Multilateral bargaining with subjective claims under majority vs. unanimity rule: An experiment*

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Abstract

We experimentally investigate the effects of subjective claims in a multilateral bargaining game. Claims are induced by having subjects 'produce' the surplus to be divided by earning points in a quiz task. We use a Baron Ferejohn framework. Our main treatment variable is the majority required to pass a proposal. Under unanimity rule, all proposals and agreements constitute convex combinations of the equal split and a division that is proportional to points earned in the productive task. Contrary to our predictions, this pattern largely persists under majority rule. In sharp contrast to prior experiments in which an exogenous surplus is divided using majority rule, few subjects attempt to build minimum winning coalitions in the presence of claims from production.

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1 Introduction

Whenever groups of individuals collaborate in productive activities, decisions must be made about how to distribute gains resulting from joint production. Unless the division is contractually specified ex ante, it must instead be negotiated ex post. For example, governments need to distribute the tax budget across different departments and private companies need to decide how to allocate revenues across different divisions. Such negotiations are likely to be especially complicated when different group members have made different 'contributions' to the prior productive activity, inducing disagreement about the degree of 'proportionality' that should prevail.[1] How are such disagreements resolved under different decision rules? This is what we want to investigate in this paper.

A number of authors have experimentally shown that joint production can lead to the establishment of 'subjective claims' to a resulting surplus, and investigated how such claims affect bargaining behavior. In these experiments, groups of two or more subjects 'produce' a joint surplus by completing a real effort task such as answering trivia questions. Subsequently, subjects bargain over how to distribute that surplus. In a bilateral context, Gächter and Riedl (2005) and Karagözoğlu and Riedl (2014) find that subjects *expect* distributions to reflect relative performance (e.g. the number of correct answers given), and also judge such proportionality as *fair*. Further, they show that bargaining outcomes reflect these considerations.[2] Gantner et al. (2016) extend the analysis to a three-player context, comparing the impact of claims under three different bargaining procedures, all of which require unanimous consent to reach agreement. They also find that fairness judgments reflect individual contributions to production, but to a lesser extent than suggested by a strict norm of proportionality.

To our knowledge, this is the first paper to experimentally investigate *majority rule* bargaining with claims based on joint production via a real effort task. All prior experiments on bargaining with real effort production have looked at either bilateral situations or at multilateral situations with unanimity rule.[3] There are many interesting situations,

[1] Such disagreements are likely to be especially pronounced in contexts where relative contributions are difficult to assess, or where they are perceived to result from 'luck' as opposed to 'effort' (Hoffman and Spitzer, 1985; Konow, 2003; Fischbacher et al., 2009; Almås et al., 2010; Becker, 2013).

[2] Cavalan et al. (2022) conduct similar experiments with the twist that subjects are informed only about their *joint* production and are uncertain as to their own contribution. They find that subjects systematically overestimate their own relative contributions, leading to incompatible "claims" and disagreement.

[3] Baranski (2016) studies a majoritarian game in which the surplus to be divided is determined by contributions in a public goods game, rather than performance on a real effort task. The differences between this approach and our own are discussed in Section 2.

however, where distributive decisions are made using majority rule. Examples include labor-management negotiations, coalition formation, bargaining over distributive politics, and budget negotiations in national or international organizations.

As an example, consider budget allocation decisions within the European Union. Here, representatives from different member states bargain over how to allocate resources, both across different budget categories (e.g. agriculture, regional development, etc.) and within categories, to projects located in specific member states. Although many expenditures serve to create shared benefits for all member states (e.g. defense, administration), there is some truth to the common perception that the process ultimately boils down to the splitting of a cake between the separate member states. Likewise, a widely held view is that some member states are entitled to a larger slice of that cake than others, because they have made larger contributions in the form of membership fees.[4]

There are good reasons to believe that bargaining behavior and outcomes under majority rule are different from those observed under unanimity rule. Under unanimity rule, each player holds veto power which can be used to defend one's claim. This is fundamentally different under majority rule, where players can form minimum winning coalitions and exclude certain group members from the allocation. Prior experiments on majority rule bargaining over an exogenous surplus have consistently shown that most games end with such agreements. Hence, an important question is whether we continue to observe such outcomes when all players hold claims to the surplus. If so, an interesting question is which player is more likely to be included in a coalition - the one who has a larger or a smaller claim?

In this paper, we experimentally investigate how claims based on performance in a productive task affect bargaining behavior under both unanimity and majority rule. In our experiment, groups of 3 subjects bargain over a surplus which they have previously produced by separately engaging in a quiz task. The task is designed such that performance saliently depends on both skill and luck. The bargaining procedure is a finite horizon version of the Baron and Ferejohn (1989) game (henceforth BF game). Our main treatment variable is the number of votes required to pass a proposal (majority vs. unanimity rule).

[4]For example, in the discussions surrounding the 'Brexit' referendum in 2016, Britain's rising net contributions, calculated as the fees contributed to the EU minus received transfers, was one of the most contentious issues. Not only EU critics but also the popular media discussed this issue as an argument against UK's continued membership. Net contributions were also a central topic during Scotland's first independence referendum in 2014 which would have enabled Scotland to become and independent member of the EU. Prior to the referendum, the government examined Scotland's potential role within the EU and critically pointed out that Scotland was likely to become a net contributor.

In both treatments, we observe bargaining behavior in a number of different situations in terms of the relative claims of different group members, arising from their performance in the real effort task.

Our main findings are the following. Under both rules, proposals and voting behavior are significantly affected by claims. Under unanimity rule, virtually all proposals and outcomes constitute convex combinations of the three-way equal split and the split that is exactly proportional to relative points earned in the productive quiz task. This result is consistent with prior evidence discussed in the next section. More surprisingly, we observe a very similar pattern under majority rule. In particular, the vast majority of proposals allocate positive shares to all participants. This result stands in stark contrast to comparable experiments on BF bargaining in which subjects divide 'manna from heaven' and most subjects propose minimum winning coalitions.[5]

Under both decision rules, we find that players who have earned relatively fewer points in the quiz task tend to make more equal (i.e. less proportional) proposals. This pattern is more pronounced under majority rule. In combination with the fact that players with lower claims are more likely to support more equal proposals, this leads to more equal outcomes under majority rule when a majority (i.e. two players) have relatively small claims according to points earned. Finally, we find that majority rule leads to a higher passage rate than unanimity rule, especially when claims differ between group members.

The rest of the paper is organized as follows. Section 2 discusses related literature. Section 3 presents our experimental design. Section 4 summarizes our hypotheses. Results are presented in section 5. Section 6 concludes. Further analyses and experimental instructions are provided in an online Appendix.

2 Related Literature

Our paper contributes to a recent literature analysing how claims resulting from joint production affect behavior and outcomes in experimental bargaining games. For a review on bargaining games with joint production see Karagözoğlu (2012). Most closely related are three recent studies which examine the role of claims in bilateral (Gächter and Riedl,

[5] An important feature of our design is that performances on the quiz task, and the 'claims' they establish, are not strategically influenced by the decision rule. This reflects our interest in the effects of claims on bargaining behavior, and how these effects vary with the decision rule. Our goal is *not* to investigate the related question of how the decision rule might affect the effort invested in joint production. (The latter question is the focus of related work by Baranski (2016), which we discuss in the next section.)

2005; Karagözoğlu and Riedl, 2014) and multilateral bargaining (Gantner et al., 2016). In these experiments, subjects earn endowments by answering a series of quiz questions. These endowments are then combined to form a common surplus. Subsequently, either two (Gächter and Riedl, 2005; Karagözoğlu and Riedl, 2014) or three (Gantner et al., 2016) subjects bargain over the distribution of the surplus using unanimity rule. A common finding in all three papers is that subjects who have made higher contributions to production are offered more compared to subjects with lower contributions. Further evidence suggests that individuals derive 'subjective claims' which reflect their relative contributions to the jointly produced surplus. According to Schlicht (1998), claims (or 'entitlements') are "rights, as perceived by the individual (...) that go along with a motivational disposition to defend them" (Schlicht, 1998, p.24). Moreover, he defines obligations as the counterpart of claims, i.e. people will feel obliged to comply with what they perceive as another person's right. Hence, claims appear to capture what a person *expects* to receive as well as her subjective fairness view.[6]

In sum, several prior studies have found evidence that claims have a significant impact on bargaining under unanimity rule, i.e. when all group members must consent to the final agreement. To our knowledge, this paper is the first to present experimental evidence on the effects of claims under majority rule.[7] The key difference is that a majority coalition (in our case 2 players) can, in principle, ignore the claims of a minority player, as his consent to the allocation is not required. If no player can enforce his own claim by vetoing a potential agreement, do claims become meaningless?

Of obvious relevance to this point are several studies looking at two-person dictator games with a jointly produced surplus. Cappelen et al. (2007) conduct an experiment in which subjects contribute endowments earned in a prior investment stage. Importantly, endowments are a combination of the sum a subject decided to invest in one of two projects and a randomly determined high or low interest rate paid for each dollar invested. Both subjects in a pair decide how to allocate the joint surplus and one (randomly chosen) decision is implemented. Subjects are repeatedly matched and thus take decisions in different distributional situations which allows the authors to classify subjects into types. They find

[6]Several authors have studied sources of entitlement other than joint production. Güth and Tietz (1986) and Shachat and Swarthout (2013) find that ultimatum game offers and rejection rates are lower when the right to participate in the game is auctioned off. Hoffman et al. (1994) find similar results when the proposer role is determined by performance on a quiz task. Max et al. (2020) find that offers in both dictator and ultimatum games are higher when the recipient is identified as having a disability, or as having obtained a similar score in a college admission test.

[7]Recently, Gantner and Oexl (2021) have collected additional evidence which we discuss in the concluding section.

that a majority of subjects can be classified as 'liberal egalitarian' or 'libertarian' types and thus take the investment made by the other subject into account when choosing an allocation. Almås et al. (2010) conduct dictator games with children in grades 5 to 13 where the surplus is the result of a real effort task. They find that as children get older, their offers more strongly reflect the productive performance of their partners. In a recent meta study on dictator game behavior, Engel (2011) finds that dictators tend to give less if they have earned the endowment or take less from the receiver if she has earned the endowment. Overall, these experiments provide evidence that dictators tend to 'respect' a recipient's claim, at least to some extent, even though the recipient has no veto power. Applied to our own context, this suggests that subjects may be reluctant to form minimum winning coalitions under majority rule, and instead allocate positive shares to all players.

The previous findings from unanimity bargaining and the dictator game appear to be compatible with the idea that behavior is motivated by fairness concerns which take claims into account. Thus, the literature examining 'fairness' of outcomes in situations with joint production is also informative for this paper. For example, Selten (1988) discusses the role of the so-called 'equity principle' for understanding behavior in allocation tasks and bargaining games. He defines a 'proportional equity rule' as follows: "The proportional equity rule can be thought of as a modification of the equal division principle. Whereas the equal division principle prescribes the same reward for every person, the proportional equity rule prescribes the same reward for every unit of achievement." Among others, he discusses reward allocation experiments conducted by Mikula (1972) and Mikula and Uray (1973). In these experiments, subjects first engage in a task and subsequently one subject is asked to allocate a sum of money. As summarized by Selten (1988), subjects tend to divide equally if performance in the task was equal. If performance was however unequal, there was a tendency towards more proportional distributions. Konow (2003) reviews a very large collection of empirical studies (mostly experiments and vignette surveys) to assess the degree to which different conceptions of 'justice' are descriptive of how people commonly make impartial fairness judgments. He proposes "a multi-criterion theory of justice' (...) in which three justice principles are interpreted, weighted, and applied in a manner that depends on context." (Konow, 2003, p. 1235) These principles are *equity*, *efficiency*, and *need*. In discussing evidence on the 'equity principle', he cites extensive experimental and survey evidence showing that subjects consider it fair to distribute resources in a way that is proportional to all variables under a person's control, such as work effort. In the multilateral bargaining game discussed above, Gantner et al. (2016) find that impartial fairness assessments, elicited from independent and unaffected participants, are a convex combination of proportionality and equality, giving rise to pluralism of fairness norms which might guide individual behavior in these situations.

An important finding is that such fairness perceptions can be self-servingly biased. For example, Gantner et al. (2016) find that low contributors are more likely than high contributors to judge an egalitarian division of the surplus as fair. Further evidence comes from an experiment by Konow (2000), in which all subjects perform the same real effort task (prepare a given amount of letters) but earn different piece rates. The funds of both subjects are then pooled and either the subject with the higher piece rate or an uninvolved third person decides how to allocate the funds among the two subjects. The results of the experiment indicate that partial subjects are more likely to deviate from the accountability principle than impartial subjects, indicating a self-serving bias.[8] In a similar experiment comparing behavior of stakeholders in multiple games, Ubeda (2014) finds that those who condition their offers on relative effort or performance do so inconsistently and in a self-serving manner. In summary, these findings suggest that (at least a majority of) people judge proportionality as fair, and that the degree of proportionality they favor might be self-servingly biased. We conjecture that such judgments are likely to affect bargaining behavior under majority rule.

Our experiment is also related to multilateral bargainin experiments that involve sources of heterogeneity other than contributions to production. Diermeier and Morton (2005) conduct finite horizon BF games with heterogeneous proposer recognition probabilities (based on otherwise irrelevant 'voting weights') which are randomly assigned. The vast majority of proposals observed are minimum winning, and proportionality to voting weights is not observed. Diermeier et al. (2006) conduct three player majoritarian ultimatum games with heterogeneous disagreement values. They find that a majority of proposals are minimum winning, and of these 2/3 allocate zero to the responder with the higher disagreement value. Although the proposer's disagreement value should be irrelevant in their setting, it influences the share they demand for themselves as well as responders' willingness to support unequal proposals. Miller et al. (2017) conduct BF experiments with heterogeneous disagreement values. They also find that most proposals are minimum winning, usually excluding the responder with the larger disagreement payoff.[9] Kim and Kim (2022) conduct

[8] Konow et al. (2020) replicate these results in a study that includes additional treatments involving a "minimal group paradigm". They find that the self-serving bias is stronger when interacting with an "out group" and weaker when interacting with an "in group" member.

[9] Merkel and Vanberg (2020) introduce communication into this environment. They find a larger pro-

multilateral ultimatum games with heterogeneous disagreement payoffs as well as a (Tullock) contest to determine the proposer role. The vast majority of observed proposals is minimum winning. Interestingly, proposers who invested more in the contest demand more for themselves, and included responders are more likely to support such proposals if they are informed about the prior investments. A possible interpretation is that investments in the contest create (mutually recognized) claims to the surplus.

Finally, we add to a vast experimental literature on the Baron and Ferejohn bargaining game (McKelvey, 1991; Fréchette et al., 2003, 2005a,b,c; Diermeier and Morton, 2005; Agranov and Tergiman, 2014, 2019; Miller and Vanberg, 2013, 2015). The central findings of that literature can be briefly summarized as follows. First, most proposers form minimum winning coalitions (MWCs) under majority rule, especially after gaining some experience with the game.[10] Second, the most commonly observed proposals and agreements implement equal splits (either overall or within a MWC). Third, unanimity rule leads to more delay as compared to majority rule. Agranov and Tergiman (2014, 2019) find that free communication (chatting) between the group members leads to more unequal agreements under majority rule and to more equal allocations under unanimity rule. In addition, communication virtually eliminates delay under both rules.

To our knowledge, we are the first to report on a Baron-Ferejohn experiment involving the division of a surplus produced in a real effort task.[11] The closest we are aware of is Baranski (2016), who studies a majoritarian BF game in which the surplus to be allocated is determined by prior contributions in a standard public goods (VCM) game, rather than performance on a real effort task. His main finding is that, contrary to theoretical predictions, contributions in the VCM stage are nearly efficient. The reason is that high contributors tend to secure larger shares in the subsequent BF game, creating incentives to contribute.[12] It is important to emphasize that our research question and experimental setup differ from this in several respects. First, our production stage consists of a real effort (quiz) task rather than a VCM game. Thus, differences in contributions are not

portion of grand coalitions being formed under majority rule.

[10]For example, Miller and Vanberg (2013) observe approximately 20% of proposers suggest MWCs the first time they play, and this proportion grows to approximately 80% after 6 games are played.

[11]Following completion of this manuscript, we learned that Gantner and Oexl (2021) have since conducted an experiment that includes a majority rule treatment similar to ours. We return to this in our conclusion.

[12]In a follow-up paper, Baranski (2019) finds that bargaining over shares of the public good *prior* to the VCM stage leads to inefficient contribution levels. Baranski and Cox (2019) investigate the effects of communication in an experiment where contributions in the VCM may be unobservable. Their results replicate the findings of Baranski (2016) even in the case of unobservable contributions.

a matter of strategic *choice* but a mixture of skill and luck. Second, we implement two alternative decision rules (majority vs. unanimity). Our interest is in comparing how *given* constellations of subjective claims originating from the real effort task affect bargaining under these rules. Therefore, we purposefully design the experiment such that the decision rule cannot influence performance in the real effort task. We do so by initially informing subjects only that the group will bargain over the surplus, but not *how* they will bargain. This design choice reflect the fact that we are interested in comparing the influence of subjective claims (as *exogenous* parameters) under majority vs. unanimity rule.

3 Experimental Design

The experiment consists of of two stages, a 'production' stage followed by a 'bargaining' stage. In the production stage, subjects individually earn 'points' by answering a series of trivia questions organized into 12 'blocks'. Each block consisted of 2 multiple choice questions on different topics (i.e. geography, history, arts, science). On each block, subjects could earn either zero, one, or three points, depending on whether neither, one, or both questions were answered correctly. Each block contained one 'easy' question that we expected most subjects to answer correctly, and a second question that varied in difficulty. After completing the production stage, each subject thus had 'produced' a list of 12 separate scores, each either 0,1, or 3 points.

After all subjects had completed the production stage, they proceeded to the bargaining stage. This consisted of 12 separate bargaining games. In each game, subjects were matched into groups of three. Each group was then assigned a surplus equal to 5 EUR times the sum of three randomly and independently chosen scores, one from each of the lists that they had previously produced. Thus, the scores 'contributed' by the members of a group would usually come from different 'quiz blocks'. Throughout, we will often refer to the individual scores as the subjects' 'contributions' to the surplus, though it is important to emphasize that they reflect performance on the quiz task, and not strategic choices as in the approach of Baranski (2019).

The sampling of scores was done with replacement, so that it was possible for a given subject to have the same quiz block selected multiple times over the course of the experiment. Each subject was informed about the quiz block selected for her and about the number of points she had earned. In addition, they were informed about the number of points contributed by the other players, as well as each group member's percentage share of all contributed points. Subjects were *not* informed about the quiz block selected for the other two group members.

These design features were chosen with three goals in mind. First, the presence of an easy question in every quiz block was meant to ensure that all subjects would have a positive claim, at least in most games. Second, the more difficult questions should lead to heterogeneity in claims, as some but not all subjects will score 3 points on the quiz block chosen for them. Third, differences in difficulty between blocks implies that individual performance saliently depends on a combination of skill and luck. That is, subjects could not be sure whether differences in the number of points contributed were due to good performance (answering difficult questions) or luck (having an easy quiz block chosen).[13]

The bargaining game itself followed a finite horizon Baron-Ferejohn framework. That is, bargaining proceeded over a finite number of discrete rounds. Within each round, the sequence of events was as follows. First, all subjects were asked to propose a division of the surplus, expressed as percentage shares.[14] Next, all subjects voted either 'yes' or 'no' on each of the three proposals made in their group. Once the votes had been cast, *one* of the three proposals was randomly selected and the votes were counted.[15] Depending on the treatment, the proposal passed if either a majority (two) or all three subjects voted 'yes'. In that case, the game ended. Otherwise, the surplus shrank by 20% and bargaining proceeded to a new round. If the surplus fell below 2 EUR (i.e. after 8 rounds of bargaining), the game was terminated and all group members earned 0 EUR. At the end of the experiment, one of the 12 bargaining games was randomly chosen and subjects were paid according to the corresponding outcome.

The experiment was conducted at the AWI Lab at the University of Heidelberg, Germany, in June 2016 and January 2017. In total, 198 students, from various disciplines, participated (108 in the June and 90 in the January sessions). We conducted twelve sessions, six for each treatment (majority and unanimity rule). Each session involved 18

[13]Note that the element of 'luck' is indeed present because a given subject's quiz scores for different games are drawn *with replacement*. Therefore some subjects will be luckier than others even if they perform equally well overall, and even if we aggregate across all games played.

[14]Displaying both claims and allocated shares in percentage terms may have made a proportional allocation more salient than if we had displayed nominal quiz points and Euro shares instead. A disadvantage of the alternative would have been that subjects intending to divide proportionality would have had to perform the necessary calculations.

[15]In the standard formulation of the BF game, the proposer is selected at the beginning of the round and only one proposal is made. Our procedure allows us to observe three times as many proposals and votes. Although this does not alter the SSPE predictions, it may impact real behavior if subjects react to the additional information provided. However, any such effects are of course present in all our treatment conditions.

Table 1: Symmetric equilibrium proposals

	Proposer share	Responder share
Majority rule	73%	27% (to one)
Unanimity rule	46%	27% (to both)

subjects, divided into three matching groups of six participants.[16] Due to no-shows, we conducted three sessions with 12 subjects. Hence, in total we have 33 matching groups (17 for majority and 16 for unanimity rule). Upon entering the laboratory, subjects were randomly assigned to isolated computer terminals. Paper instructions (reproduced in the Appendix) were handed out and questions were answered in private. The experiment was programmed in z-Tree (Fischbacher, 2007). Sessions took approximately 70 minutes, and average earnings amounted to 13 EUR (highest: 23.5 EUR, lowest: 4 EUR) including a 4 EUR show-up fee.

4 Benchmark predictions and hypotheses

While the BF bargaining game admits multiple subgame perfect equilibria, the prior literature has typically focused on symmetric and stationary equilibria, which are (essentially) unique. For the finite horizon version, the relevant equilibrium concept is Symmetric Markov Perfect Equilibrium (SMPE). See Norman (2002) for a detailed analysis. As established there, the unique SMPE has three interesting properties which can be tested empirically. The first is that proposers attempt to form minimum winning coalitions in which only the number of individuals required to vote yes receive positive offers. Second, these 'coalition partners' are offered exactly their continuation value, i.e. the amount that they expect to receive if the current proposal were to fail. This implies an unequal distribution of the surplus, favoring the proposer. Third, the first proposal passes without delay. All three of these predictions are independent of the decision rule being employed. The predicted outcomes for our version of the game ($n = 3$ players and discount factor $\delta = .8$) are presented in Table 1.

Naturally, these SMPE predictions are unaffected by the prior production phase con-

[16] Admittedly, these are small matching groups. However, we believe that repeated game effects within the matching groups are unlikely. First, subjects were not told about the size of the matching group. In the instructions they were informed that they would be re-matched at the beginning of each round. Second, the identifying labels on the decision screens changed randomly between games. The advantage of implementing small matching groups is that we obtain 3 independent observations for each session.

ducted in our experiment. By definition, they are based on the assumption that all players employ the same strategy, effectively ignoring any differences in the relative contributions they have made to the surplus. Under unanimity rule, the SMPE corresponds to the only subgame perfect equilibrium. The fact that players can selectively build coalitions under majority rule, leads to multiple and asymmetric equilibria. Hence, in these cases players could use the relative contributions to coordinate on asymmetric and / or non-stationary equilibria of the game (see Norman, 2002). For this reason, it is especially interesting to study how claims affect behavior under majority rule.

In addition to the SMPE predictions, we formulate a number of additional hypotheses which are based on the idea that players are motivated by material self-interest as well as notions of fairness, which take claims into account (Konow, 2000, 2003). Players are assumed to be heterogeneous in how much weight they place on either of these two motives. As outlined in Section 2, prior evidence on unanimity rule bargaining appears to support this idea, and demonstrates that such preferences have a systematic impact on behavior and outcomes. We separately formulate our additional hypotheses for situations with *symmetric claims* (i.e. all group members have made the same contribution) and situations with *heterogeneous claims* (i.e. the group members have made different contributions).

Symmetric Claims Situations with symmetric claims are those where all three group members have contributed either 1 point (5 EUR) or 3 points (15 EUR) to the surplus. Various theories of fairness, such as summarized by Konow (2003) suggest that the unique 'fair' outcome in this situation is an equal split. This should motivate 'fair-minded' players to propose the equal split, and to vote for it (and against other proposals). Anticipating this behavior, even purely self-interested players should do the same under unanimity rule, knowing that anything else is likely to only increase delay.[17] Thus, under *unanimity rule*, we hypothesize that subjects will propose and agree on the equal split.

Hypothesis 1a. *In symmetric situations with unanimity rule, most proposers suggest three-way equal splits. Responders more often vote 'yes' on such proposals than on unequal splits. Therefore, equal splits pass with higher probability.*

The predictions implied for *majority rule* are less straightforward. Subjects strongly motivated by fairness conceptions may be relatively insensitive to the decision rule, proposing and supporting equal splits under majority rule. A rational and "selfish" proposer, on

[17]That is, if at least one of the players in a given group is 'fair-minded' in the way outlined, no unequal division can pass under unanimity rule.

the other hand, may attempt to build a minimum winning coalition, hoping that the included player will vote "yes", either because he is also selfish, or because the larger share that he can be given (e.g. 50% instead of 33%) is enough to outweigh his fairness concerns. However, rational and selfish proposers may worry that such proposals could fail. An additional concern could be that responders may retaliate against such proposals in future rounds if they fail or are not counted.[18]

When voting, fair-minded players should be more likely to support "grand coalition" proposals and equal splits. Ceteris paribus, we expect all players will be more likely to support proposals that allocate larger shares to them. In sum, it appears difficult to predict which allocations will be proposed under majority rule. Relative to unanimity rule, however, we can expect minimum winning coalitions to be more common. We therefore formulate the following hypothesis to be compared against the results obtained.

Hypothesis 1b. *In symmetric situation with majority rule, proposers attempt to build minimum winning coalitions. Coalition partners are more likely to vote yes the larger the share that is allocated to them.*

Asymmetric claims Our second set of hypotheses is formulated for situations in which the group members have made different contributions, leading to heterogeneous claims. Given that high contributors *expect* to receive higher shares, and indeed people regard this as *fair* (Gächter and Riedl, 2005; Gantner et al., 2016), it is difficult for proposers to ignore claims under unanimity rule, as doing so is likely to result in failure of their proposal. Thus, players with larger contributions should receive higher offers. This prediction is in line with the existing evidence on the effect of heterogeneous claims under unanimity rule (Gächter and Riedl, 2005; Karagözoğlu and Riedl, 2014; Gantner et al., 2016).

Hypothesis 2. *In asymmetric situations with unanimity rule, shares offered are increasing in relative points contributed.*

In the presence of a self-serving bias, proposals should be more proportional the larger the proposer's contribution, as material self-interest and fairness concerns are aligned in these cases. Similarly, when voting, players with larger relative contributions should more often vote 'yes' on proposed proportional splits than individuals with lower contributions.

[18]We investigate this possibility in Section 5.5 and Appendix A3.

Hypothesis 3. *In asymmetric situations with unanimity rule, proposers more often suggest proportional splits, and responders are more likely to vote 'yes' on proportional splits, the larger is their own relative contribution.*

When claims are asymmetric, individuals are likely to differ in how much proportionality they perceive as 'fair', thus causing heterogeneity in fairness views. This, in turn, may lead to more delay in negotiations in asymmetric as compared to symmetric situations. In line with this prediction, Karagözoğlu and Riedl (2014) find that the bargaining duration significantly increases in treatments where subjects derive heterogeneous claims based on performance feedback relative to treatments in which no performance feedback is provided.

Hypothesis 4. *Under unanimity rule, delay occurs more frequently when players have asymmetric claims than when claims are symmetric.*

One reason why claims are likely to influence bargaining outcomes under unanimity rule is that all players have *veto power* which can be used to enforce claims as well as fairness perceptions. As was already discussed, this situation is fundamentally altered when *majority rule* is used. A player seeking to maximize his payoff may propose a minimum winning coalition excluding one responder. On the other hand, fairness-oriented proposers as well as "selfish" subjects who are worried about failure and retaliation may refrain from doing so.[19] Prior evidence from Baron-Ferejohn games without claims suggests that most proposers do build minimum winning coalitions. Therefore we tentatively conjecture that this willingness to exclude a player from payment will persist in our setting, even when the surplus is jointly produced. These considerations lead us to formulate the following hypothesis, which mirrors Hypothesis 1b.

Hypothesis 5a. *In asymmetric situations with majority rule, proposers attempt to build minimum winning coalitions. Coalition partners are more likely to vote yes the larger the share that is allocated to them.*

Should this hypothesis prove to be true, an interesting follow-up question is which responder is more likely to be included in a minimum winning coalition. When responder 'claims' differ, two competing considerations may play a role. On the one hand, the responder with the larger claim may appear more deserving, and thus fairness concerns

[19] In a bilateral bargaining experiment, Carpenter (2003) provides direct evidence that subjects independently classified as "egoists" strategically make fair offers only when they expect others to reject low offers.

may dictate that she be included in the coalition. On the other hand, it appears likely that the responder with the smaller claim will be 'cheaper' - i.e. more likey to vote 'yes' for a given share being offered. Thus, proposers may strategically exclude the player with the larger claim. Which of these considerations prevails more often is an empirical question. We will organize our analysis around the following hypothesis.

Hypothesis 5b. *In asymmetric situations with majority rule, proposers who build minimum winning coalitions more often include the responder who has made a smaller contributions (if responder contributions differ).*

As under unanimity rule, heterogeneous claims are likely to cause more disagreement in subjective fairness ideals which will lead to more delay in negotiations as compared to situations with homogeneous claims.

Hypothesis 6. *Under majority rule, delay occurs more frequently when players have asymmetric claims.*

All hypotheses formulated thus far concern the effects of claims *within* each of our treatments (majority and unanimity rule). Next, we formulate two hypotheses regarding differences between the two treatments. First, claims should affect proposals (and final outcomes) more strongly under unanimity than under majority rule. Under unanimity rule, the existence of veto power implies that claims and fairness perceptions can be enforced. Under majority rule, in contrast, subjects can trade off fairness against higher shares for themselves which might cause less fair-minded players to propose minimum winning coalitions and even relatively fair-mindeded individuals might propose less proportional and more equal divisions of the surplus. Thus, under majority rule proposals and final outcomes should shift away from the proportional split.

Hypothesis 7. *Proposals and final outcomes under majority rule are less proportional than under unanimity rule whenever the proposer has made a smaller contribution.*

Our next hypothesis concerns the length of the bargaining process under both decision rules. Given that under majority rule less members need to consent, majority rule should lead to faster agreement than unanimity rule. This effect should be particularly pronounced in situations with heterogeneous claims as group members are more likely to hold conflicting fairness views. The final hypothesis is also in line with previous research conducted on the BF bargaining game. For example, Miller and Vanberg (2013, 2015) and Miller et al. (2017) find that delay occurs more frequently under unanimity rule.

Hypothesis 8. *Delay occurs more frequently under unanimity than under majority rule, especially in situations involving heterogeneous claims.*

Our final hypothesis is based on a finding reported in the metastudy of majoritarian BF games by Baranski and Morton (2022).[20] They find that round 1 proposers whose proposals fail receive smaller offers in round 2 as compared to round 1 responders. This pattern may be interpreted as a form of retaliation, and could motivate subjects to make more generous or fair proposals. Given the prior evidence, a similar effect may be expected in our majority rule treatment. In addition, we can investigate whether the result extends to unanimity rule. Finally, our specific experimental design will require us to distinguish between proposals that were counted in round 1 vs. proposals that were voted on but not counted. We summarize the relevant conjecture as a single hypothesis and postpone these distinctions to section 5.5.

Hypothesis 9. *Subjects whose proposals fail in round 1 subsequently receive lower offers than those whose proposals pass or are not counted.*

5 Results

As indicated above, we designed the quiz blocks such that most subjects should earn at least one point, but only some would earn three points. We did this because we want to observe situations where all group members have made positive contributions, but the size of these contributions may differ. Table 2 summarizes the frequency with which we observed various constellations of points within the bargaining groups that were formed in both treatments.[21] The category 'not all positive' contains a large number of different constellations. By design, these situations occur too rarely to perform a meaningful statistical analysis. We therefore exclude those cases in the main analysis and focus on those where each group member has contributed at least one point.[22] We also have relatively few observations where all subjects contributed either one point or three points. Since the *relative* contributions are the same in these situations, we will pool these data in the subsequent analysis.

[20]We thank the reviewers and editor for suggesting this analysis, which was not planned *ex ante*.

[21]As can be inferred from Table 2, overall pie sizes are significantly larger under majority rule. Nevertheless, the pie size are exogenous to the decision rule in the sense that the differences are purely coincidental and only influence the number of times that various 'situations' are observed.

[22]We analyze the excluded cases in the Online Appendix.

Table 2: Constellations of points contributed

		Number of games	
Points	Surplus	Unanimity rule	Majority rule
(1,1,1)	15 EUR	20	30
(3,3,3)	45 EUR	47	39
(1,1,3)	25 EUR	87	117
(1,3,3)	35 EUR	140	116
Not all positive	Various	90	106
Total		384	408

As is typically done in the literature on Baron-Ferejohn bargaining, most of our empirical analysis will focus on the first round of bargaining. Given our method of having all subjects make a proposal, we observe three proposals per game. In situations where relative contributions differ, we will distinguish cases according to whether the proposer has made a relatively large or small contribution.[23] With this in mind, Table 3 presents the number of proposals we observed in each of five possible situations. Here and later, the first coordinate of the contribution vector (in bold) denotes the relative contribution of the *proposer*. When responder contributions differ, they are ordered such that the smaller contributor is listed first (i.e. the second coordinate). When responder contributions are the same, they are ordered alphabetically according to the letter i.d. ('A', 'B', or 'C') that players were randomly assigned at the start of the game.

Table 3: Situations observed (first round)

Percentage	Number of proposals	
Points†	Unanimity rule	Majority rule
(**33**,33,33)	201	207
(**20**,20,60)	174	234
(**60**,20,20)	87	117
(**14**,43,43)	140	116
(**43**,14,43)	280	232
Total	882	906

† The first coordinate is the proposer's point percentage.

[23] Recall that, by design, individual contributions can take on only two values, 1 and 3.

5.1 Symmetric claims

We begin by discussing the situations where all subjects have contributed the same number of points (either 1 or 3). Figure 1 displays the distribution of proposals within a simplex. In this and the following figures, the simplex is defined such that the shares allocated to responders 1 and 2 are measured along the horizontal and vertical axes, respectively. As mentioned above, responders are ordered alphabetically according to the letter i.d. they were assigned on the decision screen. The south-west corner would correspond to a proposal where the proposer demands the entire pie, and the right and top corners represent points where everything is allocated to responder 1 and responder 2, respectively. For orientation, a number of focal points are highlighted. Equal splits (both two- and three way) are marked in blue. The proportional split (reflecting claims) is marked in red. (In the symmetric case, the proportional split is identical to the three-way equal split.) The size of the bubbles reflect the relative frequency of the corresponding proposals, and the pie charts within the bubbles display the fraction of proposals that pass (in green) and fail (in red). Finally, each (sub)figure contains information about the three most frequently observed proposals. For example, the most frequently observed proposal under unanimity rule is an equal split.[24] It accounts for 88% of all offers, and it passes 95% of the time.

As can be easily recognized by inspecting Figure 1, behavior in the symmetric situation is quite similar under both rules. In particular, the vast majority of proposals are either equal splits or very close to equal splits, and these proposals almost always pass. Overall, 94% and 95% of proposals pass under unanimity and majority rule, respectively (see Table 5 below). Under majority rule, we observe only few minimum winning coalitions being proposed and all of them suggest the two-way equal split.

While this behavior was to be expected under unanimity rule (see Hypothesis 1a), it is somewhat surprising under majority rule. As mentioned, previous experiments on the BF game without claims have found that most proposers build minimum winning coalitions (MWCs), especially after some experience. Given the wealth of prior evidence, our experiment did not include a treatment without claims. As a possible benchmark, consider the proposals observed in Miller and Vanberg (2013), which used a very similar design.[25] Figure 2 presents the distribution of first round proposals in that experiment.

[24] Although the figure displays these as $(34, 33, 33)$, these may include some proposals that were actually $(33, 33, 33)$. The simplex is constructed such that the first coordinate is 100 minus the other two, i.e. we are assuming that all proposals sum to 100.

[25] The prior experiment used the same computer interface. As in our experiment, all subjects proposed and all proposals were voted on. Aside from the absence of claims, there are additional differences, most

Figure 1: Proposals and passage rates, $c = (33, 33, 33)$

(a) Unanimity rule ($N = 201$) (b) Majority rule ($N = 207$)

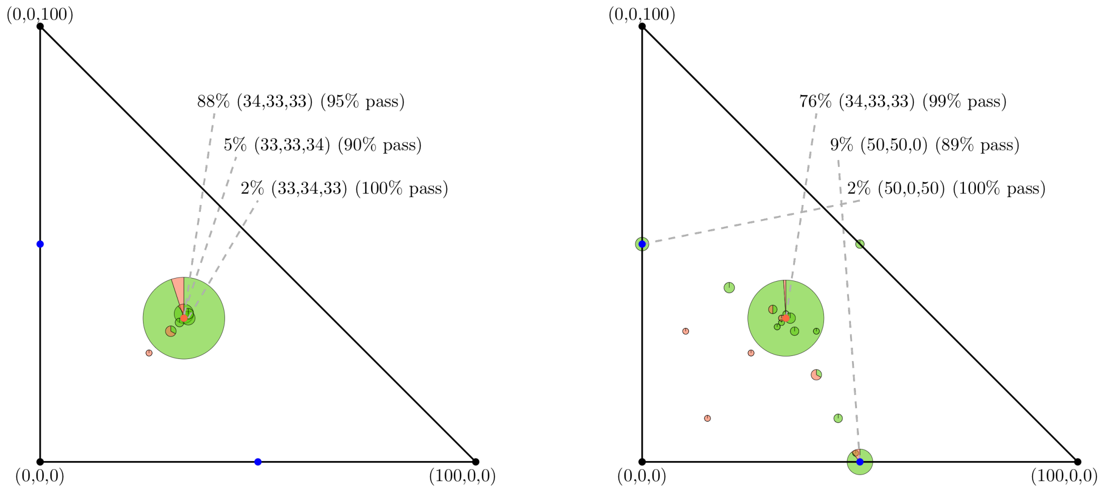
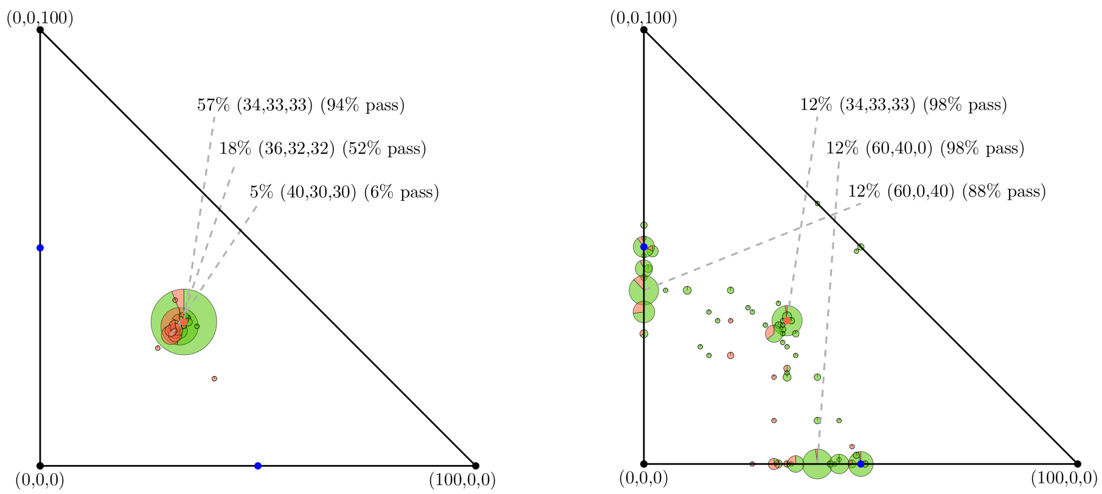


Figure 2: Proposals and passage rates, no claims†

(a) Unanimity rule ($N = 339$) (b) Majority rule ($N = 354$)



† These data are taken from a previous experiment (Miller and Vanberg, 2013)

The most notable pattern is the predominance of minimum winning coalitions. Comparing, we find that the fraction of MWCs is significantly lower in our sample (Chi-squared test, 11% vs. 66%, $p < 0.01$, $N_1 = 207$ and $N_2 = 354$). Thus, we can reject Hypothesis 1b.[26] Our results suggest that the willingness to completely exclude one player from payment is substantially reduced when the surplus being distributed has been jointly produced.

One reason behind the prevalence of grand coalition could be that subjects believed that MWCs are less likely to pass. Although we have only few relevant observations in symmetric situations, we find that 91% of MWC proposals pass, as compared to 95% of grand coalitions. This difference is not statistically significant (Wilcoxon matched-pairs signed-ranks test based on matching group averages, $p = 0.72$, $N = 7$).[27] To the extent that subjects anticipated or learned this, the fact that few MWCs are proposed suggests that individuals indeed preferred to allocate positive shares to all group members.

Table 4: PROBABILITY OF VOTING YES (SYMMETRIC CLAIMS)

	Unanimty rule		Majority rule	
	RE Probit	Marg. Effects	RE Probit	Marg. Effects
Distance to equal split	-0.37**	-0.02**	-0.04***	-0.01***
	(0.01)	(0.00)	(0.00)	(0.00)
Period	0.11	0.01	-0.01	-0.00
	(0.10)	(0.09)	(0.83)	(0.83)
Constant	2.03***		1.51***	
	(0.00)		(0.00)	
Observations	402	402	414	414

p-values in parentheses: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

To analyze how the location of a proposal affects voting behavior, we run a Random-effects probit regression using the voting decision as dependent variable.[28] The independent

notably a discount factor of $\delta = 0.9$ rather than 0.8. The pie size was 20 pounds as compared to either 15 or 45 EUR, and the game was repeated 16 times as compared to 12. (On the latter point, see footnote 26.)

[26] It should be noted that the frequency of MWCs increases over time. If we focus only on the final 4 periods, it is 17%. This is still substantially smaller than what is observed in periods 9-12 of Miller and Vanberg (2013) (79%, $p < 0.01$, $N_1 = 48$ and $N_2 = 96$). Also see their Figure 6 which shows the evolution of coalition types over time.

[27] We observe MWCs being proposed in 7 of 17 matching groups in the majority rule treatment and symmetric situations.

[28] Each individual votes on the proposals of both other group members in every game. We use panel

variables are the Euclidean distance to the equal (proportional) split and the period. Under both decision rules, we find that the probability to vote 'yes' decreases significantly as the distance to the equal split increases (See Table 4). Hence, deviations from the equal split result in higher disapproval.[29]

Result 1a and b. *In symmetric situations, the vast majority of proposers suggest a three-way equal split under both decision rules. Under majority rule, only a small number of proposers attempt to build a minimum winning coalition. Those that do always propose a two-way equal split. Under both decision rules, proposals are more often rejected, the larger the distance to the equal split. (Consistent with Hypothesis 1a, inconsistent with Hypothesis 1b.)*

5.2 Asymmetric claims, unanimity rule

Next we look at situations in which the group members have contributed different amounts to the surplus. We begin by considering behavior under unanimity rule.

Figure 3 displays the distribution of proposals and corresponding passage rates in the $c = (20, 20, 60)$ situation. The left panel depicts cases in which the proposer has contributed 20%, the right panel those in which his contribution is 60%.

Three patterns are immediately visible. First, virtually all proposals are located on a line connecting the *proportional* (marked in red) to the *three-way equal* split (blue). Second, the distribution of proposals shifts away from the equal split and towards the proportional split when the proposer's own contribution is relatively larger (right panel). In these cases, the proposer suggests the proportional split almost twice as often (57% vs. 30%). Finally, the proportional split passes less often when the proposer has made a comparatively large contribution (68% vs. 85%), but this difference is not significant (Wilcoxon matched-pairs signed-rank test, $N = 13$, $p = 0.2$).

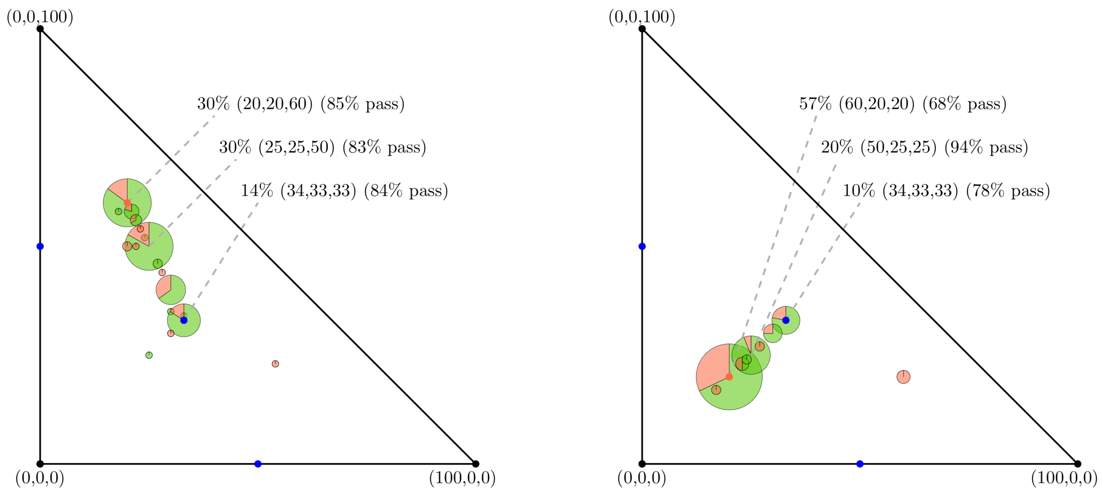
The corresponding distributions for the $c = (14, 43, 43)$ situation are depicted in Figure 4. Again, the left and right panels depict the cases where the proposer's contribution is relatively small (i.e. 14%) or large (43%). As for the $c = (20, 20, 60)$ situation, proposers suggest the proportional split more often if they have made a high contribution (18% vs. 34%). Again, the proportional split passes less often when the proposer has made a large

methods assuming that voting decisions are uncorrelated with individual characteristics.

[29] These results are robust to including the responder's share as an independent variable. Given that all MWC proposals suggest a two-way equal split, we cannot test the second part of Hypothesis 1b.

Figure 3: Proposals and passage rates, $c = (20, 20, 60)$, unanimity rule

(a) $(20, 20, 60)$ $(N = 174)$ (b) $(60, 20, 20)$ $(N = 87)$



contribution (74% vs. 80%), but this difference is not statistically significant (Wilcoxon matched-pairs signed-rank test, $N = 10$, $p = 0.06$).

Given that virtually all proposals in both asymmetric situations are somewhere in between the equal and proportional splits, it follows immediately that offers are affected by claims. Table 5 summarizes the average offers made in all situations and in both treatments. Focusing on the middle column for now, we can see that the ordinal ranking of offers received matches that of the claims in all situations. (Wilcoxon matched-pairs signed-rank tests $p < .001$, $N = 16$ in both the $(20, 20, 60)$ and $(43, 14, 43)$ situations.) This pattern is consistent with Hypothesis 2.

Result 2. *In asymmetric situations with unanimity rule, shares offered are increasing in relative points contributed. (Consistent with Hypothesis 2.)*

In order to assess the statistical significance of these patterns, we take advantage of the fact that almost all proposals are located along the line connecting the proportional to the three-way equal split. This allows us to reduce the data to a single dimension, as follows. For each proposal y_i, we identify its *scalar projection* onto the line described by the equation

$$y_i = (1 - a_i) \cdot \text{equal split} + a_i \cdot \text{proportional split}$$

Figure 4: PROPOSALS AND PASSAGE RATES, $c = (14, 43, 43)$, UNANIMITY RULE

(a) $(14, 43, 43)$ (N=140) (b) $(43, 14, 43)$ (N=280)

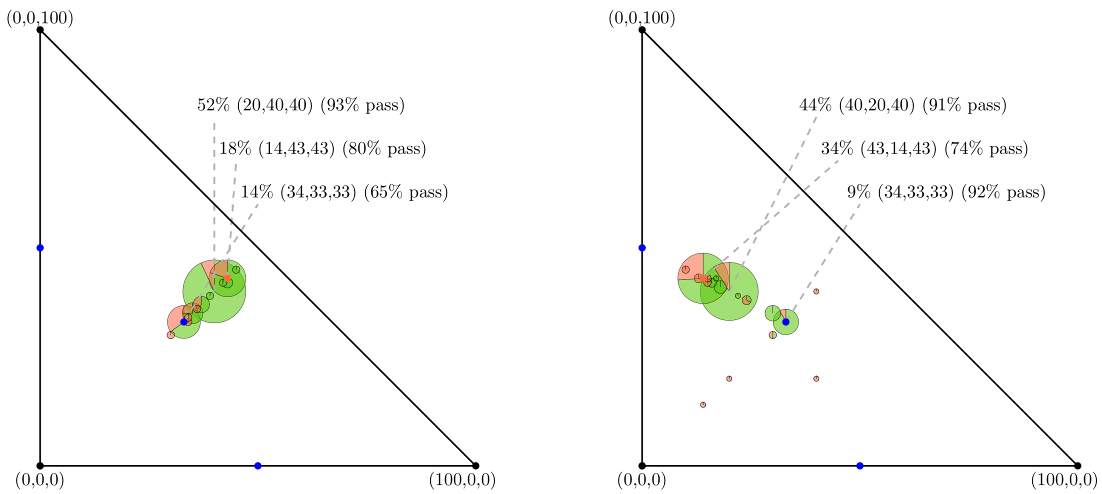


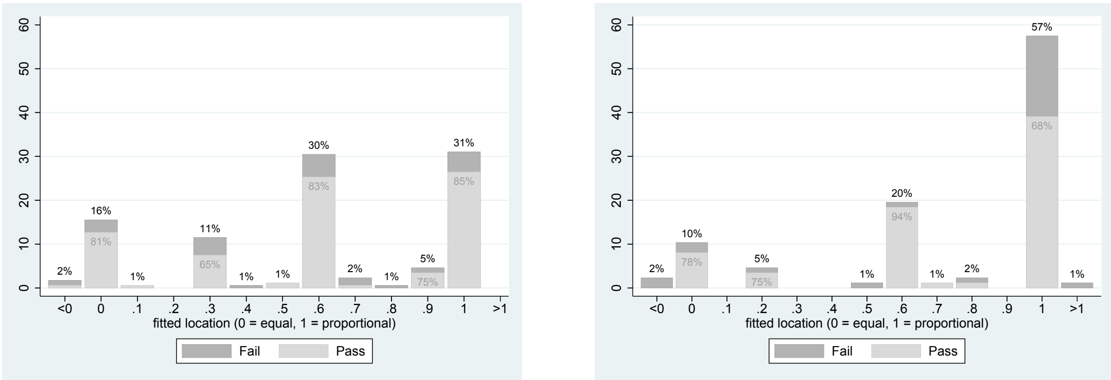
Table 5: AVERAGE PROPOSED SHARES[†]

Percentage Points (c_0, c_1, c_2)	*Unanimity Rule* Average Offers (y_0, y_1, y_2)	*Majority Rule* Average Offers (y_0, y_1, y_2)
(**33**, 33, 33)	(33, 33, 33)	(36, 34, 30)
(**20**, 20, 60)	(26, 25, 49)	(31, 29, 40)
(**60**, 20, 20)	(53, 24, 23)	(55, 25, 20)
(**14**, 43, 43)	(22, 39, 39)	(28, 39, 33)
(**43**, 14, 43)	(40, 19, 40)	(43, 16, 41)

[†] When responder contributions are the same, they are ordered according to the letter i.d. assigned to them in the corresponding bargaining game.

Figure 5: Distribution of a_i values, $c = (20, 20, 60)$, unanimity rule

(a) $(20, 20, 60)$ (N=174) (b) $(60, 20, 20)$ (N=87)



The corresponding value of a_i characterizes the point on the line which is closest to the proposal, i.e. whose connecting vector is orthogonal to the line. Thus, $a_i = 0$ corresponds to the equal, and $a_i = 1$ to the proportional split. After we identify the a_i for each proposal, we can look at the distribution of the a_i as well as its effect on voting and passage rates.

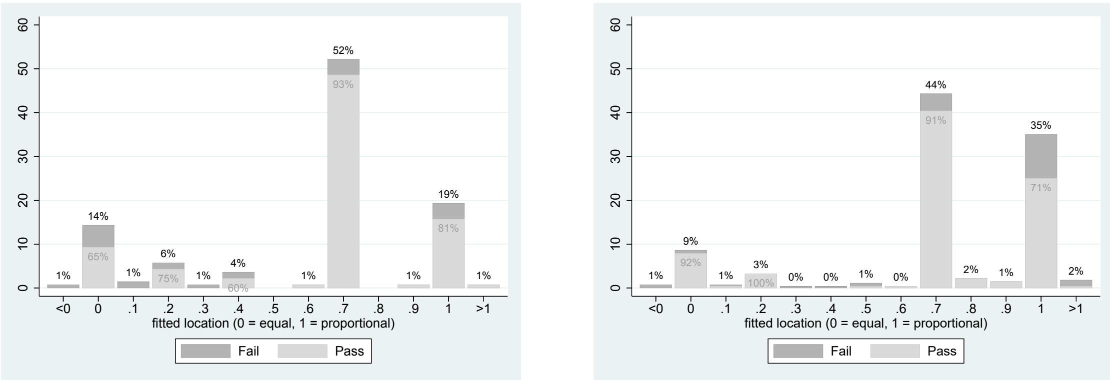
Figure 5 displays the distribution of a_i values in the $c = (20, 20, 60)$ situation. As above, the left and right panels show the situation where the proposer's own contribution is 20% and 60%, respectively. Within each bar, the lighter region represents the fraction of proposals that passed. Comparing the right to the left panel, we see that the distribution appears to be shifted to the right, with nearly twice as much weight on the proportional split (located at $a_i = 1$) when the proposer's own contribution is large. Using paired matching group averages as our unit of observation, we find that this difference is statistically significant (Wilcoxon matched-pairs signed-ranks test, $p < 0.01$, $N = 16$).

The corresponding distribution of a_i values for the $c = (14, 43, 43)$ situation are displayed in Figure 6. Again, we see that the distribution shifts to the right, i.e. towards the proportional split, when the proposer has made a relatively large contribution (right panel). To test for significance, we compare the average values of a_i in all matching groups and find a significant difference (Wilcoxon matched-pairs signed-ranks test, $p < 0.01$, $N = 16$). Hence, in both asymmetric situations we find that proposals are more proportional if the proposer himself has made a relatively large contribution. This supports the first part of Hypothesis 3.

To assess the effect of proposal location on voting behavior, we run Random-effects probit regressions. Results for unanimity rule are summarized in the top part of Table 6. In each regression, the dependent variable is the voting decision, coded as $v_i = 1$ if a

Figure 6: Distribution of a_i values, $c = (14, 43, 43)$, unanimity rule

(a) $(14, 43, 43)$ (N=140) (b) $(43, 14, 43)$ (N=280)



subject votes 'yes' and $v_i = 0$ otherwise. The independent variables are a_i and the period. For the $(20, 20, 60)$ situation, we find that the coefficient on a_i is positive and significant for responder 2 but insignificant for responder 1. That is, the subject with the larger claim is significantly more likely to vote yes if the proposal is closer to the proportional split. We observe a similar pattern in the $(43, 14, 43)$ situation. Namely, the coefficient on a_i is positive and significant for responder 2 but negative and significant for responder 1. Hence, in this situation the individual with the larger claim is more likely to vote yes if the proposal is closer to the proportional split while the opposite is true for the individual with the smaller claim. We also find that the coefficient of a_i is positive in the $(14, 43, 43)$ situation where both responders have made a relatively large contribution. In contrast, we find no significant opposite effect of a_i on voting in the $(60, 20, 20)$ situation, where both responders have made a relatively small contribution. In summary, our results indicate that responders with relatively large contributions vote 'yes' more often the more proportional a proposal. On the other hand, we find only partial evidence that individuals with lower contributions less often vote 'yes', as suspected in the second part of Hypothesis 3.

Result 3. *In asymmetric situations and under unanimity rule, individuals who have made relatively large contributions make proposals that are closer to the proportional split than do individuals who have made relatively small contributions. Responders with large contributions are more likely to vote 'yes' on proposals closer to the proportional split. (Partially consistent with Hypothesis 3.)*

Turning to rates of passage, it is apparent that proposals fail more often in the asymmetric situation (Figures 3 and 4) than in the symmetric situation (Figure 1, left panel).

Table 6: Effect of proportionality on responder votes (grand coalitions)

		(20, 20, 60)	(43, 14, 43)	(60, 20, 20)	(14, 43, 43)
Unanimity	Responder 1	-.03	-.48 ***	-.09	.21 ***
rule	Responder 2	.24 ***	.07		
	# of obs	(174)	(280)	(174)	(280)
	# of ids	(74;60)	(67;85)	(74)	(85)
Majority	Responder 1	-.12*	-.80 ***	-.54***	.49***
rule	Responder 2	.76 ***	.16 *		
	# of obs	(195)	(188)	(184)	(206)
	# of ids	(82;62)	(53;76)	(80)	(81)

Responder 1's points correspond to the second individual in the vector of points earned, responder 2 to the third. The table reports average marginal effects of proposal location. ($a_i = 0$ and $a_i = 1$ correspond to equal and proportional splits.) The coefficient can *roughly* be interpreted as the effect of proposing the proportional rather than the equal split. (However, it is not evaluated at the equal split.) Under majority rule, we only include 'fitted' grand coalitions in our regressions.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 7: Passage rate by situation (all first round proposals)

	(33,33,33)	(20,20,60)	(60,20,20)	(14,43,43)	(43,14,43)	Total
Unanimity rule	94%	78%	71%	82%	81%	83%
	189/201	136/174	62/87	115/140	228/280	730/882
Majority rule	95%	93%	84%	76%	95%	90%
	196/207	217/234	98/117	88/116	220/232	819/906
Rank Sum p†	0.95	0.01	0.67	0.89	< 0.01	0.01

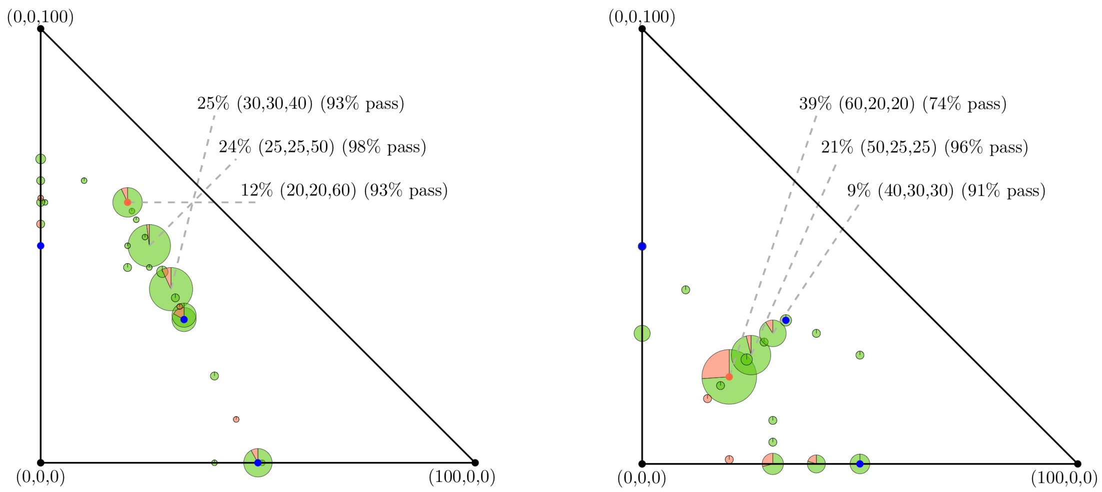
† Rank sum tests are based on fraction passed within each matching group (16 and 17 observations for unanimity and majority rule, respectively).

Table 7 presents information on the overall passage rates in each of the situations observed. Pooling all asymmetric situations, the overall rate of passage under unanimity rule is 79%, as compared to 94% in the symmetric situation. By comparing average passage rates within each matching group, we find that this difference is significant (Wilcoxon signed-ranks test, $p = 0.01$, $N = 16$). This supports our Hypothesis 4.

Result 4. *Under unanimity rule, the passage rate is larger in situations where claims are symmetric as compared to situations in which claims are asymmetric. (Consistent with Hypothesis 4.)*

Figure 7: PROPOSALS AND PASSAGE RATES, $c = (20, 20, 60)$, MAJORITY RULE

(a) $(20, 20, 60)$ (N=86) (b) $(60, 20, 20)$ (N=43)



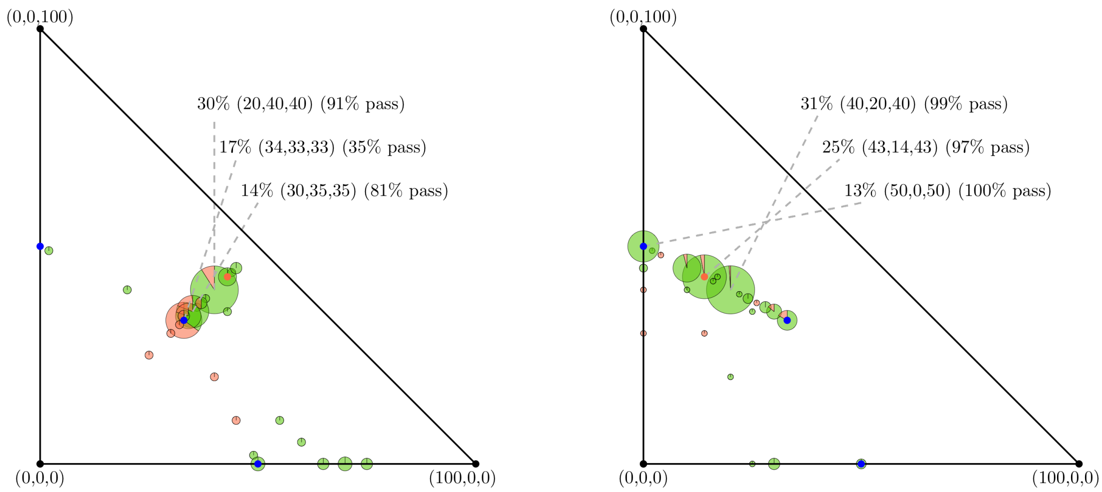
5.3 Asymmetric claims, majority rule

Now we turn to the majority rule treatment, and continue to look at situations where subjects have heterogeneous claims. Figures 7 and 8 display the distribution of proposals and the corresponding passage rates in detail. A salient pattern in these figures is that proposals are concentrated in three distinct areas. As in the unanimity rule treatment, the vast majority is located along a line connecting the three-way equal to the proportional split. In addition, a small number of proposals are located along either the horizontal or vertical axis, corresponding to minimum winning coalitions with responder 1 or responder 2, respectively.

Looking only at the grand coalitions in the $c = (20, 20, 60)$ and the $c = (14, 43, 43)$ situations, we observe that the distribution of proposals shifts towards the proportional split when the proposer's contribution is relatively larger (right panels). In these cases the proposer suggests the proportional split three times as often in the $c = (20, 20, 60)$ (12% vs. 39%), and almost twice as often in the $c = (14, 43, 43)$ situation (18% vs. 34%). Although we observe few minimum winning coalitions ((20,20,60) 16%, (60,20,20) 19%, (14,43,43) 9%, (43,14,43) 18%), the distribution of offers within these coalitions seems to reflect claims. That is, a two-way equal split is proposed if both coalition partners have made the same contribution, whereas partners with higher (lower) contributions are offered more (less) than the two-way equal split. For example, in the (20,20,60) the average offers

Figure 8: PROPOSALS AND PASSAGE RATES, $c = (14, 43, 43)$, MAJORITY RULE

(a) $(14, 43, 43)$ (N=86) (b) $(43, 14, 43)$ (N=43)



within MWCs are 50 and 62% to responders 1 and 2, respectively. In the (43,14,43) situation, average offers within MWCs are 37% to responder 1 and 49% to responder 2.

To study the composition and frequency of MWCs in more detail, we split proposals into two categories: Any proposal allocating less than 5% to at least one responder is defined as a 'fitted' Minimum Winning Coalition. Proposals which allocate strictly more than 5% to each responder are, in turn, classified as 'fitted' Grand Coalitions. Note that this measure will classify *more* proposals as MWCs than a more 'strict' definition would. The percentage of proposals that are thereby categorized as 'fitted' MWCs and 'fitted' grand coalitions is summarized in Table 8. The left and right parts of the table provide information on all periods and on the last 4 periods, respectively.

In every situation, we find that the vast majority of proposers (84%) build grand rather than minimum winning coalitions (MWCs). Although the fraction of MWCs increases somewhat over time, it remains low even in the last four experimental periods (25%). This evidence is inconsistent with Hypothesis 6.[30] Turning to the composition of MWCs, we do not find evidence that proposers systemically exclude members with higher claims as conjectured in Hypothesis 7. In the (20,20,60) situation, proposers are indeed more likely to include responder 1 who has contributed a smaller share (Wilcoxon matched-pairs

[30] MWCs are slightly more frequent in asymmetric than in symmetric situations (17% vs. 13%, all periods, 26% vs. 21%, last four periods). However this difference is not statistically significant (Wilcoxon matched-pairs signed-ranks test, $p = 0.24$, $N = 17$).

Table 8: 'Fitted' coalition composition, majority rule

	All periods				Periods 9-12			
	MWC with		Grand		MWC with		Grand	
Situation	resp. 1	resp. 2	coalition	N	resp. 1	resp. 2	coalition	N
(33,33,33)	9%	2%	88%	207	13%	4%	83%	48
(20,20,60)	12%	5%	83%	234	18%	3%	79%	94
(60,20,20)	17%	4%	79%	117	28%	6%	66%	47
(14,43,43)	10%	1%	89%	116	18%	0%	82%	38
(43,14,43)	3%	16%	81%	232	5%	26%	68%	76
Total	9%	7%	84%	906	16%	9%	75%	303

Notes: 'Situations' are defined such that the first coordinate is the proposer, the second and third are responder percentage of points earned. Due to rounding errors, the numbers in each row do not add up to 100% in all situations.

signed-ranks test, $p = 0.04$, $N = 16$). However, in the (43,14,43) situation, proposers are more likely to include responder 2 who has made a larger contribution (Wilcoxon matched-pairs signed-ranks test, $p = 0.01$, $N = 15$). This is despite the fact that responder 2 is offered higher shares when included in a MWC than responder 1 (see above). Hence, when responders have different claims, it appears that the proposer is more likely to include the responder who has contributed the same share as the proposer. Thus, we do not find that the responder with the higher claim is systematically excluded. This evidence stands in contrast to our Hypothesis 7.[31]

Focusing only on the 'fitted' grand coalitions, Figures 9 and 10 provide histograms of the a_i values (calculated as above - see section 5.2). Among the 'fitted' grand coalitions, we observe the same pattern as in the unanimity rule treatment. Namely, in both figures, the distribution of proposals seems to be shifted to the right, i.e. towards the proportional split, when the proposer has made a relatively large contribution (right panels). Using matching group averages of a_i as unit of observation, we find that the average values of a_i are indeed significantly larger when the proposer has made a relatively large contribution in both situations (Wilcoxon matched-pairs signed-ranks test; (20,20,60), $p < 0.01$, $N = 17$;

[31]In addition, we find that whenever responders have the same claims, proposers are more likely to include responder 1. Remember that we ordered responders according to the letter i.d. they received on the decision screen. That is, if the proposer's i.d. is 'A', responder 1 corresponds to the individual displayed as 'B' on the decision screen. If the proposer's i.d. was instead 'B' responder 1 corresponds to the individual displayed as 'A' on the decision screen. Hence, in both of these cases responder 1 is the person displayed below the proposer on the decision screen which might have affected the likelihood of receiving a positive offer.

(14,43,43), $p < 0.01$, $N = 17$).

Turning to voting behavior, we explore how the location of a proposal affects the decision to vote 'yes'. We do so separately for grand and minimum winning coalitions, starting with the latter. As would be expected, the most important determinant of voting on MWC proposals is whether a subject is included in the proposed coalition. If not, virtually all subjects (95%) vote 'no'. In contrast, those included vote 'yes' in 92% of all cases. To test how the location of a proposal affects the decision to vote 'yes' within a MWC, we run a Random-effects probit regression[32], with the voting decision as dependent and the period as well as the share being offered as the independent variables. Our tests reveal that coalition members are more likely to vote 'yes' the higher the share they are offered (Average marginal effect, $\beta = 0.01$, $p < 0.01$).

In a second step, we explore voting behavior within the 'fitted' grand coalitions that we observe in the majority rule treatment. For this purpose, we again run a set of Random-effects probit models, using the voting decision as dependent and the period as well as a_i as independent variables. The bottom half of Table 6 reports the average marginal effects of a_i on the decision to vote yes. In the $(20, 20, 60)$ and the $(43, 14, 43)$ situations, the coefficient on a_i is negative (and significant) for responder 1 and positive (and significant) for responder 2. Consistent with this pattern, we find that the coefficient on a_i is negative (and significant) in the $(60, 20, 20)$ and positive (and significant) in the $(14, 43, 43)$ situation. Hence, our findings indicate that individuals with relatively large claims are more likely to vote yes if a proposal is closer to the proportional split while the opposite holds for individuals with smaller claims.

Result 5a. *In asymmetric situations with majority rule, the vast majority of proposers attempt to build grand coalitions. Responders with larger contributions more often vote 'yes' the more proportional a proposal suggested in a grand coalition. Responders included in a MWC more often vote 'yes' the larger the share they are being offered. (Inconsistent with Hypothesis 5a.)*

Result 5b. *Proposals within the 'fitted' grand coalitions are closer to the proportional split if the proposer himself has made a larger contribution. Proposers who do build minimum winning coalitions are more likely to include the responder who has made the same contribution as themselves. (Inconsistent with Hypotheses 5b.)*

[32]Each subject votes on the proposals of the other two group members. We use the voting decisions of each individual as panel variable assuming that voting decisions are independent of individual characteristics.

In a last step we explore passage rates. As displayed in Table 7, we observe that 89% of the proposals pass in the asymmetric situations. This is significantly smaller than the passage rate in symmetric situations which amounts to 95% (Wilcoxon matched-pairs signed-ranks test, $p = 0.01$, $N = 17$) which supports our Hypothesis 8.

Result 6. *Under majority rule, the passage rate is larger in situations where claims are symmetric as compared to situations in which claims are asymmetric. (Consistent with Hypothesis 6.)*

As in the symmetric situation, passage rates in asymmetric situations do not differ between grand (89%) and minimum winning (91%) coalitions (Wilcoxon matched-pairs signed-ranks test, $p = 0.18$, $N = 12$). If subjects were able to anticipate or learn this over time, the fact that we observe few MWCs suggests that individuals genuinely prefer to allocate positive shares to all group members.[33]

5.4 Majority versus Unanimity rule

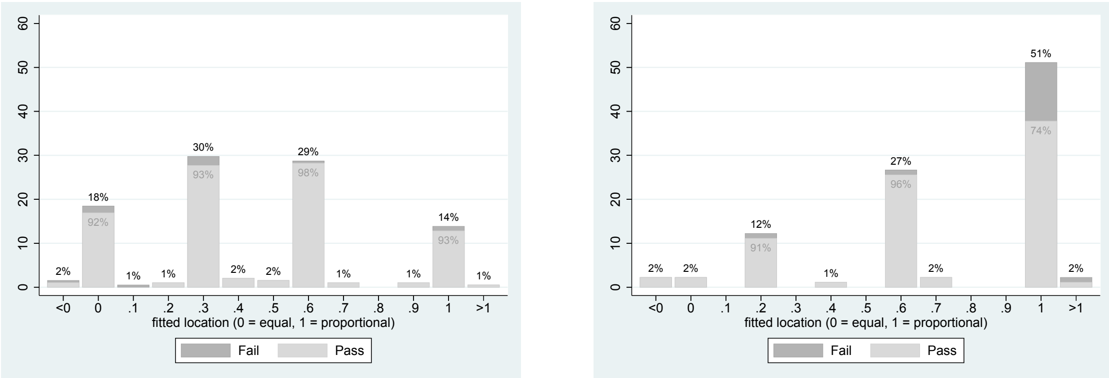
So far, we have separately discussed outcomes under both rules. In contrast to our hypotheses, we find a remarkable number of similar patterns. First, average shares offered increase in relative points contributed under both decision rules (see Table 5). Hence, offers reflect claims even under majority rule. Second, we find that offers under both rules are concentrated on a line connecting the three-way equal and proportional splits, moving closer to the proportional split if the proposer has made a relatively larger contribution. Third, individuals with relatively large contributions are more likely to vote 'yes' the closer a proposal to the proportional split. In this section, we analyze how the decision rule itself affects offers as well as passage rates and explore differences in these common patterns.

We start by comparing the distribution of grand coalition offers (i.e. distribution of a_i) between treatments. The corresponding distributions for the $(20, 20, 60)$ situation are displayed in the left panels of Figures 5 and 9. It appears that the distribution is shifted to the right (i.e. towards the proportional split) under unanimity as compared to majority rule. In particular, we observe almost twice as many proportional proposals under unanimity rule (31% vs. 14%). This is also the case in the $(14, 43, 43)$ situation, depicted in the left panels of Figures 6 and 10. Here, the fraction of proportional proposals is 19% under unanimity and only 5% under majority rule. By comparing the average values of a_i

[33]We are unable to test this conjecture directly, given that we did not elicit beliefs over passage rates.

Figure 9: Distribution of a_i values in 'fitted' grand coalitions, $c = (20, 20, 60)$, majority rule

(a) $(20, 20, 60)$ (N=195) (b) $(60, 20, 20)$ (N=92)



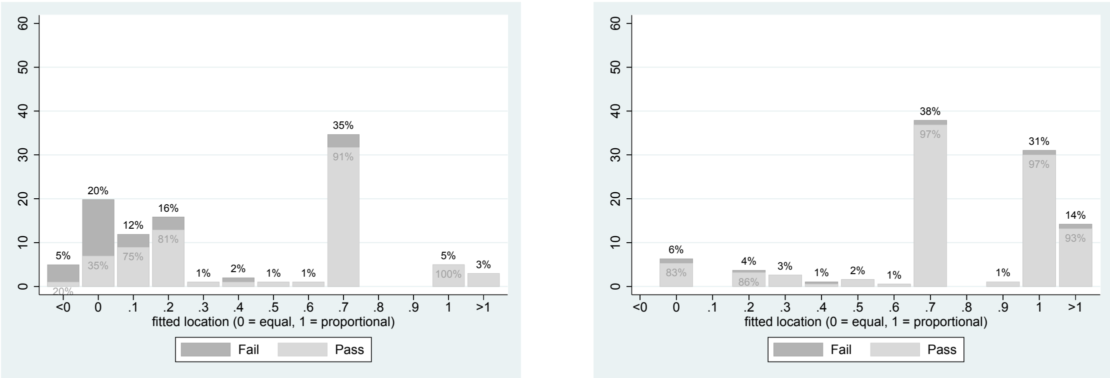
across matching groups, we find that proposals are indeed significantly closer to the proportional split under unanimity rule in both situations (Wilcoxon rank-sum test; $(20, 20, 60)$, $p = 0.02$; $(14, 43, 43)$, $p = 0.01$; $N = 33$). In contrast, we do not find that the decision rule has a significant effect in the $(43, 14, 43)$ (Wilcoxon rank-sum test, $p = 0.26$, $N = 32$) and the $(60, 20, 20)$ situations, i.e. when the proposer has made a relatively large contribution (Wilcoxon rank-sum test, $p = 0.8$, $N = 33$). These findings lend partial support for our Hypothesis 7.

Result 7. *Proposals under majority rule are less proportional (and more equal) as compared to unanimity rule in situations where the proposer's contribution is relatively small. In contrast, the degree of proportionality does not differ significantly when the proposer has made a relatively large contribution. (Partially consistent with Hypothesis 7.)*

As stated in Hypothesis 10, we are also interested in how the decision rule affects the incidence of delay. Given that delay is costly in our setting, this allows us to comment on the efficiency of agreements reached under both decision rules. Table 7 above summarizes the passage rates under both decision rules for each situation observed in our experiment. Averaged over all situations (including the symmetric ones), we find that the passage rate is significantly higher under majority than under unanimity rule (83% vs. 90%, Wilcoxon rank-sum test, $p < 0.01$, $N = 33$). This difference in passage rates is slightly higher in the asymmetric situations (78% vs. 89%, Wilcoxon rank-sum test, $p < 0.01$, $N = 33$). However, when comparing the passage rates in each situation separately, we find no significant differences in the $(60, 20, 20)$ situation, nor in the $(14, 43, 43)$ situation. Hence,

Figure 10: Distribution of a_i values in 'fitted' grand coalitions, $c = (14, 43, 43)$, majority rule

(a) $(14, 43, 43)$ (N=103) (b) $(43, 14, 43)$ (N=188)



we only find partial support for our Hypothesis 8.

Result 8. *On average, the passage rate is significantly higher under majority as compared to unanimity rule, especially when considering asymmetric situations only. However, when comparing the passage rates under unanimity and majority rule for each situation separately, we do not find significant differences in the* $(60, 20, 20)$ *and the* $(14, 43, 43)$ *situations. (Partially consistent with Hypothesis 8.)*

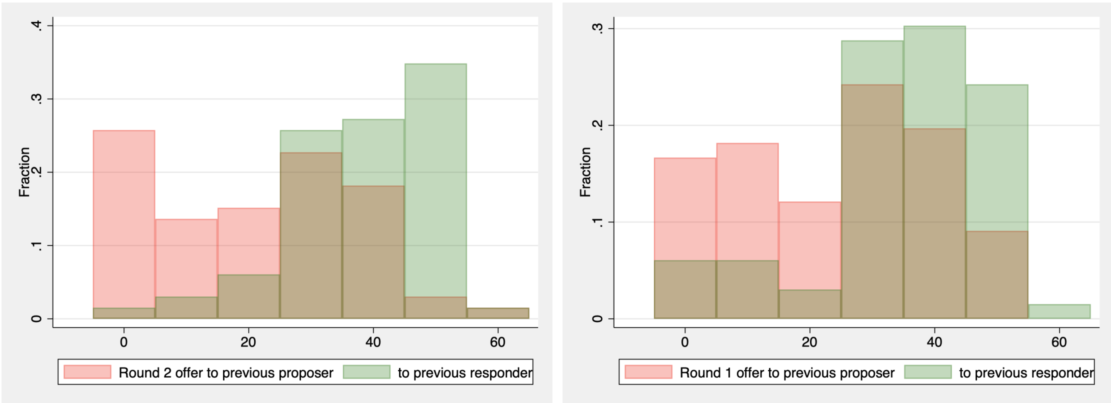
5.5 Bargaining dynamics and retaliation

In a metastudy of majoritarian BF experiments, Baranski and Morton (2021) found evidence for path dependence in proposal behavior. Specifically, average round 2 offers to subjects who proposed in round 1 are lower than offers to previous responders. Baranski and Morton's intertpretation is that subjects retaliate against round 1 proposers whose proposals both responders rejected.

If similar patterns of retaliation were present in our experiment, it is conceivable that the relatively low frequency of minimum winning coalitions observed in our majoritarian treatment is driven in part by proposers fearing future retaliation. Such concerns may be amplified in our design by the fact that a proposal will be put up for a vote even if it is not counted. In this section, we investigate whether Baranski and Morton's (2021) result was replicated in our experiment.[34]

[34]Another potential form of path dependence concerns patterns of inclusion within the majority rule treatment. In Appendix A2, we show that subjects are 14% more likely to exclude another subject in

Figure 11: Offers by first round responders in groups that reach round 2 (majority rule)



5.5.1 Majority Rule

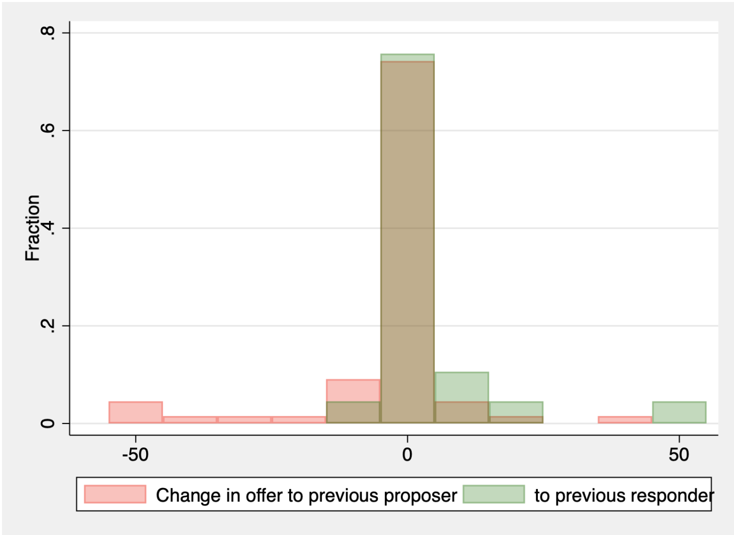
One way to replicate B&M's approach in our setting is to define "first round proposers" as those subjects whose proposals were randomly chosen to be counted in round 1, and then to compare the round 2 offers from "first round responders" to previous proposers vs. previous responders. The left panel of Figure 11 displays the corresponding distributions. On average, previous proposers are offered 22% as compared to 39% for previous responders.

At first glance, these data seem to support the notion that round 1 proposers are "punished" if their proposals fail. However, this interpretation is complicated in our setting by the presence of heterogeneous claims. It is conceivable that round 2 offers are affectd by factors distinct from, but correlated with, the failure of others' first round proposals. To investigate this, we can exploit the fact that our design allows us to observe the proposals that round 1 responders made *in round 1.* The right panel of Figure 11 displays the distributions of *round 1* offers made by first round responders to round 1 proposers vs. to round 1 responders, within groups who reach round 2. (Note that these are the same as those who enter the comparison in the left panel.) We can see clearly that these round 1 responders were *already* less generous to round 1 proposers in round 1, i.e. before they had seen their proposals. Thus, at least some of the differences in second round offers cannot be interpreted as retaliation. Instead, it is likely to be driven by situational factors (claims) that are correlated with the failure of first round proposals.

Given these patterns, a reasonable way to investigate the extent of retaliation in our context is to look at the *differences* between the proposals that round 1 responders made

round 2 if that subject excluded them in round 1.

Figure 12: Changes in offers by first round responders in groups that reach round 2 (majority rule)



in round 2 vs. round 1. If there is retaliation against previous proposers, we would expect the shares they are offered to decrease, and conversely the offers to round 1 responders to increase, i.e. the *changes in offers* should be negative for previous proposers and positive for previous responders. Figure 12 displays the distributions of these changes.

The figure indeed supports the expected pattern. However, the most salient feature of the graph is that more than 70% of round 2 offers to both previous proposers and previous responders are the same as in round 1. On average, offers to previous proposers are only 3.5% lower than in round 1, while offers to previous responders are 3.2% higher. To assess the significance of these differences, we estimate a random effects model, treating the *change* in offers from round 1 to round 2 as the dependent variable, controlling for whether the responder was a first round proposer, her precentage claim, as well as the experimental period. Column (1) of Table 9 shows the result, which confirms the pattern described (a 7% difference in offer adjustments) and suggests that the effect is statistically significant.

In sum, we find that the result reported by Baranski and Morton (2021) is qualitatively replicated in our majority rule treatmnet. Although the magnitude of the effect appears to be modest, it is possible that the potential for retaliation may have motivated even "selfish" subjects to respect claims and propose grand coalitions in our majoritarian treatment.

As noted earlier, such a concern might have been amplified in our setting if round

Table 9: CHANGE IN OFFERS ROUND 2 VS. ROUND 1 (RANDOM EFFECTS REGRESSIONS)

	Majority rule		Unanimity rule	
	from first round responders	to first round responders	from first round responders	to first round responders
Responder was proposer	-6.63**		0.64	
	(2.23)		(0.59)	
Resonder's first proposal passed		-5.82		1.08
		(7.49)		(1.01)
Responder's claim (%)	-0.03	-0.02	-0.04*	-0.03
	(0.07)	(0.07)	(0.02)	(0.03)
Period	0.03	0.14	0.04	0.07
	(0.28)	(0.22)	(0.09)	(0.14)
Constant	3.88	8.57	0.75	0.14
	(3.37)	(7.62)	(0.93)	(1.40)
Observations (offers)	132	132	216	216
Number of proposer IDs	49	64	61	74

Standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

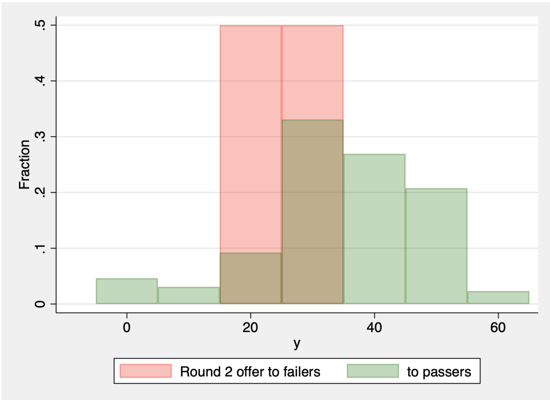
2 proposers relatiated against those who made unpopular proposals, even when those proposals were not counted. We now investigate whether there is evidence of this in our data.

The left panel of Figure 13 displays the second round offers received by subjects whose proposals were *not* counted in round 1, conditional on whether that proposal (would have) passed ("passers") or not ("failers"). The pattern is similar to the comparison between previous proposers and responders above. However, the very same pattern is observed when we look at *first round* offers received by these players (right panel). This suggests that the differences in round 2 offers reflect something other than retaliation against "failers".

Indeed, if we look at the distribution of *changes* in offers made to subjects whose proposals were not counted, it appears that there is no systematic relationship to the passage or failure of their round 1 proposals. (See Figure 14). This is confirmed by a random effects regression (see column 2 of Table 9). Thus, we conclude that there is no systematic evidence for retaliation against subjects whose first round proposals were not counted, so that having subjects vote on all proposals is unlikely to have enhanced concerns about retaliaion. We summarize our findings for the majority rule treatment as follows.

Result 9a. *Within the majority rule treatment, subjects whose first round proposals are*

Figure 13: Offers to round 1 responders (majority rule)



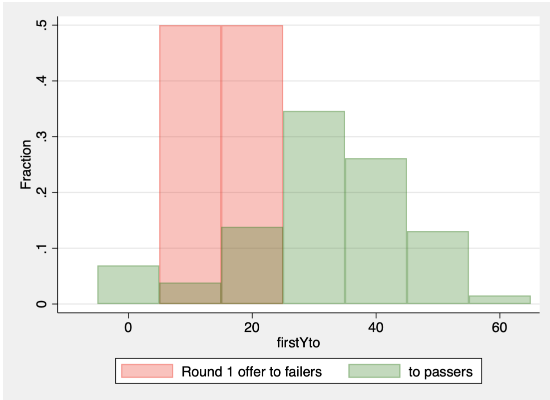
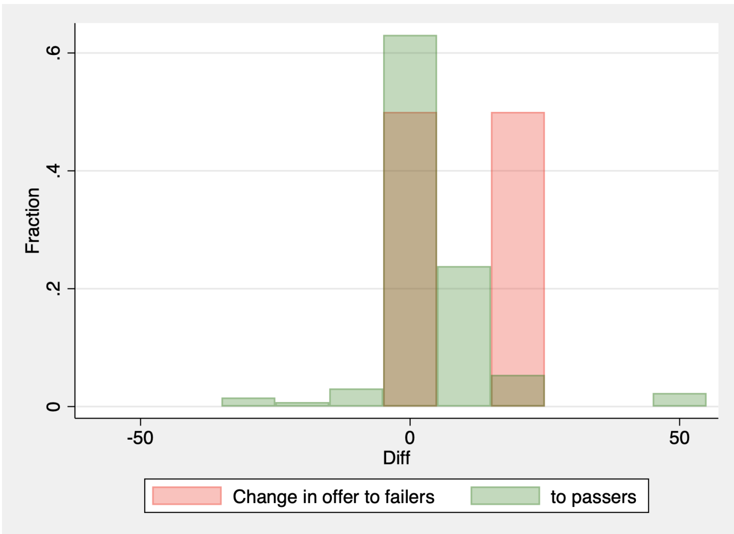


Figure 14: Changes in offers to round 1 responders (majority rule)



counted and fail are subsequently offered less than those whose proposals were not counted. The magnitude of this effect is modest. In contrast, round 2 offers to subjects whose first proposals were not counted are unaffected by the success or failure of those proposals.

5.5.2 Unanimity Rule

Figures A5 to A8 in the Appendix are analogous to Figures 11 to 14 above. They do not reveal a systematic difference between offers to first round proposers vs. reponders, or between offers to first round responders whose proposals fail vs. pass, respectively. This impression is confirmed by the random effect regressions reported in columns 3 and 4 of Table 9. We summarize these findings as follows.

Result 9b. *Within the unanimity rule treatment, subjects whose first round proposals are counted and fail are not subsequently offered less than those whose proposals were not counted. Likewise, round 2 offers to subjects whose first proposals were not counted are unaffected by the success or failure of those proposals.*

6 Conclusion

We experimentally investigate how claims, derived from relative contributions to a commonly produced surplus, affect bargaining behavior and outcomes under two decision rules, namely unanimity and majority rule. Under unanimity rule, each group member possesses veto power which may be used to defend one's claim. Hence, while unanimity rule might result in fair (in the sense of proportionality) outcomes, endowing each party with veto power could cause severe delay. Majority rule, on the other hand, enables a minimum winning coalition to ignore the claims of a minority member. While this may reduce the degree of proportionality reflected in final outcomes and, consequently, be deemed unfair, requiring fewer group members to consent might allow groups to reach an agreement more quickly.

We study how claims affect fairness and efficiency in a laboratory experiment in which groups of three subjects first jointly produce a surplus and then bargain over the distribution of the surplus. Bargaining takes place in a finite horizon Baron and Ferejohn framework. Across treatments, we vary whether two or all three group members have to agree on a proposed division of the surplus. In line with previous evidence, we find that claims affect proposals and final outcomes under unanimity rule. Specifically, offers received increase in relative points contributed. A closer inspection reveals that virtually all proposals are located between the equal and the proportional split. In addition, we find that proposals are closer to the proportional split if the proposer has made a relatively large contribution, and hence benefits from receiving the proportional instead of the three-way equal share. Studying voting behavior, we find that individuals with higher claims are also more likely to vote yes the closer the proposal to the proportional split.

Turning to majority rule, we detect many similar patterns. In contrast to previous experiments without claims, we find that a majority of proposers suggests a grand instead of a minimum winning coalition and that average offers reflect the ranking of contributions. This is despite the fact that minimum winning coalitions are as likely to pass as grand coalitions. Although we observe few minimum winning coalitions, proposers are more likely to include group members who have made the same contributions. This behavior might result from the fact that there is a clear norm to share the benefits equally with partners who have contributed the same amount, while it is more difficult to assess how much needs to be offered to individuals with higher or lower contributions. Within grand coalitions, proposals are closer to the proportional split if the proposer has made a relatively large contribution. Thus, under both decision rules we find that proposers attempt to implement the proportional split more often if they have made a relatively large contribution. Conversely, they attempt to distribute the surplus more equally whenever they have made a relatively small contribution. In these latter cases, we find that proposals as well as final outcomes outcomes are closer to the equal split under majority as compared to unanimity rule. In terms of efficiency, we find that majority rule leads to a higher passage rate, especially in situations in which individuals have made different contributions.

While we do find that the decision rule affects proposer behavior, final outcomes as well as the incidence of delay, these differences are not as large as one might have expected based on previous Baron and Ferejohn experiments without claims. In these papers, differences in offers under unanimity and majority rule are mostly driven by the fact that proposers form minimum winning coalitions under majority rule. Our results suggest that the willingness to do so is substantially reduced when all individuals have contributed to the surplus via a real effort task. We find some evidence of retaliation against subjects whose first round proposals fail. However these effects are modest, and failure is rare, with 90% of proposals passing irrespective of whether they are grand or minimum winning coalitions. Thus, our interpretation is that this result reflects the influence of fairness perceptions, i.e. proposers deliberately choose to respect claims because they regard this as fair.[35]

[35]Another indication that fairness conceptions play a role is that even subjects who build minimum

Our paper shows that the differences between the two decision rules are instead more subtle in the presence of claims. In particular, we do observe that individuals strategically propose and approve less proportional distributions whenever this is to their own advantage and whenever the decision rule leaves them more discretion to ignore the claims of other group members (as under majority rule). This results in less proportional outcomes, whenever a majority of group members has contributed relatively little. Given that individuals seem to balance their offers between two prevalent fairness norms, proportionality and equality, this behavior may be indicative of a self serving bias in fairness norms. That is, in a given situation, individuals opportunistically choose the fairness norm which suits their own interests most (Messick and Sentis, 1983; Cappelen et al., 2007). Although the consequences for high contributors are not as drastic as, for example, being excluded from a coalition, this behavior certainly shows that individuals are willing to ignore the claims to the benefit of more equality within the group.

After completion of this manuscript, we learned that Gantner and Oexl (2021) have conducted similar experiments in which three subjects divide a surplus produced via a quiz task. They compare a majoritarian Baron-Ferejohn with a dictator game treatment. In the former, more than 1/3 of proposals made in late experimental periods are “fitted” MWCs (defined as offering less than 10% to one responder). Gantner and Oexl conclude that many subjects do not consistently respect claims when the decision rule allows them to exclude others. We also observe an increase in the proportion of “fitted” MWCs to approximately 1/4 in late games, but have emphasized that this proportion remains low as compared to experiments without claims (e.g. more than 3/4 in the comparable experiment by Miller and Vanberg (2013)).[36]

Our findings may be relevant for real world instances of bargaining with claims, such as budget allocation within the EU. Several recent reforms of the EU decision rules appear to be motivated by settling the conflict between redistribution from richer to poorer member states and preserving proportionality at the same time. While redistribution from poorer to richer member states is an explicit goal of the EU, richer member states provide most of the budget and also represent a majority of the population. Hence, preserving proportionality might be an important goal in order to secure support from the voters in these countries and

winning coalitions typically include the responder whose claim is similar to their own. Arguably, a purely “selfish” proposer would choose the partner with the smaller claim.

[36] There are also some differences in the design, perhaps most notably in the way that points earned in the quiz task determine the surplus. In our experiment, the points are added, such that the relation between relative contributions and relative claims is unambiguous. In Ganter and Oexl, points are multiplied, which may render the implied claims more ambiguous.

to preserve the EU's legitimacy. Several recent voting reforms have indeed shifted voting rights from newer and poorer member states to older and richer member states. Research in political science suggests that this voting reform has led to more proportional outcomes which come at the cost of less equal outcomes. For example, with the 2004 enlargement the EU moved from the traditionally employed unanimity rule to a system with qualified majority rule and country voting weights, allocated roughly approximate to population. It has been shown that members with higher voting weights were in fact able to secure higher shares of structural and agricultural funds (Aksoy, 2010). The latest reform implemented a system of double majority, according to which a proposal passes if it is approved by 55% of the member states who represent at least 65% of the population. Effectively, this reform has been found to redistribute voting weights from newer towards older EU15 members, especially to Germany (Leech and Aziz, 2013). Although our experiment is not directly applicable to the complex institutional setting of the EU, we believe that it captures some relevant facts on how decision rules affect the distribution of benefits and may, thus, be informative for the public discourse about optimal decision rules.

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