


Respecting entitlements in legislative bargaining: A matter of preference or necessity?

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Abstract. We investigate whether fairness concerns overrule strategic behaviour in legislative bargaining with entitlements. In a lab experiment, we vary bargaining power by using either majority rule or dictator rule to implement a division. We apply coarse measures in order to assess whether entitlements are respected. Our results show that with experience over one third of proposers make “extreme” offers, assigning at most 10% of the surplus to partners whose consent is not needed under the respective rule. Having observed extreme outcomes in the past increases the likelihood of own extreme proposals. Overall, we find significant limitations in the acknowledgment for others’ entitlements, in particular for groups in which individual contributions differ.

Résumé. *Respecter les droits dans les négociations relatives à la législation – une question de préférence ou de nécessité?* Nous examinons si les préoccupations en matière d'équité l'emportent sur les comportements stratégiques dans le cadre de négociations relatives à la législation lorsqu'il est question de droits. Dans une expérience en laboratoire, nous modifions le pouvoir de négociation en utilisant soit la règle majoritaire, soit la dictature pour instaurer une division. Nous appliquons des mesures approximatives afin d'évaluer si les droits sont respectés. Nos résultats montrent que, une fois qu'ils ont acquis une certaine l'expérience, plus du tiers des proposant font des offres « extrêmes », attribuant au plus 10% de l'excédent à des partenaires dont le consentement n'est pas requis en vertu de la règle respective. Le fait d'avoir déjà observé des résultats extrêmes augmente la probabilité de faire soi-même des propositions extrêmes. De façon globale, nous constatons des limites importantes à la reconnaissance des droits des autres, surtout au sein des groupes où les contributions individuelles diffèrent.

JEL classification: C91, D01

1. Introduction

FAIR DIVISION OF power and money within a group of stakeholders often stands in sharp contrast to group members’ individual interests. The allocation of the decision-making power in the face of such a conflict defines the “legal” property rights, while entitlements, which are rights as perceived by the individual, constitute “moral” property rights (Gächter and Riedl 2005).¹ When parties make costly contributions towards the surplus, they feel more entitled to see their moral property rights implemented.

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- 1 As Munzer (1990) states, “Moral property rights are justifiable under moral principles. Legal property rights are property rights that are recognized under a particular legal system” (pp. 39–40)

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In multi-party democracies, political parties decide on the formation of a government, dividing political power between the partners. In many business partnerships, a committee decides on a performance-based bonus allocation to partners. The repeated nature of interaction in these examples makes large distortions in the division of the surplus unlikely, and no contributing partner is expected to remain with empty hands. In one-shot decision-making of committees or partnerships, however, the degree to which moral property rights of stakeholders are taken into account may depend on the allocation of decision power. Only if fairness preferences and norms are sufficiently important can they restrict the utilization of unequal decision power and ensure that moral property rights of all contributors are taken into account.

While there is unambiguous experimental evidence that entitlements matter in bargaining (Cappelen et al. 2007, Karagözoglu and Riedl 2015, Gantner and Kerschbamer 2016), it is not clear whether this is due to a preference for rewarding contributions or the necessity to respect entitlements when bargaining power is limited. In this study, we want to disentangle decision-making power from moral aspects in order to understand their respective roles under less-than-unanimous decision rules. We compare behaviour in multilateral bargaining games with entitlements under two rules with different bargaining power: a majority rule and a dictator rule. We create an environment in the experimental lab, where subjects derive subjective entitlements from their contributions towards a jointly produced surplus in three-person groups. Groups then distribute the surplus according to one of the two rules: (i) in the *dictator treatment*, the two responders have no choice but to accept the proposer's allocation of the shares and (ii) in the *majority treatment*, bargaining partners take turns in making proposals and a proposal is implemented as soon as it obtains a majority (Baron and Ferejohn 1989). Assuming self-regarding behaviour, the finite horizon version of the majority bargaining game predicts players to form minimum winning coalitions, i.e., coalitions consisting of the minimum number of players satisfying the majority rule.

The majority rule plays an important role in democratic voting processes. Applying it to monetary division problems may result in members of a minimum winning coalition distributing the entire surplus amongst themselves, leaving nothing for partners outside the coalition. Because such a proposal would require the approval of all chosen coalition partners, it may not find enough support if sufficiently many people are fairness-oriented. A proposer, thus, has to consider whether to propose a minimum coalition at all and how to split the surplus among the members of a coalition. Observing grand coalitions, in which all partners obtain a significant share, may thus be due to fairness preferences of the proposer, or it may be due to the necessity of finding sufficient support for a proposal. The fear of rejection of a minimum winning coalition proposal may drive proposers to make more generous offers to all partners.

Studies on less-than-unanimous group decision rules with entitlements are scarce. For majority bargaining, Merkel and Vanberg (2019b) find all parties to receive a positive share of the surplus in over 80% of proposals, and the average offer reflects the order of contributions.² Baranski (2016) applies majority bargaining to divide a surplus whose production relies on a voluntary contributions mechanism. He also observes few minimum winning coalitions; the modal allocation is a grand coalition, where partners with higher contributions obtain higher shares.

² On the other hand, in a further study of the majority rule, where entitlements are not earned but derived from disagreement payoffs, Merkel and Vanberg (2019a) find between 40 and 60% minimum winning coalitions, implying that many individuals end up with empty hands.

In these experiments, fairness motives follow the “equity principle” (Konow 2003), and they seem to explain the large number of grand coalition outcomes.³ If fairness plays such an important role, then one would expect strategic behaviour to be overruled by moral property rights not only under the majority rule but also under *any* decision rule. In particular, we should observe a large number of grand coalitions respecting entitlements also under the dictator rule. If, instead, strategic behaviour is sufficiently important, we expect outcomes ignoring entitlements to be more frequent in the dictator treatment because the majority rule still requires the approval of some coalition partner. The dictator game is a useful benchmark for disentangling a preference for respecting entitlements from a mere necessity because a proposer can refer to moral property rights or legal property rights for his decision without fear of rejection by the responders.⁴

Evaluating moral property rights is not straightforward because there are several competing fairness norms and the context of *subjective* entitlements brings in further ambiguity as to which norms to apply. The goal of our study is not to evaluate outcomes regarding their closeness to precise fairness norms. Instead, we want to assess the fundamental role of moral property rights under different bargaining rules. To include different fairness views, we allow for a large range of outcomes that may be interpreted as respecting entitlements. In fact, it seems easier to say which outcomes one would certainly *not* expect if moral property rights are respected: most people would prefer to abstain from a partnership if they knew they would obtain a share of zero or close to zero after making a costly contribution. Therefore, the first measure we use in evaluating the role of entitlements is the occurrence of such “extreme” proposals, in which no more than 10% of the surplus is assigned to partners whose consent is not needed under the respective rule. Our second and third measures for the role of entitlements then refer to all non-extreme proposals, i.e., allocations assigning a share of more than 10% to each partner. We assess whether a minimal standard of *others’ entitlements* is respected in such proposals by considering an ordinal comparison of receivers’ entitlements. One measure for others’ entitlements is based on known fairness norms, while the other is based on subjects’ own fairness views. We compare behaviour under the two decision rules using the three measures described, and we compare behaviour over time in order to allow for some learning under both rules.

Only about one third of individuals respect entitlements independent of the decision rule and their level of experience. The majority, however, ignores others’ entitlements when agents contribute different amounts. This happens even though we use coarse measures for entitlements, which include a large range of possibilities regarding the definition of others’ entitlements. Furthermore, entitlements are increasingly ignored with experience. The share of extreme outcomes increases over time to over one third under both division rules. Minimum winning coalitions are almost always addressed to the partner who has contributed the same amount as the proposer. Thus, entitlements are also ignored in the choice of a coalition partner under majority rule. Overall, respecting entitlements is, thus, interpreted as a necessity rather than a preference.

3 Discussing different ideas of justice, Konow (2003) interprets the “equity principle” as one in which resources are distributed proportionally to effort or other variables under agents’ control. Note that this principle does not imply a unique fairness norm in our context.

4 In fact, dictators have been found to act more morally, thus not exploiting the strategic possibilities of their position, possibly because they obviously cannot shift the blame for selfish decisions (Dana et al. 2007, Falk and Szech 2013, Bartling and Fischbacher 2012). In our context, we can investigate if they actually respect their partners’ relative entitlements, or just offer them some small amount in order not to seem entirely selfish.

Over time, an individual's likelihood for an extreme proposal increases with past observations of extreme outcomes under both decision rules. While strategic behaviour, such as proposing a minimum winning coalition, often takes some rounds of learning (see, e.g., Baranski and Morton 2020), the dictator rule has no room for strategic behaviour. If observing others' extreme proposals increases proposers' likelihood to offer extreme proposals themselves also in the dictator treatment, then learning includes not only a strategic but also a moral component. Learning about others' acceptance of outcomes ignoring entitlements not only reduces the risk of rejection of an extreme proposal in majority bargaining but also induces proposers to make extreme offers in the dictator treatment because they know others do so as well.

Finally, we conclude that increasing proposer power from a majority rule to a dictator rule does not decrease the significance of moral property rights accordingly. We observe similar and stable proportions of extreme proposals under both rules after some learning. Extreme offers do not prevail as behaviour overall, but are observed in a non-negligible part of the population. The majority of individuals respect entitlements to some degree by assigning shares exceeding 10% to each partner, but proposals do not generally support the equity principle.

The paper proceeds as follows. In section 2, we present the experimental design. Section 3 presents some relevant results from the literature and our hypotheses. Section 4 shows our results regarding the two division rules, behaviour over time, behaviour at the individual level and the determinants of extreme proposals. Section 5 concludes.

2. Experimental design

In our experiment, subjects first perform an individual real effort task, from which they earn points according to performance. These points are brought into a partnership, determining the size of the surplus, which is then to be divided amongst the partners according to a given decision rule.

For the real effort task, subjects are initially assigned to cohorts containing four individuals, within which they compete in answering 30 quiz questions.⁵ Subjects are then ranked within their cohorts according to the number of correct answers given and the two highest-ranked players earn 4 points (we refer to them as H-types), while the two lowest-ranked (L-types) earn 2 points.⁶ The points earned in the real effort task are a subject's contribution towards the joint surplus of a (newly created) partnership of three individuals, all of them coming from different cohorts of the quiz competition. We label the three partners *A*, *B* and *C*, and the size of the jointly created surplus is given by $S = \text{points } A \cdot \text{points } B \cdot \text{points } C + 12$, which is then available for division amongst the three partners. We chose this non-linear production function to create subjectivity in entitlements. This subjectivity is further enhanced by having subjects earn points from the real-effort task in different competitions of cohorts and, due to the task itself, in which luck may also partly determine a successful ranking.

Our treatment variation is the rule regarding the division of the surplus. Either a dictator game or a majority bargaining game is played to obtain a final division. In both treatments, individuals play 10 games under the same rule. In each of the 10 games, individuals are

5 The real effort task follows that of Gantner et al. (2016), but with the appropriate adjustments because we decided to have only two (rather than three) possible contribution types.

6 In case of a tie, the rank is randomly assigned.

randomly rematched into new three-player partnerships (groups). The division rule and individuals' contributions (points earned from the real-effort task) are fixed throughout the 10 games, but the size of the surplus may change because of changing partners. We have four possible group compositions regarding the partners' contributions, with the respective surplus in parenthesis: LLL (20), HLL (28), HHL (44) and HHH (76). No individual is matched with the same two partners more than once.⁷

We use the strategy method to collect complete division proposals.⁸ In the dictator treatment, all subjects are asked how they would divide the available surplus in the current game among the three partners if they were the dictator. One partner is then randomly selected as the dictator, and the corresponding proposed allocation is implemented. In the majority treatment, all subjects are asked to submit a proposal for division. The three proposals in a group are displayed to all partners, who then have to vote on whether they approve or reject each of them. After the voting, one partner is randomly selected as the actual proposer, and the voting on this proposal is implemented. If it was approved by at least two of the three partners, the division is implemented accordingly and the game ends. Otherwise, the surplus is reduced by 20% and the division game enters a new round: each player again submits a proposal for division of the now discounted surplus and the partners vote on each proposal; again, a proposal is selected randomly and the voting on that proposal is implemented. The process continues until a proposal passes, or until the 10th round passes without finding an agreement. In the latter case, all partners receive a payoff of zero for the current game. The rules of the game are common knowledge.

Furthermore, subjects' fairness views are elicited.⁹ This is done *ex interim*, i.e., after they are informed about the relevant division rule but before they know their contribution and the relevant surplus.

We ran five sessions for each treatment, each of them with 24 subjects; thus, we have 240 participants in total. Over all games, each subject submits at least 10 division proposals (in the majority treatment it can be more than 10 because the game enters another round of proposals if a suggestion does not pass).¹⁰ Table 1 displays the number of initial observations over group compositions and surplus in the two treatments.

The experimental sessions were programmed and conducted with z-Tree (Fischbacher 2007) at the Innsbruck EconLab for experimental economic research. Recruitment was done

7 The matching is explained in appendix B2.

8 The choice of the method (strategy vs. direct response) may make a difference when dealing with behaviour in “hot” versus “cold” emotional states (Brosig et al. 2003); however, our use of the strategy method is similar to the one studied in Oxoby and McLeish (2004), where no inconsistencies between strategy method and direct response in ultimatum game behaviour were found. We therefore do not expect the choice of the method to make a difference.

9 The wording was “Before you actually distribute the total amount we would like to ask you about your non-binding opinion on what you consider a fair distribution. Suppose you are member A of a group of three and you have scored 4 points. Member B has also scored 4 points. Member C scored 2 points. Hence, the total amount is $12 + 4 \cdot 4 \cdot 2 = 44$. What do you consider a fair distribution of the total amount?” This was asked for the six possible combinations of own contribution type (H/L) and different sizes of the surplus.

10 Because subjects are informed about the random selection of two games for real payout, and they are reminded in each game of their earned contribution points, we see no reason for earned entitlements to lose importance over the 10 games.

TABLE 1

Distribution of initial proposals over treatments and groups

Group	Surplus	No. of observations in dictator	No. of observations in majority	Total
LLL	20	240	240	480
HLL	28	360	360	720
HHL	44	360	360	720
HHH	76	240	240	480
Total		1,200	1,200	2,400

using ORSEE (Greiner 2015). At the end of the experiment, two of the 10 games were randomly chosen and subjects were paid out their earnings from these two games in euros at a rate of 1:1. The duration of a session was 70 to 90 minutes, and average earnings were 17.10 euros.

3. Relevant literature and hypotheses

Standard theoretical predictions rely on the assumption that all actors are exclusively interested in their own material payoff. For the predicted formation of minimum winning coalitions in majority bargaining, substantial experimental evidence can be found in the absence of entitlements (Frechette et al. 2003, Diermeier and Morton 2005, Diermeier and Gailmard 2006, Miller and Vanberg 2013, Baranski and Morton 2020). On the other hand, previous research on two-person dictator games in the absence of entitlements has shown evidence for absolute decision power not being utilized to its full extent (Camerer 2003, List 2007, Engel 2011). According to Andreoni and Bernheim (2009), giving in the dictator game is not necessarily motivated by fairness concerns, but by a desire to signal one is not entirely selfish. Correspondingly, introducing more receivers does not necessarily lead to larger amounts given (see Fisman et al. 2007, for three-player dictator games).¹¹

Introducing entitlements plays an important role not only for elicited fairness views of outside observers and stakeholders (e.g. Gächter and Riedl 2006, Gantner and Kerschbamer 2016) but also for actual divisions obtained through unanimous bargaining in bilateral (Karagözoglu and Riedl 2015) and multilateral settings (Gantner et al. 2016). Despite a clear self-serving bias towards own claims, the shares of others typically reflect their relative entitlements.

To our knowledge, Merkel and Vanberg (2019b) conduct the only study of majority bargaining with earned entitlements, and they observe a large number of grand coalitions.¹² Baranski (2016) also studies majority bargaining, but here subjects are assigned initial endowments, from which they choose to contribute towards the production of the surplus. A direct comparison is difficult, because contribution levels are voluntary and objectively

11 In two-person games, subjects in the role of dictators give away about 20% of the endowment, while in three-person games it is 25%. Furthermore, 41% of dictators keep at least 95% of the endowment in two-person games, compared with 50% of dictators in three-person games.

Overall, the two “others” are treated symmetrically by the dictator, which reflects their similar position from the dictator’s point of view.

12 When subjects do not earn entitlements but are assigned disagreement payoffs, the observed number of all-way splits is smaller (Merkel and Vanberg 2019a). In a similar setting, Miller et al. (2018) find most subjects aim for minimum winning coalitions.

measurable.¹³ This is not the case in our experiment, where effort is subjective; the reward for effort (the points earned) may be due in part to luck and contributions are not voluntary. This may result in different fairness judgments, even if all partners agree on the necessity of a fair outcome.

In a dictator setting, earlier experiments on two-player games found dictators keep larger amounts when they earned their role in the game (Hoffman et al. 1994, Oxoby and Spraggon 2008). Cherry et al. (2002) find almost no sharing when only dictators earn the endowment, interpreting bargaining over earned wealth as making “the (ab)use of the rules of the game” more relevant.¹⁴ When receivers have exerted effort, dictators share more (Ruffle 1998, Cappelen et al. 2007). For multi-player dictator settings with entitlements, comparisons regarding the entitlements of receivers are possible. Stoddard et al. (2014) consider an outside dictator allocating exogenously fixed shares to subjects who made voluntary contributions towards a common pool, and their focus is, therefore, on efficient contribution. When outside dictators allocate shares on the basis of relative contributions rather than assigning fixed shares, Stoddard et al. (2021) find that contributions increase. In Barr et al. (2015; 2016), one player can redistribute endowments of all players, thus acting as a dictator. When initial endowments (fixed by the experimenter) are earned, they are more likely to be acknowledged as entitlements than when they are randomly assigned. While this is an important reference for the case of objective entitlements, our experiment does not contain objective entitlements, but only an ordinal comparison of individual contributions towards a joint surplus. We study whether the decision rule regarding the division of the joint surplus affects the acknowledgment of subjective entitlements.

To study the role of bargaining power in games with entitlements, the cost of rejection (Rodriguez-Lara 2016) or the punishment opportunity (Ridinger 2018) has been varied in two-player ultimatum games with different contributions. Rode and LeMenestrel (2011) consider the division of a surplus to which only one of two players has contributed, varying decision power by using either a dictator rule or a unanimity rule. Their results show more power leads to higher gains, and entitlements based on contributions are, thus, not generally respected. This confirms earlier findings of a trade-off between self-interest and fairness (Babcock and Loewenstein 1997, Messick and Sentis 1997).

We formulate our hypotheses taking into account theoretical predictions and results from the literature on fair division. For the (standard) theoretical prediction of outcomes—assuming individual money maximizing behaviour—entitlements do not play a role, because any previous effort can be considered as sunk cost. We mainly use the qualitative properties of the equilibrium predictions as a benchmark, which correspond to keeping the entire available amount in the dictator game, and the proposer sharing the entire surplus with only one of the two partners in the majority bargaining game.¹⁵

13 In a similar setting with voluntary contributions, Baranski and Cox (2019) focus on communication among bargainers, but irrespective of the communication possibility, they observe a large number of proportional sharing.

14 Similar results are obtained by Carlsson et al. (2013) in two-player charity games: the proportion of players who share their earned endowment and the amount shared decrease when the decision maker earns the money.

15 In the literature, the stationary subgame perfect equilibrium is typically considered for the majority bargaining game, where the proposer offers zero to one of the two partners, and to the coalition partner he offers the so-called continuation value, i.e., the amount this partner

To evaluate the role of entitlements for bargaining outcomes, not only allocations following the theoretical predictions can be considered as ignoring entitlements. Because all partners have made costly contributions to the provision of the surplus, any “extreme” allocation leaving a share close to zero to any partner would not respect entitlements. We define “extreme” proposals as those in which the proposer assigns at most 10% of the surplus to the partner(s) whose approval is not necessary for an agreement. This includes all proposals in the dictator game where the dictator keeps at least 80% and each partner receives at most 10%, and all proposals in the majority game where one partner receives at most 10% (allowing for any possible division of the remaining 90% between proposer and coalition partner).¹⁶ Consistent with our definition of extreme outcomes, we consider all-way splits as allocations in which each partner obtains a share of at least 10%.¹⁷

Our first research question concerns the occurrence of such extreme proposals. Assuming that proposers and responders in both treatments have similar chances of being fairness-oriented (because of random assignment to the treatments), there is a non-zero probability that responders reject an extreme proposal in the majority treatment. Proposers are expected to take this into account, and fewer extreme proposals are expected compared with the dictator treatment, where rejections are impossible.¹⁸

Considering outcomes over time, subjects are not expected to become inherently more selfish or more fair under the standard assumption of stable preferences. This holds for both treatments. However, their behaviour may change as a result of learning about the environment.¹⁹ The setting in the majority treatment is more complex due to considerations

expects to receive in case the current proposal is rejected, to the other partner. If we assume that all players use the same strategy, the proposer would keep a share of 73% for himself and offer 27% to one of the two partners. Denoting the share offered to the coalition partner by s and using discount factor $\delta = 0.8$, we have $s = \frac{1}{3} * 0.8 * (1 - s) + \frac{1}{3} * 0.8 * s$, implying $s = 0.8 * \frac{1}{3} = 0.27$.

- 16 These allocations where partners receive comparably small amounts are similar to the “pittance coalitions” identified in Diermeier and Morton (2005), except that, in our case, subjects were not constrained to propose integer allocations; hence, the motivation behind such allocations may differ.
- 17 In Baranski and Morton (2020), an all-way split is defined as a proposal in which all members receive shares greater than or equal to 5% of the surplus to be divided. Given our focus on whether entitlements are respected, we consider 10% a more appropriate limit to identify a significant share and therefore refer to such allocations as all-way splits, in a slight abuse of the term.
- 18 As found in Bolton and Brosig-Koch (2016), strategic uncertainty regarding the acceptance threshold of responders makes predictions in multilateral bargaining difficult.
- 19 One may object that our subjects may collect more information in the majority treatment because they see others’ current proposals before they vote on each of them, while in the dictator treatment, they see only the selected dictator’s proposal. Note, however, that subjects have no information regarding the acceptance of the two proposals that are not selected. Feedback regarding the outcome is given only for the randomly selected proposal in both treatments.

of obtaining at least one partner's approval.²⁰ In the dictator treatment, this consideration does not play a role.²¹

HYPOTHESIS 1. (A) *We expect to see more extreme proposals in the dictator treatment compared with the majority treatment.* (B) *Over time, we expect the increase in the number of extreme outcomes to be larger in the majority treatment.*

Our second research question concerns the respect for others' entitlements among all-way splits. The two corresponding measures we use below are defined very broadly in order to include several fairness standards, and they take into account the known self-serving bias of a proposer. That is, we focus on *others' entitlements* and compare these in a relative manner, evaluating them on the basis of either *known fairness norms* or their relative shares as stated in proposers' elicited *own fairness views*.

Expecting a larger number of extreme proposals in the dictator treatment implies that there will be fewer all-way splits. However, this does not necessarily imply that more proposals actually respect entitlements in the majority treatment because this depends on how many all-way splits ignore entitlements. On the other hand, we have no reason to expect differences across treatments in this regard, and we, thus, remain with the expectation that more proposals respect entitlements in the majority than in the dictator treatment. If a proposal in the majority treatment respects entitlements, this may be due to own fairness preferences or the necessity to take into account the assumed preferences of the responders. The latter is not expected to play a role in the dictator treatment because of the rules of the game. Other motives for respecting entitlements, such as creating an image of oneself that seems fair to others, are expected to be independent of the division rule. Over time, if subjects learn to behave strategically and propose extreme offers more frequently in the majority treatment, this may reduce the number of proposals respecting entitlements for a similar reasoning.

HYPOTHESIS 2. (A) *Among all-way splits, we expect to find more proposals that respect entitlements in the majority treatment compared with the dictator treatment.* (B) *Over time, we expect the proportion of all-way splits that respect entitlements to decrease in the majority treatment, while we expect no change in the dictator treatment.*

Our third research question regards the effect of the proposer's type on observed proposals: the proposer's relative contribution may affect the likelihood of proposing an extreme outcome and the choice of the coalition partner in the majority treatment. Given a fixed surplus for division, the possible gain from an extreme allocation compared with an all-way split that respects entitlements is relatively larger for an L-type contributor than for an H-type contributor in both treatments. L-types are, thus, expected to be more likely to propose extreme allocations.

HYPOTHESIS 3. *We expect that L-type proposers are more likely to propose an extreme division than H-type proposers.*

20 There is substantial experimental evidence that minimum winning coalitions increase with experience in majority bargaining without entitlements (see, e.g., surveys by Palfrey 2016, Baranski and Morton 2020) and Merkel and Vanberg (2019a) observe more extreme outcomes with experience in majority bargaining with entitlements.

21 One may argue that, if past observed proposals signal preferences for fairness, this may create social pressure to behave fairly; but because individuals are rematched in a new group every period, this seems unlikely. In addition, it should not differ between the treatments.

Regarding the choice of the coalition partner in the majority treatment, different considerations point into different directions. First, theory predicts that the “cheaper” coalition partner (i.e., the one whose continuation value is smaller) is chosen for a minimum winning coalition. While contributions are considered a sunk cost and there is, thus, no cheaper coalition partner from a theoretical point of view, possible fairness concerns and aspirations give different indications. A partner who contributed more may also be more likely to expect a larger share. Therefore, inviting the L-type partner into a coalition may seem to be the “cheaper” option. The preferred coalition partner would then be independent of the proposer’s type. Second, individuals may have a preference to share the surplus with the partner who “deserves” it most. This would be the H-type partner because of his larger contribution to the surplus. Again, the preferred coalition partner would be independent of the proposer’s type. Third, it is also possible that identity plays a role. In this case, proposers would choose a coalition partner who contributed the same amount as they did. In this case, L-type contributors would choose L-types as coalition partners and H-types would choose H-types. Our experiment was not designed to test these different motives, but the data will allow us to gain some insight regarding which of the three seems to be dominant. In the dictator treatment, the dictator is not expected to distinguish between the two receivers.²²

4. Results

4.1. Overview and the role of extreme proposals

For a clean comparison between proposals in dictator and majority treatment, we will mainly discuss proposals in round 1. These proposals correspond to final outcomes in the dictator treatment. In the majority treatment, a proposal needs approval by two of the three partners in order to be implemented as final outcome, and we find 89.5% (1074/1200) of all proposals in round 1 are accepted.²³

A first comparison regarding the theoretical prediction shows no significant difference between the two division rules: we observe 16.3% of proposers keeping everything in the dictator treatment and 21.5% in the majority treatment proposing a minimum winning coalition (Wilcoxon rank sum test: $p = 0.47$).²⁴ In terms of bargaining behaviour in the majority treatment, we observe similar proportions of rejections when a minimum winning coalition is proposed compared with all other proposals (11.3% vs. 10.6%, χ^2 -test: $p = 0.74$). Proposing a minimum winning coalition is therefore not considered unacceptable behaviour in our experiment.

Figure 1 displays the outcomes separated by treatment and by group composition. We pool observations from homogeneous groups (LLL and HHH), in which all partners contribute equally, and we pool observations from the heterogeneous groups (HLL and HHL),

²² Fisman et al. (2007) found that the two receivers are usually treated symmetrically.

²³ Focusing on proposals of round 1 avoids possible dependence on bargaining behaviour in later rounds of the majority treatment. Because a random draw decides which of the three partners is actually in the role of proposer, all proposals in round 1 are potentially binding.

²⁴ All non-parametric tests are based on 10 independent observations per treatment. We had five sessions of 24 subjects per treatment, each consisting of two subgroups (of 12 subjects each) which did not interact with each other. We use the corresponding mean for one such subgroup as one independent observation.

in which partners contribute different amounts. In heterogeneous groups, partners may contribute the same (from an H-type proposer's point of view in HLL groups and for an L-type proposer in HHL groups), or they may contribute different amounts. For the latter, we indicate in the figures which responder is of the same type as the proposer. The theoretical predictions would imply observations at the proposer's full-share vertex in the dictator treatment (top of the triangle), while in the majority treatment a minimum winning coalition between the proposer and one of the two partners would imply observations either at the proposer's edge of the triangle (excluding receiver 1) or receiver 1's edge (excluding receiver 2).

We observe a large number of outcomes at or around the equal split (midpoint of triangle) for all group compositions. Figure 1(a) displays the outcomes for homogeneous groups under the dictator rule. Virtually all deviations from the equal split are found along a suggested vertical line towards the proposer's full-share vertex. This line represents divisions in which the two receivers receive the same amount, but the proposer takes

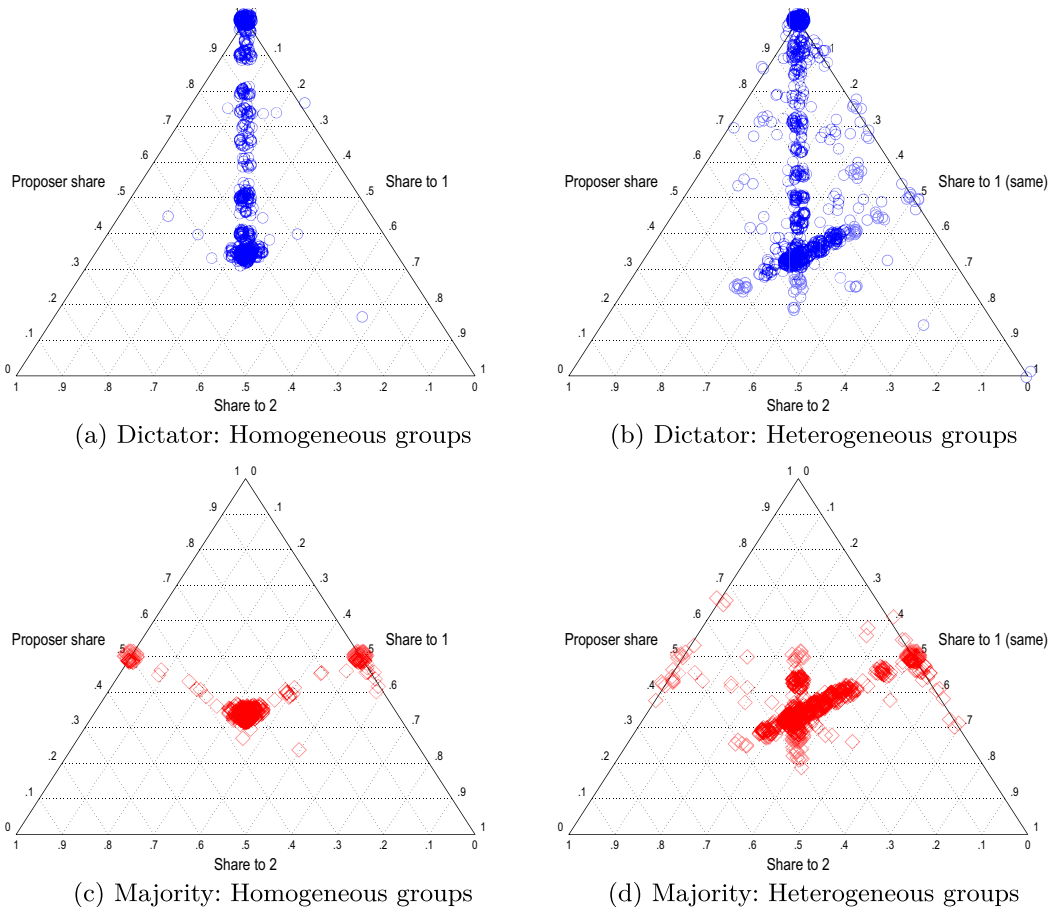


FIGURE 1 Outcomes in dictator and majority treatments

NOTES: These plots show the relationship between the shares of the three players in a two-dimensional graph, where the horizontal lines display the increments for the proposer's axis, the positively sloped lines correspond to the increments for receiver 1 and the negatively sloped line to receiver 2. When one of the two receivers in a heterogeneous group is of the same type as the proposer, his share is always displayed as "share to 1."

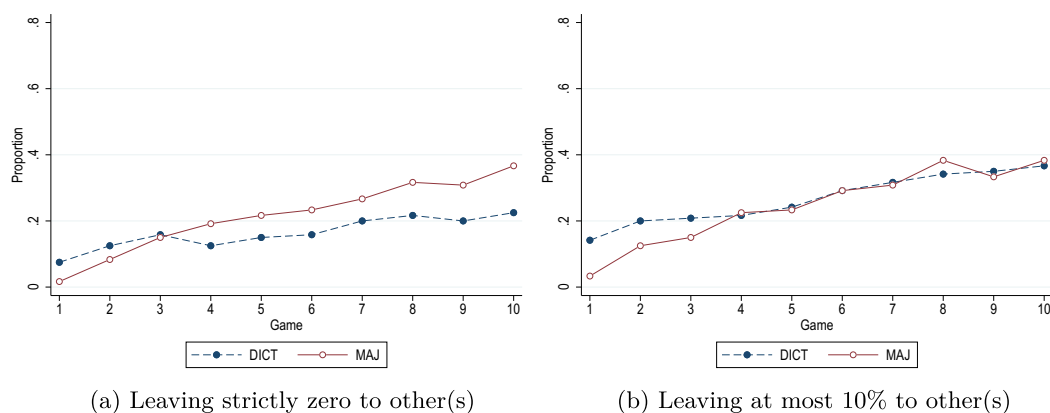


FIGURE 2 Proportions of extreme outcomes

a larger share.²⁵ For heterogeneous groups in the dictator treatment (figure 1(b)), we find more deviations from the equal split, most of them indicating allocations in which the proposer either offers the same amount to the two partners (along the vertical line), or different amounts to the two receivers (along a positively sloped line). Figures A1(a) and A1(b) in appendix A confirm the conjecture that in these deviations from the equal split the two receivers are offered the same amount when they are of the same type (two L-type receivers in HLL or two H-type receivers in HHL), and they are offered different amounts when they are of different types (one H-type and one L-type receiver in both HLL and HHL).

For outcomes under the majority rule, figure 1(c) shows that almost all observations for homogeneous groups are either closely around the equal split or on the edges. For heterogeneous groups in the majority treatment, figure 1(d) shows deviations from the equal split towards increasing shares of two players at the cost of the third. Most of these deviations benefit the proposer and one of the receivers (to the right of the equal split), but there are also allocations in which the two receivers obtain larger shares than the proposer (to the left of the equal split), suggesting divisions according to relative contributions (see also figure A1(d) in appendix A).

To investigate behaviour over time, we divide our observations into “early” and “late” games: games 1 to 3 and games 8 to 10 (see also figures A2 and A3 in appendix A).²⁶ First, we observe an increase in outcomes corresponding to the theoretical prediction for late games. In the majority treatment, the proportion of minimum winning coalitions rises from 8.3% in early games to 33.1% in late games (Wilcoxon matched-pairs signed rank test (WSR): $p < 0.01$); see also figure 2(a). In the dictator treatment, the proportion of dictators keeping the entire amount rises from 11.9% in early games to 21.4% in late games (WSR: $p = 0.08$). Second, a comparison between late games in the two treatments shows that outcomes consistent with the theoretical prediction occur more frequently in the majority treatment (one-sided t-test, $p = 0.10$).

²⁵ In the dictator treatment, the two receivers receive the same amount in 64% of all games.

²⁶ This is the smallest number for early and late games where we have all possible group compositions represented.

We are particularly interested in the observation of extreme proposals, as defined in section 3.1. Over all games, there is no difference in the occurrence of extreme proposals between the two treatments (majority: 24.7%; dictator: 26.8%; Wilcoxon rank sum test: $p = 0.76$). Over time, however, we observe a significant increase in extreme proposals for both treatments (see figure 2(b)): In the majority treatment, the increase is from 10.3% in early games to 36.7% in late games (WSR: $p < 0.01$); in the dictator treatment from 18.3% in early games to 35.3% in late games (WSR: $p < 0.01$). While in early games the difference in the occurrence of extreme outcomes between the treatments is significant (t-test: $p = 0.06$), this difference vanishes for late games ($p = 0.42$).

These findings do not correspond to our expectations formulated in hypothesis 1. We expected an increase in extreme proposals only for the majority treatment. Instead, we observe a similar increase also in the dictator treatment. These findings are confirmed by a panel logit regression (see table A1 in appendix A). After gaining some experience, more than one third of our subjects in both treatments use (almost) as much bargaining power as the procedure allows for, showing no consideration for entitlements.²⁷

Result 1: (A) Overall, the share of extreme proposals does not differ between majority and dictator treatment. (B) Over time, the occurrence of extreme proposals increases in both treatments. In late games, more than one third of individuals propose extreme outcomes under both division rules, thus showing no concern for entitlements.

4.2. The role of others' entitlements

To understand the role of entitlements, we do not want to refer to a precise count of allocations that coincide with known fairness norms. Such a count would, for example, not allow for the proportional norm to include allocations in which the proposer claims more than a share proportional to his/her contribution. However, proposers' self-serving bias has already been shown to play an important role in previous experimental studies on fair division.²⁸ Acknowledging the self-serving bias, we focus on an ordinal comparison of receivers' entitlements (labelled "others" entitlements') to assess the fundamental role of entitlements.²⁹

Furthermore, to incorporate different possible reference points subjects may refer to when considering others' entitlements, we define two measures. The first measure is based on known fairness norms, the second on subjects' own fairness views.³⁰ Using subjects' own fairness assessments as a reference for others' entitlements avoids imposing an external

27 One may argue that excluding some partner (almost) entirely from the division is only one aspect of measuring a self-serving distortion, while another aspect would be to consider the share the proposer keeps to himself. Figure A4 in appendix A shows that the mean share kept by the proposer over all outcomes is larger in the dictator treatment in each of the 10 games ($p < 0.01$ for each game). Furthermore, the dictators' mean share increases steadily over time, from about 48% in early games to 68% in late games, while the proposer's mean share in the majority treatment changes little.

28 Proposers' fairness views display a significant self-serving bias in the presence of entitlements by claiming a larger share than others would assign to them (Gantner et al. 2016), and furthermore, the application of norms is used in a self-serving way (Feng et al. 2013, Rodriguez-Lara and Moreno-Garrido 2012, Ubeda 2014).

29 It is debatable if our definition captures a sufficient condition for fairness in outcomes. As we will show, even this weak condition is frequently violated in all-way splits.

30 Fairness views were solicited ex interim, i.e., when subjects were already informed about the division procedure, but not yet about their individual contributions and available surplus.

fairness norm on behaviour. Both measures are coarse because of their ordinal character for evaluating others' entitlements, but they help us to identify how the two division rules compare with respect to some minimal requirements for the role of entitlements.

We now use the complementary set to the previously discussed extreme proposals for the role of entitlements, i.e., we apply our two measures in this section only to all-way splits in which each partner is assigned more than 10%.³¹

4.2.1. A measure for others' entitlements based on fairness norms

The most prevalent fairness norms in a division context are the egalitarian norm and norms taking agents' contributions into account, such as the proportional or libertarian norm.³² We define others' entitlements based on fairness norms to be respected if: (i) the ordinal comparison of the receivers' shares in a proposal is consistent with the order of their contribution points or (ii) receivers obtain the same amount.³³ This definition includes all divisions consistent with the egalitarian, proportional and libertarian norm, but it further includes divisions in which a proposer's self-serving bias distorts the allocation with respect to the contribution order if all partners' shares are considered.

Figure 3 displays the proportions of all proposals that respect entitlements based on fairness norms, separated by treatment and over time. Because of the importance of the egalitarian norm, we report equal-split proposals separately from those respecting others' contribution order; note that for homogeneous groups the latter include the former, while this is not the case for heterogeneous groups. We further identify the proportion of "inconsistent" proposals, i.e., all-way splits that ignore entitlements based on fairness norms, and the class of extreme proposals. Overall, the proportion of proposals respecting others' entitlements based on fairness norms does not differ between treatments (majority: 60.1%, dictator: 56.2%; t-test: $p = 0.42$). An important observation is that entitlements are increasingly ignored with experience: under both decision rules, offers that respect others' entitlements based on fairness norms occur more often in early than in late games, even though the difference is significant in only the majority treatment (majority: early 72.2%, late 50.8%, WSR: $p = 0.01$; dictator: early 61.4%, late 51.6%, WSR: $p = 0.25$). This trend is aggravated for heterogeneous groups, where under both rules, entitlements are respected in less than 50% of the late games (dictator: 65.0% in homogeneous vs. 39.2% in heterogeneous groups, WSR: $p < 0.01$; majority: 57.1% vs. 43.0%, WSR: $p = 0.01$). This observation

Therefore, subjects were aware of potentially different entitlements and different group compositions when providing their own fairness views.

- 31 For example, a division assigning less than 10% to one partner is considered to entirely ignore the entitlements of this partner, even if the remainder is allocated as a 50–50 split between two partners and, thus, seems generous towards the favoured partner. Such a division selectively respects only *some* entitlements.
- 32 The proportional norm divides the entire surplus proportionally to each agent's contribution; the libertarian norm divides the part of the surplus that can be attributed to agents' contribution in a proportional way, while the remainder (i.e., the constant of 12 in our function determining the surplus S) is divided equally among agents.
- 33 In order to take into account possible rounding of numbers, we allow for a difference of at most 1 point of the surplus in the proposed shares to the two partners in homogeneous groups and for a difference of at least 1 point of the surplus in the proposed shares in heterogeneous groups.

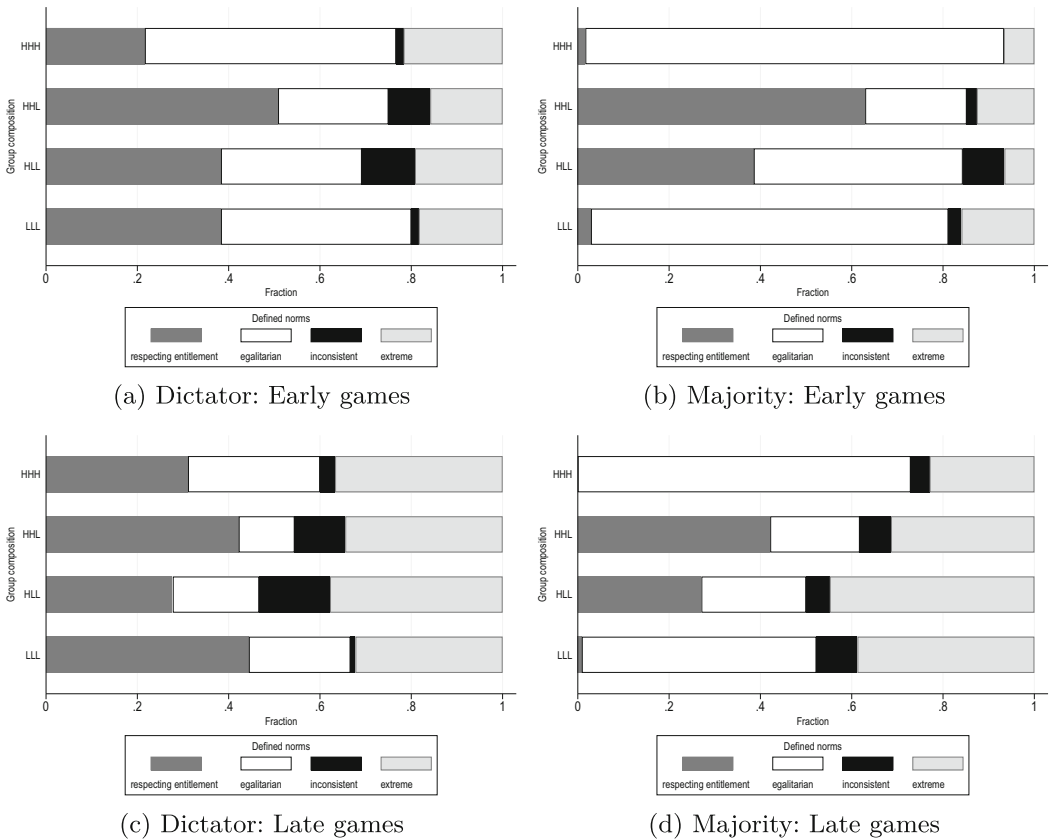


FIGURE 3 Respecting entitlements derived from fairness norms: Early vs. late games
NOTE: For homogeneous groups, all egalitarian proposals also respect others' contribution order, but not vice versa.

shows that (perceived) differences in entitlements not only allow for a multiplicity of fairness standards but also seem to induce a majority of subjects to ignore relative entitlements entirely.

A notable difference between the two division rules occurs in homogeneous groups. In the majority treatment, proposals respecting entitlements based on fairness norms are almost all egalitarian, while in the dictator treatment only about half of them are egalitarian. For the other half, the proposer treats his partners equally, but keeps the larger share to himself. Proposals in the dictator treatment, thus, show a larger self-serving bias in this respect.

Result 2.1: *Using a measure for others' entitlements based on known fairness norms, we find no differences in the share of proposals respecting entitlements between majority and dictator treatment. In late games, entitlements are ignored in almost half of all games, and this is further aggravated for heterogeneous groups.*

4.2.2. A measure for others' entitlements based on own fairness views

Before we define our measure for others' entitlements based on subjects' own fairness views, we discuss these elicited fairness views. Figure 4 shows to which degree extreme proposals and the egalitarian norm play a role in subjects' fairness views. Furthermore, it displays the share of proposals following a (broadly defined) proportional norm that

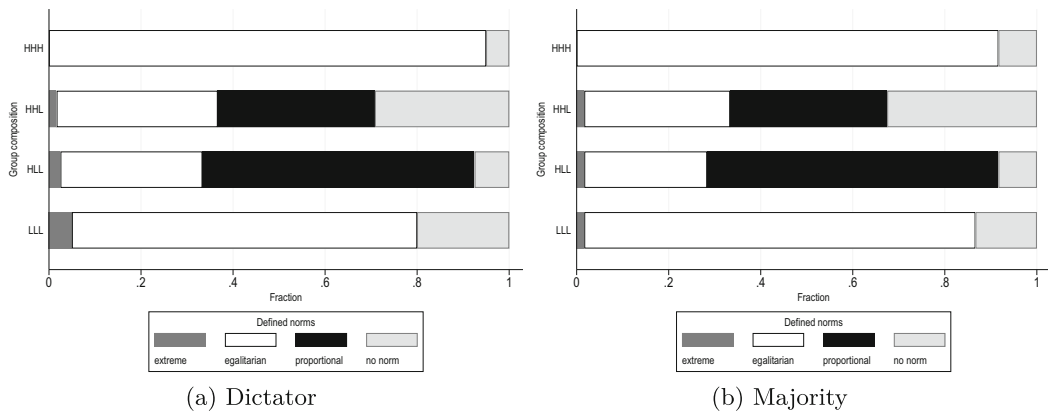


FIGURE 4 Norms represented in subjects' fairness views
NOTE: For homogeneous groups all egalitarian proposals are also proportional.

includes all divisions as long as they are consistent with the order of contribution points.³⁴ Because in homogeneous groups the egalitarian and proportional norm coincide, we assign the corresponding proposals to the egalitarian norm. Finally, all observations that do not satisfy the criteria for any of the three categories described are assigned to the class “no norm.”

Extreme outcomes play virtually no role in the fairness views under either division rule (majority: 1.3%; dictator: 2.1%, over all groups). Furthermore, fairness views do not differ significantly between the two treatments (χ^2 -test: $p = 0.40$).

Auxiliary result: *In subjects' fairness views, the proportions of extreme proposals, egalitarian proposals and proposals consistent with a broadly defined proportional norm do not differ between majority and dictator treatment.*

This result suggests that the general view people hold regarding the role of entitlements and fairness is independent of the actual procedure used to divide the endowment. Hence, if subjects' own fairness views determine whether others' entitlements are respected in the actual division, then it should not matter which of the two procedures is implemented.

For our second measure of entitlements, we define others' entitlements on the basis of fairness views to be respected if the ordinal comparison of shares to the two partners in a subject's proposal is consistent with the one in this subject's own fairness statement.

Figure 5 displays the proportion of all proposals respecting others' entitlements based on subjects' own fairness views, the proportion of extreme proposals and “inconsistent” proposals (classifying the remainder), separated by treatment and over time. A comparison between the majority and dictator treatment shows that, on average, others' entitlements are respected in a similar share of all proposals (majority: 65.7%, dictator: 68.5%, t-test: $p = 0.66$).

³⁴ Precisely, we count all proposals towards a proportional norm in heterogeneous groups if they assign any payoff from 4 to 8 to L and 12 to 20 to H in HHL, and from 6 to 12 to L and 16 to 19 to H in HLL. Numbers outside these intervals would interfere with the selfish or egalitarian norm, taking into account our allowed deviation of at most 1 point.

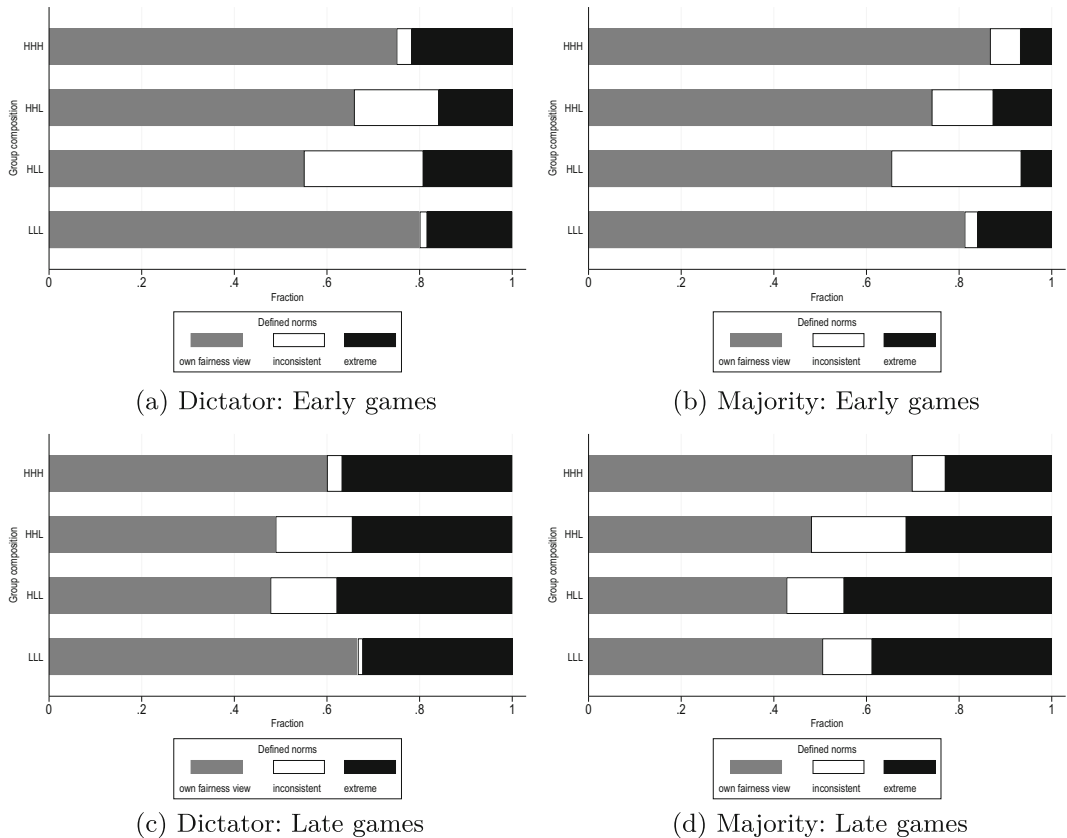


FIGURE 5 Proposals respecting others' entitlements derived from subjects' own fairness views

When comparing early and late games, we find the results are similar to those for entitlements based on fairness norms. Under both division rules, entitlements are respected more often in early compared with late games (majority: early 83.3%, late 55.8%, WSR: $p < 0.01$; dictator: early 72.8% vs. late 59.7%, $p = 0.02$). This trend is aggravated for heterogeneous groups, even though the differences between homogeneous and heterogeneous groups is significant only for the dictator treatment (dictator: 66.3% in homogeneous vs. 55.0% in heterogeneous groups, WSR: $p = 0.02$; majority: 57.1% vs. 52.5%, WSR: $p = 0.17$).

Result 2.2: (A) Using a measure for others' entitlements based on subjects' own fairness views, we find no difference in the share of proposals respecting entitlements between majority and dictator treatment. (B) In late games, entitlements are ignored in more than 40% of all games, and this is further aggravated for heterogeneous groups.

4.3. Determinants of the (missing) respect for entitlements

Having found no major differences in the role of entitlements under our two decision rules with different bargaining power, we now consider further factors that may explain the (missing) respect for entitlements and its decline over time.

We start by investigating whether the proposer's relative contribution may play a role. This could explain why entitlements are ignored more frequently in heterogeneous groups.

L-type proposers tend to propose an extreme allocation more often than H-type proposers in the majority treatment, but the difference is not significant (28.7% vs. 20.8%, t-test: $p = 0.12$); also in the dictator treatment we find no difference between proposer types (L-type proposers: 26.7% vs. 28.0%, t-test: $p = 0.44$). We therefore have to reject our hypothesis that L-types are generally more likely to propose extreme allocations.

In the majority treatment, the proposer's type may also play a role in the choice of the partner for a minimum winning coalition in the majority treatment. When the proposer faces different-type partners, the minimum winning coalition is directed to the same-type partner in the vast majority of extreme proposals (see figure A5 in appendix A); this holds for both H-type and L-type proposers.³⁵ Furthermore, this tendency becomes stronger over time.³⁶ Altogether, this is further evidence for neglecting the role of entitlements: proposers do not seem to generally consider that the partner who contributed more deserves to receive a larger share of the surplus; they also do not look for the "cheaper" coalition partner. Instead, proposers seem to choose a partner who is in a similar position.

Result 3: *A proposer's relative contribution does not affect the occurrence of extreme proposals. It does, however, affect the choice of the minimum coalition partner in the majority treatment: proposers largely prefer same-type partners.*

We continue by investigating the role of experience and learning for the occurrence of proposals respecting entitlements. This could explain differences in behaviour between early and late games. Throughout all 10 games, about one third of the subjects consistently offers proposals respecting entitlements in both treatments (dictator: 34.2%, majority: 35.0%). For these subjects, moral property rights overrule legal property rights, irrespective of the bargaining power and the possibility to learn about strategic behaviour. Extreme allocations are consistently proposed by 7.5% of subjects in the dictator treatment, while such behaviour is virtually nonexistent under majority rule (0.8%). For the remaining majority of the subjects, we observe a learning process over time, leading to an increasing number of extreme proposals in later games.

To examine possible determinants for the decreasing role of entitlements and the increasing occurrence of extreme proposals over time, table 2 shows the results of panel logit regressions with the dependent variable *extreme*, denoting the occurrence of an extreme proposal as defined in section 3.1. Our explanatory variables are whether the proposer has seen an extreme proposal in any of the previous games or rounds (*extreme seen*), whether he or she has made an extreme proposal in any of the previous games or rounds (*extreme self*), a dummy variable for whether the proposer faces partners of different types (*mixed others*) and a variable controlling for experience (*game*).

Having seen an extreme proposal from a partner in any game before (*extreme seen*) leads to a significant increase in the likelihood for an extreme proposal in the current

35 In the HHL groups, the H-type proposes to share the surplus with the other H-type in 90.2% of all extreme offers. In the HLL groups, the L-type proposes to share the surplus with the other L-type in 81.1% of all extreme offers; see also the random effects logit regressions in table A2 in appendix A.

36 A possible explanation for this finding is that proposers' behaviour is driven by group identity (Chen and Li 2009, Le Coq et al. 2015), when they have to find a coalition partner in the majority treatment. In the dictator treatment, excluding one of the partners is not expected and is, in fact, observed in only 3% of the cases.

TABLE 2

Extreme proposals explained: Random-effects logistic regression (standard errors adjusted for 10 clusters per treatment)

Dependent variable: Extreme proposal	(1) Game 2-5	(2) Game 2-10
Extreme seen	1.01* (2.26)	1.05* (2.19)
Extreme self	2.45*** (5.27)	1.82*** (4.65)
Game	0.03 (0.24)	0.10+ (1.94)
Mixed others	0.24 (0.73)	0.59* (2.09)
Dictator	0.51 (0.56)	-0.38 (-0.62)
Dictator × extreme seen	0.29 (0.52)	0.68 (1.09)
Dictator × extreme self	1.17+ (1.80)	0.41 (1.18)
Dictator × game	-0.34 (-1.50)	-0.03 (-0.45)
Constant	-3.52*** (-6.01)	-4.33*** (-8.34)
Observations	1,047	2,310

NOTES: *t*-statistics in parentheses. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

game in both treatments.³⁷ This finding helps us understand why we do not observe the expected increase only in extreme proposals in the majority but also in the dictator treatment. Learning in this environment does not only refer to understanding the more complex strategic behaviour under a majority rule, but it also relates to what others do and what seems to be morally acceptable in this setting. Having offered an extreme proposal in a previous game (*extreme self*) also increases the likelihood of an extreme proposal in both treatments. Because subjects' own history of extreme proposals allows them to infer whether such proposals are acceptable, the positive effect of *extreme self* shows that the lack of fairness in own proposals is tolerated by others and leads to reinforcement of such behaviour.³⁸

5. Conclusion

Our experimental study used two division procedures, the dictator game and the majority bargaining game, as representatives for the assignment of unequal distribution of power of decision rules. Our aim was to find out whether entitlements—constituting moral property

37 65% of the individuals have seen a selfish proposal by game 4; therefore, we include only games 2 to 5 in column (1); however, results do not change qualitatively when we look at games 2 to 10; see column (2).

38 After controlling for other factors such as *extreme seen*, experience has a small positive effect overall. This, however, is mainly driven by the majority treatment, as a post-estimation test shows no effect for the dictator treatment (Game + Dictator × game = 0, $p = 0.28$).

rights—can overrule the use of legal property rights, which are derived by the rules of the respective game.

Our main finding is that moral property rights are often not respected under both decision rules. Differences in the use of bargaining power disappear when we consider extreme proposals, which denote allocations leaving at most 10% for the partners whose consent is not needed for an agreement. After some games that allow for learning, subjects make extreme proposals in over one third of the observations in both treatments. We consider this definition of extreme proposals appropriate for assessing unfair behaviour because it is known that subjects in the dictator game like to signal that they are not entirely selfish by giving at least a small amount, but not because of motives of fairness (Andreoni and Bernheim 2009). In majority bargaining, proposers need a coalition partner by rule of the game, which already requires some sharing; hence, they may not feel obliged to give to a third partner, not even a small amount.³⁹

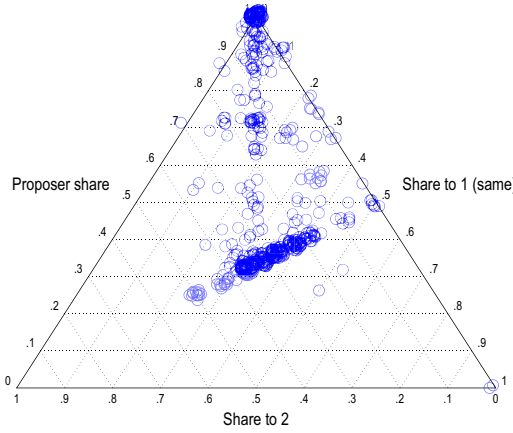
We also use two very coarse measures for the respect of entitlements among all-way splits, which take into consideration only the order of others' entitlements and, thus, allow for various fairness norms to be included. In early games, a large majority of outcomes respect entitlements in both treatments: about 75% of subjects proposals in the dictator treatment and more than 85% in the majority treatment respect the order of their partners' contributions or choose an egalitarian allocation. In late games, 40-50% of proposals are not consistent with these measures.

The observed development over time indicates that people learn about the procedure and the preferences of others. Extreme proposals are more likely to occur when such proposals have been observed in the past, suggesting people learn from others' behaviour that being selfish is “morally” acceptable. This is further supported by our observation that extreme proposals are no less likely to be accepted than proposals yielding an all-way split in majority bargaining. Increasingly extreme proposals are also observed in the dictator treatment, where no “legal” approval of others is needed.

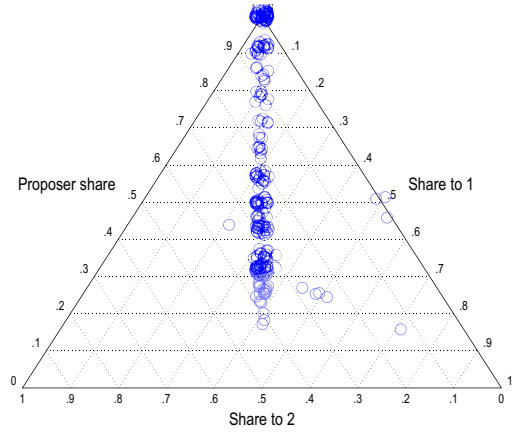
Our main conclusion is that entitlements may play a smaller role than what could be expected from previous experimental studies, in particular for more experienced stakeholders. While a vast majority of inexperienced subjects seems to respect entitlements, a closer look at a division problem that is more “complex,” in the sense that entitlements are earned but may be different from one another and not objectively comparable, shows that moral property rights do not ensure a minimally fair share for each stakeholder. Respecting others' entitlements may be much less likely than one would hope for.

³⁹ Such behaviour that aims to satisfy some minimal criteria for one's own moral self-image is also found in consumers' behaviour by Engel and Szech (2020): if agents feel that they fulfill one ethical aspect, this suffices for their moral self-image, and they use it as an excuse to ignore further related ethical aspects.

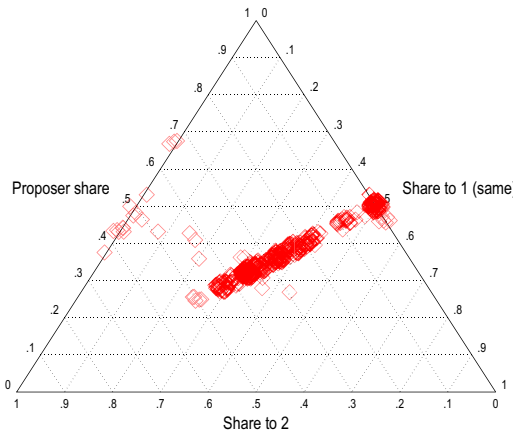
Appendix A: Additional figures and regressions



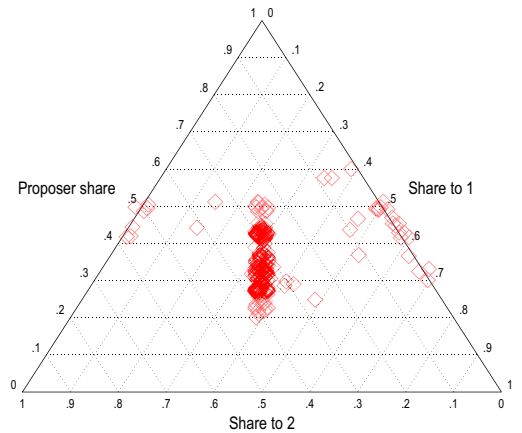
(a) Dictator: L-type proposers in HLL groups, H-type proposers in HHL groups



(b) Dictator: L-type proposers in HHL groups, H-type proposers in HLL groups



(c) Majority: L-type proposers in HLL groups, H-type proposers in HHL groups



(d) Majority: L-type proposers in HHL groups, H-type proposers in HLL groups

FIGURE A1 Outcomes in heterogeneous games in dictator and majority treatments

NOTE: These plots show the relationship between the shares of the three players in a two-dimensional graph, where the horizontal lines display the increments for the proposer's axis, the positively sloped lines correspond to the increments for receiver 1 and the negatively sloped line to receiver 2.

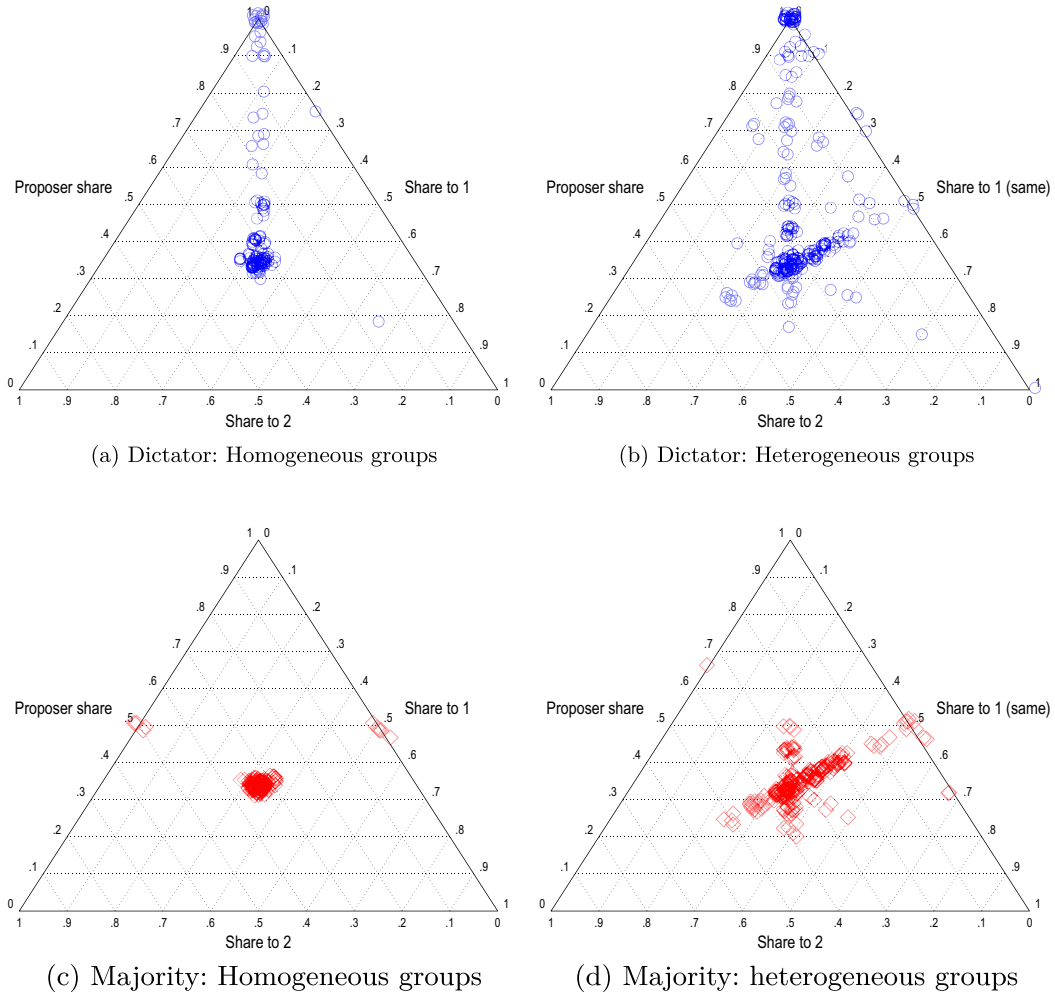


FIGURE A2 Outcomes in *early* games in dictator and majority treatments
NOTES: These plots show the relationship between the shares of the three players in a two-dimensional graph, where the horizontal lines display the increments for the proposer’s axis, the positively sloped lines correspond to the increments for receiver 1 and the negatively sloped line to receiver 2. When one of the two receivers in a heterogeneous group is of the same type as the proposer, his share is always displayed as “share to 1.” “Early” games indicate the games 1 to 3.

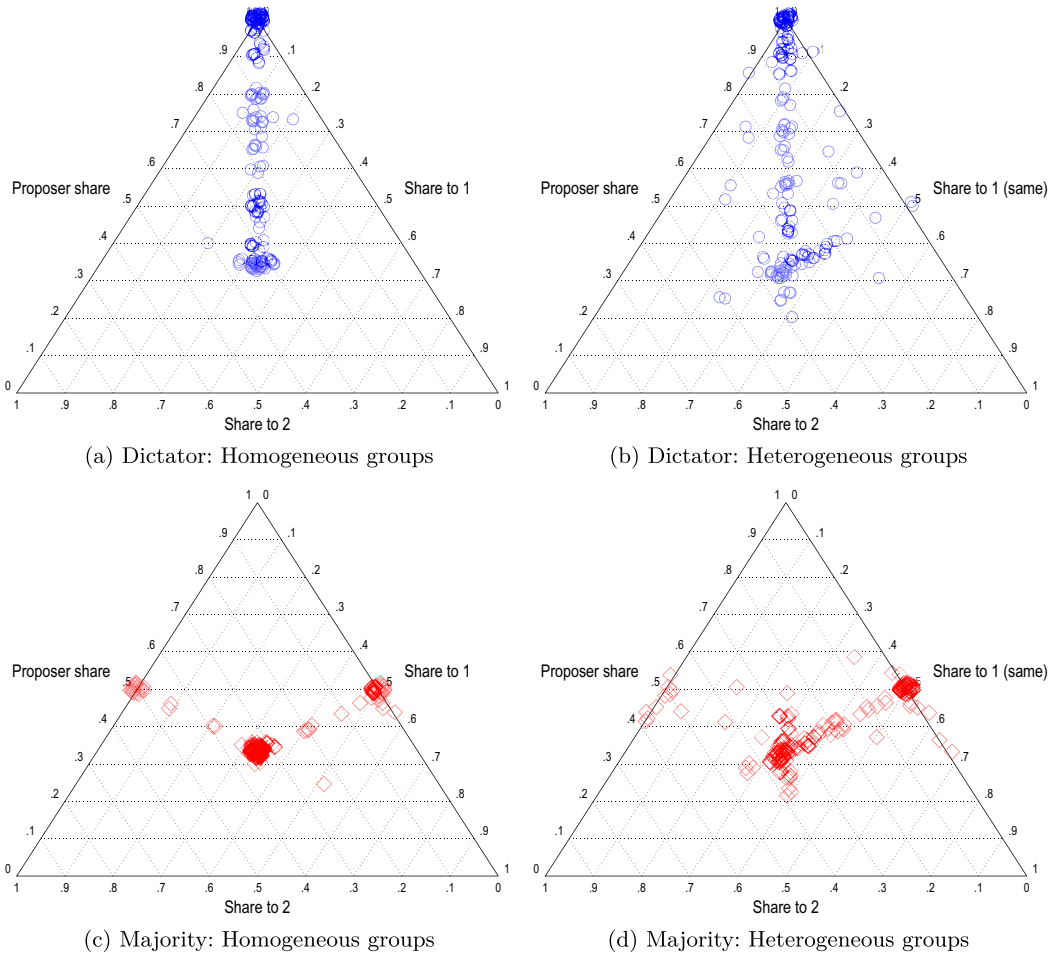


FIGURE A3 Outcomes in *late* games in dictator and majority treatments
NOTES: When one of the two receivers in a heterogeneous group is of the same type as the proposer, his share is always displayed as “share to 1.” “Late” games indicates games 8 to 10.

TABLE A1

Difference in extreme proposals over treatments over time

	(1)
Dependant variable: Extreme outcome	
Dictator	-0.09 (-0.11)
Early	-3.50*** (-5.74)
Dictator × early	1.50* (2.16)
Constant	-1.38* (-2.14)
Observations	1,440

NOTES: *t*-statistics in parentheses. ⁺ *p* < 0.10, * *p* < 0.05, ** *p* < 0.01, *** *p* < 0.001.

TABLE A2

Extreme proposals to the respective type

Dependant variable: Extreme proposal	(1) to L-type	(2) to H-type
L-type	5.94*** (4.11)	
H-type		5.94*** (4.11)
Constant	-3.59*** (-4.11)	-2.34* (-2.53)
Observations	143	143

NOTES: *t*-statistics in parentheses. ⁺ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

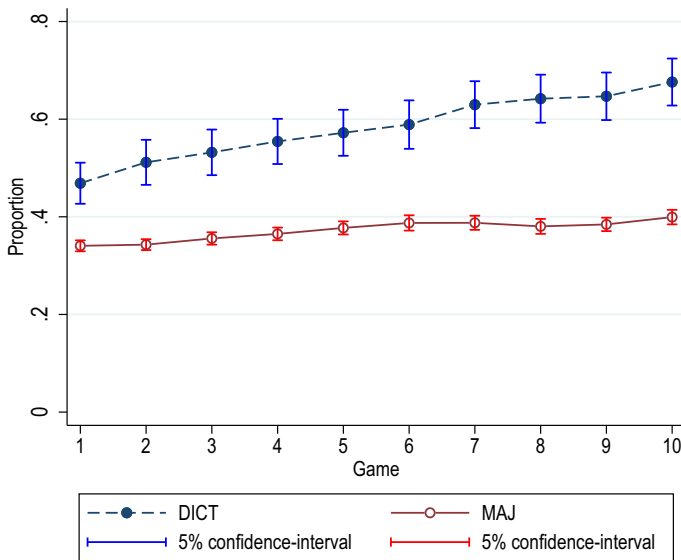


FIGURE A4 Proposer's share over time

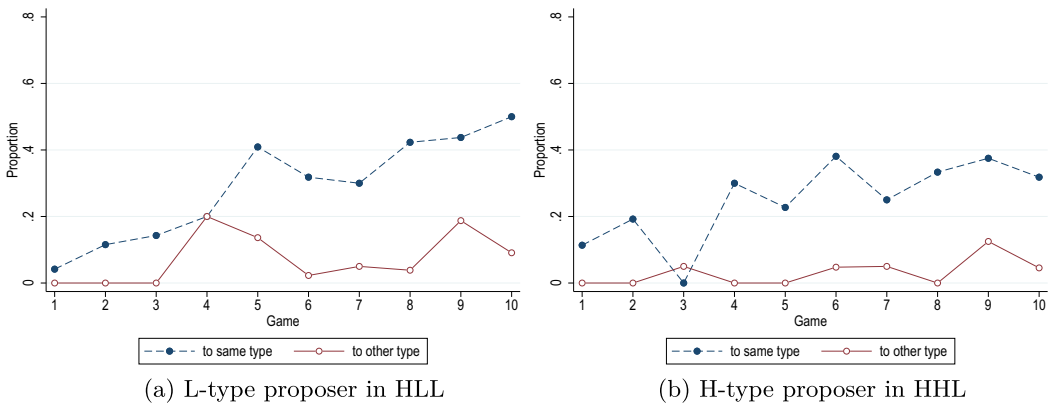


FIGURE A5 Majority: Allocation of significant shares in extreme proposals

Appendix B: Instructions and matching

B1. Instructions

[[[Instructions for the majority bargaining are given in brackets]]]

Dear participants,

Welcome to today's experiment. Please read the instructions for the experiment carefully. For better comprehensibility, from now on we use only male designations. These are to be understood in a gender-neutral way.

All statements in the instructions are true and all participants receive exactly the same instructions. The experiment and the evaluation of the data is done anonymously. Your payout depends on your own decisions and decisions of other participants.

Your earnings from the experiment will be paid to you in cash at the end of the experiment. Overall, the experiment will take about 70[90] minutes; In addition to the payout from the experiment, you will receive 4 euros, which you have earned by being on time for the experiment.

From now on, we ask you to stop talking to other participants and to use only those tools provided by the instructors. Please switch off all electronic devices. Also, only functions that are necessary for the experiment may be used on the computer. If you violate these rules, you will not be paid out in this experiment and you will be excluded from future experiments.

In this experiment, you are a member of a group of three people. These three members, by participating in a knowledge-quiz, contribute to providing an amount, which is subsequently divided among the three.

Below are detailed instructions. Thank you for your attention and your participation in today's experiment. If you have a question, please raise your hand. Your question will then be answered privately.

Description of the experiment

The experiment consists of 2 parts.

In Part 1, you answer quiz questions on general knowledge. There are always 4 possible answers, and only one is correct. The number of correct answers is compared with that of other participants. From this, a score is derived, which you take from the quiz for the rest of the experiment.

In Part 2, you form triplets. Then, within the group of three, you negotiate/bargain about the distribution of a total amount in euros. The total amount is calculated from the points that the respective

Part 1: The quiz and your score

For the knowledge quiz, 12 participants are divided into 3 equal cohorts at the beginning, in cohort A, cohort B and cohort C (in each cohort there are 4 participants). All participants receive the same general knowledge questions that appear one after the other on the computer. Click the answer you think is correct, and then click OK. After your input, a new question will appear – until 5 minutes have elapsed.

At the end of the quiz, a ranking is created within each cohort. Rank 1 is the highest rank you can achieve; Rank 4 is the lowest rank. A person gets a higher rank the more correct answers she has given. If 2 participants have exactly the same number of correct answers, then the lot decides which of the two gets the better rank. Then, depending on the rank they have achieved in their respective cohort, they receive points. These are allocated as follows:

Rank in cohort	Points of this person
1	4
2	4
3	2
4	2

After the quiz is over, you will be told how many of your answers were correct, what rank you achieved, and how many points you earned.

The fairness questions

Before you see your quiz result, you will be asked on the screen to tell us what you think would be a fair distribution of different total amounts to the members of your group. Your answer has no consequences for the rest of the experiment, and no consequences for your payout. In particular, the actual allocation of the total amount does not depend on the answers to this question.

You see your result from the quiz and your score only after answering the fairness questions.

Part 2: Calculation and distribution of the total amount

Part 2 of the experiment consists of 10 “distribution-rounds.” Prior to each distribution-round, you will be randomly assigned to two other participants from other cohorts, with whom you will then form a triplet for this distribution-round. Each triplet consists of one person from cohort A (hereafter called member A), one person from cohort B (= member B) and one person from cohort C (= member C).

Before each distribution-round, new triplets are formed. Each group of three must split a total amount among themselves.

The total amount

In order to determine the total amount, which the group of three has to distribute among themselves, the points of the three group members obtained from the quiz are multiplied, and 12 is added to it. That is, the total amount is calculated as follows:

$$\text{Total amount} = 12 + (\text{points member A}) \cdot (\text{points member B}) \cdot (\text{points member C})$$

Example: Member A has rank 2 in his cohort, member B has rank 1 in his cohort, and member C has rank 4 in his cohort. Rank 1 and 2 each give 4 points, rank 4 gives 2 points. Then the total amount is $12 + 4 \cdot 4 \cdot 2 = 44$ points. Every point is worth one euro. That is, in this case, the three members would divide 44 euros among themselves.

You will be informed at the beginning of each distribution-round how many points the other two members of your group have scored and what is the total amount available for distribution to your group.

The distribution of the total amount

One of the three members determines the distribution of the total amount. The procedure is as follows: Each of the three members proposes how to divide the total amount among the three members. The sum of the proposed shares must be the total amount. You have a calculator available on the screen.

Once each member has made a proposal, one of the three proposals will be selected at random. This determines the distribution of the total for this round, and you will be informed about it. The members see only the result of the selected proposal; they receive no information about the other two suggestions.

There are a total of 10 distribution-rounds. In each new distribution-round, the group is composed by different members.

[[[[To split the total amount, a negotiation takes place between the three group members. The decision is made according to the principle of majority according to the following rules:

Each of the three members proposes how to divide the total amount among the three members. The sum of the proposed shares must be the total amount. You have a calculator available on the screen.

Once each member has made a suggestion, you will see the three suggestions from the members of your group on the screen. Then you have to indicate which proposal you accept and which proposal you want to reject. You can also accept or reject all suggestions. Next, one of the suggestions of the three members is randomly selected. If at least two of the three group members have agreed to this proposal, the proposal is accepted. This determines the distribution of the total amount for this round, and you will be informed about the end of the negotiation. The members see only the result of the selected proposal. There is no information about the voting over the other two proposals.

If less than two of the three group members have agreed to the randomly selected proposal, then the negotiation goes into a new period, with the same members. The total amount will be reduced by 20%. (Example: If the total amount to be split in the first period was 20 points, then in the second period it is only 16 points, in the third only 12.8, etc.)

In each new period exactly the same rules apply: Each of the three members again makes a distribution proposal; You see the three proposals and indicate which proposals you agree with and which ones you want to reject. Next, again one of the three proposals will be randomly selected. If this proposal has been approved by at least two of the three group members, the proposal is accepted; otherwise the negotiation goes into another period. Again, the total amount is reduced by 20% and a new period follows with the same rules. If the group members have not reached agreement after 10 periods, the distribution-round will end without any agreement, and each member will receive 0 points in that distribution-round.

There are a total of 10 distribution-round, each of which can consist of several periods (if there is no agreement in the first period). During a distribution-round, the members of a group of three remain unchanged. In each new distribution-round, the group is composed by different members.]]]]

The payout

At the end of the experiment, a ball is pulled out of a bag. The bag contains 10 balls, numbered 1 through 10. The drawn ball determines the distribution round, from which your share is paid to you 1:1 in euro.

B2. Matching

The 24 subjects of each session are divided into two groups of 12 subjects. These two groups do not interact with each other, therefore we have two independent observations per session. The matching for each group of 12 subjects proceeds as follows. First, the 12 subjects are assigned to three different cohorts for the quiz questions: A, B, C. Each cohort, thus, consists of four subjects, as displayed in table A3. After completing the real effort task (quiz) within their cohort, the two best-performing subjects in a cohort achieved 4 points (type H for high)

TABLE A3

Assignment of subjects to real-effort task within a 12-person group

Cohort A				Cohort B				Cohort C			
S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
H	H	L	L	H	H	L	L	H	H	L	L

TABLE A4

Example for group composition matching within a 12-person group

G1	HHL: S1, S5, S11	LLH: S3, S7, S9	HHL: S2, S6, S12	LLH: S4, S8, S10
G2	HHH: S1, S5, S9	LLL: S3, S7, S11	HHH: S2, S6, S10	LLL: S4, S8, S12
G3	HLH: S1, S7, S9	LHL: S3, S5, S11	HLH: S2, S8, S10	LHL: S4, S6, S12
G4	LHH: S4, S5, S9	HLL: S2, S7, S11	LHH: S3, S6, S10	HLL: S1, S8, S12
G5	LLL: S3, S7, S12	HHH: S1, S5, S10	LLL: S4, S8, S11	HHH: S2, S6, S9
G6	LLH: S4, S7, S9	HHL: S2, S5, S11	LLH: S3, S8, S10	HHL: S1, S6, S12
G7	LHL: S4, S5, S11	HLH: S2, S7, S9	LHL: S3, S6, S12	HLH: S1, S8, S10
G8	HLL: S1, S7, S11	LHH: S3, S5, S9	HLL: S2, S8, S12	LHH: S4, S6, S10
G9	HHH: S1, S6, S9	LLL: S3, S8, S11	HHH: S2, S5, S10	LLL: S4, S7, S12
G10	LLL: S4, S7, S11	HHH: S2, S5, S9	LLL: S3, S8, S12	HHH: S1, S6, S10

and the two worst-performing achieved 2 points (type L for low). For simplicity, suppose that S1 and S2 in cohort A are type H and S3 and S4 are type L (similarly for cohorts B and C, see last row of table A3). A subject's type remains fixed over the entire experiment.

For the re-matching of subjects from the three cohorts to three-person groups, note that group consists of one member from each cohort A, B and C. With the subject types H/L as in table A3, the assignment to different group compositions would be as displayed in table A4.

Supporting information

The data and code that support the findings of this study are available in the Canadian Journal of Economics Dataverse at <https://doi.org/10.5683/SP3/3JTF3C>.

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