Flip a coin or vote: Choosing Group Decision Rules *

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Abstract

Before a group can take a decision, its members must agree on a mechanism to aggregate individual preferences. In this paper we present the results of an experiment on the influence of private payoff information and the role of the available alternatives on individuals' mechanism choices in such group choice situations. While efficient mechanisms are desirable, our experiment shows that participation constraints can prevent their implementation. In the context of social choice mechanisms for the provision of an indivisible public good, we find strong indications that individual preferences for choice rules are sensitive to individual expected payoffs. Our results highlight the importance of considering participation constraints when designing choice institutions.

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1 Introduction

Before a group or society can take a decision, whether it is about what restaurant to visit or the implementation of social security reform, the group has to select a decision rule to aggregate individual preferences. To maximize the expected value of the final decision to the group, its members should agree on a mechanism that maps the vector of individual preferences into an efficient decision. However, in a seminal paper Myerson and Satterthwaite (1983) show that if individuals are privately informed about their preferences over outcomes, there is no efficient decision rule that is unanimously preferred over the non-implementation status quo. If a participant can force non-implementation by not participating, she[1] should not participate whenever the (proposed) decision rule can lead to outcomes she likes less than the status quo. Together, the existence of an outside option (the non-implementation status quo) and private information on preferences, imply that some individuals are better off not participating in the efficient mechanism at all. In this paper we address the problem of (efficient) mechanism selection in a group decision experiment. We study subjects' binary choices between four decision rules and investigate the role of different outside options and private information on subjects' preferences over mechanisms.

In a collective decision about the implementation of an indivisible public project, an optimal mechanism results in implementation if and only if the sum of individual valuations is larger than zero. While such mechanisms exist and groups can replace any existing mechanism by a more efficient one in theory, other mechanisms are often selected in practice. Several reasons for the choice of inefficient mechanisms have been discussed in the (theoretical) literature. The Myerson-Satterthwaite theorem (Myerson and Satterthwaite, 1983) illustrates that private information should determine individual preferences over trade mechanisms. This result has been extended to public good settings like our experiment. Individuals that dislike the public project can often reduce the probability of implementation more in an inefficient mechanism than in the efficient mechanism, and therefore are worse off under the efficient mechanism, e.g. Güth and Hellwig (1986) and Mas-Colell et al. (1995, ch. 23) (particularly section 23.E). Furthermore, comparing the contributions of Myerson and Satterthwaite (1983), Schmitz (2002), Segal and Whinston (2011), and Grüner and Koriyama (2012) shows that private information and outside options are key factors that determine whether an efficient mechanism can be implemented voluntarily. If individuals are aware that they can better serve their interest in an inefficient than in the

[1] For better readability only female pronouns are used.

efficient mechanism, they have no reason to select the efficient mechanism.

In this paper we study the influence of both of these aspects on individuals' mechanism choices. We conduct an experiment with a two-stage voting procedure in a collective decision making setting. In the first stage, subjects individually select their preferred decision rule from two available mechanisms (mechanism choice). In the second stage, each three-person group applies the chosen mechanism to determine the group decision on the provision of an indivisible public good (implementation decision). By varying the distribution of private valuations for the public good between treatments and the available mechanisms between rounds, we investigate the role of the outside option on the mechanism choice. Furthermore, we vary the moment at which private information about individual project payoffs is revealed within treatment. This enables us to show how preferences change when private information is received by our subjects. Understanding how the revelation of private information alters choices can help us to shed light on problems that occur in many choice institutions. Since in many real-life situations decision rules can be altered in the interim stage where individuals have private information, we consider this aspect particularly important.

In our experiment the mechanism selection is done via a random dictator procedure. We ask subjects to declare their preferred mechanism out of 2 options. After each subject has selected her preferred mechanism, one group member is randomly chosen and her preferred mechanism is implemented as the group decision rule. While this random dictator rule is neither an optimal nor a realistic procedure, it cleanly elicits the preferences over two mechanisms. Since rational agents only participate in a mechanism if and only if they prefer it over all available alternatives, this choice between 2 mechanisms directly maps to a participation choice between two mechanisms. The random dictator rule ensures incentive compatibility and allows us to present the mechanism choices in a randomized order to minimize presentation or order effects. The four group decision rules we use in our experiment are: the Simple Majority (SM) mechanism, a first-best optimal direct revelation game known as the Arrow, d'Aspremont and Gérard-Varet (AGV) mechanism,[2] the Non-implementation Status Quo (NSQ) and the flip of a fair coin, or Random implementation (RAND). Since this two-stage voting procedure is a game of imperfect information, there are several measures of efficiency that could be relevant. We measure efficiency through realized values, and thus efficiency in this paper refers to ex-post classical effi-

[2]This mechanism is also known as the expected externality mechanism. It was originally proposed in Arrow (1979) and d'Aspremont and Gérard-Varet (1979).

ciency.

With the chosen design we can compare mechanism choices in ex ante and an ad-interim stages. Ex ante, an uninformed individual should prefer the more efficient mechanism. Ad interim, if she knows she has a negative payoff from project implementation, the same individual should prevent the use of any mechanism that allows for project implementation, and thus prefer NSQ over all other mechanisms. Since the NSQ mechanism has the same utility consequences as non-participation in the original Myerson-Satterthwaite setting, the choice for this mechanism perfectly overlaps with violations of the participation constraint in their setting. A choice for the NSQ mechanism shows that the participation constraint of the individual is not met by the alternative mechanism. By changing the two available mechanisms between rounds, we can test the predictions of Schmitz (2002), Segal and Whinston (2011), and Grüner and Koriyama (2012) that participation constraints are less binding if the outside option includes risky outcomes. The variation of the potential valuations for the public good over treatments allows us to demonstrate that the observed change in preferences is driven by changes in expected payments, and not preferences for particular mechanisms per se.

Our results demonstrate that without private payoff information individuals select efficient mechanisms. Subjects choose the more efficient mechanism because it yields the largest expected payoff ex ante. Ad interim, when they are informed about their valuation for the project, subjects only prefer the (more) efficient mechanisms if they have a positive private valuation. With a negative valuation subjects opt for the non-implementation status quo whenever possible, exactly as predicted by theory. Interestingly, we find indications that the differences in expected payoffs from the mechanisms *as they are played in the lab*, strongly influence the mechanism choices made.

These results illustrate the importance of thinking about the decision rule to use in a group, or committee, before this group faces any actual decisions. Deciding upon a decision rule after an issue comes up is very inefficient. This effect can, for instance, be observed in hiring committees at universities and research institutes. Committees that fail to agree upon a decision rule before meeting the candidates, will likely have different subgroups within the committee that favor different candidates. In the ensuing discussion, the subgroups can propose criteria that favor their preferred candidate. With different preferred candidates this will lead to a discussion about what set of criteria to use, and a costly delay of the decision or even a failure to hire a suitable candidate is likely.

The NSQ mechanism provides subjects the possibility of not participating in the decision and blocking all change. Our results show that with a safe, non-implementation status quo, even three-person groups are severely hindered in their ability to implement an efficient mechanism. Public projects and reforms usually require all involved individuals to cooperate, pay part of the price (through taxes for instance), permit use of their resources or even the reorganization (or removal) of their property rights. In a completely voluntary setting, the type of inertia caused by our non-implementation status quo would make public projects virtually impossible to negotiate.

Other findings suggest that it can be feasible to implement an efficient mechanism ad interim as long as the outside option yields uncertain results. With a risky outside option, individuals who know they do not want to implement the public project have no guaranteed way of blocking the implementation. In the absence of a secure non-implementation option, these subjects might prefer the (more) efficient mechanism because it allows them to influence outcomes. Since both subjects with positive and subjects with negative valuations of the public project prefer to have influence over the outcome, agreements on efficient mechanisms are possible.

In many group decisions the mechanism choice takes place when agents are already informed about their preferences over outcomes and the outside option is fixed by the existing situation. If the group decision does not involve an efficient mechanism, the group might need coercive power to force individual members to participate. As a consequence, our results provide a rationale for the role of coercive power in group decisions. By forcing group members to participate in individual projects, the group surplus can be increased as the individual projects no longer need to satisfy the participation constraints of all individuals involved. Furthermore, our results also provide evidence that specifying decision procedures in constituting documents is a good idea. By setting a standard procedure and demanding that these procedures can only be changed through a considerably more demanding procedure, the drafters of the constitution ensure that the mechanisms are de facto established in an ex-ante stage.

The rest of the paper is organized as follows: Section 2 summarizes the previous research on group mechanism choices and participation constraints. Section 3 outlines the experimental design and the three treatments. Section 4 states the theoretical predictions, while Section 5 discusses how these predictions are borne out by the data and discusses further findings. Finally, Section 6 concludes.

2 Related literature

Our experiment is closely related to the social choice literature and the choice of voting rules or constitutions. This, mostly theoretical, literature is riddled with impossibility theorems. These theoretical results show it is not possible to design a social choice rule, or an implementing mechanism, that combines some set of desirable properties in every imaginable circumstance. Most famously, Arrow (1950) shows that non-dictatorship, Pareto efficiency and independence of irrelevant alternatives cannot be obtained by any social choice function for all potential preference profiles. In similar vein, Myerson and Satterthwaite (1983) show that even in a setting with only two players and independent valuations, an efficient, interim incentive compatible and budget neutral mechanism for trade does not exists as long as players can guarantee themselves a sufficiently large payoff when not trading.[3] The result that individual rationality, incentive compatibility and budget balance are incompatible for a N-player public good setting, of which our experiment is a special case, was proven by Mailath and Postlewaite (1990). Similar results are obtained by Güth and Hellwig (1986) and Güth and Hellwig (1987) for the private supply of a public good. In all these settings, when the mechanism choice is made through a veto rule (i.e. voluntary participation by all players), efficient production cannot be reached unless a subsidy is provided. These impossibility results illustrate how a non-implementation status quo can stifle any chance of (efficient) mechanism change. As all of these results hinge on the interim participation constraints, and the Myerson-Satterthwaite theorem is the most famous of these results, we will refer to this type of result as the Myerson-Satterthwaite theorem.

Several papers have derived possibility results that illustrate how the impossibility results depend on the status quo that occurs if the efficient mechanism is rejected. Cramton et al. (1987) show that a status quo that specifies a more or less equal distribution of the good (ownership rights in their setting) makes it possible to design an auction-like procedure that is both ad interim incentive compatible and ex-post efficient, without requiring subsidies. Schmitz (2002) shows that decisions on public good provisions can be made through an efficiently designed mechanism for some particular status quo settings. In many cases a status quo, either an interim allocation or a probability of implementation between 0 and 1, can be found that allows an efficient implementation and does not violate individual rationality at the interim stage. In case the valuation

[3] An older, less general result can be found in Chatterjee (1982), while a more general statement can be found in a.o. Segal and Whinston (2016). The interpretation in this paper is mostly due to Cramton et al. (1987).

of the public good is identically and independently distributed, such a status quo can always be found. This result implies a status quo exists that will incentivize individuals to accept an efficient mechanism ad interim, both for the bargaining game of Myerson and Satterthwaite (1983) and for the provision of a public good. Segal and Whinston (2011) make a similar point by demonstrating how background risk, or a status quo that is not quite as secure as the no-trade outcome, can increase the willingness of individuals to accept mechanism changes. Most importantly for our paper, their proposition 1 states that individuals are willing to accept a more efficient mechanism if it has the same equilibrium distribution over allocations as the status quo, or default mechanism. Grüner and Koriyama (2012) illustrate that it is even possible for groups to shift from a (simple) majority voting system to the AGV mechanism without violating interim participation constraints. This result is quite remarkable, since majority systems are much more efficient than a fixed or random status quo. The efficiency gains of moving to the AGV are therefore limited. However, for some settings and distributions of valuations the efficiency gains are large enough to compensate individuals for the potential loss in information rents.

Two closely related experimental papers study the effect of social preferences on mechanism choice. Bierbrauer et al. (forthcomming) identify the theoretically optimal mechanism assuming players have other-regarding preferences. Their experiment shows that choices for a small, but significant number of subjects are better explained by including other-regarding preferences. They also illustrate that if enough of such subjects are present, the optimal mechanism with strictly self-interested rational players is no longer optimal to a social planner. The article most closely related to ours is Engelmann and Grüner (2013). In their experiments, groups of five subjects select their preferred mechanism out of 5 potential voting mechanisms. The voting mechanisms differ in the amount of positive votes required for implementation of a common project. Individuals differ in their utility from project implementation (utility is equal to zero if it is not implemented). A completely self-interested and rational subject should always opt for the voting rule that requires only one (all five) vote(s) for implementation, if she has a positive (negative) valuation of implementation, while voting positively (negatively) in the implementation decision. However, the authors find that subjects often choose mechanisms that require two, three or four positive votes for implementation. These deviations could be explained by efficiency or pro-social concerns in the mechanism choice stage. The authors note that this implies efficiency gains in decision making could be obtained by letting groups vote on voting rules, before they vote on issues. If individuals indeed decide upon mechanisms with more efficiency/equality related criteria then they use for implementation decisions, participation constraints are less binding.

3 Experimental design

We first describe the game subjects played and the mechanisms used. We then describe the treatments and the procedures of the experiment. Treatments differ only in the set of potential private valuations for the public project. The underlying procedures, game and all other details of the experiment, e.g. number of rounds, group size, available mechanisms, are identical across all treatments.

3.1 The game

Subjects interact in groups of three and each group faces the question whether or not to implement an indivisible public project. Non-implementation results in a zero payoff for all subjects. If the project is implemented each player receives a project payoff equal to her valuation. The private valuations are drawn independently from a known uniform distribution on a given set of four values that depend on the treatment. The distribution and its support are common knowledge and remain the same within a session.

Each of the 18 experimental rounds consists of two stages. First, subjects select a mechanism to make the group decision. Second, the group decides about the implementation of the public project through the chosen mechanism. In all treatments the same four mechanisms are used and in each round subjects choose between two of them. The mechanisms we consider are:

Mechanism I AGV mechanism (AGV)

All group members report a valuation for the implementation of the project. They can only report valuations that are present in the type space. If the sum of reported valuations is larger than zero the project is implemented. If the sum is smaller than zero the project is not implemented. Independent of project implementation, subjects pay or receive a transfer that depends on the vector of reported valuations.

Mechanism II Voting - Simple Majority (SM)

All group members vote for or against the project (no abstention). If two or more group members vote for implementation the project is implemented, otherwise the project is not implemented.

Mechanism III Non-implementation Status Quo (NSQ)

The public project is not implemented.

Mechanism IV Random implementation (RAND)

Whether the public project is implemented depends on the flip of a fair coin. If the result of the coin toss is heads, the project is implemented otherwise the project is not implemented. Therefore this mechanism has a 50% probability of implementation independent of subjects' valuations.

At the beginning of a round subjects are informed about the two available mechanisms. They cannot influence which mechanisms are available in a round, and the order of the comparisons is randomly altered between sessions. Each subject privately selects one of the two mechanisms. After mechanism choices have been recorded, the computer randomly picks one group member as the dictator and the mechanism chosen by this random dictator is executed. All group members are informed of the selected mechanism, but they do not learn whose choice was selected or what mechanism the other two subjects selected.

If the AGV or SM mechanism is selected, all group members state a valuation for the project (AGV) or vote on the implementation of the project (SM). If the NSQ or RAND mechanism is selected no further action by the subjects is required. The computer determines whether the project is implemented through the selected mechanism and payoffs are realized accordingly. The project payoff is equal to the private valuations if the project is implemented, otherwise the project payoffs are 0. In the AGV subjects additionally pay or receive transfers that depend on the reported valuations but not on project implementation.

This random dictator elicitation for the mechanism choice clearly differs from the theoretical, mechanism-design setting that we are aiming to capture in this experiment in two important ways. First, we force subjects to choose between two given mechanisms, rather than from the universe of potential mechanisms. Providing subjects with a binary choice set has the methodological advantage that it identifies subjects' outside option and allows us to manipulate the outside option by changing the second mechanism. The drawback, a reduced choice set for participants, is unavoidable in any realistic empirical setting. Even by only considering direct revelation games, such that any mechanisms can be chosen that maps from the reports to the implementation decision and payments, subjects would have to choose from an infinite and multi-dimensional set of options. This is too demanding both on the experimental set-up and the subjects. Furthermore, we would immediately lose the ability to identify the best outside option, and thus have to make extra assumptions to identify the crucial comparisons. Secondly, we follow the standard experimental methodology of randomizing the order of presentation in the mechanism choices, rather than labeling one mechanism as the status quo or default. While the randomization is theoretically innocuous, since rational individuals should always compare all options in the same manner regardless of their labels, the randomization prevents response biases and noise and thus allows a cleaner identification of preferences.

The experiment proceeds in two parts. In the first part, the first twelve rounds, subjects learn their private valuation for the public project ad interim that is, after choosing their preferred mechanism but before the mechanism is played. In part two, the last six rounds, subjects are informed about their private valuation for the project at the start of each round and therefore are aware of their valuation when choosing a mechanism. Subjects are never informed about valuations of other subjects. Our subjects face all six possible binary mechanism choices twice in the ex-ante condition (rounds 1-12), before going to the ad-interim rounds (rounds 13-18).

By design, the choices in the ex-ante rounds are not influenced by previous experiences in the ad-interim rounds. Since we consider the expected value calculations to be more demanding in the ex-ante rounds than in the ad-interim rounds, we chose to begin with the design that delivers the cleanest decisions in the ex-ante rounds. Because we did not observe any signs of consistency concerns or order effects in the choices made by our subjects, we did not conduct sessions with a reversed order.

The design is in many respects similar to the two-stage voting procedure studied by Engelmann and Grüner (2013), but there are three important differences. First, in our study subjects choose between two mechanisms rather than five. This clearly identifies the outside option. Second, we have four very different mechanisms, rather than five mechanisms from the class of simple voting rules. This allows us to make the same comparisons studied in the theoretical papers cited above. We describe the theoretical properties of the mechanisms used and the reasons for selecting these mechanism in the next subsection. Third, Engelmann and Grüner (2013) did not look at the effects of private information on the behavior of subjects, while this is an important aspect of our set-up.

3.2 The four mechanisms

The four mechanisms are chosen because of their theoretical implications and relevance for group decision making. The AGV mechanism, or expected externality mechanism, is the theoretically optimal mechanism for decisions about indivisible public projects, like reforms. It is incentive compatible, ex-post budget balanced and induces efficient implementation. It was first suggested by Arrow (1979) and d'Aspremont and Gérard-Varet (1979) who also give a formal proof of its properties. The AGV is a direct revelation game in which all individuals send a message from the type space (they can behave like other types but not invent new types). The expected surplus generated by the project is calculated based on the reports and the project is implemented if and only if the reported surplus is positive. If individuals report truthfully, this leads to efficient project implementation.

To ensure truthful reports, the mechanism calls for transfers equal to the expected externality an individual generates for the others with her reported valuation.[4] This forces individuals to take the expected surplus generated for the other players into account, and makes all individuals residual claimants of a value equal to their expected societal surplus (their own surplus, plus the expected surplus generated for others). Consequently, they should send the message resulting in the highest expected social surplus. Since the mechanism leads to efficient implementation decisions if all subjects report truthfully, this induces truthful reporting of all types. Because it combines incentive compatibility with efficiency and budget balance, the AGV provides the theoretical benchmark to compare other mechanisms to. If it is impossible to switch from a given mechanism to the most efficient mechanism, the AGV, a switch to any other (less efficient) mechanism is unlikely.

The NSQ mechanism resembles the opportunity for individuals not to take part in a decision process and thereby preventing a group decision. It therefore mimics the participation constraint of Myerson and Satterthwaite (1983) in our experiment. The RAND mechanism introduces an uncertain status quo and is chosen to reproduce the comparisons studied in Schmitz (2002) and Segal and Whinston (2011). The SM mechanism is chosen for two reasons. First, it is a common mechanism used in committee and small group decision making and therefore provides a natural benchmark for the empirical performance of the AGV. Second, the comparison between AGV and SM is the focus of the possibility theorem in Grüner and Koriyama (2012), such that we can use it to reproduce the theoretical situation of that paper.

[4]The translated instructions for the symmetric treatment in A.3 include a table of all possible transfers.

3.3 Treatments

In all treatments a uniform distribution over a type space with four possible valuations (in €) for the public project is used. We have one treatment with a symmetric and two treatments with skewed distributions. The two skewed treatments differ from the symmetric treatment in the valuation of a single type. The type spaces and distributions used are shown in Table 1 below.

Table 1: Distribution of valuations for public project by treatment

Treatment	Valuations (€)			
symmetric	-3	-1	1	3
right skewed (+7)	-3	-1	1	7
left skewed (-7)	-7	-1	1	3
probability	25%	25%	25%	25%

Notes: Probabilities are the same in all treatments.

Subjects draw a new private valuation for the project in each round and only participate in one treatment. The distribution of private valuations determines the expected payoff for the four mechanisms. In Section 4 we provide the expected payoffs for all mechanisms in all three treatments as well as the theoretical predictions we test.

3.4 Procedures

The computerized experiments (zTree, Fischbacher 2007) were conducted in the mLab of the University of Mannheim. Subjects were mostly undergraduate students from the University of Mannheim (recruitment through ORSEE, Greiner 2015). Each session consisted of 18 rounds with random rematching among subjects. In sessions with 18 or more participants there were two independent matching groups and subjects were only matched within these groups, such that in these sessions we have two independent matching groups. All interactions were anonymous and subjects did not know who they were matched with in any round. To prevent income effects only one randomly selected round was paid in addition to a show up fee of 9€. Each round was equally likely to be chosen for payment and the selected round was identical for all subjects within a session. We conducted 9 sessions with 6 to 24 subjects, resulting in 150 participants in 15 matching groups (45 subjects and 4 matching groups in the symmetric, 42 subjects and 4 matching groups in the right skewed, 45 and 5 matching groups in the left-skewed treatment and 18 subjects in 2 matching groups in a robustness check session we describe in Section 5.4.1). 85 (57%) Subjects were male and the average age of participants was 23 years.[5]

The 18 rounds were split into three six-round blocks: two blocks of ex-ante rounds, rounds 1-12, followed by one block of ad-interim rounds, rounds 13-18. Upon arrival in the lab the game played in the first 12 rounds was explained to the subjects. Subjects were aware of the existence of rounds 13-18 at the beginning of the experiment, but were only informed about the difference - the revelation of private valuations before the mechanism choice in the ad-interim rounds - after round 12. Subjects made each of the six possible binary mechanism choices once in each block, yielding three choices for each comparison. The order of the pairwise comparisons was randomized within each block and between sessions. Additionally for each binary choice the order of the two mechanisms on the screens of the subjects was randomized between the three blocks. Initially we also planned to run sessions with ad-interim rounds before the ex-ante rounds. However, since we found no indications of order effects in the mechanism choices, see Section 5.1, but did have extra questions regarding the reporting strategy in the AGV, we ran the extra session reported on in Section 5.4.1 instead. In the next section we state theoretical predictions for all treatments.

4 Theoretical predictions

To derive the theoretical predictions for our setting, we assume risk-neutrality and rational behavior in the second stage. All calculations required to derive our predictions can be found in the appendix.

In the ex-ante rounds a rational, risk-neutral agent should consider the Bayes-Nash equilibrium of each mechanism and select the mechanism with the highest expected payoff. The payoff-maximizing mechanism depends on the possible private valuations (and their probability distribution, which is common in all treatments) and therefore on the treatment. Table 2 below displays the preference ordering of mechanisms in the ex-ante rounds for each treatment.[6] Because the AGV is the only theoretically efficient mechanism, it yields the largest expected payoffin all treatments. In the symmetric treatment a risk-neutral subject should prefer the SM mechanism over NSQ and RAND. For the comparisons between mechanisms with the same expected payoff, e.g. NSQ and RAND

[5] The translated instructions for the symmetric treatment are in A.3. Screen shots from the original zTree program are in A.4

[6] The calculations for the AGV and for the SM mechanism assume truthful valuation reports (AGV) and sincere voting (SM), both in accordance with their respective Bayes-Nash equilibria.

in the symmetric treatment, no prediction can be made for risk-neutral agents. However, a small amount of risk aversion would imply a strict preference for NSQ.

Table 2: Predicted mechanism choices (ex ante)

Treatment	Ordering of mechanisms						
symmetric	AGV	≻	SM	≻	NSQ	∼	RAND
right skewed (+7)	AGV	≻	SM	≻	RAND	≻	NSQ
left skewed (-7)	AGV	≻	SM	≻	NSQ	≻	RAND

Notes: ≻ and ∼ indicate the preference ordering over the four mechanisms for a risk-neutral subject. The ordering of mechanisms corresponds to their expected payoffs in the respective treatments.

The relative advantage of the AGV over the SM, measured in the gain in expected payoff, is much larger in the two skewed treatments than in the symmetric treatment. In the symmetric treatment the AGV yields a 6% higher expected payoff than the next best mechanism (SM). This difference is 16% in the right-skewed treatment and it is 81% in the left-skewed treatment.[7]

By definition, ex ante all subjects are equal. Therefore it follows that the payoff-maximizing mechanism for each subject is also maximizing the expected group surplus. Without private information, payoff maximization should induce subjects to choose the most efficient mechanism, in which case the AGV and SM mechanisms should be preferred over NSQ and RAND. While the AGV should be preferred over SM if the Bayes-Nash equilibrium is played, if the equilibrium is not played the preferred mechanism can depend on the realized efficiency of the two mechanisms.

Prediction 1. *Without private information, all individuals prefer the AGV and the SM over the NSQ and the RAND mechanism.*

In the ad-interim rounds subjects should consider the expected value of each mechanism given their valuation. Therefore, an individual with a negative valuation of the public project should choose the mechanism with the lowest implementation probability (given the strategies played in the next stage). From this observation we can immediately conclude that the NSQ, with a zero probability of implementation, dominates all other options for individuals with a

[7] In the symmetric treatment the ex ante expected payoff from the AGV mechanism is 0.53125€, while the SM has an expected payoff of 0.5€, NSQ and RAND both yield an expected payoff of 0€. In the right-skewed treatment the expected payoffs are 1.452125€ for the AGV, 1.25€ for SM, 1€ for RAND and 0€ for the NSQ mechanism. In the left-skewed treatment the expected value for AGV and SM is still positive, 0.453125€ (AGV) and 0.25€ (SM), while the expected payoff for the NSQ mechanism remains at 0€ and actually is negative, -1€, for RAND.

negative project valuation.[8] This is essentially what application of the Myerson-Satterthwaite impossibility theorem entails in our setting: interim individual rationality makes all incentive compatible mechanisms less appealing than simply not participating.

Prediction 2. *With private information, individuals with a negative valuation prefer the NSQ over all other mechanisms.*

Table 3 shows the order of the expected payoffs in the ad-interim rounds per treatment and valuation, again assuming the Bayes-Nash equilibrium is played.

Table 3: Predicted mechanism choices (ad interim)

Treatment	Valuation	Ordering of mechanisms						
symmetric	3	AGV	≻	SM	≻	RAND	≻	NSQ
	1	AGV	∼	SM	≻	RAND	≻	NSQ
	−1	NSQ	≻	SM	∼	AGV	≻	RAND
	−3	NSQ	≻	AGV	≻	SM	≻	RAND
right skewed	7	AGV	≻	SM	≻	RAND	≻	NSQ
	1	AGV	≻	SM	≻	RAND	≻	NSQ
	−1	NSQ	≻	SM	≻	AGV	≻	RAND
	−3	NSQ	≻	SM	≻	AGV	≻	RAND
left skewed	3	SM	≻	AGV	≻	RAND	≻	NSQ
	1	SM	≻	AGV	≻	RAND	≻	NSQ
	−1	NSQ	≻	AGV	≻	SM	≻	RAND
	−7	NSQ	≻	AGV	≻	SM	≻	RAND

Notes: ≻ and ∼ indicate the preferences ordering of the four mechanisms for a risk-neutral subject. The ordering of mechanisms corresponds to their expected payoffs given the respective treatment and valuation.

Schmitz (2002) and Segal and Whinston (2011) show that by replacing the safe outside option with riskier ones, the impossibility problem of prediction 2 can be overcome. In our experiment this translates to the prediction that the AGV should be preferred over RAND, even with private information. Similarly, since with a three-person group and the chosen distributions the SM mechanism is much more efficient than the RAND mechanism, all subjects should choose the SM over the RAND mechanism.

Prediction 3. *With private information*

(i) all individuals prefer the AGV over the RAND mechanism and
(ii) all individuals prefer the SM over the RAND mechanism.

Grüner and Koriyama (2012) demonstrate that individuals can prefer the AGV over the SM, even with a negative valuation, as long as some conditions are met.

[8]The appendix shows that the expected transfers are never large enough to influence the preference for mechanisms in our setting, hence we ignore these here.

Mainly because we have odd numbered groups, these conditions do not always hold in our setting. However, their results translate to the following qualified prediction:

Prediction 4. *In the symmetric treatment:*

(i) subjects with a private valuation of -3 or +3 strictly prefer the AGV over the SM mechanism,
(ii) subjects with a private valuation of -1 or +1 are indifferent between the AGV and the SM.

In the skewed treatments:

(iii) subjects with a private valuation of -3 or -1 (right-skewed treatment) and 3 or 1 (left-skewed treatment), strictly prefer the SM over the AGV,
(iv) while all other subjects prefer the AGV over the SM mechanism.

Furthermore, the AGV transfers in the right-skewed treatment are usually paid by subjects reporting extremely high valuations. This "taxing the winner" property could be seen as fair by subjects, since an individual benefiting strongly from project implementation has to compensate other group members. In the left-skewed treatment this "tax" is levied from the loser(s). If such fairness concerns play a role in mechanism selection, the AGV should be more desirable in the right skewed than the left-skewed treatment. However, we do not believe that the mechanism choices in the ad-interim rounds will be affected, since the known private valuation for the project should make the own payoff consequences of the mechanism choice more focal and therefore fairness concerns might be less relevant.

Prediction 5. *The AGV mechanism is chosen more often*

(i) in the right-skewed treatment than in the left-skewed treatment
(ii) this preference is more pronounced in the ex-ante rounds then in the ad-interim rounds.

5 Results

We present the results starting from the ex-ante mechanism choices that are the focus of our paper. Next, we present our findings on the Myerson-Satterthwaite impossibility theorem and then discuss the ad-interim mechanism choices. We then discuss the realized efficiency of the AGV and SM mechanisms, before concluding with an analysis of subjects' behavior in stage two of the AGV (value reports) and the SM mechanism (voting) to show what drove the realized efficiency.

5.1 Ex-ante choices

In this section we analyze subjects' mechanism choices in the ex-ante rounds (rounds 1-6). We focus on the results of the first block to ensure independence of our observations. However, we did not find any relevant changes in behavior from block one to block two (rounds 7-12).[9] In the interest of space we concentrate on the results of the symmetric treatment, since most results are not qualitatively different among treatments, and only discuss comparisons between mechanisms in the skewed treatments that are particularly interesting.

The choices made in the six binary ex-ante comparisons in the symmetric treatment are shown in Figure 1. In five cases there is a clear majority for one mechanism: AGV and SM are clearly preferred to NSQ and RAND and SM is generally chosen over AGV.[10] There is no clear preference in the choice between NSQ and RAND. Subjects are almost evenly split between these mechanisms and a binomial test does not reject a 50:50 split (p-value 0.77). Given that both mechanisms have an identical expected payoff this indifference is not surprising. It seems to indicate risk neutrality of our subjects. Only in the choice between AGV and SM the majority of subjects does not prefer the mechanism with the larger expected payoff in theory. We will come back to this issue in Section 5.4.[11]

Table 4 below shows for all comparisons and treatments the mechanism selected by a majority of subjects in the first ex-ante block. The prediction that subjects select the most efficient mechanism corresponds to completely unanimous choices in every comparison. While this is not the case, in many comparisons one mechanism is preferred by a large majority. Although the predictions concentrate on individual choices, we present the modal choice in this table. Since we are dealing with binary choices and about 80% of the mechanism rankings obtained from individual binary comparisons within a block of 6 rounds sat-

[9] Table 9 in the appendices displays all choices.

[10] Binomial tests confirm a significant differences from a 50:50 split for these five comparisons (p-values < 0.05).

[11] Which of the two mechanisms is listed first seems to be without effect. We vary the order of comparisons between sessions, but there are no signs of order effects in any direction. Using two-sided Fisher's Exact tests yields no significant difference of the individual mechanism choices dependent on the mechanism listed first (all p-values above 0.3 for the symmetric treatment).

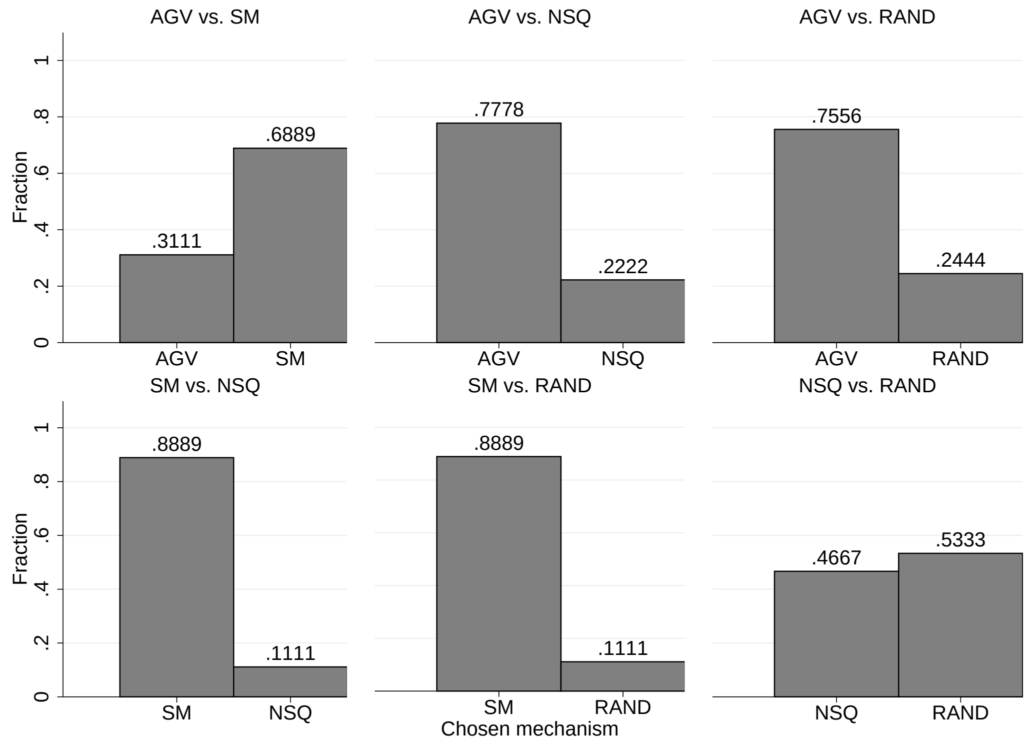


Figure 1: Ex-ante binary choices (symmetric treatment)

isfy strict transitivity, this aggregation is consistent with the preferences of our ‘average’ or median subject.

The modal stated preference goes in the predicted direction for all, but three comparisons. In the symmetric and the right-skewed treatments the AGV is not preferred to the SM mechanism and in the left-skewed treatment the NSQ mechanism is not preferred over the RAND mechanism.

Table 4: Mechanisms chosen by a majority of subjects in the ex-ante rounds

Treatment	AGV vs. SM	AGV vs. NSQ	AGV vs. RAND	SM vs. NSQ	SM vs. RAND	NSQ vs. RAND
symmetric	SM**	AGV	AGV	SM	SM	NSQ ∼ RAND
right skewed (+7)	SM ∼ AGV*	AGV	AGV	SM	SM	RAND
left skewed (-7)	AGV	AGV	AGV	SM	SM	NSQ ∼ RAND*

Notes: The mechanism in each cell was chosen by the majority of subjects in the respective treatment. All results are for the first comparisons (rounds 1-6). The number of observations for the three treatments are: 45 (symmetric), 42 (right skewed) and 45 (left skewed). Binomial tests reject a 50:50 split at the 5%-level for all but three comparisons: NSQ vs. RAND in the symmetric and left-skewed treatment and AGV vs. SM in the right-skewed treatment. A * indicates that the majority choice is not in line with the theoretical efficiency prediction, ** indicates that the choice is in line with realized but not with theoretical efficiency (see Section 5.4 for details).

In the symmetric (69%) and right-skewed treatment (55%) a majority of subjects chose the SM over the AGV mechanism. This modal preferences flips around

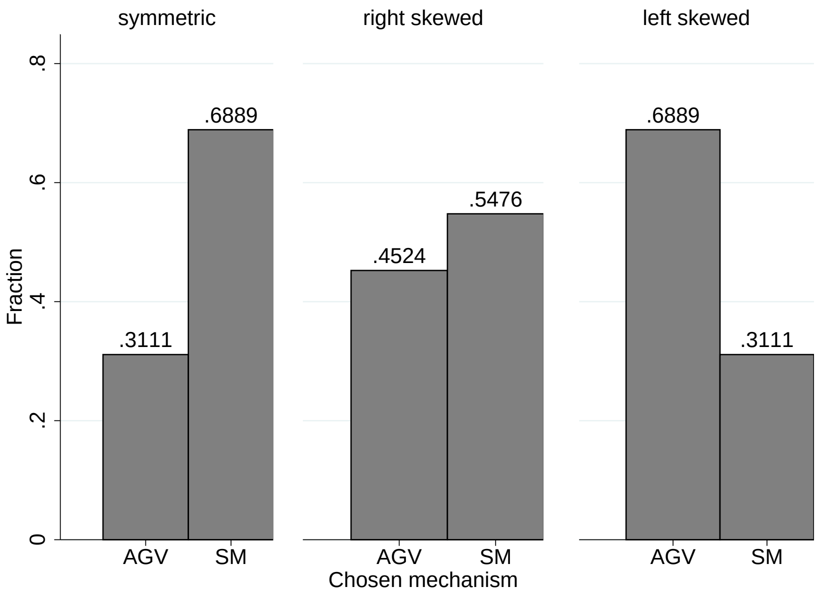


Figure 2: Ex-ante choices between AGV and SM mechanism (by treatment)

for the left-skewed treatment, in which 69% prefer the AGV.[12]

Comparing subjects' choices with the realized surplus in Section 5.4, shows that a majority chooses the mechanism with the highest realized surplus in all comparisons, except in the right-skewed treatment for the comparison between AGV and SM and in the left-skewed treatment for the comparison between NSQ and RAND. It seems that the average mechanism choice of subjects is almost perfectly in line with the ordering predicted by realized efficiency. While the pattern of choices between AGV and SM appears to be consistent with the relative advantage of the AGV over SM.

Since the theoretical predictions about efficiency has almost the same order as the realized efficiency, subjects generally prefer the theoretically most efficient mechanism in the ex-ante rounds, confirming prediction 1. Note that this means we can already reject prediction 5. Our subjects do not appear to prefer taxing winners over taxing losers, not even in the ex-ante rounds. Choices seem to follow (realized) expected value, rather than any form of other-regarding preferences.

[12] Comparing the average mechanism choice on the matching group level between treatments using Mann-Whitney-U (MWU) tests yields significant differences between the symmetric and the left-skewed treatment (p-value 0.01) and between the right-skewed and the left-skewed treatment (p-value 0.05). The difference between the symmetric and the right-skewed treatment is not significant (p-value 0.14).

5.2 Impossibility results

The Myerson-Satterthwaite theorem predicts that no (efficient) mechanism is unanimously preferred over the non-implementation status quo. Figure 3 shows all choices made between NSQ and the other mechanisms in the symmetric treatment.[13] In the top (bottom) row the revealed preferences for the ex-ante (ad-interim) comparisons are shown. For each decision the figure first shows the choices for subjects with a positive and then for those with a negative valuation. Since subjects do not know their valuation when making the mechanism choice ex ante (top row), the choices of the subjects with positive and negative valuations are statistically indistinguishable.[14]

The expected choice reversal can be seen by comparing the graphs in each column. The change in choices is obvious in all three comparisons: The AGV and SM are preferred over the NSQ in the ex-ante round (top, columns one to four) and the RAND and NSQ mechanism are about equally likely to be chosen by all subjects (top, columns five and six), these choices reverse for virtually all subjects with a negative valuation in the ad-interim round. In our experiment subjects with a negative valuation prefer the NSQ over the other mechanism (bottom, columns two, four and six).[15] These results confirm prediction 2: many individuals would prefer not to participate in the efficient group choice mechanism, making unanimous agreement virtually impossible.

The effect of private information can be seen very clearly in the comparison between the RAND and NSQ mechanism (columns five and six). With a symmetric value distribution both mechanisms have a zero expected payoff ex ante and the choices of subjects seem to indicate this "indifference". With private information, however, subjects' revealed preferences are almost perfectly correlated with valuations: NSQ is preferred by subjects with a negative valuation and RAND by those with a positive valuation. Even complete randomness is acceptable, as long as it increases own income (at least in the lab). Unlike the behavior observed by Engelmann and Grüner (2013), in our setting mechanism choices appear almost perfectly rational and narrowly self-interested. Social or efficiency concerns seem not to affect the chosen mechanism ad interim.

[13] Results for the other treatments are very similar and are in the appendix in Figures 6 and 7.

[14] Comparing the average of the chosen mechanism between subjects with positive and negative private valuations yields no significant difference for all 9 ex-ante comparisons (three per treatment, MWU tests using matching group averages by valuation, p-values > 0.18).

[15] MWU tests show significant differences between types' mechanism choices in the ad-interim rounds. The tests use the average mechanism choice on the matching group level: p-values < 0.05 for all but one comparison. The AGV vs. NSQ comparison in the left-skewed treatment shows weakly significant difference (p-value 0.06).

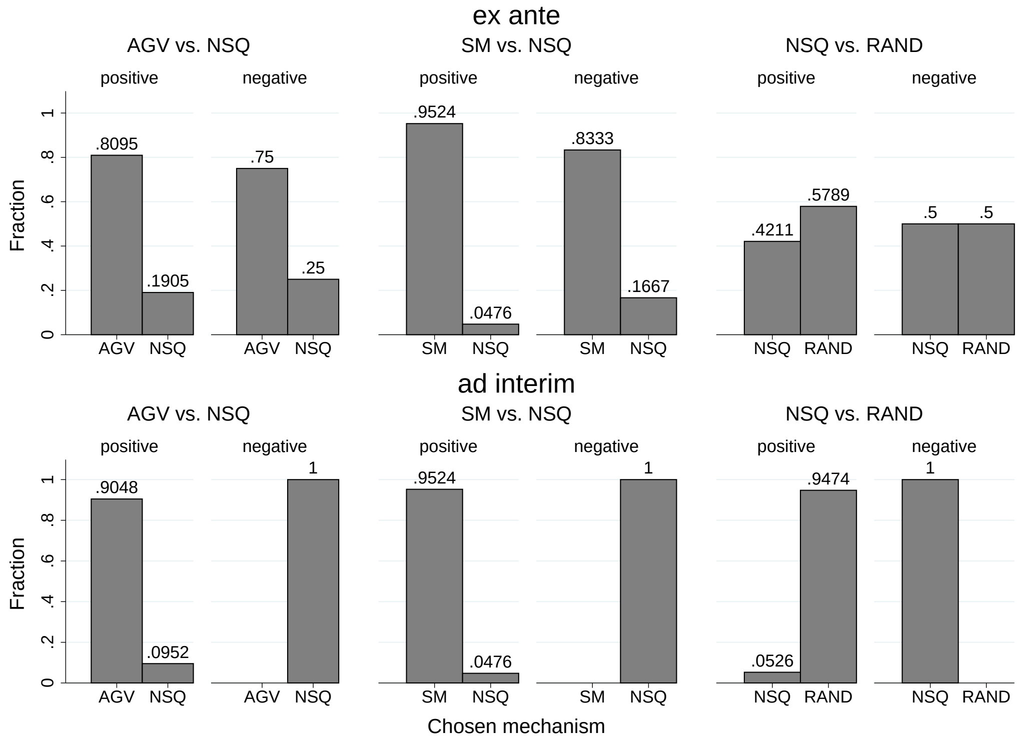


Figure 3: Mechanism choice by positive/negative private valuation (symmetric treatment)

5.3 Ad-interim choices

We now turn to the results for the other ad-interim comparisons. Prediction 3 states that all subjects should prefer the AGV and the SM over the RAND mechanism, regardless of their valuation. Our results are qualitatively equivalent for the binary comparisons of the AGV vs. the RAND mechanism and the SM vs. the RAND mechanism. In the interest of space we only report the former.[16] Figure 4 shows that at the aggregate level the AGV is clearly preferred over the RAND mechanism. As was predicted by Schmitz (2002) and Segal and Whinston (2011), the Myerson-Satterthwaite impossibility theorem can be overcome if the outside option is a risky, rather than a save status quo.[17]

Unlike with the preferences for AGV/SM over NSQ, the private valuation of subjects has no influence on the preference for AGV/SM over RAND. Comparing the ad-interim mechanism choices within treatment yields insignificant differences for all six comparisons (two comparisons per treatment using MWU tests on the matching group level by private valuations, p-values > 0.18). Essentially, the average subject appears to prefer AGV/SM over RAND ad interim as

[16]We show the results of all ad-interim choices separately for treatments and private valuations in Table 10 in the appendix.

[17] Binomial tests reject an equal distribution in all treatments (p-values < 0.01).

well as ex ante.

Prediction 3 is actually stronger than a preference for the AGV over RAND on the aggregate level, since it predicts a preference for the AGV by all types. This stronger prediction seems to describe the data well, since for almost all valuations a majority of subjects prefers the AGV mechanism. There is one exception, in the left-skewed treatment the AGV and RAND mechanism are equally often preferred by individuals with type +3: exactly 50% chose the AGV. In all other treatments and for all other valuations, the AGV is chosen by at least 60% of the subjects and in most cases it is chosen by a larger margin.[18]

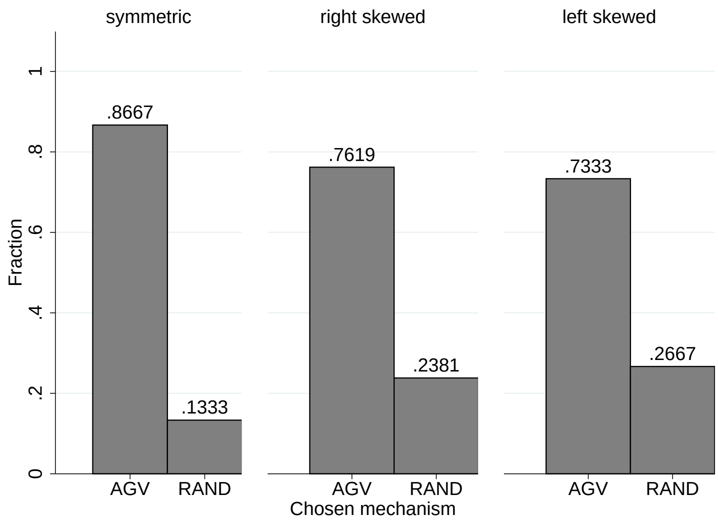


Figure 4: Ad-interim choices between AGV and RAND mechanism (by treatment)

The revealed preferences of subjects for the ad-interim choice between the AGV and the SM mechanism are shown in Figure 5 per treatment and type. Although the statements made in prediction 4 are the most sensitive to the small number of observations in some cells, the comparative statics are largely borne out by the data. In the symmetric treatment, preference for the AGV is more pronounced for the types -3 and 3 then for the types -1 and 1. Similarly, the preference for the AGV seems to increase with the valuation in the right-skewed treatment, and decreases with valuation in the left-skewed treatment. The only exception to the trend is the -3 type in the right-skewed treatment.

While the AGV mechanism is preferred by all subjects with the most extreme private valuations (+/-7), subjects with a valuation of +/-1 are almost evenly split

[18] While the results appear clearly in the appropriate graphs, formal tests cannot confirm the results at the common significance levels for the different private valuations, since the low number of cases (8-15 per valuation and treatment) results in relatively high p-values even if 60% or more selected the AGV mechanism.

between the AGV and SM mechanisms. The clear preference for the AGV of subjects with an extreme valuation is not only in line with the prediction, it is also an indication that subjects understood that in the AGV mechanism an extreme valuation report is equivalent to certain implementation (+7), respectively a veto against implementation (-7). Since subjects in the skewed treatments like the AGV mechanism less than predicted, prediction 4 is not fully confirmed.

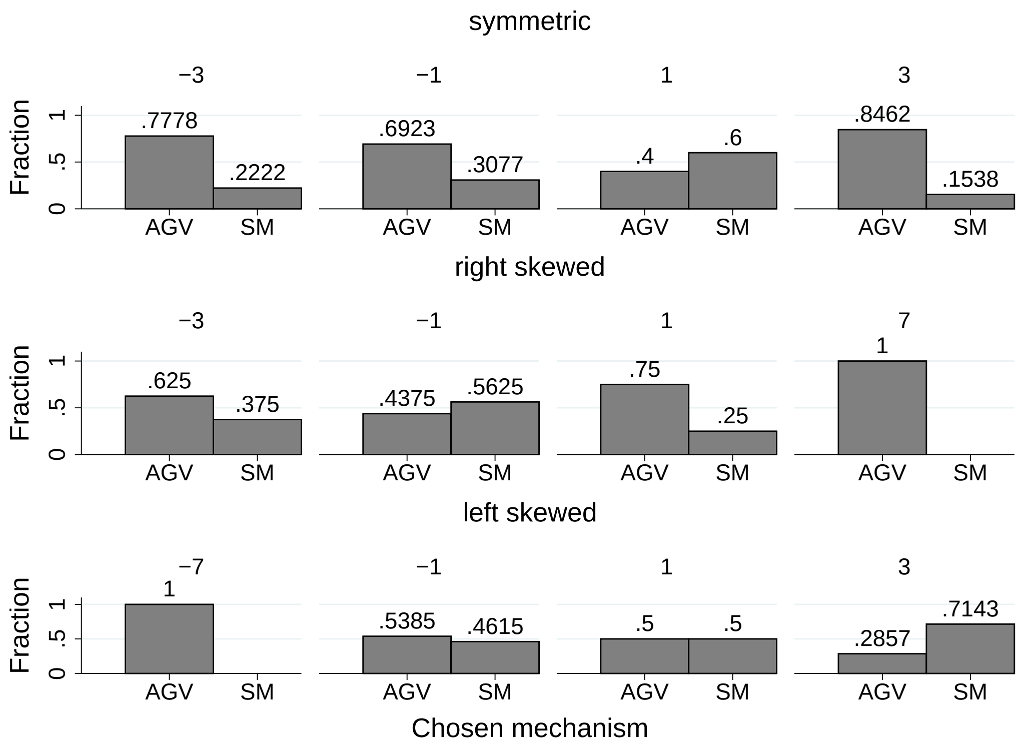


Figure 5: Ad-interim choices between AGV and SM mechanism (by treatment and valuation)

5.4 Realized surplus

Whether the AGV is actually more efficient than the other mechanisms depends on subjects' behavior and especially on the question whether they truthfully report their type (AGV) and vote sincerely (SM mechanism). Theoretically the AGV is incentive compatible, such that truthful reporting should result in equilibrium. However, if subjects misreport their valuation it is not clear whether the AGV actually generates the largest surplus. Since we cannot assume perfectly rational expected-value maximization, the actual efficiency of the AGV is an empirical question.

We do not use the actual surplus generated in the lab as our measure of efficiency. This measure of efficiency would be strongly influenced by the realization of private valuations as well as the mechanism choices by the random dictator. Instead, we use the observed distribution of reports/votes made by subjects with a specific type in a treatment as the behavioral strategy for that type in that treatment. We calculate project implementation probabilities for all permutations of the type vector given these strategies. The realized surplus (in €) is the expected value of the group surplus in the mechanisms given these observed behavioral strategies and the probability that a particular permutation of the type vector occurs. It is therefore the surplus that would have realized if all possible combinations of private valuations occurred with their expected probabilities and all individuals with the same type used the observed reporting/voting strategy. Equivalently, the realized surplus can be interpreted as the expected value of the next, unobserved round given these behavioral strategies.

Table 5 below shows the Bayes-Nash equilibrium surplus and the realized group surplus for the AGV or SM mechanisms in the ex-ante rounds in all treatments.[19] The theoretical surplus of each mechanism is reported in columns 2 (AGV) and 5 (SM), the realized surplus in columns 3 and 6, and columns 4 and 7 show the absolute (and relative) surplus loss compared to the theoretically benchmark.

Table 5: Theoretical and realized group surplus with AGV and SM (ex ante)

	AGV Group surplus			SM Group surplus		
Treatment	theoretical	realized	lost (%)	theoretical	realized	lost (%)
symmetric	1.59	1.18	0.41 (26%)	1.50	1.34	0.16 (11%)
right skewed (+7)	4.36	3.84	0.51 (12%)	3.75	3.68	0.07 (2%)
left skewed (-7)	1.36	0.93	0.43 (32%)	0.75	0.66	0.09 (13%)

The results in Table 5 clearly show that the AGV generates a higher expected surplus than the SM mechanism in theory. However, the table also illustrates that neither mechanism reaches its full theoretical efficiency level. The AGV is still the most efficient mechanism ex ante in the two skewed treatments. In the symmetric treatment the SM mechanism is theoretically very close to optimal, while the realized efficiency of the AGV is quite low. The AGV mechanism only realizes an expected group surplus of 1.18, while SM reaches a surplus of 1.34, which reverses the efficiency ordering.

The largest deviations from the prediction seems to stem from the fact that the AGV is not always as efficient in the lab as predicted by theory. This was caused by subjects' second stage reporting (AGV) and voting (SM) strategies, which are

[19] We concentrate on the ex-ante results, because we have more observations in these rounds than in the ad-interim rounds, which makes the results more reliable. Although they are noisier, results for the ad-interim rounds are qualitatively similar.

analyzed next.

5.4.1 Voting and reporting behavior

In the AGV truthful reporting forms a Bayes-Nash equilibrium. To make sure that our subjects were aware of this, our subjects were told that if the other subjects report truthfully, it maximizes their expected payoff to report their true valuation as well. However, there is no guarantee that subjects understand and act in accordance with those statements, let alone that they believe others do. For the SM mechanism no such instruction was necessary, as the game is dominance solvable. In SM, voting in line with ones preferences is (part of) the best-response strategy regardless of the behavior of other players.

Table 6 shows four tables, one for each of the 3 treatment and one for an additional robustness session. Each table shows the reported valuations as a function of private valuations for the ex-ante rounds in which the AGV mechanism was used.

Table 6: AGV reports (ex ante)

(a) symmetric treatment

True valuations	Reported valuations 3	1	−1	−3	Total
3	41	7	0	0	48
1	16	28	1	0	45
−1	1	3	28	16	48
−3	4	6	7	25	42
Total	62	44	36	41	183

(b) right-skewed treatment

True valuations	Reported valuations 7	1	−1	−3	Total
7	43	1	0	0	44
1	13	29	1	0	43
−1	3	8	11	24	46
−3	6	5	5	37	53
Total	65	43	17	61	186

(c) left-skewed treatment

True valuations	Reported valuations 3	1	−1	−7	Total
3	35	10	1	0	46
1	23	36	0	0	59
−1	1	5	35	14	55
−7	4	3	2	53	62
Total	63	54	38	67	222

(d) robustness session

True valuations	Reported valuations 3	1	−1	−7	Total
7	19	1	1	0	21
−1	1	9	4	11	25
−2	1	0	8	8	17
−3	0	0	0	15	15
Total	21	10	13	34	78

If all subjects reported their true valuation all entries would be on the main diagonal of the tables. However, as all the off-diagonal elements show, many subjects misreport. We consider two types of false reports separately. Over- or under-reporting is defined as sending a report that is more (or less) extreme than the subjects' true valuation but has the same sign. This kind of reporting can be caused by the desire to ensure (non-)implementation or avoid paying transfers. Misreporting the sign of the valuation, e.g. reporting +1 with a valuation of -1, is of a different caliber. There is no reason to misreport the sign of the valuation if a subject is maximizing her expected payoff. A subject with a negative valuation does not want the project to be implemented. By reporting a positive valuation she increases the probability of implementation, which can never be optimal. The same argument, with reversed signs, holds for positive valuations. Therefore, while over- or under-reporting can be rationalized (at least to some extent) by small mistakes, misreporting the sign of the valuation cannot.

Table 6b shows that the reports that involve an incorrect sign in the right-skewed treatment are concentrated on subjects with a negative valuation. Only one of subjects with a positive valuation misreports the sign. In striking contrast, 22 of the 51 misreports from subjects with a negative valuation include an incorrect sign (43%). This pattern is not limited to the right-skewed treatment as we show in Tables 6a and 6c. This pattern is also not caused by a few individuals, 30% of reports differ from true valuations and 25% of subjects incorrectly report the sign of their valuation at least once. These averages are also quite stable over rounds. Such that it seems unlikely that the underlying behavior is driven by confusion.

We ran an additional, robustness session that eliminates most reasons for misreporting as a robustness check. In this session, private valuations were drawn from the set {-3€, -2€, -1€, 7€}. These valuations result in identical transfers and implementation probabilities for all negative reports, such that under- or over-reporting has no effect on payoffs. Furthermore, all valuations had a unique absolute value, decreasing the probabilities of accidentally selecting -1 rather than +1 and vice versa (the experimental screens in all treatments displayed the + and - signs for all valuations). The AGV reports in the ex-ante rounds of this session are shown in Table 6d.

Eliminating most misunderstanding possibilities in the robustness session results in fewer reports with an incorrect sign. While 35% of all reports are false reports, only 4 (15%) include an incorrect sign and most notably only 2 are from subjects with a negative valuation. In the robustness session, subjects with a negative valuation are substantially less likely to misreport the sign compared to the other treatments. We conclude that some, but not all, of the misreported signs in our main treatments are likely to have been mistakes.

5.4.2 Surplus consequences of false reporting

In order to approximate the loss in expected group surplus caused by the two different types of false reports, we adjust the calculations of Table 5 by respectively excluding over- and under-reporting or misreporting the sign from the observed strategies. Table 7 shows both the original (columns 4-5) and the adjusted results. Comparing the adjusted efficiency without misreported signs (columns 6-7) with the adjusted efficiency without under- and over-reporting (columns 8-9) shows that efficiency loss compared to theoretical expectations is mostly caused by the falsely reported signs. Depending on the treatment between 11% (right-skewed treatment) and 23% (symmetric treatment) of the theoretical group surplus is lost due to valuation reports with an incorrect sign.[20]

Table 7: Effects of different types of false reports (ex ante)

	All reports correct	All reports		Effect of over- / under-reports		Effect of sign misreports	
Treatment	theoretical	realized	lost (%)	adjusted	lost (%)	adjusted	lost (%)
symmetric	1.59	1.18	0.41 (26%)	1.46	0.13 (8%)	1.22	0.37 (23%)
right skewed (+7)	4.36	3.84	0.51 (12%)	4.12	0.24 (6%)	3.88	0.48 (11%)
left skewed (-7)	1.36	0.93	0.43 (32%)	1.12	0.24 (18%)	1.08	0.28 (21%)

Notes: The columns *Effect of over- / under-reports* [*Effect of sign misreports*] calculate the group surplus after removing all reports with a false sign [that over- or under-report] from the behavioral strategy of the subjects. The *lost* columns show the absolute (relative) loss of group surplus compared to the theoretical group surplus under truthful reporting.

Unlike the reports in the AGV mechanism, the voting behavior of subjects is very close to theoretical predictions and almost perfectly rational. For all treatments and private valuations, subjects vote according to their valuations in 89% to 100% of the rounds. There is no pattern of non-sincere votes in relation to the sign of the valuation. Subjects are about equally unlikely to vote against their private valuations for positive and negative valuations.

The different rates of rational reporting/voting drive the relatively small realized efficiency advantage of the AGV over the SM mechanism. Especially the incorrectly reported signs result in large efficiency losses of the AGV. The higher percentage of misreports in the AGV compared to the non-sincere votes in the SM mechanism can be partially explained by familiarity of subjects with the SM. However, the systematic difference in the reporting behavior of individuals with positive and negative types is unlikely to be explained by mistakes alone. Up to this point we have no explanation for this difference.

[20] The sum of surplus lost by the individual types of false reports does not add up to the difference between the theoretical and realized group surplus, since both types of misreports can occur together and thus interact in the realization of actual efficiency.

6 Conclusion

This paper presents the results of a first experimental study on the effects of private information and outside options on mechanism selections in a group decision experiment. Our results on the ex-ante preferences in all treatments demonstrate that subjects are aware of the efficiency differences between the mechanisms. In almost all ex ante cases a clear majority of subjects selects the mechanism that is more efficient in the lab. Not too surprisingly, if the difference in efficiency between two mechanisms is small, results are less clear.

The behavior in the ad-interim rounds also largely confirms related theoretical predictions. As the Myerson-Satterthwaite theorem and related impossibility results predict, the same subjects who prefer the efficient AGV mechanism ex ante, suddenly opt for the complete inertia of the non-implementation status quo after learning their private valuation is negative. Similarly, most subjects prefer the AGV over flipping a coin (RAND) even after learning their private valuation, as predicted by Schmitz (2002) and Segal and Whinston (2011). Our data is less clear about the predictions made by Grüner and Koriyama (2012) regarding the choice between AGV and SM. Although the overall pattern seems to conform to their theoretical predictions, efficiency differences between these mechanisms are small and clear majorities for either AGV or SM often do not exists.

These results highlight the importance of participation constraints in the design of institutions. In many situations it is impossible to set an efficient decision rule ex ante, while it might not be possible to establish an efficient mechanism through a completely voluntary procedure ad interim. This combined impossibility touches upon one of the most fundamental questions in mechanism design, political economy, and more generally political philosophy. Since participation constraints already create problems in the small groups in our experiment, the difficulties of negotiating a public project on the scale of a nation would seem close to insurmountable if unanimity (or completely voluntary participation by all parties) is required. A group that is stuck in an inefficient mechanism might require an outside influence or coercive power to break away from the status quo. Centralized organizations with an amount of coercive power, like the state or the company, are able to force participation and thus avoid these problems. In doing so, these organizations allow participants to bundle individual projects and reforms and take them away from purely decentralized mechanisms like open markets. Often the gains in efficiency from extra investment in common projects are large enough to compensate participants for their involvement in projects that are not individually rational to them. In this sense, our findings give one reason for the existence of states. Although a centralized state might not be as efficient in dealing with (local) incentive constraints as the market, it makes dealing with the participation constraints on individual projects a lot easier.

Because our subjects play all mechanisms, we can compare the relative efficiency of the AGV and SM mechanism on the same group of subjects. The SM mechanism is almost as efficient in the lab as theoretical calculations with rational self-interested agents predict. The AGV is perfectly efficient in theory, but loses a lot of its efficiency in practice due to false reports. In our experimental results we find a puzzling pattern in the reporting strategy used by subjects in the AGV. While both subjects with positive and negative valuations sometimes over- or under-report their valuation, only subjects with a negative valuation systematically misreport the sign of their valuation. These valuation reports with an incorrect sign account for most of the efficiency loss of the AGV in our experiment. Interestingly, this pattern is present in all treatments and does not seem to be driven by the behavior of a few individuals. Subjects in our experiment gather some experience in the AGV, but not too much. Depending on the random allocation of private valuations, a subject might never experience the real advantage of the AGV over the much more familiar SM mechanism. In order to have a "fair" comparison, it might be necessary to provide subjects with more opportunities to learn how the AGV actually works and to demonstrate why the mechanism is more efficient. Given that we do not familiarize our subjects with the AGV in this manner, it is actually quite remarkable how often the AGV is chosen. Still our findings indicate that there is room for further research in the area of efficient mechanism implementation.

Our setup allows us to vary individual participation constraints and to compare the preference for mechanisms before and after private information is received. The crispness of the results obtained is a clear indication of the strength of this methodological setup. We believe the method by which participation constraints are implemented, measured and varied in this experiment could be fruitfully applied to experimentally investigate other questions surrounding participation constraints.

A Appendix

A.1 Derivation of predictions

A.1.1 Prediction 1

Note that all mechanisms generate as much surplus as is generated by the common investment, as the rest of the (experimental) budget is ex-post balanced. From the four mechanisms, the AGV mechanism is the only mechanism that implements (in Bayes-Nash equilibrium) the project if and only if the generated surplus is larger than 0. The other mechanisms all have an efficiency loss from wrong implementation, or wrong non-implementations and therefore are less efficient in expectation. These differences in efficiency imply the preference of individuals without private information for the AGV over NSQ and RAND mechanism in prediction 1. The SM mechanism implements if and only if at least two people vote in favor. If we assume that individuals vote in favor if they have a positive valuation and against if it they have a negative valuation, we can see when the loss of efficiency in implementation occurs. In the symmetric treatment this happens in two cases (type vectors {-1,-1,3} and {1,1,-3}), both of which cost 1€ and occur with a probability of 4.6875%, such that the expected loss of the SM mechanism relative to the efficient outcome is 0.09€, or 5.88% of the maximum efficiency.

In the right-skewed treatment with the +7 value there are four cases of inefficient implementation, type vectors {-3,-3,7}, {-3,-1,7}, {-3,1,1} and {-1,-1,7}, occurring with probabilities 4.6875%, 9.375%, 4.6875% and 4.6875% respectively. The expected loss is 0.61€, or 13.98% of maximum efficiency. In the left-skewed treatment with the -7 value there are four cases of inefficient implementation, type vectors {1,1,-7}, {3,1,-7}, {3,-1,-1} and {3,3,-7}, occurring with probabilities 4.6875%, 9.375%, 4.6875% and 4.6875% respectively. The expected loss is also 0.61€, but this is 44.82% of maximum efficiency in this setting, since the maximum efficiency delivers a much lower surplus.

The RAND mechanism has a zero expected surplus for the symmetric treatment, a -1€ expected surplus in the left-skewed treatment (-7), and a +1€ expected surplus in the right-skewed treatment (+7). The loss of efficiency of the NSQ is a 100% always. Since the efficiency loss in the SM mechanism is always lower than the loss in the NSQ or RAND mechanism, this proves prediction 1.

A.1.2 Prediction 2

With known private values v_i, individuals can calculate their expected utility as a function of mechanism Γ:

$$E(U) = v_i * \Pr(\text{Y=1} \mid \Gamma = \text{M}).$$

With $Y = 1$ denoting implementation and $M \in \{\text{NSQ}, \text{RAND}, \text{SM}\}$. With a negative private value, v_i, the best response is to choose the mechanism with the lowest probability of implementation. Since Pr(Y=1 | Γ = NSQ) = 0, the NSQ (weakly) dominates {RAND, SM} for these individuals. For the AGV mechanism, we also have to verify that the transfers do not change this prediction. The expected transfer, in truth-telling Bayes-Nash equilibrium in the symmetric treatment is -0.125€ for the statements 3 and -3 and +0.125€ for -1 and 1. For the AGV, the lowest implementation probability is achieved by any given subject by stating claiming the lowest type. Note, however, that this yields a probability of implementation that is strictly greater than 0 and a negative expected transfer, such that no rational individual with a negative valuation would choose this strategy over NSQ. Choosing AGV and playing claiming type -1 in the AGV yields an expected transfer of 0.13 [0.23] (0.23) € in the symmetric [-7] (+7) treatment, but increases the implementation probability to 37.5% [37.5%] (50%) (assuming a truthful strategy of the other players). With any negative value in our distributions the expected implementation costs are therefore higher than the transfer gains. Hence this strategy is also not preferred to the NSQ. Since the transfers achieve their maximum at the -1 report, while the probability of implementation keeps increasing in the reported valuation, this also rules out any strategy with a higher reported type. Hence, also in the comparison between AGV and NSQ, types with a negative valuation prefer the NSQ. In fact what we find is that the expected transfers, for types with a negative valuation, are never large enough to change the preferences over mechanisms. A similar line of reasoning proves the same result for types with positive valuations.

A.1.3 Predictions 3 and 4

For the AGV assume that individuals report truthfully in the second stage when playing AGV, and vote in favor in case of positive valuation and against otherwise in SM. Each individual should then choose the mechanism that maximizes her expected payoff, which for $M \in \{\text{NSQ}, \text{RAND}, \text{SM}\}$ is as before:

$$E(U) = v_i * Pr(Y = 1 | \Gamma = M, v_i).$$

In the AGV the expected payoff is additionally influenced by the expected transfer each individual has to pay/receives, so it becomes:

$$E(U|AGV) = v_i * Pr(Y = 1 | \Gamma = AGV, v_i) + E(t_i|m_i = v_i).$$

Where t_i is the transfer and m_i the message send by the subject about her type. Since the individuals possess private information, this can be either positive or negative. It is straightforward, albeit somewhat tedious, to calculate the expected utility of each type for each of the three mechanisms in all treatments. The results are displayed in Table 8 below.

Table 8: Expected utility by type and mechanism

	Mechanism				
	AGV			RAND	SM
Type	symmetric	right skewed	left skewed	all treatments	
−7			−0.604 17	−3.5	−1.75
−3	−0.6875	−1.166 67		−1.5	−0.75
−1	−0.25	−0.270 83	−0.145 83	−0.5	−0.25
1	0.75	0.854 167	0.760 417	0.5	0.75
3	2.328 125		1.885 417	1.5	2.25
7		6.401 042		3.5	5.25

Like Segal and Whinston (2016) showed more generally, no single type prefers to flip a coin over playing the AGV (or SM in this case). For the predictions of Grüner and Koriyama (2012) we have a slightly more qualified result. In the skewed treatments the types -3 and 3 prefer the SM mechanism while the other types {-7, -1, 1, 7} prefer the AGV mechanism. In the symmetric treatment the types -1 and 1 are indifferent, while the types -3 and 3 prefer AGV.

A.2 Further results - Choices in all treatments

Figures 6 (left-skewed treatment) and 7 (right-skewed treatment) below show all choices made in the first block ex ante (rounds 1-6) and ad interim between NSQ and the other mechanisms.

In Table 9 the results for all binary comparisons in the first ex-ante round (block

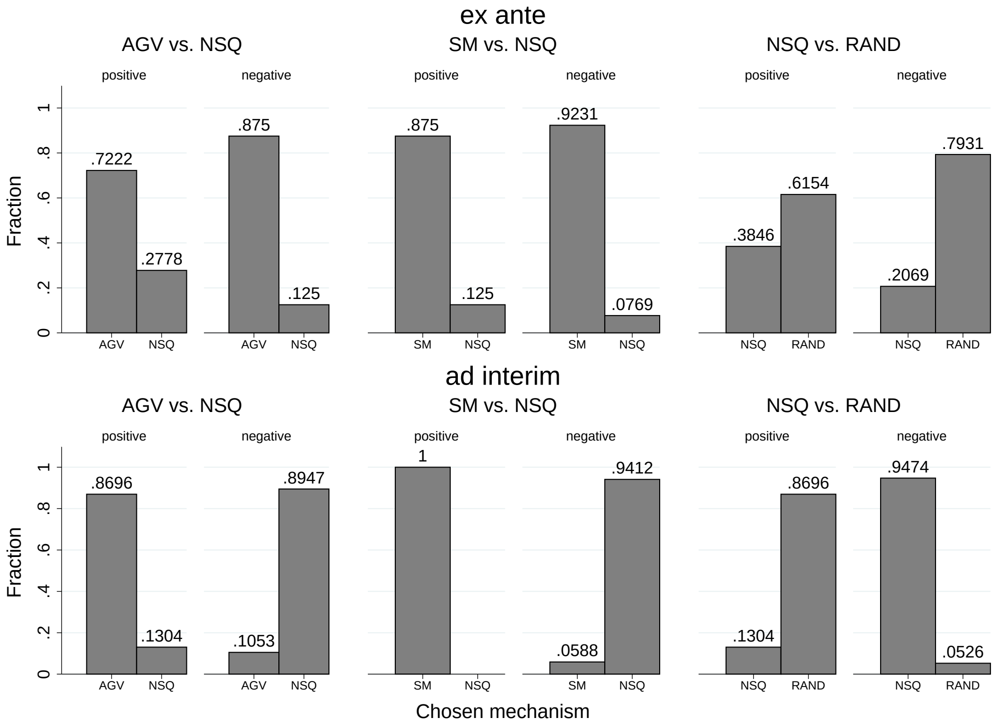


Figure 6: Mechanism choice by private valuation (right-skewed treatment)

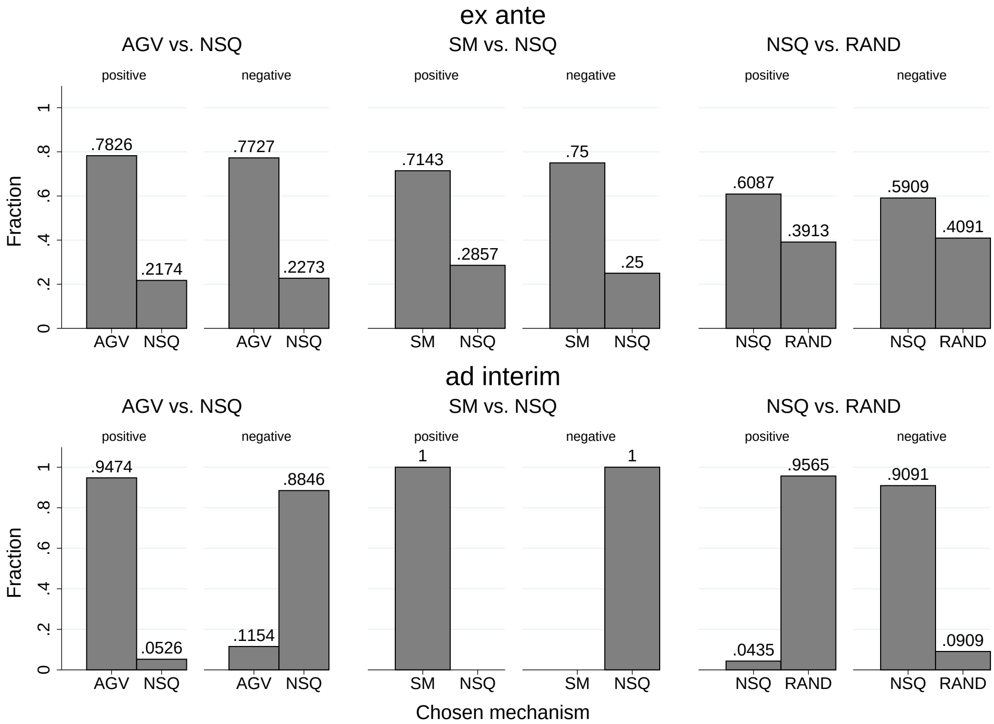


Figure 7: Mechanism choice by private valuation (left-skewed treatment)

1: round 1-6) are shown. The mechanism stated in each cell is the mechanism chosen by a majority of subjects for the binary comparison in this column. E.g. the 69% in the row *'symmetric treatment, block 1'* in the third column *(AGV vs. SM)* mean that 69% of subjects chose the SM over the AGV mechanism (consequently 31% chose the AGV mechanism) in the first comparison of these mechanisms.

Table 9: Percentage of subjects who chose each mechanism in the ex-ante rounds

Treatment	# of subjects	Binary choice					
		AGV vs. SM	AGV vs. NSQ	AGV vs. RAND	SM vs. NSQ	SM vs. RAND	NSQ vs. RAND
symmetric							
block 1	45	SM (69%)	AGV (78%)	AGV (76%)	SM (89%)	SM (89%)	RAND (53%)
block 2	45	SM (60%)	AGV (76%)	AGV (87%)	SM (87%)	SM (84%)	NSQ (62%)
right skewed (+7)							
block 1	42	SM (55%)	AGV (81%)	AGV (79%)	SM (90%)	SM (88%)	RAND (74%)
block 2	42	SM (62%)	AGV (83%)	AGV (90%)	SM (90%)	SM (88%)	RAND (69%)
left skewed (-7)							
block 1	45	AGV (69%)	AGV (78%)	AGV (82%)	SM (73%)	SM (93%)	NSQ (60%)
block 2	45	AGV (71%)	AGV (73%)	AGV (82%)	SM (60%)	SM (93%)	NSQ (69%)

Notes: The mechanism named in each cell was chosen by the majority of subjects (percentage). Each subject made a choice in each round, therefore the number of subjects for the three treatments are: 45 (symmetric), 42 (right skewed) and 45 (left skewed).

In Table 10 the mechanism that was chosen by the majority of subjects for each binary comparison in the ad-interim round of all treatments is listed. The table reports the proportions of subjects for each valuation, e.g. the cell in the row *'symmetric, 3'* and second column *(AGV vs. SM)* states that 11 of 13 subjects with a valuation of +3 chose the AGV mechanism over the SM mechanism (consequently 2 of 13 subjects selected the SM mechanism).

Table 10: Proportion of subjects who chose each mechanism in the ad-interim rounds

Treatment / Valuation	Binary choice					
	AGV vs. SM	AGV vs. NSQ	AGV vs. RAND	SM vs. NSQ	SM vs. RAND	NSQ vs. RAND
symmetric						
3	AGV (11/13)	AGV (10/11)	AGV (7/8)	SM (10/11)	SM (11/12)	RAND (10/10)
1	SM (6/10)	AGV (9/10)	AGV (9/11)	SM (10/10)	SM (9/12)	RAND (8/9)
−1	AGV (9/13)	NSQ (5/5)	AGV (12/14)	NSQ (14/14)	SM (10/11)	NSQ (11/11)
−3	AGV (7/9)	NSQ (19/19)	AGV (11/12)	NSQ (10/10)	SM (8/10)	NSQ (15/15)
right skewed (+7)						
7	AGV (6/6)	AGV (10/12)	AGV (9/10)	SM (14/14)	SM (5/7)	RAND (10/11)
1	AGV (9/12)	AGV (10/11)	AGV (12/15)	SM (11/11)	SM (13/14)	RAND (10/12)
−1	SM (9/16)	NSQ (9/10)	AGV (5/7)	NSQ (8/9)	SM (11/13)	NSQ (11/12)
−3	AGV (5/8)	NSQ (8/9)	AGV (6/10)	NSQ (8/8)	SM (6/8)	NSQ (7/7)
left skewed (-7)						
3	SM (10/14)	AGV (7/8)	AGV (5/10)	SM (16/16)	SM (6/9)	RAND (14/14)
1	AGV (5/10)	AGV (11/11)	AGV (9/12)	SM (17/17)	SM (9/11)	RAND (8/9)
−1	AGV (7/13)	NSQ (6/9)	AGV (7/10)	NSQ (5/5)	SM (9/13)	NSQ (6/8)
−7	AGV (8/8)	NSQ (17/17)	AGV (12/13)	NSQ (7/7)	SM (11/12)	NSQ (14/14)

Notes: The mechanism named in each cell was chosen by the majority of subjects with the specified valuation (number of subjects who chose the stated mechanism/total number of subjects with given valuation). Each subject makes each binary choice one time with a randomly drawn valuation. For each treatment the sum of choices of all four valuations within a binary comparison is the number of subjects: 45 in symmetric, 42 in right skewed and 45 in left-skewed treatment.

A.3 Translated instructions

This is the translation of the original instructions used for treatment one (symmetric distribution). The instructions for other treatments only differ with respect to the described distribution and therefore the used examples and tables. All emphasizes are in the original. The original instructions for all treatments are available from the authors upon request.

Instructions

Thank you for taking part in this experiment. The amount of money you can earn in this experiment 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 after reading the instructions, please raise your hand. We will then clarify your question.

All the information you provide will be treated anonymously.

You will begin the experiment with a starting budget of 9€. This amount can be increased or decreased depending on all participants' choices in one of the 18 rounds of this experiment. In each round each participant receives a payment. This payment can be zero, positive or negative. At the end of the 18 rounds, one round will be randomly determined for payment. The payment of the selected round will be added to or subtracted from your starting budget. The sum of your starting budget and the payment of the selected round yields your final payoff. In each round you should act as if the round was selected for payment. You will receive your final payoff in cash at the end of the experiment. The payments are chosen in such a way that you cannot make losses under any circumstances. Each participant can earn between 5.75€ and 12.25€. Your payment will be treated anonymously.

The entire experiment is organized in two phases. Phase I consists of rounds 1-12 and phase II of rounds 13-18. You will now receive information about phase I. We will explain any changes in phase II after round 12, but before the start of round 13 (the start of phase II).

Thank you for participating.

STRUCTURE OF THE EXPERIMENT

In each round of the experiment you will be part of a group with 3 members (you and two randomly selected other participants). Each group has the possibility to conduct a project, called project A. If you do not conduct the project each group member receives a payoff of 0€ for this round. If your group conducts project A, then each group member receives his or her private valuation for the project as payment for this round. The private valuation of project A can be different for each member of your group. If your group decides not to conduct project A, all group members receive a payoff of zero. The valuation for project A is newly determined each round and each participant receives a new private valuation in each round. Groups are newly formed in each of the 12 rounds.

The experiment is computer based. Therefore individual participants cannot identify the other group members. You will not know which other participants are in your group in which round, neither during nor after the experiment.

One round consists of two parts. In the first part each group chooses a decision rule which is used to determine whether project A is implemented or not. In the second part your group uses the selected rule to determine whether project A is implemented or not. You will be informed about your private valuation for project A **after** part one of a round. We will now describe the two different parts of each round as well as the possible decision rules in detail.

PART ONE

In part one you have the choice between two different decision rules, which will be used in part two to determine whether project A is implemented or not. The two available rules change from round to round. **Each of the three group members suggests one of the two available rules for part two of this round. The computer randomly picks one of these suggestions as group rule. This decision rule determines how in part two the question whether project A is implemented or not is resolved.** The different rules are explained below. In part one you do not know whose rule suggestions will be the group decision rule. Your suggestion can be selected, but also the suggestion of another group member. Each group member has the same chance in each round for his or her suggestion to be selected. Non selected suggestions will not be made known to the other group members. Please note that the decision rule is important, because dependent on the decision rule the implementation of project A is easier or more difficult.

PART TWO

In part two the selected decision rule is used to determine whether project A is implemented or not. The group decision arises directly from the decisions of all group members in part two. The decision is announced and each participant is informed about his or her payment in this round.

VALUATIONS

In case project A is implemented all group members receive a payment dependent on their project valuations. This means, if your valuation for project A is positive, you benefit from the implementation of project A, and when your valuation for project A is negative, then you have to pay if the project is implemented. **Your valuation for project A is randomly given to you in each round anew. You learn your valuation after part one.** Therefore you do not know your valuation when you decide between the different decision rules in part one, but you know your valuation in part two, when you decide about the implementation of project A according to the selected decision rule.

Please note that you will know your exact valuation for the project, but not the valuations of the other group members. The valuation of each group member can be -3€, -1€, +1€ or +3€. All values are equally likely. The values are independently distributed, such that your valuation in one round does not allow any conclusions for the valuation of other members in your group. Furthermore your valuations are independent between rounds. Therefore your valuation in one round does not depend on previous or future valuations.

Example: Assume your valuation in round 1 is -1€ and +3€ in round 2. If your group decides to implement project A in both rounds, then your payment (not necessarily your final profit) in these rounds is your valuation. If round 1 would be randomly selected for payment, then your final profit in the experiment would be 8€ (=9€ - 1€). If round 2 would be selected your final profit would be 12€ (= 9€ +3€).

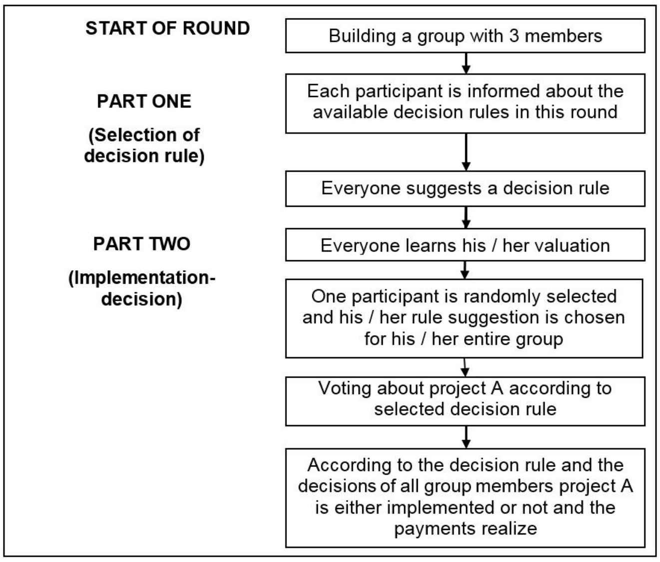
If your group does not implement project A, each group member receives 0€ for this round, meaning in this round you neither gain nor lose anything, independently of your valuation for project A. Therefore if such a round is selected for payment, your final profit is your starting budget of 9€.

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

POSSIBLE DECISION RULES

In part one each group member has the choice between two decision rules. The rules are identical for all group members in each round. The following four decision rules (I.-IV.) are possible:

Rule I. Whether project A is implemented or not depends on the stated valuations of all group members. With this decision rule each group member states his or her valuation for the project in part two of the round. **If the**



sum of all stated valuations is larger than 0, then project A is implemented. If the sum is smaller, the project is not implemented. Each participant has to state a possible valuation (-3€, -1€, +1€ or +3€). He can state his true valuation, but also any other possible valuation. The calculation of the sum only depends on the three **stated valuations**. The true valuations are not taken into account.

With this decision rule there are transfer payments between the group members additionally to the payments from an implementation of project A. The transfer payments depend on the stated valuation and the stated valuations of the other group members. You can see which transfers you receive / pay dependent on the stated valuations in Table 1 below. Please note: A transfer payment is independent of your true valuation and the implementation of project A. You can also receive or pay a transfer if project A is **not** implemented. Transfer payments **only** exist in this decision rule.

Transfers are chosen in such a way that your expected payoff is maximized if you state your true valuation and also the other group members state their true valuation. The table states the transfers for all possible situations. The first column contains your statement and the respective columns to the right list the transfers dependent on the statements of the other group members.

Example 1: Assume you state a valuation of -1€. If the other two group members state valuations of -1€ and 3€, then you receive a transfer of 0.125€.

Example 2: Assume you state a valuation of 1€. If the other two group

Your statement:	Stated valuations of the other group members: 3, 3	1, 3 or 3, 1	-1, 3 or 3, -1	-1, 1 or 1, -1	-1, -1	3, -3 or -3, 3	1, -3 or -3, 1	-1, -3 or -3, -1	1, 1	-3, -3
3	0	-0.125	-0.125	-0.25	-0.25	0	-0.125	-0.125	-0.25	0
1	0.25	0.125	0.125	0	0	0.25	0.125	0.125	0	0.25
-1	0.25	0.125	0.125	0	0	0.25	0.125	0.125	0	0.25
-3	0	-0.125	-0.125	-0.25	-0.25	0	-0.125	-0.125	-0.25	0

Table 1

members state valuations of -3€ and 3€, then you receive a transfer of 0.25€.

Example 3: Assume you state a valuation of -3€. If the other two group members state valuations of -1€ and 3€, then you receive a transfer of -0.125€. Therefore you have to pay 0.125€.

Example 4: Assume you state a valuation of 3€. If the other two group members state valuations of -3€ and -3€, then you receive a transfer of 0.

Please note that transfers payments are always made, independent of whether project A is implemented or not. You receive / pay a transfer **on top** of the payments from project A.

Rule II. At least two group members have to vote for the implementation of project A. In part two all group members vote either for or against the implementation of project A. At least 2 group members have to vote for the implementation, otherwise project A is not implemented **(simple majority)**.

Rule III. Project A is never implemented. Group members do not make any further statements in part two. There is no voting and no valuations are stated.

Rule IV. The decision for or against implementation of project A depends on the result of a coin flip. There is no voting. If the coin flip results in HEADS, the project is implemented. If the result is TAILS, the project is **not** implemented. Both results, HEADS and TAILS, are equally likely. Therefore with rule IV. project A is implemented in 50% of all cases and not implemented in the other 50%.

Please note that in decision rules I and II each participant has to state a valuation / vote. It is not possible to abstain.

We now ask you to answer several understanding questions regarding the various decision rules and your possible payments. Please answer these questions on the computer screen. After all participants have answered the seven understanding questions all participants will take part in four practice rounds. In each round you will apply one of the four possible decision rules (I.-IV.). In these rounds there is no choice between two rules, but the rule is predetermined.

In these four rounds you are not in a group with two other participants. The computer simulates the decisions of your group members. The computer randomly choses between all available actions. E.g. with rule II the computer will vote "YES − implement project A" in 50% of all cases and "NO − do not implement project A" in the other 50%.

These four rounds do **not** count towards your final profit. They are just meant to familiarize you with the four possible decision rules. After all participants have completed these four rounds the actual experiment starts.

A.3.1 Transfer tables used in the experimental instructions

Since the only real difference between the treatments in the type space used and the transfers in the AGV that different type reports cause, translations of the transfer tables from the instructions are reproduced below. The transfers of the symmetric treatment can be found in the sample instructions above.

Table 11: Transfers in the right-skewed treatment

Stated valuations of the other group members:										
Your statement:	**7, 7**	**1, 7 or 7, 1**	**-1, 7 or 7, -1**	**-1, 1 or 1, -1**	**-1, -1**	**7, -3 or -3, 7**	**1, -3 or -3, 1**	**-1, -3 or -3, -1**	**1, 1**	**-3, -3**
7	0	-0.42	-0.42	-0.84	-0.84	-0.375	-0.79	-0.79	-0.84	-0.75
1	0.84	0.42	0.42	0	0	0.46	0.04	0.04	0	0.08
-1	0.84	0.42	0.42	0	0	0.46	0.04	0.04	0	0.08
-3	0.75	0.33	0.33	-0.08	-0.08	0.375	-0.04	-0.04	-0.08	0

Table 12: Transfers in the left-skewed treatment

Stated valuations of the other group members:										
Your statement:	**3, 3**	**1, 3 or 3, 1**	**-1, 3 or 3, -1**	**-1, 1 or 1, -1**	**-1, -1**	**3, -7 or -7, 3**	**1, -7 or -7, 1**	**-1, -7 or -7, -1**	**1, 1**	**-7, -7**
3	0	-0.04	-0.04	-0.08	-0.08	0.375	0.33	0.33	-0.08	0.75
1	0.08	0.04	0.04	0	0	0.46	0.42	0.42	0	0.84
-1	0.08	0.04	0.04	0	0	0.46	0.42	0.42	0	0.84
-7	-0.75	-0.79	-0.79	-0.84	-0.84	-0.375	-0.42	-0.42	-0.84	0

Table 13: Transfers in the robustness treatment

Stated valuations of the other group members:										
Your statement:	**7, 7**	**-1, 7 or 7, -1**	**-2, 7 or 7, -2**	**-3, 7 or 7, -3**	**-1, -1**	**-2, -1 or -1, -2**	**-1, -3 or -3, -1**	**-2, -3 or -3, -2**	**-2, -2**	**-3, -3**
7	0	-0.75	-0.75	-0.75	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5
-1	1.5	0.75	0.75	0.75	0	0	0	0	0	0
-2	1.5	0.75	0.75	0.75	0	0	0	0	0	0
-3	1.5	0.75	0.75	0.75	0	0	0	0	0	0

A.4 Screen shots

The following Figures 8 to 13 show original screen shots of the German zTree program. All screen shots are from the symmetric treatment.

Figure 8: Screen shot: Mechanism choice in ex-ante round

Figure 9: Screen shot: Voting in the SM mechanism

Figure 10: Screen shot: Feedback in the SM mechanism

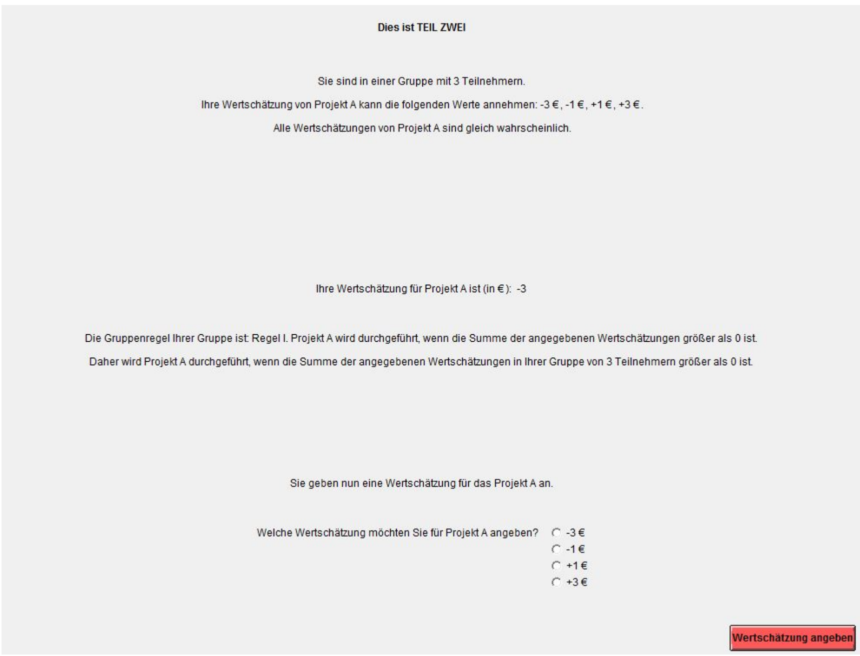


Figure 11: Screen shot: Reporting valuation in AGV mechanism

Figure 12: Screen shot: Feedback in the AGV mechanism

Figure 13: Screen shot: Mechanism choice in ad-interim round

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