Preventing the Tyranny of the Majority - Experimental Evidence on the Choice of Voting Thresholds*

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In democracies, an absolute majority of the population may choose policies that are harmful to the rest of the population. A purpose of super-majority rules is to prevent this from happening when the harm to the minority is likely to be larger than the benefit to the majority. Similarly, sub-majority rules enable a minority to implement a choice when their benefit exceeds the losses to the majority. We study whether individuals optimally choose sub- or super-majority rules when the rights of minorities should be protected. In our Bayesian experiment individuals receive information about the distribution of valuations for a public project before knowing their own valuation. We find that as predicted, subjects propose more extreme voting rules for more skewed distributions. However, we also find that rule choices are biased towards balanced rules, leading to under-protection of the minority that is associated with substantial welfare losses.

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"[We acknowledge] the principle that the majority must give the law."

Thomas Jefferson to William Carmichael, 1788. ME 7:28

"[Sometimes] the minorities are too respectable, not to be entitled to some sacrifice of opinion, in the majority."

Thomas Jefferson to James Madison, 1788. ME 7:184

1 Introduction

From its very beginning, democracy relies on voting (Thorley, 2005). Whereas voting is a common feature of democratic institutions, majority thresholds are diverse, ranging from sub- via super-majority rules to unanimity rule (Vermeule, 2004). Despite this vast diversity, simple majority rule plays a particularly prominent role (Rae, 1969). It is actually applied so often that many people (wrongfully) identify democracy – the rule of the people – with the rule of a majority.[1] However, such a narrow interpretation of democracy has a downside. When a simple majority of citizens rules, it may choose policies that are very harmful to the rest of the population, a phenomenon labelled "the tyranny of the majority" (Adams, 1788, p. 291). It is a main purpose of super-majority rules to prevent this from happening.

Since simple majority rule is applied so frequently in practice, one may wonder whether those who establish voting rules properly understand the risks that are associated with balanced rules. The present paper studies whether this is the case. We run a two-stage voting experiment to find out whether individuals efficiently choose majority thresholds when the rights of minorities should be protected.

In many practically relevant cases the voting rules have to be chosen (long) before stakeholders' preferences materialize. Our experimental analysis focuses on these cases, i.e., subjects have to suggest voting rules at a stage when their own preferences have not yet realized.[2]

[1] According to Rae (1969) the limitation to some prominent decision making rules "is illustrated by Abraham Lincoln's remark: 'Unanimity is impossible; the rule of a minority as a permanent arrangement, is wholly inadmissable; so that, rejecting the majority principle, anarchy or despotism in some form is all that is left."'

[2] It is a key politico-economic insight that rules governing collective decision making should ideally be chosen before individual preferences about outcomes have realized. Rawls (1972) builds his theory of justice on the view that a fair system should maximize expected utility under a veil of ignorance, and Brennan and Buchanan (1985) argue that the establishment of an efficient system is more likely if the decision about the

It is well established in the theoretical voting literature that the efficient protection of minorities requires that the majority threshold is optimally adjusted to the distribution of preference intensities. The point that institutions should be designed in a way that they fit citizens' preference intensities has been raised early by Buchanan and Tullock (1962). The formal analysis of voting setups with decentralized information about preferences was then pioneered by Rae (1969), who introduced Bayesian voting problems with binary positive or negative valuations. Rae showed that in symmetric setups the optimal voting rule is simple majority rule. His results were later generalized by Badger (1972), Curtis (1972), Schofield (1972), and Taylor (1969). More recently, Schmitz and Tröger (2012) have shown that qualified majority rules maximize social welfare in the class of mechanisms that can implement an anonymous social choice in dominant strategies.[3]

To see why the majority threshold should be adjusted to the underlying distribution of preferences, consider a binary voting decision between two alternatives, A and B that will also underly the experiment in this paper. Intuitively and in the binary setup that we will consider in this paper, a vote in favor of one alternative should count more if those who benefit from that alternative on average benefit more than those who lose. Thus, the voting threshold for one alternative should generally decrease in the expected preference intensity of the supporters and increase in the expected preference intensity of the adversaries. Stronger majority requirements can thus effectively protect minorities in cases where preferences in favor of or against a decision may be particularly strong.[4] Our main finding is that while our subjects react to the distribution of preferences in the direction required for efficient minority protection, rule choices are biased towards balanced rules, leading to under-protection of the minority and substantial welfare losses.

Our experiment is designed as follows. Subjects decide on a voting rule before knowing their own valuation for an alternative that changes the status quo, such as implementing a public project. Experimental participants decide in groups of five in a two-step procedure about whether to enact the change. In the first step, for a given distribution of possible valuations they suggest a voting rule (such as simple majority, super-majority, or even an extreme minority one where one vote in favor is sufficient to enact the change). They make these decisions for 21 different distributions. In the second step the participants learn their own valuations and vote about the implementation of the change according to the voting

institution is taken *before* preferences have materialized. The present paper considers this case. There are other situations where informed voters pick rules. This case has been analyzed experimentally in Engelmann and Grüner (2017).

[3]See Barberà (1979), Börgers and Postl (2009), Azrieli and Kim (2011), and Gershkov, Moldovanu, and Shi (2013) for related papers that study cases with more than two alternatives. The selection of voting rules and weighted voting have also been studied theoretically in Barbera and Jackson (2004, 2006). The fact that voting rules should be adjusted to the distribution of information also plays a key role in the literature on strategic voting in committees (Austen-Smith and Banks, 1996, and Feddersen and Pesendorfer, 1998).

[4]We make this point in more detail in Section 2.

rule randomly selected from the suggested ones.[5] Thus, the experimental subjects vote on the outcome after receiving the information about their own valuation but they have to decide on the voting rule before the uncertainty is lifted.

We choose payoff distributions that vary in their skewness so that the total-payoff maximizing voting rule ranges across all possible thresholds from unanimity required for the public project to unanimity required against the public project. The total-payoff maximizing voting threshold for a decision increases in the expected cost for the opponents and decreases in the expected gains for the supporters. Our analysis shows that this is true qualitatively for the chosen voting rules. We find strong evidence for a monotonic relationship between the relative preference intensity of supporters and opponents and the chosen voting rule. This monotonicity is weaker than predicted, however, and subjects tend to shy away from choosing unanimity rules. While on average subjects respond in their rule choice to the underlying distribution of valuations by picking more extreme voting rules for more skewed distributions, fewer than half of the rule choices are for the total-payoff maximizing rule. The suggested rule choices imply that on average more than one third of the total surplus would be lost if all subjects voted selfishly in the second stage, which they typically do. Interestingly, subjects do not particularly favor the simple majority rule, even though they rarely choose unanimity rule. Hence the participants in our experiment do not seem to have a preference for majority rule per se but they are biased towards this rule even if the underlying problem is very unbalanced. This implies that a tyranny of the majority can systematically occur in democratic settings even when (i) the rule can be adjusted to the underlying problem and even when (ii) agents are ignorant about their preferences when they choose voting rules. Thus even under ideal conditions the tyranny of the majority empirically plays an important role.

There is substantial heterogeneity across subjects. While most subjects show a positive correlation between the chosen and the payoff-maximizing rule, only one among 130 subjects chooses the total-payoff maximizing voting rule more than two thirds of the times (and indeed does always do so). Experimental participants do not exhibit a particular preference for majority voting (only 4% choose the simple majority voting rule more than half of the time). They do, however, show a tendency towards moderate rules (73% of subjects never propose an extreme rule requiring unanimity for one of the outcomes, so that a single subject can determine the outcome), even though a unanimity rule is efficient in one third of the tasks. As a result, ex-ante rule choice is not generally sufficient to overcome the "tyranny of the majority" in particular in the case where the majority is large and the minority is small. Experimental participants lose most expected surplus when unanimity rules would be total surplus maximizing, more than twice the loss in payoff when majority voting is optimal.

[5]Since we are interested mostly in the choice of the voting rules, only for three of the 21 distributions, randomly selected, valuations are drawn and votes are cast.

We do not find evidence that rule choices are biased towards conservative rules or that increased variance in possible payoffs would lead to more conservative rule choices, which would both be predicted by risk aversion. In contrast, participants choose more conservative rules if the probability for a negative outcome increases, which is inconsistent with the theory, but arguably psychologically plausible.

There are many important real world situations in which ex-ante choices of rules are relevant. In our experiment, we consider an election with a small (five) number of voters. Hence, taken literally, our experiment evaluates individual's ability to choose rules for clubs (sports clubs etc.), local trade unions, parent school boards, faculties and other "small" institutions. On the political level, these "small" decision making bodies also include several national and international organizations that take decisions in committees (including Parliamentary subcommittees, the United Nations, the IMF, Nato, the EU council of ministers, or central bank councils).

Many procedural and constitutional rules make use of the simple majority rule even in classes of situations where gains and losses from decisions are unlikely to be distributed symmetrically. There are many collective decision problems in which the optimal rule is likely to be biased towards one outcome in order to protect minority interests but the actual rule in parliament is the simple majority rule. One such example is the decision about whether same sex marriages should be allowed. This decisions seems to affect the feelings of some people to some - perhaps rather limited - extent, but it matters - potentially a lot - to those who are directly affected by it. Decisions about the size of public investments also often affects different people to a different extent. A good example is a public investment into the research on specific rare diseases. Ex-ante it is very unlikely that one benefits from this kind of research but interim one may care a lot. Specific public services can also be associated with an unbalanced distribution. Valuations for late opening hours of a public library or a sports facility can be skewed with some people caring very little while others who have no other option may care a lot.[6] The efficient protection of minorities, however, appears explicitly not to be a concern in recent populist movements, who consider constitutional constraints of simple majority rule as a violation of democracy. This was most evident in the outcry by some Brexit supporters about the court ruling that parliament would have the ultimate decision on whether to leave the EU. In contrast to this equating of democracy with majority voting, the Brexit choice may indeed be a good case where majority voting has not been efficient, because a clear majority of younger people, who are likely much more affected by such a long-term choice, preferred to remain in the EU.

[6]Some regulatory decisions can also be associated with skewed distributions of valuations. Consider e.g. rules regarding the consumption of specific types of food. Some people dislike it when others consume specific types of food (e.g. whales or horses) while those (few) who like that food may care a lot about it. However, many of these decisions are not taken in a formal vote and rather delegated to some regulatory agency.

While, for obvious practical reasons, our experiment considers a small election, the basic choice problem is similar to the choice of voting rules in large elections where voting rules should also take the joint distribution of preferences into account. Constitutions also usually specify different majority requirements for different classes of actions. An example is the German constitution that for most issues requires a simple majority to make a decision in parliament. However, for some issues such as constitutional changes the constitution requires a two third majority. Some rules cannot even be changed unanimously. Such majority thresholds in constitutions rarely change over time. Therefore when these thresholds were implemented, these were clearly choices under a veil of ignorance.

Our experiment is a direct empirical test of subjects' ability to perform the task of rule selection at the ex-ante stage. While there is a lot of empirical research about what determines individuals' voting behavior under a given rule, very little is known about how individuals choose rules that they would like to apply in the future. Specifically, very little is known about whether individuals are able to properly adjust the majority threshold to the underlying distribution of voter preferences. One exeption is the analysis by Engelmann and Grüner (2017) who study the choice of voting thresholds at the interim stage, i.e. at the stage where individual preferences have already realized. Their main finding is that efficiency concerns may make individuals chose rules that are not in their own favor which can make a rule choice stage welfare enhancing even if preferences have already realized. While interim rule choices are made in many practically important cases, it is equally important to understand whether individuals are capable of making the right choices under the closer to ideal conditions when they do not yet know their own preferences. This is what the present paper is about. Another recent paper by Weber (2016) also experimentally studies the choice of voting rules for representatives of homogenous groups, but does so in a setup with binary valuations of identical absolute size. This is why the paper does not permit to study how the absolute size and size-distribution of individual valuations affect the choice of voting rules.

The next section outlines the theoretical argument how majority thresholds should be adjusted to the underlying distribution of valuations. Section 3 presents the experimental design and Section 4 the results. We conclude with a discussion in Section 5.

2 The voting problem

Before we describe our experiment in detail, we explain why a voting threshold should generally change with the underlying distribution of types. This section also introduces the discrete type setup underlying our experiment.

Consider a population of finite size n that has to take a binary voting decision between two alternatives, A and B. Normalizing all players' payoffs resulting from alternative B

to zero, we represent a player's realized preference by a payoff θ resulting from alternative A. In our experiment, we draw these valuations from a finite distribution on a set $\Theta = [\underline{\theta}, \overline{\theta}]$ with only strictly positive or negative elements. Thus, there are only winners or losers with potentially different preference intensities within and between these two groups.[7] Valuations are drawn independently from the same distribution and the distribution of individual valuations is common knowledge.

Voters must cast a vote for A or B. Abstentions are not allowed. A symmetric mechanism maps the number of votes in favor of alternative A (which implies the number of votes in favor of alternative B) into a probability that A get realized. An important subclass consists of monotonous voting rules which assign the outcome A to any voting profile in which at least k voters voted in favor of A and outcome B to all other voting profiles.

A voting strategy is a mapping $S : \left[\underline{\theta}, \overline{\theta}\right] \rightarrow \{A, B\}$. Always voting in line with the sign of one's own valuation is a weakly dominant strategy for any possible monotone voting rule. Based on this voting behavior, the class of total-payoff maximizing voting rules can easily be determined. Denote conditional expected monetary gains of winners by $E^+ := E(\theta \,|\theta > 0)$ and conditional (absolute) losses by $E^- := |E(\theta\,|\theta < 0)\,|$. Denoting the number of winners and losers by a and b, an optimal rule must specify that a decision in favor of alternative A (B) is made if $aE^+ > (<)\, bE^-$. When $aE^+ = bE^-$ any outcome is optimal. Since zero valuations occur with probability zero, a binary voting mechanisms with a voting threshold of $\lceil nE^- / (E^- + E^+) \rceil$ votes in favor of alternative A is optimal.[8]

Note that the optimal choice of the voting mechanism does not depend on the probabilities of voters preferring A or B but only on the conditional gains and losses. This may appear counter-intuitive at a first glance, because one might think that if losses are more likely, we may want stronger protection of losers and hence a higher threshold. That intuition is false, however, because the number of voters in favor or against a policy change depends on the realized numbers of negative and positive valuations and not for the ex-ante expected numbers. Hence the latter are irrelevant for the determination of optimal voting rules. Nevertheless, it is plausible that experimental participants react to the probabilities of gains and losses. Hence we also vary these probabilities in the experiment.

[7] Thus, in our experiment we exclude that subjects may be (completely) indifferent. Note that a zero mass on zero valuations also arises (quite naturally) in the context of continuously distributed types. Therefore, our setup leads to the same simple optimal voting mechanism as in the case of a continuous distribution that has been studied extensively in the theoretical voting literature. This optimal voting mechanism only requires two signals, A or B. If zero valuations arise with positive probability, a third signal - abstention - would be necessary to achive a constrained optimum. Therefore, restricting the analysis to mechanisms with two votes significantly restricts the choice sets on the rule choice stage.

[8] $aE^+ > bE^- \Leftrightarrow aE^+ > (n-a)E^- \Leftrightarrow a(E^+ + E^-) > nE^- \Leftrightarrow a > nE^- / \left(E^- + E^+\right)$. Hence when a is at least as high as the next highest integer than $nE^- / \left(E^- + E^+\right)$, A is at least weakly preferable over B.

3 Experimental design and hypotheses

3.1 Design

Our experiment considers the following two-stage decision setup. In the first stage, experimental participants are given a distribution of possible valuations (positive and negative) for alternative A, representing net payoffs from a public project, or from a change from the status quo. This distribution is the same for each member of the group of five individuals. The valuation for alternative B (representing the status quo) is always 0€ for all individuals. For example, a distribution of valuations for alternative A can be

- the valuation of A is 2€ with probability 2/3 and it is -5€ with probability 1/3.

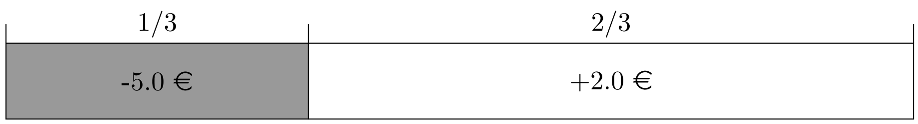

Figure 1: Illustration of valuations for a distribution

For a given distribution, each individual chooses one of the threshold voting rules, specifying how many individuals in the group of five need to vote for alternative A for it to be adopted. Abstentions are not allowed in the voting stage, thus the threshold for alternative A automatically implies the threshold for alternative B. Therefore, for groups of five voters, the available voting rules are:

Rule I. At least 1 vote for alternative A is required for A to be chosen, thus 5 votes for alternative B are required for B to be chosen (unanimity for B);

Rule II. At least 2 votes for alternative A are required for A to be chosen, thus at least 4 votes for alternative B are required for B to be chosen (qualified majority for B);

Rule III. At least 3 votes are required for either A or B to be chosen (simple majority), that is, whichever alternative has more votes wins;

Rule IV. At least 4 votes for alternative A are required for A to be chosen (qualified majority for A), hence at least 2 votes for alternative B are required for B to be chosen;

Rule V. 5 votes for alternative A are required for A to be chosen (unanimity for A), thus at least 1 vote for alternative B is required for B to be chosen.

In the second stage of the experimental setup, the rule suggestion of one randomly chosen group member is chosen to be the actual voting rule (a random dictator mechanism).[9] The subjects are informed about which rule was chosen, but not whose decision determined the voting rule nor the voting rule choices of the other four group members. The participants' valuations are then realized according to the given distribution and each participant learns his/her own valuation for alternative A. The participants then cast a binary vote (either for A or for B). The votes are tallied and the outcome (either A or B) is decided according to the chosen voting rule.

The two-stage procedure is designed to have individuals make decisions on the voting rule under the "veil of ignorance" (in the first stage, before they know their own valuation). The second stage is the one more commonly tested in the experimental literature on voting, and we include it as a check on subjects' voting behavior and to make the rule-choice stage incentive compatible. However, our interest is mainly in the decisions in the first stage.

In the second stage of the procedure, it is a (weakly) dominant strategy to vote for A if one's realized valuation for A is positive and vote for B if one's realized valuation for A is negative. If voting in the second stage is going to follow the dominant decisions, and if individuals maximize their expected payoff (or the expected payoff of the whole group), then which rule is optimal depends on the distribution. For example, for the distribution of valuations for A shown in the example above (2€ with probability 2/3 or −5€ with probability 1/3) the optimal rule Rule IV is skewed towards B: four votes for A are needed. This is because benefits from A are much lower than the losses that it causes. Even though players with losses are likely to be in minority (the probability of a negative value is only 1/3), they need to be protected from ex-ante point of view. This example also helps to demonstrate that to determine the optimal decision rule it is actually irrelevant how likely negative (or positive) values are, because the rule becomes relevant for a given size of the minority. In this case, whenever two participants have a negative valuation, this outweighs three positive valuations and hence A should only be chosen if at least four participants support it. Since in the first stage individuals make a decision which rule to suggest before knowing their own valuation for alternative A (and thus they may end up being the players with valuation −5€), it is in their own interest to suggest such a protection of the minority.

In the experiment, the two stages did not immediately follow each other. In fact, in the first part of an experimental session, the participants made rule choices for 21 distributions of valuations for alternative A. These distributions are listed in Table 1. The order in which the distributions were shown to the subjects was randomly determined and thus varied between subjects; there was no feedback between rounds in the first part of the experiment.

The distributions are chosen to vary in their skewness such that the total-payoff maximiz-

[9] We chose a random dictator mechanism because it is incentive compatible and moreover easy for participants to understand to be incentive compatible.

No.	V_1	V_2	V_3	$Pr(V_1)$	$Pr(V_2)$	$Pr(V_3)$	E^-	E^+	Optimal Rule
1	-5	1		1/3	2/3				V
2	-4	1.5		1/3	2/3				IV
3	-2.5	2.5		1/2	1/2				III
4	-1.5	4		2/3	1/3				II
5	-1	5		2/3	1/3				I
6	-5	1		1/2	1/2				V
7	-4	1.5		1/2	1/2				IV
8	-2.5	2.5		1/3	2/3				III
9	-2.5	2.5		2/3	1/3				III
10	-1.5	4		1/2	1/2				II
11	-1	5		1/2	1/2				I
12	-5	0.5	1.5	1/3	1/3	1/3			V
13	-4	1	2	1/3	1/3	1/3			IV
14	-2.5	2	3.5	1/2	1/3	1/6			III
15	-1.5	3	5	2/3	1/6	1/6			II
16	-1	3.5	6.5	2/3	1/6	1/6			I
17	-1.5	0.5	5	1/3	1/3	1/3			II
18	-2	1	4	1/3	1/3	1/3			II
19	-3.5	-2	2.5	1/6	1/3	1/2			III
20	-5	-3	1.5	1/6	1/6	2/3			IV
21	-6.5	-3.5	1	1/6	1/6	2/3			V

Table 1: Distributions used in the experiment. V_1, V_2, V_3 denote the possible valuations, $Pr(V_i)$ the probability of V_i. E^- and E^+ are the absolute values of the expected valuations conditional on being negative and positive, respectively. The optimal rule is the ex-ante expected-value maximizing rule.

ing voting rule ranges across all possible thresholds from unanimity required for alternative A (rule V) to unanimity required for alternative B (rule I). Distributions 1-5 are taken as the base; the rest of the distribution are derived from them. For example, distributions 6-11 are variants of distributions 1-5, but with different probabilities of each value. Distributions 12-16 are variants of distributions 1-5 but with increased variance, with one of the outcomes in distribution 1-5 being replaced by a mean-preserving spread. Finally, distributions 17-21 are derived from 12-16 by multiplying all valuations with -1.[10]

After the first part was finished, three of the 21 distributions were randomly selected for the second part of an experimental session. Therefore subjects in the same session voted on the same three distributions, potentially using a different voting rules in different groups, but subjects in different sessions typically voted on different distributions. In each round of the second part, valuations for the participants were drawn according to the distribution and the participants were only informed about their own valuation. One voting rule among those suggested by the five group members for this distribution was randomly selected and the participants were informed about which rule is selected. The participants then voted for alternative A or alternative B, and the outcome of the voting was determined according to the voting rule. At the end of a round, the participants were informed about the outcome of the voting and their payoff. They were paid for all three group decisions from the second part.

The experiments were conducted at the Laboratory of Experimental Research Nuremberg (LERN) in December 2015. We ran 5 sessions, with the number of participants ranging between 15 and 30 in each. In total there were 130 participants. The experimental sessions were programmed using zTree (Fischbacher, 2007) and the recruitment of the participants was done with ORSEE (Greiner, 2015). Each participant was given a starting budget of 15€. The valuations in Table 1 are in Euro; with the three distributions actually played out, the minimum amount a participant could earn was 3€ and the maximum amount was 27€.

3.2 Hypotheses

Our experimental setup permits to test the following hypotheses:

1. Distribution matters: Voting rule choices take into account the skewness of the distributions towards larger positive or negative outcomes, thus reflecting which rules are optimal.

[10]Following this rule, distribution #17 should have been -1.5 with probability 1/3, -0.5 with probability 1/3, 5 with probability 1/3, with the optimal rule being rule I. Due to a copying error, 0.5 was entered instead of -0.5, making rule II the optimal rule.

2. Preference for majority rule: Rule III is chosen more often than is warranted by it being theoretical optimal. Such a preference could result from a preference for democracy and a perception that majority voting best represents democracy.

3. Asymmetry: There is a systematic bias towards rules IV and V as compared with rules I and II. This may reflect risk attitudes: since alternative A is a more risky than alternative B, a risk-averse person would suggest rules IV and V more often. A maxmin person should always pick rule V, since for each distribution losses are possible.

4. Variance matters. Although distributions with one outcome replaced by a mean-preserving spread (for example, distributions 1 and 12 in Table 1) have the same theoretically optimal rule, decisions in the experiment may not reflect this. A distribution with higher variance is less attractive for a risk-averse person, who should hence choose more conservative rules for a distribution derived by a mean-preserving spread.

5. Probabilities of various outcomes matter. Although distributions with the same outcomes but different probabilities of these (for example, distributions 1 and 6 in Table 1) have the same theoretically optimal rule, decisions in the experiment may not reflect this. Specifically, having a higher probability of a loss may make a distribution appear to be more risky and hence lead to more conservative rule choices by risk-averse subjects.

6. Extreme rules: A risk-neutral person who does not understand that voting aggregates information about the realized distribution will pick rule V or rule I depending on the expected payoff of the lottery determining their own valuation.

7. Focality: Prominent numbers, or easy to calculate ratios of numbers or of probabilities may play a role in the decision process.

4 Experimental results

4.1 Rule Choices - aggregate data

As a first basic result, rule choices of the subjects are regressed on the optimal rule. Table 2 presents this for each session separately and over all sessions, where *OptRule* denotes the optimal rule variable.[11]

[11] Since we did not provide any feedback in the first part of the experiment, each of our subjects presents an independent observation. *Since each subject made 21 decisions we cluster standard errors on the subject level to account for the multiple observations per subject.*

Table 2: Regression of choice on optimal rule

	Obs	Correlation	Regression
Session 1	525	0.407^{***}	$1.605^{***} + 0.459^{***} OptRule$ ($R^2 = 0.165$)
Session 2	630	0.520^{***}	$1.408^{***} + 0.551^{***} OptRule$ ($R^2 = 0.270$)
Session 3	630	0.349^{***}	$2.026^{***} + 0.362^{***} OptRule$ ($R^2 = 0.122$)
Session 4	630	0.342^{***}	$2.091^{***} + 0.349^{***} OptRule$ ($R^2 = 0.117$)
Session 5	315	0.449^{***}	$1.731^{***} + 0.455^{***} OptRule$ ($R^2 = 0.201$)
Overall	2730	0.409^{***}	$1.783^{***} + 0.432^{***} OptRule$ ($R^2 = 0.167$)

The correlations coefficients and the regression coefficients on *OptRule* are all significantly different from 0 and from 1. Thus the subjects appear to take into account which rule is optimal for a given distribution, as the first hypothesis in the previous section suggests, but clearly not as much as the optimal rule implies. For example, from the last line of the table, if $OptRule = 1$, then subjects' average choice is predicted to be 2.215 rather than 1; if $OptRule = 4$, the predicted choice is 3.511 rather than 4. Note also that there does not appear to be much difference between sessions. Hence there is qualitative support for Hypothesis 1, but subjects do not fully react to the optimal rule as theoretically predicted.

Note that although the coefficient of *OptRule* is highly significant, R^2 is not high. There is a lot of variance in subject's choices that is not explained by which rule is optimal for a given distribution. Table 3 shows the distribution of actual rule choices by optimal rule.

Table 3: Rule choices

OptRule	Obs	Median	Mean (St.Dev.)	Rule choices				
				I	II	III	IV	V
I	390	2	2.254 (1.330)	39%	25%	17%	8%	11%
II	650	2	2.594 (1.261)	24%	27%	24%	15%	9%
III	650	3	3.080 (1.189)	11%	20%	35%	19%	15%
IV	520	4	3.598 (1.297)	9%	11%	22%	24%	33%
V	520	4	3.896 (1.348)	10%	9%	13%	21%	48%

The table shows just how much noise there is in the choice of rules: even for the distributions where an extreme rules is optimal (1 or 5), 18% of suggested rules are on the wrong side of the simple majority rule III.[12]

There is not much evidence in favor of Hypothesis 2 that subjects have a preference for

[12] Note also that standard deviation of suggested rules is lower for those distribution whose optimal rule is III and increases as the optimal rule moves to the extremes. It is not clear though if this increase is anything more than simply allowing larger distances from the mean.

majority rule in the sense that rule III is chosen most often. Rule III is not chosen much more often than other rules. Even for the distributions where III is the optimal rule, it is chosen only about 1/3 of the time.

Hypothesis 3 predicted asymmetry, i.e. rules I and II are chosen less often than rules IV and V. Although there is a slight shift to the rules with larger numbers (evident from the averages and the percentages), it does not appear to be large, providing at best very weak support for Hypothesis 3.

Our distributions were chosen so that some of them are variants of others but with different variance and different probabilities of the same values. Theoretically, changing variance or probabilities of values does not change which rule is optimal. Table 4 lists means and standard deviations of suggested rules for the distributions, organized by the optimal rule (recall that distribution #17 was supposed to be a variant of distribution #5 but was not correctly implemented and is thus omitted from the table):

Table 4: Effects of changes in distributions

OptRule	Base	Var 1	Var 2	Prob 1	Prob 2
I	D#5 2.508 (1.342)	D#16 2.208 (1.322)		D#11 2.046 (1.293)	
II	D#4 2.892 (1.277)	D#15 2.677 (1.331)	D#18 3.085 (1.168)	D#10 2.208 (1.132)	
III	D#3 2.962 (0.901)	D#14 2.746 (1.095)	D#19 3.500 (1.087)	D#8 2.446 (1.114)	D#9 3.746 (1.235)
IV	D#2 2.454 (1.283)	D#13 3.308 (1.167)	D#20 3.708 (1.349)		D#7 3.923 (1.310)
V	D#1 3.854 (1.330)	D#12 3.807 (1.365)	D#21 3.992 (1.327)		D#6 3.931 (1.376)

Hypothesis 4 states that the variance of distribution matters. From Table 4, it does not appear that variance per se matters. Var 1 distributions had an increased variance of positive values compared with the Base ones while Var 2 distributions had an increased variance of negative values. The means for Var 1 distributions are lower than for the Base distributions and those of Var 2 are higher. It appears that what matters perhaps is the magnitude of values (larger numbers loom larger, reflecting Hypothesis 7 to some effect) but not their variance per se.

Hypothesis 5 states that probabilities of values matter although they should not in theory. Table 4 lends some support to this hypothesis. Prob 1 distributions had an increased probability of positive values compared with the Base distributions and Prob 2 distributions had an increased probability of negative values. This seems to have an effect: an increased probability of positive value lowered the average suggested rule (thus fewer votes in favor of alternative A would be needed) while an increased probability of negative values led to higher average suggested rules (this can be most clearly seen for distributions with optimal rule III, where changes in probability moved the choices closer to II and IV respectively).

Hypothesis 7 states that prominent numbers play a role. Depending on how this hypothesis is interpreted, it may have some support. Distributions with higher variances meant that numbers were "stretched", so that e.g. 4 becomes $\{3$ with probability $1/2$ and 5 with probability $1/2\}$. Then 5 perhaps played a more prominent role than 4 in realizing that the optimal rule should involve a low threshold (as indeed happens since High Var 1 have on average lower suggested rule than Base) (although the presence of two positive values rather than one may also play this role).

Finally, Hypothesis 6 that someone risk-neutral who does not understand that there will be voting will pick rule V or rule I depending on the expected payoff of the lottery determining their own value. There may be some subjects who behave in a similar (though less extreme) way (e.g. Subjects #3, #5, #11, #17 in session 1, Subjects #18, #20, #21, #23 in session 2, ...) but this is left for the analysis of individual types rather than of aggregate patterns.

To summarize the rule choice results,

Result 1: Rule Choices Rule choices follow the optimality of rules to some extent although there is a lot of heterogeneity and possible errors. There is little evidence of preference for majority rule III or of risk-aversion (or asymmetry). Variance in a distribution plays little role, but shifts in probability and in magnitude (or in the number) of values seem to play a role.

4.2 Rule Choices - individual data

We also looked at the individual behavior and tried to identify whether the heterogeneity we observe in the aggregate data is generated by a few subjects or whether choices of subjects are typically noisy. To provide some overview of the general performance of subjects, Table 5 shows how many subjects made less than 5, between 5 and 10, between 11 and 15 and more than 15 optimal rule choices. About half of the subjects made between 5 and 10 rule choices that correspond to the optimal rule. Remarkably the one subject that choose an optimal rule more than 15 times choose the optimal rule in all 21 distributions.

Table 5: Overview: Efficient rules choices by individuals

NumOfOptRuleChoices	Frequency
$<= 5$	43
$5 < x <= 10$	63
$10 < x <= 15$	23
> 15	1

To see which implications these choices have on the surplus extracted, we calculate for each individual the expected missed surplus using all 21 rule choices an individual made and based on the assumption that subjects would have voted rational and selfish (i.e. for alternative A if valuation is positive and for alternative B if valuation is negative).

Table 6 states the expected missed surplus per session, as well as the expected missed surplus by the best ("min") and worst ("max") individual in each session. Thus this analysis takes the size of the error by not choosing the most efficient rule into account. Note that these are absolute numbers **per group**, e.g. 90.08 means that a group of five subjects would have in expectation earned 90 Euro less than with the optimal rule choices. As a reference, always choosing the most efficient rule yields a group surplus of 63.89 Euro (= 12.8 Euro/subject). Therefore "missing" 90 Euros means, that on average the group would have lost money.

Table 6: Expected surplus missed by session

Session #	mean	sd	min	max
1	25.04	22.69	4.53	90.08
2	20.01	14.39	0.00	53.45
3	28.12	18.98	5.67	84.10
4	26.22	17.77	5.14	69.10
5	22.05	10.97	5.99	45.36
Total	24.52	17.79	0.00	90.08

On average 25 Euro of the achievable surplus is missed. For the five sessions the expected missed surplus varies between 20 and 28 Euro, however, the individual variation is much larger. Session 1 stands out with regard to the standard variation and this is driven by three subjects that missed 60-90 Euro of the expected surplus.[13]

Figure 2 is a scatter plot with the expected missed surplus of each individual on the y-axis and the number of efficient rule choices on the x-axis. While the number of efficient rules choices clearly drives the total surplus missed, the scatter plot also demonstrates that the variation is substantial. Especially for subjects that selected the optimal rule less than 10 times, the missed surplus varies a lot.[14]

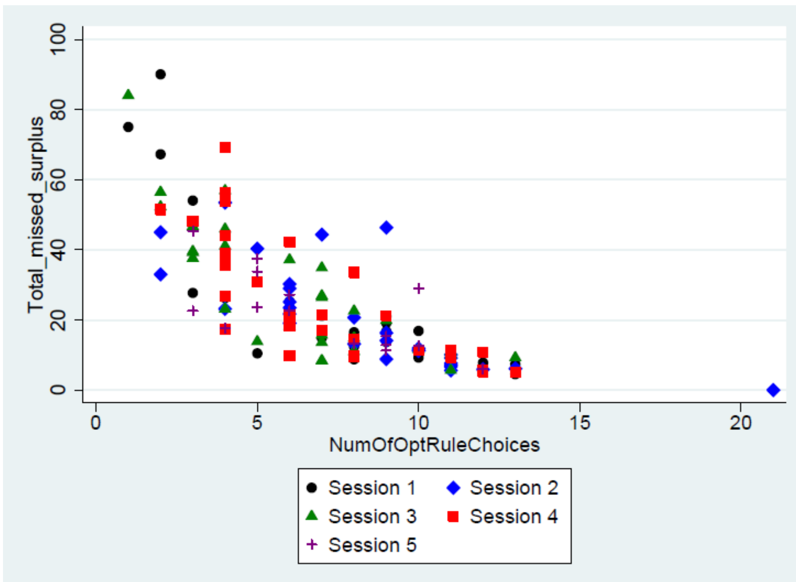

Figure 2: Scatter plot - missed surplus

We divided subjects into types according to the correlation between the chosen rules and the optimal rules. There are 4 different classifications based on the individual correlation between the choices and the efficient rule. Two subjects always choose the same rule (one always rule I, the other always rule V), therefore these two are not classified.

For most subjects the correlation is positive and for more than half it is above 0.5. These numbers indicate that a majority behaves as least in the predicted direction. Subjects seem to take the expected payoff into account when choosing the group decision rule. However,

[13]Subjects in session 1 did not answer understanding questions after reading the instructions. In all other sessions subjects had to answer several questions regarding the resulting payoffs given various distributions and voting rules to ensure that participants understood the relationship between choosing a rule in stage 1 and the effect of these decisions rules for stage 2.

[14]A possible effect of not asking understanding question in session 1 can be seen in the upper left: the three black dots indicate that three subjects in this session missed a lot of expected surplus. So while the session average is not very different from the others, maybe some individuals could be heavily affected.

about 30% of subjects have a correlation below 0.25, which indicates that their choices are not in line with the efficient rule very often. In order to understand especially this third of the subject population we looked for various other "types", most of them based on our hypotheses.

Table 7: Correlation with efficient rule choice

Correlation	Freq.	Percent
< 0	25	19.53
≥ 0 and < 0.25	11	8.59
≥ 0.25 and < 0.5	22	17.19
≥ 0.5	70	54.69
Total	128	100.00

We only mention very few types in detail here, since many specified types cannot be identified very often. There are only 12 subjects (9%) who select the efficient rule in at least 12 rounds. Even fewer subjects have a strong preferences for rule III. Only 5 out of the 130 subjects voted for rule III in at least 12 rounds (4%). The same number of subjects voted only for the extreme rules (rule I or V). Clearly rule III does not seem to be special.

Another finding is that 73% (95 subjects) **never** suggested rule I or V and therefore only used rules II-IV (even though an extreme rule was the optimal rule in 7 of 21 distributions). When generating types using our hypotheses that rule choices are affected by changes in variance or probabilities the individual choices confirm the results from the aggregate data. Many subjects change their chosen rule when either the variance or the probabilities change. However, we did not find one type that is very prominent. It looks like both variations lead to different chosen rules, but no single reason "dominates" the others.

The self classification of risk aversion does not explain a lot. Splitting the sample for subjects that stated to be "risk averse" or "somewhat risk averse" in a questionnaire administered at the end of the experiment (89 subjects, 68%) shows that these subjects tend to choose "higher" than optimal rules a little more often, but the differences are small (7.5 times compared to 6.9 for the remaining 32%). Just conditioning on those that state that they are "risk averse" yields somewhat bigger differences (9.6 vs. 7.1 times), but this regards only a small fraction of the population (10 subjects). So risk aversion "works" in the expected direction, but (at least self-assessed) risk aversion does not seem to be a major driver of the results.

Result 2: Short summary on types There is quite some heterogeneity in the rule choice behavior of subjects. Looking at the classification using the correlation between the rule choice and the optimal rule shows that about 1/3 of subjects behaves rather noisily.

The other 2/3 react to the optimality of different rules, but to a smaller extend then it would be optimal.

4.3 Surplus extraction rates by rule

To identify the surplus extraction rates we used the “expected missed surplus” measure. Table 8 below states for the five rules how much surplus was lost on average if the given rule was the optimal rule. Since these numbers are absolute numbers, they do not take into account how much surplus was actually possible with the optimal rule. Therefore the column “maximal surplus” states the mean expected surplus with the efficient rule.

Table 8: SER rule summary table

OptRule	mean	sd	maximal surplus
I	1.61	2.37	7.16
II	1.22	1.37	4.41
III	0.65	0.71	2.55
IV	1.12	1.28	1.37
V	1.47	2.35	0.53
Total	1.17	1.69	3.04

Looking at the average of surplus lost, a U-shape is clearly visible. If an extreme rule is optimal, the surplus lost is clearly larger than with the intermediate rules. Especially with rule III, the surplus loss is the smallest. However, as mentioned these numbers are not directly comparable in the sense that only the absolute values are shown. One aspect that plays a big role is the fact that for many inefficient rules, the generated surplus is negative. This is especially true for the case that rule V is optimal.

It appear that under the veil of ignorance, subjects are on average inclined to pick balanced voting rules even in unbalanced situations. The fact that many subjects never chose an extreme voting rule might indicate that many subjects are just drawn to the middle of their choice set. Together with the fact that rule III does not stick out, a possible explanation would be that subjects react to the optimal rule, but often stay away from extreme rules.

4.4 Voting behavior

Although our main interest is in the choices of voting rules in the first stage of the procedure, we also looked at the voting choices in the second stage. Table 9 summarizes how consistent voting was with the realized values, by session and in aggregate (Consistent choice means voting for A if one's value is positive and voting for B if one's value is negative):

Table 9: Consistency in voting

Session	Consistent	If positive value	If negative value
1	56/75 (75%)	30/45 (67%)	26/30 (87%)
2	80/90 (89%)	45/51 (88%)	35/39 (90%)
3	81/90 (90%)	37/43 (86%)	44/47 (94%)
4	83/90 (92%)	43/47 (91%)	40/43 (93%)
5	32/45 (71%)	20/32 (63%)	12/13 (92%)
Total	332/390 (85%)	175/218 (80%)	157/172 (91%)

Voting in Session 1 was less consistent that in Sessions 2, 3, 4 but not that different from Session 5. Voting was more consistent when values were negative which may be just by chance because the randomly selected distributions to be voted on in the second part more often had small positive and large negative values than the other way round (the average of realized positive values was 2.07 and the average of realized negative values was -2.65). The "inconsistency" in voting may thus reflect a concern for efficiency (especially relevant if the voting rule used is not the optimal one) or may be because of not wanting to enforce a loss on others (concern for equity).

To check the efficiency concern, we calculated the realized average payoffs (net of 15 Euros) in each session (Actual), as well as what payoffs would have been if all votes were consistent with values (but the voting rule is the one actually used, not necessarily optimal) (Sincere) and if in addition to consistent voting the rule were optimal (Optimal)

Table 10: Voting and realized net actual payoff

Session	Actual	Sincere	Optimal
1	0.367	0.433	0.607
2	0.533	0.583	0.672
3	0.156	0.072	0.283
4	-0.044	-0.033	0.361
5	0.144	0.322	0.578
Total	0.236	0.264	0.487

As can be seen from Table 10, voting "insincerely" did not improve the average payoff (except in Session 3). "Insincere" voting did not make the average payoff much worse though. The main source of inefficiency appears to be the choice of voting rules: the payoff with the optimal rule (and consistent voting) would have been about twice as much as the actual payoff (or as the payoff if voting were sincere with actual rules used). Note also that from the analysis of rule choices, Sessions 4 and 3 are the ones where the correlation between actually chosen rule and the optimal rule is the weakest, and those sessions appear to lose most from not using the optimal rule.

Result 3: Voting Voting is mostly consistent with values; where it was inconsistent, it did not noticeably changed the obtained payoff. Not choosing the optimal rule appears to be the main source of lower average payoff.

5 Conclusion

Many collective decisions are governed by institutions that rely on voting procedures to aggregate stakeholders' preferences. Often, the very same institution, including as diverse institutions as faculty boards or the US Senate, relies on several different voting procedures to decide on different kinds of issues. While, in some cases, voting outcomes are determined by a simple majority of participants, other decisions require support of a supermajority or even unanimous support. Clubs frequently decide on time and place of their next assembly by simple majority, whereas the decision to accept a new club member often requires more widespread support (see Grüner and Tröger, 2017 for a list of examples).

We analyzed the behavior of experimental subjects in a situation where they can decide on voting rules under "the veil of ignorance" – i.e. before knowing their own valuations for possible alternatives, even though they know the distribution of possible valuations (and they know that they may be actually playing this situation out, voting on the alternatives in the second stage of the experiment). For distributions skewed towards (possibly unlikely) high positive values, or towards very low negative values, a voting rule that is optimal in such a situation involves clear departures from the simple majority rule.

We find that subjects on average adjust the voting rule to the distribution. However, they fail to adjust the rules strongly enough, missing, in expected terms, quite a substantial proportion of available surplus. Thus, minorities with strong preferences are systematically under-protected against decisions made by a majority of voters in our experiment. There are several possible reasons why this may be the case. One reason could be that simple majority rule is frequently associated with the mere concept of democracy (i.e. the majority decides). Nevertheless, we do not see a clear preference for the simple majority rule. Another possible reason is that it is difficult to calculate which of the rules different from simple majority rule is optimal for a given distribution. Subjects thus may decide to avoid the extreme rules (such as rules I and V in our setting).

Our experiments suggest a way to explore designing voting rules and constitutions more generally. While it may be the case that rules can be designed to protect minorities, it remains challenging for decision-makers to determine how much protection there should be even in situations where uncertainty is relatively transparent and quantifiable. It is even more difficult to determine the necessary protection and thus optimal voting rules in the real world, but the analysis in this paper sheds a light on how such decisions can possibly be improved.

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APPENDIX - INSTRUCTIONS

You are now taking part in an experiment. The amount of money you earn depends on your choices and the choices of the other participants. It is therefore important that you understand the instructions. Please do not communicate with the other participants during the experiment. If you have any questions, please raise your hand and we will come to your seat.

All the information you provide will be treated anonymously. The experiment is run through a computer program, which determines the resolution of all random events during the experiment.

You will begin the experiment with a starting budget of *15€*. This amount can be increased or decreased depending on all participants' choices in the experiment, as explained below. Your final earnings, however, cannot be negative, that is, there is no risk that you will have to pay us. For each participant, the minimum possible earnings of the entire experiment are *3€* and the maximum possible earnings of the entire experiment are *27€*. The earnings of all participants will be paid out privately in cash after the experiment.

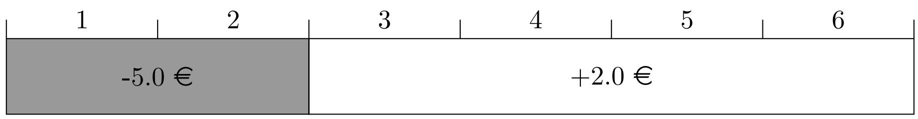
Thank you for participating.

THE EXPERIMENT

The experiment consists of two parts, each of which consists of a number of rounds.

In each round you will be asked to consider a problem of making a choice between two alternatives, called A and B, by a group consisting of 5 members, you and four other participants. Your payoff will depend on which alternative is ultimately chosen. If alternative B is chosen, your (and the other group members') payoff is 0. If alternative A is chosen, the payoff of each group member (including you) depends on a randomly assigned valuation, which can be positive or negative. Each group member has the same possible valuations for alternative A and the same corresponding probabilities. The description of the problem in each round will consist of a list of the possible valuations and the probabilities of their realization as illustrated in the example below.

Example: *For the current round, the valuation for alternative A of each group member can be either −5€ with probability 1/3 or +2€ with probability 2/3. The valuation will be randomly assigned to each participant by the computer using the given distribution. In this example this is equivalent to each participant rolling a 6-sided dice. If the outcome is a 1 or 2 the valuation for alternative A of the participant is −5€. If the dice outcome is a 3, 4, 5 or 6, the valuation for alternative A of the participant is +2€.*



PART I: RULE CHOICE ROUNDS

Part I of the experiment consists of 21 rounds. In each round, a different collective decision problem like the one above will be presented to all participants. You (and each of the other participants) will be asked to choose one of five group decision rules for this problem, listed below. The rules determine how the group decision about alternative A or B is derived from the individual votes of all group members. The actual voting, according to one of these rules, selected as explained below, will take place in Part II of the experiment if this round is selected for it.

AVAILABLE GROUP DECISION RULES

Five group decision rules are available. All five rules are voting rules where voters have to vote for A or B. Hence, no-one can abstain from voting, so, for example, only two votes for A automatically means that there are three votes for B.

Rule I. At least 1 vote for alternative A is required for A to be chosen, thus 5 votes for alternative B are required for B to be chosen (unanimity for B).

Rule II. At least 2 votes for alternative A are required for A to be chosen, thus at least 4 votes for alternative B are required for B to be chosen (qualified majority for B).

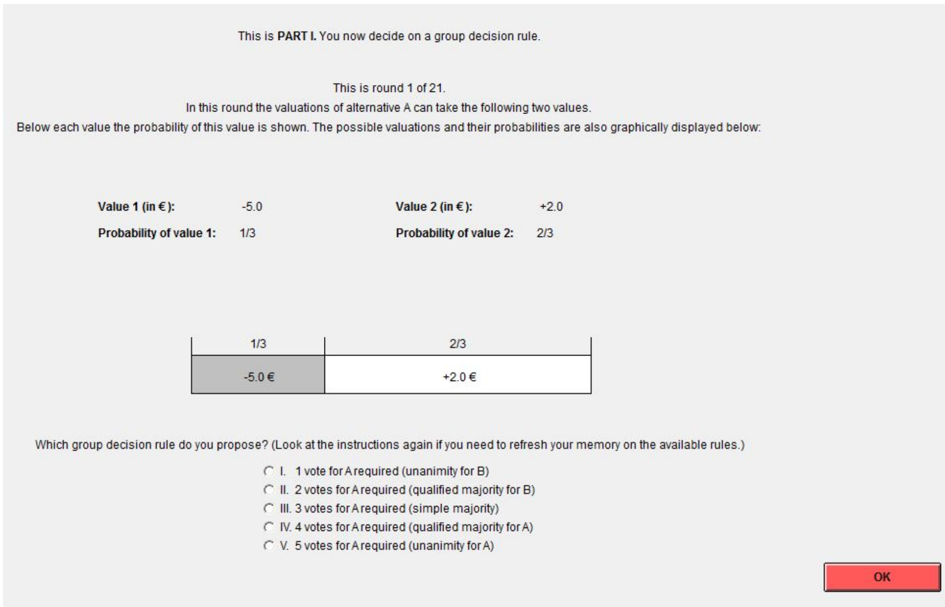
Rule III. At least 3 votes are required for either A or B to be chosen (simple majority), that is, whichever has more votes wins.

Rule IV. At least 4 votes for alternative A are required for A to be chosen (qualified majority for A), hence at least 2 votes for alternative B are required for B to be chosen.

Rule V. 5 votes for alternative A are required for A to be chosen (unanimity for A), thus at least 1 vote for alternative B is required for B to be chosen.

Note that at the stage when you propose a voting rule you know neither your own valuation for alternative A (which can be positive or negative), nor the valuations of the other participants. You know only the possible valuations for alternative A and their probabilities, as in the example above. The decision screen for Part I looks like this, using the valuations and probabilities from the example above.

Your choice in each of the rounds may be selected as one of the rules that will be used to determine the actual voting outcomes in Part II, as explained below. After all participants have made their choices for the 21 decision problems, Part II begins.



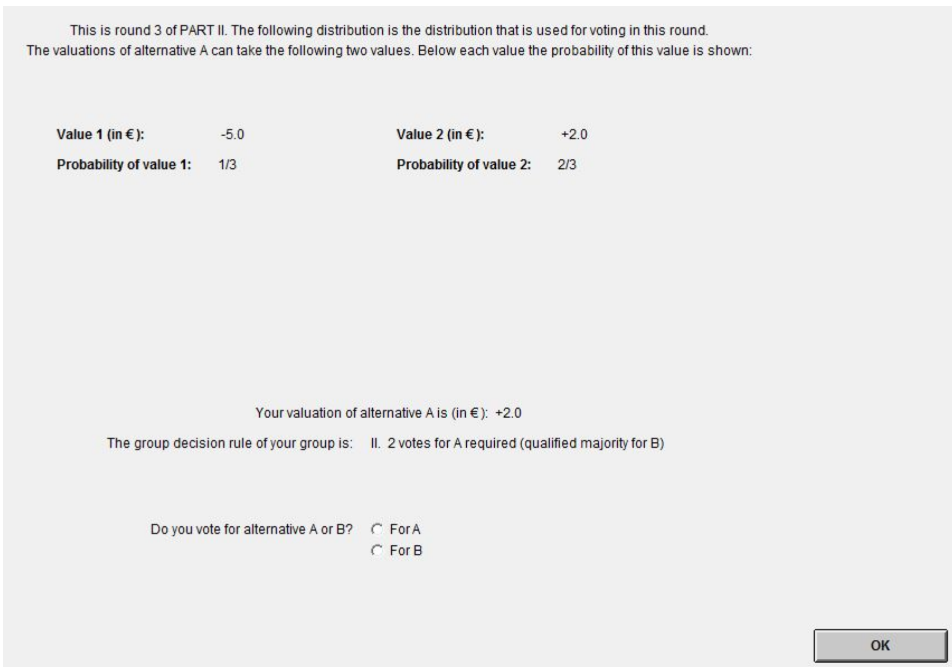
PART II: VOTING ROUNDS

In Part II, each player will participate in three different collective decisions. All three decision problems will be selected randomly from the 21 problems of Part I, with each problem being equally likely to be selected. In each round, groups of 5 participants will be randomly formed. Note that group members cannot recognize each other, so even if you should encounter the same participant in different rounds, you will not be able to identify her or him.

After the groups are formed, the group decision rule is determined as the choice in Part I for this round of one of the five group members, selected randomly with equal probability for each group member. The selected group decision rule is announced to all members of the group. In addition, each group member is privately informed about his or her valuation for alternative A. No participant can see another participant's valuation for A at this stage or at any later point of time. The random draws of the valuations for the group members are independent of each other; thus, learning your own valuation does not change the possible valuations and their probabilities for each of the other members of your group.

Example: *The round in which the valuation for alternative A of each group member is* -5€ *with probability 1/3 and* $+2$€ *with probability 2/3 is selected for Part II. The selected voting rule is Rule II (At least 2 votes are required for alternative A to be chosen, hence at least 4 votes for alternative B are required for it to be chosen). You are further informed that your valuation for alternative A is* $+2$€*; from your point of view, the valuation for* *alternative A of each of the other group members is still -5€ with probability 1/3 and +2€ with probability 2/3.*

After being informed about the selected rule and your valuation, you and the other group members vote for alternative A or B. The decision screen for Part II looks like this.



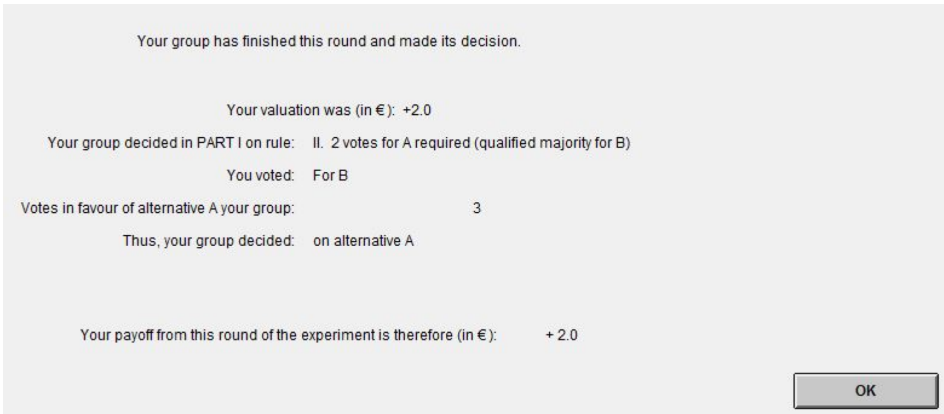
After all group members made their choice, the group decision automatically results from the individual votes according to the selected group decision rule. The decision is announced and you get the payoff equal to your valuation of the chosen alternative.

Example: *Suppose that the voting rule is Rule II and that your valuation for alternative A is +2€. Suppose further that there are 3 votes for alternative A and 2 votes for alternative B. According to Rule II, alternative A is chosen. Your payoff for this round is your valuation for alternative A, that is, +2€.*

At the end of each round of Part II, you will be informed about the outcome of the round. The screen looks like this.

PAYOFFS

Your payment from the experiment is the sum of payoffs you get in the three rounds of Part II, plus the starting budget of *15€*. Recall that your payoff in a round is your valuation of the alternative chosen by your group in that round. Recall that the valuation of alternative



B is 0 for all participants, while your (and the other participants') valuation for alternative A is determined anew in each round and can be positive or negative.

Payment rule example: *Assume that your valuation for alternative A in round 1 of Part II was +5€, in round 2 it was −3€, and in round 3 it was +1€. If your group voted for alternative A in each round, then your payoff from the three rounds would be 3€ (=+5€+(−3€)+1€) and your final earnings would be 18€ (=15€+3€). If your group chose alternative B in all three rounds, you would have final earnings 15€, equal to the starting budget. If your group chose alternative A in the second round and alternative B in the other two rounds, then your payoff from the three rounds would be −3€ (=0€+(−3€)+0€) and your final earnings would be 12€ (=15€+(−3€)).*

OVERVIEW OF THE EXPERIMENT

Here is the structure of the experiment again in a short overview:

- There are 2 parts;
- Part I consists of 21 rounds. In each round:
  - Possible valuations for alternative A and their probabilities are announced;
  - Each participant selects one of the five group decision rules.
- Part II consists of 3 rounds. In each round:
  - One round from Part I is randomly chosen and the corresponding possible valuations for alternative A and their probabilities are announced;
  - Groups of 5 participants are randomly formed;

  - The group decision rule chosen in Part I by one randomly chosen participant in the group of 5 is selected and announced to all group members;
  - Each group member privately learns his or her valuation for alternative A;
  - Each group member votes for alternative A or B;
  - The group decision is taken based on the selected group decision rule and the votes;
  - All group members are informed about the outcome of the vote and their payoff.

- The sum of payoffs from the 3 rounds of Part II, added to the starting budget, is paid out privately.