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Should Voting be Mandatory? Democratic Decision Making from the Economic Viewpoint

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Abstract

Many decisions are made by voting. At first glance, the more people participate in the voting process, the more democratic – and hence, better – the decision. In this spirit, to encourage everyone's participation, several countries make voting mandatory. But does mandatory voting really make decisions better for the society? In this paper, we show that from the viewpoint of decision making theory, it is better to allow undecided voters not to participate in the voting process. We also show that the voting process would be even better – for the society as a whole – if we allow partial votes. This provides a solid justification for a semi-heuristic "fuzzy voting" scheme advocated by Bart Kosko.

Need for democratic decision making. Often, a social entity faces a problem, and there are several alternative ways to solve this problem. For example, to build a new baseball stadium, the city can either use the existing funds or issue a bond – and hope that the future profits from this stadium will pay off this bond. In many such cases, the decision is made by voting: the choice is placed on a ballot, and the solution is decided by a majority vote.

Voting is beneficial not only in the social life: there is a body of research showing that students perform better in a democratic classroom, where they are actively involved in day-by-day pedagogical decisions; see, e.g., [2, 3, 4, 5, 6, 7, 8].

Which form of democratic decision making is the best? Does the democratic process always leads to a solution which is the best for the population? No doubt, democracy is better than tyranny, and a decision made with people's participation is better than a decision made by the rulers without the people's input, but democracy can mean many different things, and it is not a priori clear which form of democratic decision making is the best.

For example, some countries (like Australia) force its citizens to vote, imposing fines and other penalties for not voting, while in the US, voting is voluntary.

As a result, in Australia, close to 100% of the registered voters vote, while in the US, even in important elections, about 60% of the voters come to the poll. Does it mean that Australian solutions are more democratic and thus lead to better results?

Our approach. People have been passionately arguing about these issues for a long time, but these arguments are usually on the imprecise level, a level at which it is difficult to convince each other and come up with a mutually agreeable solution. To generate such a solution, let us analyze this problem from the precise economic viewpoint – namely, from the viewpoint of decision theory; see, e.g., [1, 10, 13].

In this paper, we only consider situations in which each of the proposed solutions is better than status quo. In our analysis, we only consider situations in which each of the proposed solutions is better than status quo.

A good example if when a country is in an economic crisis, on the verge of bankruptcy; in this case, most proposed solutions are better for everyone than the current situation.

What decision theory tells us about such situations. Decision theory has thoroughly analyzed different decision making situations. To apply decision theory to such a situation, we need to know, for each participant i and for each proposed solution a, the utility $u_i(a)$ of this solution a to the participant i.

Utility describes preferences in the sense that the larger the utility, the more preferable is an alternative. In these terms, our assumption that for each participant i, each proposed solution a is better than the status quo situation a_0 means that $u_i(a) > u_i(a_0)$ for all a and i.

Once we know these utility values $u_i(a)$, we can characterize each alternative a by a vector $u(a) = (u_1(a), \ldots, u_n(a))$. Collective decision-making means that we need to be able to meaningfully compare every two alternatives a and b: based on the vectors $u(a)$ and $u(b)$, we need to decide which of the alternatives a and b is better. In mathematical terms, we need to define a total (linear) order on the set of all the vectors $u = (u_1, \ldots, u_n)$ for which $u_i > u_i(a_0)$ for all i.

It is known that the utility values are not absolute, they are defined modulo a linear transformation $u_i \to k_i \cdot u + \ell_i$, for constants $k_i > 0$ and ℓ. In our voting situation, we have a fixed alternative – the status quo state a_0. For simplicity, it is therefore reasonable, by selecting an appropriate value ℓ_i, to make the i-th utility of the status quo solution a_0 equal to 0. Thus, without losing generality, we can assume that $u_i(a_0) = 0$ for all participants i. Under this additional assumption, the above restriction on utility values take a simple form $u_i > 0$ for all i, and the only remaining non-uniqueness in defining utility is re-scaling $u_i \to k_i \cdot u_i$.

It is reasonable to require that the resulting order between the vectors u and v do not change if we simply re-scale the utilities. In other words, if originally, we had $u = (u_1, \ldots, u_n) > v = (v_1, \ldots, v_n)$, and we apply a re-scaling to each of the utility scales, then after the re-scaling, we should have

$$(k_1 \cdot u_1, \ldots, k_n \cdot u_n) > (k_1 \cdot v_1, \ldots, k_n \cdot v_n).$$

It is also reasonable to require that all people are equal, i.e., that the order does not change if we simply swap two or more participants. In precise terms, if $\pi : \{1, \ldots, n\} \to \{1, \ldots, n\}$ is a permutation, then $(u_1, \ldots, u_n) > (v_1, \ldots, v_n)$ should imply $(u_{\pi(1)}, \ldots, u_{\pi(n)}) > (v_{\pi(1)}, \ldots, v_{\pi(n)})$.

It is known that these reasonable conditions uniquely determine the desired ordering between the alternatives: namely, we should select the alternative a for which the product $\prod\limits_{i=1}^n u_i(a)$ attains the largest possible value. This result was first obtained by the Nobelist John Nash [11], and it is known as *Nash's bargaining solution*.

Let us apply decision theory solution to this voting situation. From the mathematical viewpoint, maximizing the product is the same as maximizing its logarithm. So, the recommendation of the decision theory is to select an alternative a for which the sum $\sum\limits_{i=1}^n \ell_i(a)$ attains the largest possible value, where $\ell_i(a) \stackrel{\text{def}}{=} \ln(u_i(a))$.

In particular, if we only have two alternatives a_1 ad a_2, then we select a_1 if and only if $\sum\limits_{i=1}^n \ell_i(a_1) \ge \sum\limits_{i=1}^n \ell_i(a_2)$, i.e., if and only if $\sum\limits_{i=1}^n \Delta_i > 0$, where

$$\Delta_i \stackrel{\text{def}}{=} \ell_i(a_1) - \ell_i(a_2) = \ln\left(\frac{u_i(a_1)}{u_i(a_2)}\right).$$

How is this related to voting. In the above sum:

- participants who prefer a_1, i.e., for whom $u_i(a_1) > u_i(a_2)$, enter with a positive weight $\ln\left(\frac{u_i(a_1)}{u_i(a_2)}\right) > 0$, and
- participants who prefer a_2, i.e., for whom $u_i(a_1) < u_i(a_2)$, enter with a negative weight $\ln\left(\frac{u_i(a_1)}{u_i(a_2)}\right) < 0$.

In this sense, the solution is similar to voting:

- if the overwhelming majority of people prefer a_1, we select a_1, and
- if the overwhelming majority of people prefer a_2, we select a_2.

However, this is not exactly the usual voting, because in the Nash's bargaining solution, different weights are assigned to different participants.

To better understand the difference between Nash's solution and the usual voting, let us re-scale the preferences of each of the participant in such a way that the largest value of his or her utility becomes equal to 1. Let us first consider a simplified situation in which each participants assigns utility 1 to his or her preferred alternative and some positive value $u_0 < 1$ to another alternative. In this case, for participants who prefer a_1, we have $u(a_1) = 1$, $u(a_2) = u_0$, and thus,

$$\Delta_i = \ln\left(\frac{u_i(a_1)}{u_i(a_2)}\right) = |\ln(u_0)|.$$

For participants who prefer a_2, we have $u(a_1) = u_0$, $u(a_2) = 1$, and thus,

$$\Delta_i = \ln\left(\frac{u_i(a_1)}{u_i(a_2)}\right) = -|\ln(u_0)|.$$

Thus, the sum $\sum\limits_{i=1}^{n} \Delta_i$ is equal to $|\ln(u_0)|$ times the number of participants who prefer a_1 minus the number of participants who prefer a_2. In this simplified situation:

- we select a_1 if the majority prefers a_1, and
- we select a_2 is the majority selects a_2.

In other words, in this simplest case, Nash's equilibrium solution coincide with the usual voting.

In general, however, this is not the case: undecided participants, for whom $u_i(a_1) \approx u_i(a_2)$, influence the Nash's bargaining solution much less than those for whom $u_i(a_1) \gg u_i(a_2)$ or $u_i(a_2) \gg u_i(a_1)$.

Conclusion. A US-type system, where undecided people are allowed not to vote, is closer to the optimal solution than a system in which everyone is forced to vote. In effect, forcing everyone to vote make undecided people vote at random, adding a confusing random noise to the voting results.

An even better voting system would be to take into account utilities – and thus, degrees of indecision. Such a "fuzzy voting" system has been actively promoted – on a heuristic basis – by B. Kosko; see, e.g., [9] (see also [12]). What we show is that such a system naturally follows from the general ideas of decision making theory.

Comment. There is an even better approach: to make people accept measures that may hurt them in the short run, people who advocate these measures provide additional compensations to those who may be hurt: e.g., an increase in a university tuition is usually compensated by increasing stipends and loans available to students who cannot afford such increases. At present, such compensation is provided on a heuristic basis. Ideally, the amount of compensation should also be decided based on Nash's bargaining solution.

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