) and divide by the total number of first period, non-random uninformed votes per treatment (22 in Sim1, 23 in Sim2, 20 in Sequ1, 22 in Sequ2). We consider only first-period choices in the case of uninformed players to control for potential dependencies between informed and uninformed periods stemming from information spill-overs between periods. Looking only at first-period's decisions does not alter the results significantly, but helps to reduce the noise in our sample. Otherwise, the total frequency of sincere votes of uninformed players is still twice as high (63%), but p-values are slightly higher due to the additional noise. Note that a similar problem does not exist for informed players' decisions.

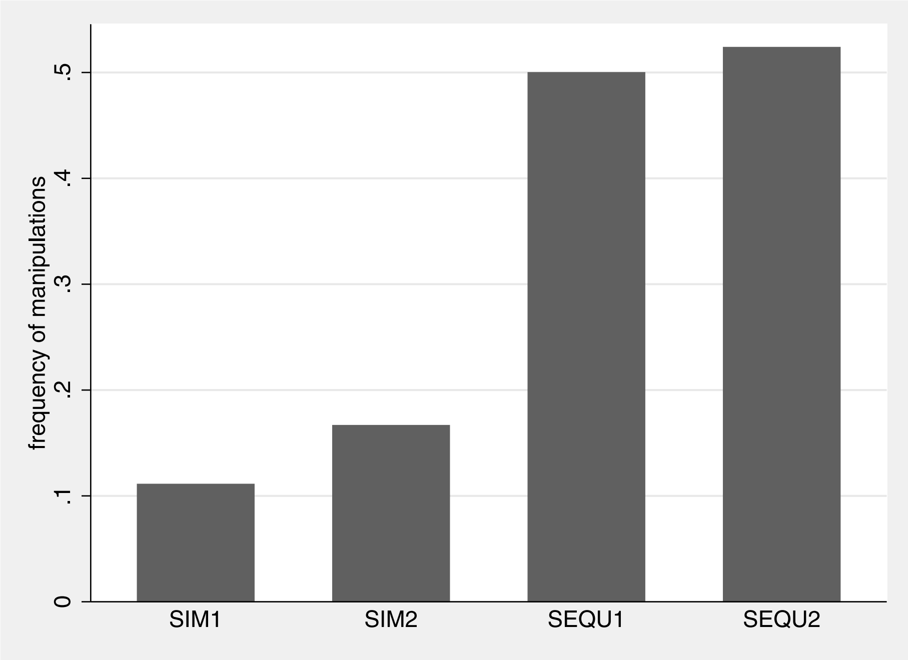

Fig. 4 Frequency of outcome manipulations

players behave differently than uninformed players. Nevertheless, the number of informed players stating their true preferences is surprisingly high, uniformly across treatments.[8]

Result 1 Despite the possibility of a successful outcome manipulation, a non-negligible fraction of informed players report their preferences truthfully. Yet, compared to the uninformed players the additional information crowds out sincere voting behavior, i.e., informed players vote significantly less often sincerely.

Next, we look in more detail at the behavior of informed players, checking how often they manipulate the outcome. In the sequential treatments, informed players know the actual votes of the other two members in the committee. Therefore, we define the frequency of outcome manipulation in these treatments as the fraction of the actual number of outcome manipulations over the number of outcome manipulation possibilities. The outcome manipulation possibilities are all instances in which there existed a way to achieve a higher-ranked alternative than the one resulting from sincere voting. A decision is counted as an actual outcome manipulation if the informed player casts one such manipulative vote. Note that outcome manipulation corresponds to a specific form of strategic behavior and not to insincere voting in general. As can be seen from Fig. 4, the total rate of outcome manipulation is 50% in Sequ1 and 52.4% in Sequ2.

[8]We do not find significant treatment effects with respect to the number of informed sincere votes. The 2-sided p-values from a corresponding ranksum-test are 0.7453 (Sequ1/Sequ2), 0.4029 (Sim1/Sequ1), 0.402 (Sim1/Sequ2), 0.1629 (Sim1/Sim2), 0.1824 (Sim2/Sequ1), and 0.2087 (Sim2/Sequ2).

In treatments Sim, informed players know the preferences but not the actual decisions of the others. When deciding how to vote, the informed member needs to form beliefs (conditional on the preference information) about the other players' decisions. In accordance with the procedure in Sequ, a decision should be classified as an outcome manipulation if, *given the beliefs*, it leads to a higher-ranked alternative than the one achievable by a sincere vote. For our analysis, we assume that an informed player's beliefs about the others' actions and his information about the others' preferences match, i.e., that he expects them to report their preferences truthfully. Under this assumption, each informed decision problem is an outcome manipulation possibility by design, and we speak of an outcome manipulation in the Sim treatment if the vote actually casted would have yielded a better (= first-best) outcome given that the others vote sincerely. Application to our data in Sim shows (Fig. 4) that the total frequency of outcome manipulation is 11.1% in Sim1 and 16.7% in Sim2.[9]

Turning to the analysis of treatment effects, recall from Sect. 2.2 that we have two treatment variables: information and inequality. As already noted, the behavior of fully rational, self-centered, money-maximizing individuals should not be affected by variations in these two variables. But empirical evidence suggests that economic agents are neither fully rational, nor always self-centered. In our present context, the uncertainty about the other players' behavior, and in particular about their rationality, creates a situation of *ambiguity* which might lead to lower manipulation rates in Sim1 (Sim2) as compared to Sequ1 (Sequ2). On the other hand, fairness in the sense of inequality-aversion might lead to lower manipulation rates in Sim2 (Sequ2) as compared to Sim1 (Sequ1).

We find that the difference in the outcome-manipulation frequency between Sim1 and Sim2 is only 5.6 percentage points, and 2.4 percentage points between Sequ1 and Sequ2; neither of the two differences is significant (ranksum-test, 2-sided, $p = 0.6045$, resp. $p = 0.6267$). Furthermore, in the questionnaire data, only one person states to have manipulated because of distributional concerns (Sim1 and Sequ1), and only two subjects write that they did not manipulate (Sim2 and Sequ2) because of distributional concerns.[10] Taken together, this suggests that distributional concerns in the sense of inequality aversion have only a negligible impact on voting behavior in our context. Taking a broader definition of fairness, however, the sincere behavior of some of the informed players can also be interpreted as resulting from social motives. In fact, it could be that those subjects dislike to reduce the others' earnings (compared to the sincere outcome), i.e., they do not want to "deprive" the other subjects of the higher payoff associated with the sincere outcome.[11] While in view of our present experimental design we can only speculate about this – a simple taste for sincereness might also explain those sincere votes – the explanation seems to be compatible with recent empirical results on the role of guilt-aversion in related contexts (e.g., Charness and Dufwenberg 2006; or Corazzini et al. 2007).

On the other hand, the additional information about other members' decisions strongly affects the outcome manipulation rate. The outcome manipulation frequency is more than

[9] Another possible approach would be to determine the outcome manipulation frequency in Sim by naively assuming that the informed member perfectly predicts the others' decisions, i.e., that his beliefs about the others' decisions and their actual decisions coincide even when the uninformed subjects do not vote sincerely. While lacking a clear conceptual foundation, such an approach does not qualitatively change the results reported in the text.

[10] Six subjects in Sequ2 gave more points to their second-best alternative (the payoff-equalizing one), although this alternative would also have won if they had voted sincerely—this might also be interpreted as a preference for equality. However, according to their questionnaire answers, only three did so because of distributional concerns.

[11] We thank an anonymous referee for pointing this out.

four times higher in Sequ1 than in Sim1 (difference of 38.9 percentage points), and more than three times higher in Sequ2 than in Sim2 (difference of 35.7 percentage points); both differences are significant (ranksum-test, 2-sided, $p = 0.0152$, resp. $p = 0.0509$).

Result 2 The behavior of informed subjects is not affected by inequality considerations, but strongly affected by the degree of uncertainty, i.e., by differences in the information structure.

Adding up the instances of sincere votes and outcome manipulations, we see that this explains 88.89% in Sequ1 and 80.56% in Sequ2, but only 38.89% in Sim1 and 36.11% in Sim2 of all informed decisions.[12] The remaining decisions in Sequ1 and Sequ2 are difficult to classify and we count them as random or noise. By contrast, the remaining decisions in Sim1 and Sim2 do not appear to be random upon closer examination. In fact, in each of these two treatments 47.22% of all informed decisions can be classified as *conformative* votes.[13] These votes take the form of $b \succ a \succ c \succ d$, or $b \succ c \succ a \succ d$. In the first case, the informed player switches the ranks of his first- and second-best alternative so as to *agree* with the highest-ranked alternative resulting from the other members' (sincere) votes. In the second case he adopts the entire aggregate ranking resulting from the other members' sincere votes (cf. Figs. 1 and 2).[14]

One might be tempted to attribute such behavior simply to a "preference for conformity."[15] In light of our results from Sequ, however, one has to be careful in interpreting the results in this direction. Indeed, we do not observe similar "conformity behavior" in Sequ1 and Sequ2, which suggests that it is caused by uncertainty rather than by a genuine preference for conformity. Informed players in Sim might expect that uninformed players do not behave in a rational way and, for whatever reason, do not state their true preferences. More specifically, there is evidence that informed players might fear ending up with a bad alternative (their third- or fourth-ranked) if uninformed subjects vote in an unpredicted way. When manipulating in the way described in Fig. 2, the election ends in a close race from the viewpoint of the informed member: his first/second/third-ranked alternatives receive 9/8/8 points, respectively, provided the other members vote sincerely. In this situation, a *tremble* of an uninformed member is likely to alter the winning alternative since the highest alternative only leads by one point. For example, if B switches the points he gives to a and c, c wins the election (cf. Fig. 2). On the other hand, by giving four points to his second-best alternative (exactly the opposite of what one has to do to successfully manipulate the outcome), the informed player can significantly reduce the risk of receiving a bad alternative due to trembles, since the winning alternative then receives three points more (8/11/8 points under sincere voting of the other members). Our interpretation is that the behavior of some subjects can thus be described as *satisficing* behavior in that they attempt to achieve some aspiration level (here the second-best alternative) rather than to maximize payoff using (possibly complex) computations based on uncertain hypotheses about other voters' behavior. Evidence for this motivation can also be found in the questionnaire data. Subjects were

[12] We also classified as explainable those cases where a sincere vote of the informed member would have yielded the first-best outcome and the outcome resulting from actual insincere voting was first-best as well (four cases in Sequ1 and two in Sequ2), and three decisions that were unambiguously attributable to distributional concerns (all in Sequ2).

[13] Leaving us with 13.9% unexplained decisions in Sim1 and 16.7% in Sim2.

[14] Full adoption of others' aggregate ranking occurred once in Sim1 and five times in Sim2.

[15] See, e.g., the seminal work by Asch (1951).

asked to describe how they decided when they were in the role of the informed player. Most of the informed subjects who switched the ranks of alternatives *a* and *b* state that they did so because they wanted to increase the probability of getting a more preferred alternative, or decrease the chances of "loosing" or receiving a low payoff. A representative answer is the following:

> I gave most points to my second-best alternative, because this one already received many points from the other members. In any case, I wanted to avoid receiving only my third- or fourth-highest alternative.

Summarizing, we obtain the following result:

Result 3 Under uncertainty, rather than trying to bring about their best alternative, the majority of informed subjects shows satisficing behavior: They try to secure themselves at least their second-best alternative.

4 No-information control-treatment

A non-negligible fraction of uninformed players voted insincerely despite their lack of information, and we observe this across all four treatment conditions and also in the first round. But *why* do these uninformed voters not report their preferences truthfully? One may speculate that this behavior was meant to hinder manipulative voting by the informed players—i.e., that uninformed voters anticipated that informed voters would use their superior information in order to manipulate the outcome of the election, and that by casting an insincere vote they wanted to prevent them from succeeding with such manipulations.[16]

To shed more light on this issue,[17] we subsequently ran four sessions of an additional treatment in June 2008. The 96 subjects were randomly drawn from the same subject pool as before, excluding those subjects who had already participated in our previous treatments. The game was played one-shot, resulting in 96 independent uninformed decisions in total (32 each for the role of players *A*, *B*, and *C*). The payoffs and instructions closely followed the ones in Sim1 and Sequ1. However, in this new treatment all players knew only their own preferences, i.e., no player had any kind of superior information about the others' preferences and/or actions—and this was common knowledge.

The results from this treatment variation allow us to address two points. First, by comparing the behavior of players *B* and *C* under this new information structure to the behavior in the previous treatments, we can check whether the insincere votes were meant to hinder manipulative voting by the informed players. The combined frequency of sincere votes of *B* and *C* is about 73% in the new treatment, compared to 75% in the previous treatments (χ^2-test, $p = 0.860$). This suggests that the insincere votes in the previous treatments were not a reaction to the suspected existence of an informed player in the group. Instead, several questionnaire responses indicate that this behavior rather was due to a "supply effect" as it is found in other experimental studies as well.[18] Subjects invest time in enrolling and

[16] Remember that uninformed individuals were aware of the *possibility* that other individuals possess superior information.

[17] ... and to answer the concerns of two anonymous referees whom we thank for pointing to the problem ...

[18] For example, Carpenter et al. (2006) observe similar effects in a bilateral, double-blind dictator game. Two persons each receive an identical amount of money and are simultaneously asked how much of their own

showing up for the experiment, and because of this may find it hard to do the equivalent of nothing—i.e., to simply report their true preferences.

By contrast, informed voters who are at the focus of interest in our study face a "real" decision task. It is thus unlikely that they are prone to a supply effect. On the other hand, it might add to the ambiguity present in the Sim treatments if informed voters anticipate that the uninformed voters will not report their preferences truthfully because of this effect. Perhaps therefore, the informed voters do not have a real strategic advantage and, because of the uncertainty about the uninformed voters' behavior, consider themselves to be essentially in the same situation as the uninformed voters.[19] This is the second point that we can address with our new treatment. We find that the behavior of player A differs substantially and significantly between the previous treatments and the new treatment. Now most players report their preferences truthfully (26 of 32 decisions or 81%), as compared to 31% (45/144) in the previous treatments (χ^2-test, $p = 0.000$). This shows that for player A the simultaneous treatment is clearly not strategically equivalent to having no information at all. We can thus reject the hypothesis that the ambiguity present in the Sim treatment transforms the situation for an informed player into one in which he has no strategic advantage from his superior information.

5 Conclusion

In this paper, we examined the voting behavior of asymmetrically informed members in a small committee under a Borda scoring-rule mechanism. A variation of the underlying payoff structure did not lead to a change in behavior, suggesting that subjects were not motivated by distributional concerns, or more specifically, by inequality aversion. By contrast, introducing uncertainty about the actual decisions of uninformed members had a significant impact on informed subjects' behavior. While they frequently manipulated in order to bring about their most preferred outcome in a situation of certainty, they rather tried to *satisfice* or secure themselves a specific payoff when acting under uncertainty.

Our results have a number of implications, both for the advancement of existing theories and for the design of voting mechanisms in practice. First, it is doubtful whether the "fear" of strategic manipulations is always justified in an applied framework. Axiomatic approaches usually call for non-manipulability of the selection mechanism, implicitly assuming that subjects manipulate the outcome whenever this is possible. However, the actual frequency of outcome manipulations in our experiments is rather low. Recall that even in the easiest possible situation for manipulations, i.e., in an one-shot, sequential setup with only three members where the last mover is informed about the others' preferences and decisions, only half of the subjects really do manipulate. Consequently, this figure can be viewed as an upper bound for actual outcome manipulations. In naturally occurring environments that are both more complex and involve inexperienced subjects we should expect to observe even fewer occurrences of strategic manipulations.

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money they want to send to the other person. Thirty percent of the subjects "intend on playing" and send money to the other person. In Abbink and Sadrieh (2008), about 22% of the subjects choose to burn another person's money without any conventional reason, seemingly simply because they are given the opportunity to do so. Another example is the first-mover's decision in information cascade experiments to ignore the private signal although one clearly should not do so; this is observed in about 20% of all cases (see Weizsäcker 2007).

[19] In a related context, Lehtinen (2006) derives a formal result showing that signal extraction under extreme ambiguity is observationally equivalent to having no information.

Furthermore, our findings inform the growing literature on behavioral social choice (see, e.g., the recent monograph by Regenwetter et al. 2006) in a specific way. Besides sincere votes and manipulations that aim at changing the probable outcome of the election, we observe "satisficing" strategic behavior, i.e., insincere votes that are attributable to the desire to avoid bad outcomes rather than to achieve the best possible outcome. Indeed, many informed subjects deviate from their sincere vote in order to reinforce the alternative that is likely to receive the highest number of points from the other voters. This might add to our understanding of how people really take decisions in voting contexts such as the one considered here.

Finally, our analysis also sheds light on the recent research work on social preferences. Neither in the simultaneous game with strategic interaction, nor in the sequential game in which the decision is a simple choice between different payoff distributions, do we observe behavior to be shaped by inequality-aversion. It seems to be a worthwhile task for further work to clarify why this might be so—as well as to check for the influence of different forms of social motives (e.g., guilt-aversion) that might potentially interact with voting behavior.

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