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Sharing with the Powerless Third: Other-regarding Preferences in Dynamic Bargaining

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Other-regarding Preferences in Dynamic Bargaining

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Abstract

Other-regarding preferences are powerful drivers of human behavior, leading individuals to forgo their own economic gains to share with the less fortunate. However, when actors with different levels of other-regarding concern bargain about how to distribute payoffs, it is unclear whether joint bargaining decisions reflect the individual preferences. In this study, I examine how heterogeneous other-regarding preferences interact and influence negotiated distribution decisions that involve a third passive actor. In a dynamic free-form bargaining experiment, two subjects must allocate payoffs between themselves and a powerless third subject. The data reveal that fairness between the bargainers is more important than fairness towards the third subject; bargainers only allocate payoff shares to third subjects if the other bargainer is willing to allocate the same amount, even if their other-regarding preferences differ strongly from each other when revealed individually. Through the formal analysis, I can systematically link the results to the other-regarding preferences elicited individually and, thereby, provide important insights into other-regarding preferences in joint decision-making environments.

Keywords

Free-form bargaining, Other-regarding and Social preferences, Third Agent, Unstructured bargaining

JEL-Classification

C78, C92, D64, D9;

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1. Introduction

Any coalition, whether it is a political coalition between parties, a business cooperation or a union, must decide how to distribute available resources among its members. Often, these decisions affect third parties that, at the decision-making stage, have no direct influence on the outcome. For example, once actors have formed a majority coalition and are able to make decisions on behalf of the group, they negotiate the distribution of resources for themselves and the group members outside the coalition. In other instances, the negotiating parties may be managers or party leaders and the affected third parties are co-workers or party members. Third parties appear in various contexts, in which the motives and distribution preferences of decision-makers can be just as varied. In this paper, I examine in a stylized way under which circumstances bargainers take third subjects into account and how the distribution decisions depend on their individual levels of other-regarding preferences.

It is now well established that other-regarding preferences are an important driving force of individual behavior (Cooper and Kagel 2016; Fehr and Schmidt 2006; Konow and Schwettmann 2016). Despite the extensive amount of evidence, most of the bargaining literature refrains from incorporating other-regarding preferences in the analysis and focuses on institutional factors (for a survey see, Palfrey 2016). Distributional preferences, however, appear to be crucial in determining joint distribution decisions. While one would expect that self-interested actors leave anyone outside the majority coalition empty-handed, as allocating any payoff shares to third actors would be 'coalitionally irrational' (Aumann and Maschler 1961), other-regarding actors might happily share payoffs equally among the entire group (Sauermann et al. 2021). Yet, other-regarding preferences can interact with the implemented institutions and bargaining structure, which makes it difficult to derive generalizable insights across different environments.

Bargaining between coalition partners frequently proceeds in an unstructured way (Luhan et al. 2019), especially between two actors (Camerer et al. 2019; Ingersoll and Roomets 2020). In practice, settling on agreements without a formal protocol can be faster and more efficient once a coalition has formed than going through highly institutionalized procedures. Hence, in this study, I impose limited structure on the bargaining protocol and employ a free-form bargaining experiment in which two active subjects have to agree on the distribution of payoffs between themselves individually and a third passive subject. The experiment allows unrestricted back-and-forth interaction in the form of distribution offers, while simultaneously retaining the design feature employed by most structured bargaining experiments to prohibit verbal communication. This enables me to focus on the influence of other-regarding preferences on the bargaining outcome, while controlling for the influence of cheap-talk on bargaining outcomes (e.g., Agranov and Tergiman 2014; Baranski and Kagel 2015; Croson et al. 2003).

In order to solve the bargaining problem theoretically, I derive closed-form solutions by applying prominent social preference functions (Bolton and Ockenfels 2000; Fehr and Schmidt 1999) to the Nash bargaining solution (Birkeland and Tungodden 2014; Luhan et al. 2019; Nash 1950). To disentangle the influence of individual preferences on the outcome, subjects assigned an active role bargain consecutively with different subjects about the distribution of payoffs. Following which, I fit the derived solution functions to the observed bargaining behavior. This allows me to assess which assumptions about the other-regarding preferences explain the bargaining behavior best. Additionally, I elicit subjects' distributional preferences in individual choice tasks in two treatments, either before or after the bargaining game. This allows me to compare subjects' bargaining behavior with their individual distribution choices. I also report on the dynamics of the bargaining process, which is much richer in the free-form bargaining environment than under a structured bargaining protocol.

My main result is that when third subjects receive payoff shares, bargainers retain equal amounts of the payoff in 94 percent of the cases. A substantial share of the bargaining subjects care about the third subject; however, fairness between the bargainers appears to be more important than sharing fairly with the third subject. If other-regarding subjects are not able to enforce equal contributions, then the third subjects receive no payoff shares, because virtually no bargainer is willing to reduce inequality between themself and the third subject at the expense of an increase in inequality between themself and the other bargainer. After fitting the solution functions, the bargaining solution that captures this relationship in the underlying utility function (Fehr and Schmidt 1999) outperforms alternative solutions significantly. The rationale is also apparent when analyzing the bargaining process. In view of structured bargaining studies, which led to the conclusion that "players care neither about the absolute nor about the relative payoffs of other individuals" (Bolton and Ockenfels 2008), but just about their own payoff relative to the average, this result is surprising.

The results further show that bargaining outcomes are often polarized. In a majority of agreements, third subjects receive none or exactly one-third of the payoff. The analysis indicates that other-regarding preferences derived from the bargaining behavior correlate strongly with the revealed other-regarding preferences from the individual choice tasks. Subjects with strong self-interested preferences are more likely to enforce two-way splits, while subjects with strong other-regarding preferences are more likely to enforce three-way even splits. Moreover, analyzing the dynamics of the bargaining process reveals that the individual other-regarding preferences of the proposer of the final agreement influences the payoff distribution significantly stronger than the preferences of the receiver of the agreed offer. Also, the data confirms the presence of an 'anchor effect' (Chertkoff and Conley 1967) and a 'deadline effect' (Roth et al. 1988), implying that first offers have a lasting impact on the outcome and most agreements are formed during the last seconds of the negotiations.

The study touches upon several streams of literature. First, it contributes to studies that examine negotiated transfers to third individuals. A passive third individual was first introduced by Güth and van Damme (1998) in an extended version of the ultimatum game. The ultimatum game gives the proposer significant bargaining power since the receiver can only decide to accept or reject the offer. They find that proposers and receiver predominantly agree on the three-way even split in early periods, which can be replicated with samples outside the laboratory (Güth et al. 2007). In later periods, when the proposer learns to use their first-mover power, receivers of the take-it-or-leave-it offer care mostly about their own relative payoff share and less about the third, which is corroborated by electrophysiological data (Alexopoulos et al. 2012). The results from the structured bargaining experiments led to the conviction that self-interested bargainers are free to exploit other-regarding bargainers if the latter receives their own fair share, defined as the own payoff share relative to the average payoff share (Bolton and Ockenfels 1998, 2000, 2008). According to the evidence presented here, this conjecture cannot be supported in a less structured bargaining environment. Other-regarding bargainers do not let themselves be exploited and only transfer payoff shares to third subjects if they keep the same payoff share as the other bargainer.

Second, the study draws parallels with multilateral bargaining and coalition formation literature. Under simple majority rule, classic approaches predict that groups form minimum winning coalitions which distribute payoffs exclusively among the majority (Aumann and Maschler 1961). Experimental tests in this field show that multilateral bargaining outcomes are generally more equal than theoretically predicted by the assumption of strict self-interest (Diermeier and Morton 2005; Fréchette et al. 2003; McKelvey 1991; Palfrey 2016). However, after a few periods, many coalition agreements tend to exclude group members outside the coalition from any payoffs (Agranov and Tergiman 2014; Miller and Vanberg 2013; Okada and Riedl 2005). In comparison to these endogenous majorities, the predefined majorities in this study appear to exclude third subjects less. Likewise, when the bargaining protocol is unstructured (Schwaninger et al. 2019), endogenous majorities transfer less to subjects outside the coalition than observed here. These results suggest indirectly that either other-regarding concerns are higher when subjects outside the coalition have no power to respond or that self-interested subjects are more likely to select into the majority.

With respect to the main result, the study is also related to findings in variations of the dictator game with two dictators and one recipient. Evidence on the question of whether transfers to the same recipient align between multiple dictators is mixed, however. Panchanathan et al. (2013), who utilizes the strategy-method, find that 13 percent of all subjects condition their transfer on the transfer of the other dictator. Yet, they also find that 36 percent compensate for the other dictators' self-interest and 51 percent of all subjects do not react to the transfer of other dictators. Similarly, Gächter et al. (2017) find considerable heterogeneity regarding the influence of others on the dictators' sharing behavior. Xu et al. (2020) study transfers in a dictator game, in which a first-mover makes a suggestion about how much the two dictators should transfer. They find that charitable giving is higher when the first mover suggests donating the same amount, as compared to cases in which the first mover suggests donating a lower amount than the other subject. Ellman and Pezanis-Christou (2010) studied a team dictator game in which payoffs between the dictators are equal by design. Their results show that average transfers to third subjects are higher if the decision is based on the average distribution proposal instead of consensus.

Finally, the study contributes to the growing body of unstructured bargaining experiments. Advocates argue that in many instances results from unstructured bargaining are more applicable than structured bargaining (Camerer 2003; Tremewan and Vanberg 2016). Furthermore, the results from unstructured bargaining protocols allow for more interesting analyses of the bargaining processes preceding the bargaining outcome (Camerer et al. 2019; Karagözoğlu 2019). In this particular study, using an unstructured bargaining protocol has the additional advantage of making bargainers strategically equivalent (Gächter and Riedl 2005; Galeotti et al. 2019), which means that other-regarding preferences do not interact with the bargaining position. In unstructured bargaining experiments without further context, two bargainers predominantly agree on a two-way equal split (Isoni et al. 2014; Nydegger and Owen 1974). Recently, Ingersoll and Roomets (2020) also introduce a third passive subject to an unstructured bargaining experiment, in which the passive subjects take the role of clients which receive a share of the payoff the agent negotiates for them. They find that a "minimization of differences" solution, closely related to Fehr and Schmidt (1999) model, explains the behavior better compared to the Nash bargaining solution. In this study, I assume that subjects have inequality averse preferences and integrate them directly into the Nash bargaining solution.

The remainder of this paper is structured in the following way: First, I derive predictions for the bargaining problem on the basis of three different classes of utility functions. In section 3, I describe the experimental design to compare the predictive quality of the different models. In sections 4 and 5, I derive the hypotheses and present the results. Finally, I summarize and discuss the findings.

2. Cooperative Bargaining Solution with Inequality Aversion

This study focuses on the question of how two individuals divide payoffs among themselves and a third individual if they bargain in an unrestricted and costless bargaining environment. Building on Birkeland and Tungodden (2014) and similar to Luhan et al. (2019), I make use of the Nash bargaining solution (Nash 1950) to predict the division, allowing for heterogeneous other-regarding preferences. More concretely, suppose there are $n = 3$ individuals $j = a, b, c$. While individuals $i = a, b$ bargain over the distribution of a bargaining value, v, individual c is excluded from bargaining. The two bargaining individuals can agree on any triple $y = (y_a, y_b, y_c)$ of payoff shares, $y_j \in [0, v]$, which belong to the set of feasible bargaining agreements $Y = \{y : \ y_a + y_b + y_c \leq v\}$. The disagreement point d is zero, $d = (0, 0, 0)$, which means that individuals receive no payoff if they cannot agree on any offer and that disagreement entails the risk of losing a potential increase of utility. I assume individuals a and b bargain over the payoff shares y_j as if they were solving the following optimization problem,

$$max \ (u_a(y) - u_a(d)) * (u_b(y) - u_b(d)) \text{ subject to } y_a + y_b + y_c = v, \tag{1}$$

where $u_i(y)$ is the utility of individual i, which depends on the distribution of payoff shares. If the utility functions are convex, this bargaining solution is symmetric, independent of scale, independent of irrelevant alternatives, and Pareto efficient (Nash 1950).[3] Pareto efficiency implies that if the utility at the disagreement point is zero, i.e. $u_i(d) = 0$, which applies to the utility functions I compare in the following, an individual will not agree to any outcome resulting in a negative individual utility (Birkeland and Tungodden 2014).

When all individuals aim to maximize their own monetary payoffs, i.e. $u_i(y) = y_i$ and $d_i = 0$, the distribution $y = (v/2, v/2, 0)$ maximizes the Nash product. In this case, individual c introduces only irrelevant alternative distributions and the third individual receives no payoff since the bargaining individuals are strictly self-interested. In contrast, assuming individuals value not only their own payoffs but also the relation of their own payoffs to the payoffs of others, the third individual may receive some payoff shares. The outcome then depends on the specific properties of the utility function of the two bargaining individuals and the relative weights attached to own and other's payoffs.

Here, I examine three classes of outcome-based utility functions that incorporate the idea of other-regarding preferences in different ways.[4] As a reference, I derive predictions assuming preferences that are described by the Cobb-Douglas form (henceforth CD), which is frequently used to model the trade-off between own and others' payoffs (Andreoni 1990; Andreoni and Miller 2002; Nax et al. 2015). The second utility function integrates the properties proposed by Bolton and Ockenfels (2000) and conceptualizes inequality aversion (henceforth BO). The third utility function was developed by Fehr and Schmidt (1999) and conceptualizes pairwise inequality aversion (henceforth FS). After two decades of research on other-regarding preferences, the literature is clear that the latter two models explain individual behavior accurately in decision settings with the concrete properties at hand (Konow and Schwettmann 2016). The accuracy decreases, however, when the decision-makers face an equality-efficiency trade-off (Kagel and Wolfe 2001) or have further information about intentions, merit, or need (Cooper and Kagel 2016; Nicklisch and Paetzel 2020).

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3 For an extension to non-convex problems, see Conley and Wilkie (1996).

4 An implicit assumption in Nash's bargaining solution is that the bargainers know each other's utility function. Arguably, the distribution preferences are revealed during the bargaining process when bargainers repeatedly make their distribution offers. For a bargaining solution with incomplete information, see Harsanyi and Selten (1972). Their approach is difficult to combine with common conceptions of other-regarding preferences because types are usually not discrete. Hence, I follow Birkeland and Tungodden's (2014) and Luhan et al.'s (2019) approach.

2.1. Cobb-Douglas Utility

To solve the optimization problem in (1), I consider each utility function separately, assuming that the utility weight attached to other individuals' payoffs varies across individuals in order to allow for heterogeneity of other-regarding preferences. For a utility function of Cobb-Douglas form, I assume the utility to be

$$u_i(y) = y_i^{1-\delta_i} \prod_{j\neq i} y_j^{\delta_i/(n-1)},\ 0 \leq \delta_i \leq 1, \tag{2}$$

where parameter $1-\delta_i$ weights own against others' payoffs. Thereby, the model captures the inclination of subjects to allocate some payoffs to other subjects. Using (2) in (1) and solving for y_c gives:

$$y_c(\delta_a, \delta_b) = \frac{1}{4}(\delta_a + \delta_b)v. \tag{3}$$

Hence, if $\delta_i > 0$, then CD can explain positive transfers to the third individual. Depending on the weights of the bargaining individuals, the payoff share of the excluded individual can lie within the range $y_c(\delta_a, \delta_b) \in [0; v/2]$. This means CD also rationalizes bargaining outcomes that allocate more payoff to the third individual than to the bargaining individuals. If $\delta_a = \delta_b = 2/3$, then the bargainers would agree on the even three-way split.

2.2. Inequality Aversion

BO assumes a utility function that decreases exponentially when the own payoffs deviate from the average payoff,

$$u_i(y) = \begin{cases} y_i - \vartheta_i \left(\frac{y_i}{v} - \frac{1}{n}\right)^2 & if\ v \neq 0, \\ 0 & if\ v = 0; \end{cases},\ 0 \leq \vartheta_i, \tag{4}$$

where parameter ϑ_i weights the inequality between own payoffs and mean payoffs. Using (4) in (1) and solving for y_c gives:

$$y_c(\vartheta_a, \vartheta_b) = \begin{cases} \left(\frac{1}{3} - \frac{v}{2}\left(\frac{1}{\vartheta_a} + \frac{1}{\vartheta_b}\right)\right)v & if\ \frac{\vartheta_a + \vartheta_b}{\vartheta_a\vartheta_b} < \frac{2}{3v}, \\ 0 & otherwise; \end{cases}. \tag{5}$$

Similar to CD, BO predicts the third individual will obtain positive payoff shares if the disutility of inequality of both players is sufficiently strong ($\vartheta_a\vartheta_b/(\vartheta_a + \vartheta_b) > 3v/2$). In contrast to CD, however, BO formalizes inequality aversion and the solution implies that it cannot be optimal that the third player's payoff share is higher than one third, i.e. $y_c(\vartheta_a, \vartheta_b) \in [0; v/3]$.

2.3. Pairwise Inequality Aversion

FS assumes individuals compare their payoff pairwise to others' payoffs and dislike disadvantageous inequality more than advantageous inequality; that is,

$$u_i(y) = y_i - \frac{\alpha_i}{n-1}\sum_{j\neq i}\max\{y_j - y_i, 0\} - \frac{\beta_i}{n-1}\sum_{j\neq i}\max\{y_i - y_j, 0\},\ \beta_i \leq \alpha_i, 0 \leq \beta_i < 1; \quad (6)$$

where parameters α_i and β_i express the disutility from being worse or better-off in payoffs. Using (6) in (1) and solving for y_c gives:

$$y_c(\beta_a, \beta_b) = \begin{cases} 0 & if \quad \beta_a + \beta_b \leq \frac{3}{4}\beta_a\beta_b + 1, \\ \left(\frac{3\beta_a\beta_b - 4(\beta_a+\beta_b)+4}{9\beta_a\beta_b - 6(\beta_a+\beta_b)+4}\right)v & if \quad \frac{3}{4}\beta_a\beta_b + 1 < \beta_a + \beta_b < \frac{4}{3}, \\ \frac{1}{3}v & if \quad \frac{4}{3} \leq \beta_a + \beta_b; \end{cases} \quad (7)$$

Like BO, inequality aversion in FS also implies that $y_c(\beta_a, \beta_b) \in [0; 1/3]$. The key difference between FS and the other two bargaining solutions concerns the predicted payoff shares between the bargainers. CD and BO rationalize different and independent payoff shares of the bargainers since the utility of own payoffs is not affected by others' payoffs or only affected by the mean, which is a constant. FS, on the other hand, implies that any optimum requires even payoff shares between the bargaining individuals, i.e. $y_a = y_b$. The reason is that the other-regarding preferences necessary to break this condition ($1 + 0.5\ \alpha_i < \beta_i$) are never realized due to the assumptions of the model ($\beta_i \leq \alpha_i$ and $0 \leq \beta_i < 1$). Intuitively, the two bargainers will always agree on even payoffs between themselves because the utility gained by reducing the payoff difference to the third individual is always lower than the negative utility gained by increasing the payoff difference to the bargaining partner simultaneously (and the lower utility from the lower payoff share). Thus, in contrast to CD or BO, FS captures the idea that bargaining individuals are deeply concerned about a fair allocation between themselves.[5]

In isolation, FS attains its inner maximum either when $(v, 0, 0)$ or $(v/3, v/3, v/3)$, depending on whether $\beta_i < 2/3$ or $\beta_i > 2/3$ (in the two-player case, $\beta_i \lesseqgtr 1/2$). The worse-off weight α_i only plays an indirect role as it ensures that an individual does not prefer a lower payoff, but never becomes effective due to the assumption $\beta_i \leq \alpha_i$. When two individuals bargain with each other over the distribution of some payoff, we can differentiate three cases: both bargaining individuals are rather self-interested with $\beta_a < 2/3$ and $\beta_b < 2/3$, both individuals are rather prosocial with $\beta_a > 2/3$ and $\beta_b > 2/3$, or one individual prefers to maximize own payoffs, $\beta_a < 2/3$, while the other individual prefers equal payoffs, $\beta_b > 2/3$.

The first two cases are straightforward. When two rather self-interested individuals bargain, they will agree on the even two-way split. As long as both $\beta_i < 2/3$, the specific better-off weights do not affect the outcome because Nash's bargaining solution ensures that the agreement is independent of scale. In contrast, when two rather prosocial individuals bargain, they will agree on the even three-way split since their

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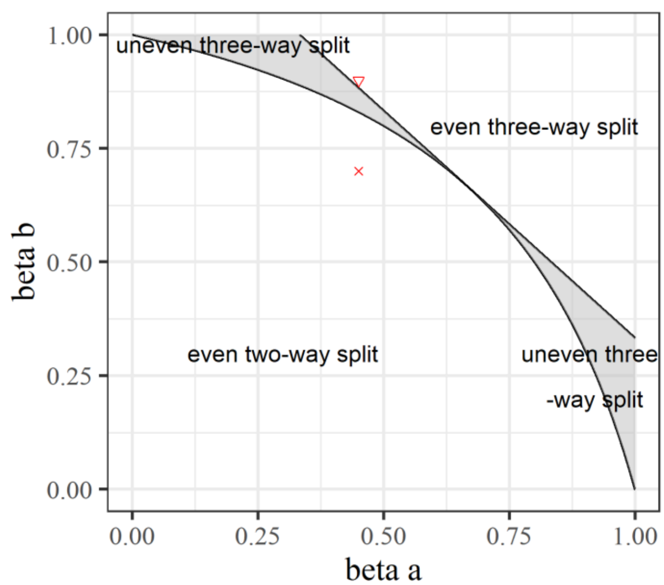
5 The related utility model of Charness and Rabin (2002) would predict the same outcomes if it makes the same assumptions about the other-regarding parameters as the FS model.

preferences both peak at an even three-way split. Hence, in many cases, the piecewise linear utility functions lead to corner prediction that represent two extremes.

The most interesting case is the third, where one individual prefers maximum payoff and the other prefers equal payoffs. In this case, the relative weights of the inequality aversion parameters determine the outcome (see Figure 1). It can be inferred that individuals with stronger preferences are more assertive and enforce their preferences. For example, let the better-off weight of an individual a be $\beta_a = 9/20$. Alone, this individual prefers to maximize own payoffs. When a bargains with an individual b with $\beta_b = 14/20$, who prefers equality, a's preferences are relatively stronger in comparison and individual a enforces the even two-way split (in Figure 1, this point is indicated by a red cross). However, if individual b has relatively stronger egalitarian preferences, say $\beta_b = 18/20$, then the relative influence flips and the bargainers will agree on the even three-way split (red triangle).

Figure 1. Predicted agreement depending on FS better-off weights.



In other words, the more important profit (equality) is for an individual, the closer the outcome is to this individual's distribution preferences since the individual is more reluctant to agree on a more (less) equal distribution. Only when the preferences are relatively similarly weighted will the bargaining individuals agree on a compromise by which they receive an even share and allocate a share between zero and one third to the third individual. In a majority of cases, however, the Nash product transforms individual preferences into the outcome preferred by the individual with stronger preferences.

3. Experimental Design

The experiment, designed to emulate the theoretical environment, incentivizes bilateral negotiations in which the participants distribute payoffs between themselves and an uninvolved third subject. In addition, I elicit distribution preferences in an individual choice setting. To control for ordering effects, I vary the sequence of the bargaining game and the individual tasks between subjects. In the *I-B treatment*, participants complete the individual decision tasks before they play the bargaining game; in the *B-I treatment*, they complete the individual tasks after the main experiment.

3.1. Free-form Bargaining

At the start of the bargaining game, two-thirds of the participants are randomly selected to bargain over the distribution of payoffs and one-third of the participants are excluded from the payoff-relevant negotiations. The role assignments remain constant throughout an entire session of the experiment. In each round, two bargainers are matched together with one excluded participant and must bargain over the distribution of 72 points.

To make an offer, a subject has to allocate exactly 72 points between themself, the other bargainer, and the excluded subject who cannot participate in the negotiations.[6] The format of the proposals is restricted to numbers displayed on the computer screen. Further communication is prohibited during the experiment. Subjects are able to send as many offers and counteroffers as they choose at any point during a round. The most recent proposal of the other bargainer can be accepted at any time during the round after the first 30 seconds by clicking on an ‘Accept’ button. In this sense, bargaining is costless, unrestricted, and not subject to a tightly structured protocol. If the bargainers agree on a distribution of payoffs, the round ends and the payoffs are implemented for all three subjects. The time limit to reach an agreement is two minutes. If no agreement is reached within the time limit, all three subjects receive zero points. When an agreement is reached or the time ends, the subjects are informed about their payoffs and a new round begins.

Each session consists of 24 participants who engage in 20 rounds of negotiations. In the first five rounds, the 16 bargainers are randomly matched in every round. In the last 15 rounds, the 16 subjects are matched so that each bargainer bargains exactly once with all other bargainers. At the end of the session, three rounds are randomly selected and paid out. In the meantime, the 8 excluded subjects also bargain in groups of two, but their outcomes are not relevant for the payoff. Even though I do not use these data, this procedure ensures the roles remain anonymous during the experiment. The subjects learn their own role prior to the bargaining game. The roles are constant during the experiment to control for indirect reciprocity.

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[6] I choose a relatively high number of points to broaden the action space of the subjects and allow for a meaningful variance of outcomes. Participants can use a calculator integrated in the bargaining interface.

3.2. Individual distribution preferences

To compare the bargaining behavior with the decisions of the individual choice task, I elicit the individual distribution preferences in two ways. All subjects complete an extended Equality-Equivalence test (henceforth EET; Kerschbamer 2015) and a three-person random dictator game.

The *EET* measures preferences for inequality aversion. It is an incentivized task assessing an individual's distributional preferences based on decisions between various distribution alternatives in two blocks. In the disadvantageous inequality block (DIB), subjects face five pairs of allocations and for each pair, they must choose whether they prefer an equal distribution between themselves and another subject (20, 20) or an unequal distribution (20 + x, 30), where $x \in \{-5, -1, 0, 1, 5\}$. In the advantageous inequality block (AIB), they must also choose whether they prefer an equal distribution (20, 20) or the unequal distribution (20 + x, 10), but the payoff share of the other subject is smaller. I can observe when a subject switches from left to right and use this decision as a proxy for the inequality aversion weight. The EET originally includes five items for DIB and AIB. I extend the latter with three additional items, where $x \in \{10, 20, 50\}$, to get a more precise measure of the better-off weight. One decision is randomly chosen per subject and is paid out to the decision-maker and a paired recipient. Hence, each subject earns two payoffs, once as a decision-maker and once as a recipient. The setup ensures that a dictators' recipient is not simultaneously the recipients' dictator, so decisions are not mutually payoff relevant. [7]

The *dictator game* elicits a subject's most preferred distribution between themself and two other subjects. Participants are randomly assigned to groups of three. Each participant must allocate exactly 72 points between themself and two other subjects. At the end of the experiment, one of the three group members is randomly selected as the dictator and their decision is paid out. The group size and stakes are the same as in the bargaining game. In comparison, the number of active decision-makers changes from one to two and the number of passive group members changes from two to one. The three-person dictator game elicits the distribution that a subject aims to enforce during the bargaining game.

All decisions in isolation are anonymous and participants do not receive any information about their payoff from the individual tasks until the end of the experiment. Since the participants are unaware of the final outcomes of the individual tasks, the influence on the bargaining game should be relatively low in the *I-B treatment*. To control for possible ordering or framing effects, I vary the order of the experiment and elicit the individual preferences after the bargaining game in the *B-I treatment*.

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[7] Since the EET is designed for two players, I included a separately incentivized battery with seven items that distributes the payoff among three subjects. Designed similarly to the EET, these items aim to capture the willingness to share payoff with a third individual, given the payoff of a second individual and a constant sum of payoffs. In this paper, I focus on the decisions in the EET and the dictator game. Attachment 1 in the Supplementary Material shows all implemented choice items.

3.3. Further Measurements

At the end of the experiment, the participants answer a short questionnaire. Since risk preferences are frequently discussed in the bargaining literature, I include a self-reported measure for risk preferences, which is argued to be more predictive of empirical behavior than alternative incentivized measures (Dohmen et al. 2011; Lönnqvist et al. 2015). To gain more information about factors that could influence the bargaining behavior, I included questions about assertiveness, compassion, and trust (Danner et al. 2016; Soto and John 2017), a self-reported assessment of the bargaining skills, and socio-economic background variables. See Attachment 4 in the Supplementary Material for the full translated questionnaire.

3.4. Procedure

I conducted six sessions with 24 subjects each at the Vienna Center for Experimental Economics in March 2018, resulting in a sample of 144 participants evenly divided between the two treatments. All subjects were university students, on average in their sixth semester, with a median age of 23. The experiment was fully computerized using z-Tree (Fischbacher 2007) and the participants were recruited using ORSEE (Greiner 2015). All experimental sessions lasted fewer than two hours. The experimental data is available at the data repository, X-econ (see, Schwaninger 2020).

The participants were all provided with written instructions. Instructions for the individual tasks and the bargaining game were handed out after each other. Participants knew the experimental session consists of several parts but did not know the content of the future parts before the respective instructions are provided. See the attached Experimental instructions for the instructions in English and German.

At the end of the experiment, the program converted the earned payoff points into Euros and the laboratory assistants paid the participants separately and in private. In sum, the payoff of the participants consisted of three bargaining outcomes (three randomly selected rounds) and three individual decisions (EET, additional items, dictator game). The payoffs between the first and second part (B and I) were evenly weighted and paid roughly the same on average. The participants earned, on average, 29.43 Euros, including 5.71 Euro (40 points) as a show-up fee.

4. Theoretical Comparison of the Bargaining Solutions

To investigate how subjects' other-regarding preferences aggregate and influence the bargaining outcomes, I compare the explanatory power of the derived bargaining solutions after calculating the best model fit of each bargaining solution. The comparison is based on the residual vectors, i.e. the remainders of each model that cannot be explained. In this section, I generate random bargaining outcomes and fit the models to the random data to calculate the restrictiveness of each model (Fudenberg et al. 2021), i.e. I compare how flexible they are in comparison to each other.

To compare the models, I estimate the individual other-regarding preferences that explain the bargaining outcomes best. In the empirical analysis, I base the estimation on round 6 to 20 to control for learning effects in early rounds. Hence, in each session, I observe sixteen individuals, $i = 1, \dots, 16$, who bargain in fifteen rounds in new pairs ab, where $a \neq b$, over the distribution of $v = 72$ points. This gives me a total of 120 observations per session, with 8 pairs in 15 rounds. For each observation, each pair ab can transfer a payoff $y_{c,ab} \in [0,72]$ to the excluded individual c. I estimate the parameters $\tilde{p}_i = \delta_i, \vartheta_i, \beta_i$, of CD, BO, and FS such that the Nash bargaining solution minimizes the sum of squared residuals between the actual and the predicted transfers, i.e. $min \sum_1^{120} \left(y_{c,ab} - y_c(\tilde{p}_a, \tilde{p}_b)\right)^2$. Afterwards, I can compare the remaining residuals against each other. The lower the squared residuals, the better the explanatory power of the functional form is. Since the total amount of squared residuals is equal in each case, this is the same as comparing the R^2 against each other. Given that I estimate one parameter for each individual in each model to predict the transfers, the models are equally parsimonious. Therefore, it is not necessary to punish for the number of parameters when I compare the models.

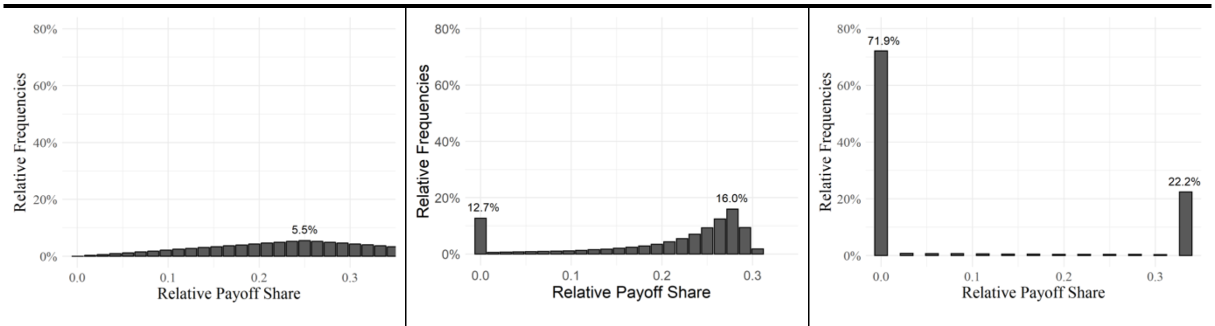
To fit the non-linear functions of the solutions based on the BO and especially the FS model, I use gradient-free algorithms implemented in the statistical software R. The algorithms of a simulated annealing process (Xiang et al. 2013) and a particle swarm optimizer (Bendtsen 2012) turned out to provide the best and fastest results for my objective functions.[8] Note that gradient-free algorithms usually do not guarantee that the optimal solution is ever found. Hence, finding the best solutions is relatively time consuming compared to standard cases with smooth objective functions.

I start the theoretical comparison of the three models by visualizing how the three preference models shape the predictions. Figure 2 shows the predicted transfers to the third individual assuming a uniform distribution of other-regarding weights within each class, which enables arguably the most insightful visual overview of the outcome dynamics. In the CD model, the payoff shares of the third individual peak at 0.25v. In the BO and FS models, the shares accumulate at zero and around one-third due to the alleged inequality aversion. Since payoff shares between the bargainers are predicted to be independent in the BO model, the distribution is less polarized compared to the FS model. Recall that the FS model predicts that one of the bargainers enforces their preferences in a majority of agreements, whereas the other bargainer gives in. The spikes between zero and one-third in the FS model visualize that the bargainers do not transfer uneven amounts to the third subject when they divide a payoff of 72 points into natural numbers because this would imply uneven payoff shares between the bargainers. In sum, Figure 2 visualizes the theoretical conclusion

[8] For a comprehensive list of available algorithms, see https://cran.r-project.org/web/views/Optimization.html.

that I can draw on two qualitative outcome criteria that separate the predicted solutions from each other: (i) How frequently do the bargainers transfer more than one-third of the payoff to the third subject? (ii) How frequently are the payoff shares distributed equally between the bargaining partners?

Figure 2. Simulated outcomes: Payoff share of the third individual



Cobb-Douglas (**CD**):	Inequality Aversion (**BO**):	Pairwise Inequality Aversion (**FS**):
$\delta_i \in U(0,1)$, $v = 72$;	$\vartheta_i \in U(0,2000)$, $v = 72$;	$\beta_i \in U(0,1)$, $v = 72$;

Predictions are rounded to the closest feasible distribution in the experiment.

Next, I compare how restrictive the three bargaining solutions are. That is, I test how flexible the three models are in organizing any kind of observed behavior. Given the same predictive power of two models, the model that is more restrictive or less flexible is usually preferred (Fudenberg et al. 2021). The more flexible a model is, the more likely is it to explain any kind of behavior, which implies that it does not narrow down the predicted set of behavior. Following Fudenberg et al.'s suggestion, I generate random transfers and compare the average error across the simulated data sets, normalized by the error of a naive model. I take the predictions of the Nash bargaining solution that is based on self-interest as a naive model.

In line with the empirical experiment, I generate 120 random transfer values for one simulated session (8 pairs times 15 rounds) and fit in total 10^3 simulated sessions. After fitting the models to the simulated data, the restrictiveness compared to the best available model is .005 for the CD, .008 for the BO and .037 for the FS model. If I assume there exists a model without an error, the restrictiveness is .218 for the CD, .220 for the BO and .243 for the FS model. The results imply that FS is the most restrictive (least flexible), BO is the second most restrictive (second least flexible) and CD the least restrictive (most flexible) model. However, the mean residual sum of squares (95%-quantiles in parenthesis) are 93.4 (76.2, 111.0), 94.5 (77.7, 112.8) and 104.1 (84.1, 126.5), which suggests that the three models are not significantly different with respect to their restrictiveness or flexibility.

Now that I have established that the three models have the same premise to predict the data from a statistical point of view, the question is which model will have the highest predictive power? From a purely theoretical point of view, it is impossible to derive explicit hypotheses. Hence, I can only look into the literature to derive expectations. Bolton and Ockenfels (2008) formulate conjectures about the mechanism of other-regarding preferences in multiple-player bargaining games. Applying these conjectures to the free-form bargaining setting, the active bargainers should insist on at least one-third of the payoff. Hence, third subjects are expected to receive one-third of the payoff at most. This restriction is not present in the CD model. Therefore, based on the conjectures, I should expect that the BO and FS model explain the bargaining behavior more precisely than the CD model. Furthermore, the conjectures state that subjects do not care about relative payoffs of other subjects. Subjects who are strongly motivated by other-regarding preferences aim to obtain close to one-third of the payoff and are indifferent on how the remaining payoff is distributed. Hence, when bargaining with self-interested subjects, they are willing to agree to a distribution in which the latter receives the remaining payoffs. This prediction is in stark contrast to the bargaining solution derived from the FS model, which predicts equal payoff shares between the bargainers. Hence, I should expect that the BO model explains the bargaining behavior more precisely than the FS model. In contrast to these conjectures, more recent evidence suggests that the FS model predicts bargaining outcomes well in unstructured experiments (Ingersoll and Roomets 2020). Overall, previous evidence is not clearly suggestive of the highest explanatory power of any specific model. Therefore, I approach the question - which model explains the data best - without explicit priors.

5. Results

Analyzing the data consists of three parts. In the first part, I give a descriptive overview of the observed bargaining outcomes. In the second part, I fit the three different models and test which functional form explains the data most accurately. Thereafter, I compare the estimated other-regarding preferences from the bargaining game with the individual decisions in the EET and the transfers in the dictator game. In the third part, I report on results regarding the bargaining process.

5.1. Bargaining Outcomes

The bargaining data show that in 67.3 percent of the cases, bargainers allocate a payoff share greater than zero to the excluded individual. On average, they transfer 15.8 percent of the payoff. Figure 3 shows the relative payoff share transferred to the third subject in the two treatments (I-B, B-I) over time. In the initial rounds, the transfers decrease and converge to about 15 percent of the distributable payoff. The transfers do not decrease significantly after round 5 in either treatment (Pearson corr., $p = .59$, $p = .67$). To control for the learning effects in the first 5 rounds, I concentrate on rounds 6 to 20 in the following analysis of the data. Furthermore, there is no statistical difference between the average transfers in I-B and B-I according to the two-sided Mann-Whitney test (in each round, $p > .10$, with and without a Bonferroni correction). The statistical indifference between the two treatments indicates no significant framing or ordering effects of the individual tasks on the bargaining game.

As discussed in Section 2 and 4, the predicted bargaining outcomes of the three models, CD, BO and FS, can be qualitively distinguished on two levels: (i) the distribution of transfers to third subjects and (ii) the allocation of payoff shares between the bargainers. Figure 4 is concerned with the first level and shows the distribution of payoff shares transferred to the third subject. In line with the BO and FS models, transfers to third subjects virtually never exceed one-third of the payoff (0.01 percent). In a majority of cases, the bargaining subjects transfer exactly zero (35.1 percent) or 24 (24.4 percent) points, which shows similarities with the patterns predicted by FS. Another focal point seems to be one-sixth of the payoff (10.0 percent). Transferring 12 points may be attractive since it offers an even compromise between more self-interested and more other-regarding subjects.

Figure 3. Payoff share of the third subject over time.

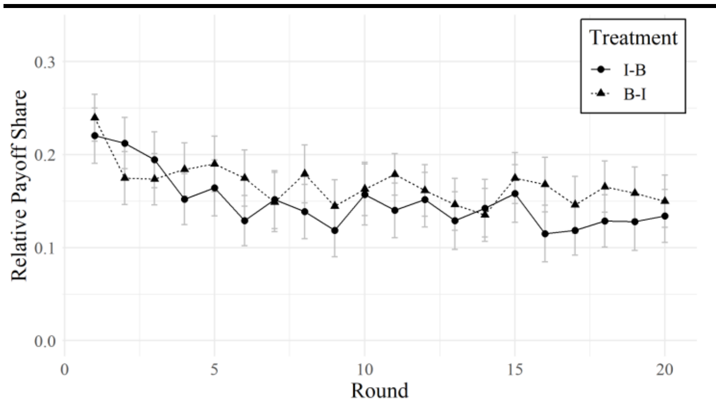
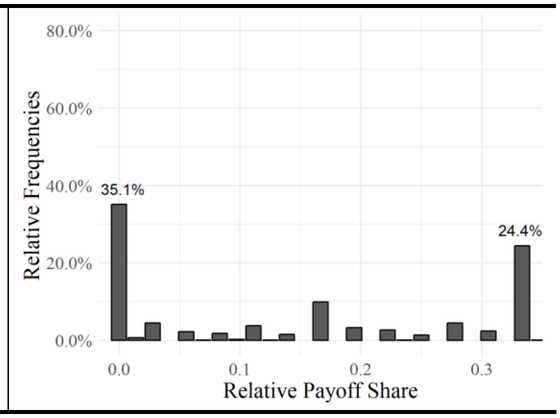


Figure 4. Distribution of third subjects' payoff.



Mean transfers and 95%-confidence intervals.

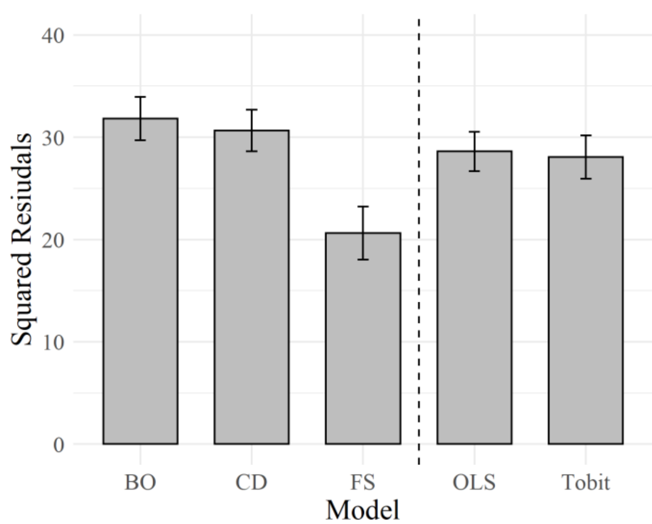
Concerning the second level, the results show that the payoff shares between the bargainers are equal in 90.5 percent of the agreements. More precisely, in 17 out of the 720 negotiations (2.4 percent), the subjects cannot agree on a distribution. In 456 of the 703 negotiations (64.9 percent), the third subject receives more than zero points. In 429 out of these 456 negotiations (94.1 percent), the bargainers agree on even payoffs between themselves. When I distinguish between subjects that send the final offer and subjects that accept the final offer, the results show that the former obtains on average 42.9 percent and the latter 42.4 percent of the available payoff. The payoff shares between sender and receiver are not significantly different (one-sided, paired Wilcoxon test with Bonferroni correction, each round, $p > .10$).[9] Hence, regarding the second level, the outcomes are closest to the ones predicted by the FS model.

[9] Without Bonferroni correction, $p = .03$, $p = .09$, $p = .09$ in round 12, 15 and 17.

5.2. Explaining the Bargaining Outcomes

To explain the bargaining outcomes, I optimize the other-regarding parameters with respect to the specific functional forms as explained in Section 4. Figure 5 shows how the models perform in comparison. The lower the squared residuals, the better the explanatory power of a model. All three models, CD, BO and FS, perform significantly better when they are fitted to the empirical data than the randomly generated transfers, SR_{CD} = 30.7, SR_{BO} = 31.8, SR_{FS} = 20.6. Recall that the lower 95-percentile of the residuals of the randomly generated transfers are equal to 76.2, 77.7, and 84.1 for the three bargaining solutions. The empirical residuals are significantly lower (Mann-Whitney tests, $p < 0.01$). The proportion of the variance (R^2) the CD, BO and FS model can predict is equal to .857, .846 and .903, respectively.

Figure 5. Squared Residuals across Models



Mean squared residuals and 95%-confidence intervals.

Furthermore, the FS model performs significantly better than CD and BO (both paired Wilcoxon tests, $p < 0.01$).[10] Hence, the data reject the hypotheses that BO explains the behavior better than CD and FS. In fact, BO explains the data worse than the other models. The SR of the FS model is also significantly lower than the SR of an ordinary least squares model with individual fixed effects (SR = 28.6, paired Wilcoxon test, $p < .01$) or a Tobit model with a lower limit at zero (SR = 28.1, paired Wilcoxon test, $p < .01$). To put

[10] I base my statistical tests on the average residual of each individual. The average residual per individual, like the residuals of the bargaining outcomes, are not a truly independent observations because the subjects interact with each other during the experiment. However, the dependency is systematic since each subject interacts exactly once with each other subject within a session. If I aggregate the data on the truly independent session level, the two-tailed paired Wilcoxon tests are still statistically significant (both, $p = .03$), but the p-value is lower due to the low number of observations.

these results into perspective, calculating the absolute residuals of FS and the best alternative (Tobit model) reduces the mean residual from 3.8 points to 2.3 points (the distributable payoff is 72 points), which improves the average accuracy by 64 percent.

To further investigate the validity of the results, I examine the relationship between the individual other-regarding preferences estimated from the bargaining game and the other-regarding preferences elicited from the individual distribution tasks. Two types of information about the individual preferences are available. The switching points of the two blocks of the EET (DIB and AIB) provide information on the advantageous and disadvantageous inequality aversion of the subjects. The median switching point for the bargaining subjects lies at 3 out of 5 in DIB and 5 out of 8 in AIB. Subjects' transfers in the three-player dictator game give a measure of the distribution preferences. The dictators in the sample allocate on average 17.2 percent of the payoff share to each recipient.[11] Most subjects allocate zero or two thirds (even three-way split) to the recipients. The correlation between the lower transfer in the dictator game and the switching point in AIB is equal to 0.25 (p = .01).

Table 2. Relation between individual and bargaining behavior.

Dependent variable:	Other-regarding preferences of the bargaining game			
	I	II	III	IV
Transfer dictator game	0.006***	0.007***		
	(0.002)	(0.002)		
AIB			0.041***	0.045***
			(0.014)	(0.015)
DIB			0.016	0.015
			(0.019)	(0.023)
Controls	No	Yes	No	Yes
Observations	96	96	96	96
R^2	0.154	0.212	0.097	0.142
F Statistic	16.217***	2.149**	4.721**	1.193

Fixed effects on session level. *** p < .01, ** p < .05, * p < .10.

Similar to previous studies, I cannot directly predict the bargaining behavior from the other-regarding parameters I estimate from the dictator game nor the EET (Blanco et al. 2011). Yet, when the estimated other-regarding parameters of the FS model correlate significantly with the behavior in the AIB (corr. = 0.31, p < 0.01) measured by the EET and the transfers in the dictator game (corr. = 0.43, p < 0.01). DIB and the FS better-off weights do not correlate (p = 0.35), which supports the notion that the worse-off weight

[11] While the bargaining outcomes between the treatments are statistically indifferent, there is weak evidence that the mean transfer in the B-I treatment is higher than in the I-B treatment (Mann-Whitney test, p = .09), which means subjects transfer more if they play the dictator game after the bargaining game. The ordering effects may be explained by a willingness to equalize anticipated inequalities from the previous bargaining game. In direct comparison, transfers to excluded individuals are, on average, higher in the individual dictator game than in the bargaining game, independent of the order of the treatments (paired Wilcoxon tests, p < 0.01).

plays no role in the bargaining game. Regressions I – IV in Table 2 analyze the relationship closer and controls for fixed effects on the session level. Further controls include observable traits such as gender, age, field of study, experience in experiments, and self-reported characteristics such as risk preferences, bargaining skills, assessment on a political left-right scale, extraversion, and agreeableness.

The results suggest that subjects who transfer higher payoff shares in the dictator game are also less self-interested during the bargaining game, which means that one can observe a behavioral consistency across the individual choice and the bargaining game. In regression I the average better-off weight in the bargaining game increases, from 0.38 if the individual transfers nothing in the dictator game, to 0.68 if the individual transfers all payoffs equally in the dictator game, i.e. transfers 48 points. Furthermore, in line with the theoretical conception, advantageous inequality aversion (AIB) has a statistically significant relationship with the behavior in the bargaining game, while disadvantageous inequality aversion (DIB) has no explanatory power. The regression results remain robust if I control for further characteristics, of which none is significant. The control variables remain statistically insignificant if I remove the incentivized other-regarding measures from the regression (see Table A1 in the Supplementary Material).

In sum, the data show that individual behavior and bargaining behavior are related, which supports the derived functional relationship of the FS model. The strength of this bargaining solution is that it explains seemingly arbitrary behavior. Generally, subjects' transfers to third subjects vary considerably across the different rounds in which they are matched with different bargaining partners. The mean individual range of transfers is equal to 21.3 points, which implies that many of the subjects transfer no points with one bargaining partner and one-third of the payoff (24 points) with another bargaining partner. The FS model explains the aggregation process behind this finding and links the associated other-regarding preferences to the distribution decisions elicited individually.

5.3. Bargaining Dynamics

So far, I have focused on the bargaining outcomes. However, since the free-form bargaining protocol enables the bargainers to react to offers and negotiate dynamically, it generates a rich data set that can open the black box between individual other-regarding preferences and negotiated distribution outcomes further. In this section, I report on bargaining patterns that can be observed during this interaction.

As in previous unstructured experiments, I observe a 'deadline effect' (Roth et al. 1988). A majority of the agreements (52.3 percent) are made just within the last ten seconds of the available bargaining time. When the distribution preferences of the bargainers do not match, instead of seeking a compromise, the bargainers tend to wait until the other bargainer eventually gives in to prevent losing all payoffs. To illustrate this, I separate the two bargainers of the final agreement into the sender and the receiver and analyze their influence on the outcome distribution. Regression I in Table 3 estimates the influence of the senders' and receivers' other-regarding preferences, measured by the dictator game, on the transfer to the third subject, in a Tobit model with session fixed effects and robust standard errors. The results suggest that individual other-regarding preferences of both subjects, sender and receiver, significantly influence the agreement. Yet, a Wald-test that compares the two coefficients indicates that the influence of the sender is significantly stronger than the influence of the receiver on the bargaining outcome ($p < 0.01$).

This finding leads to the question of which subjects are more inclined to give in. To answer this question, I count the number of times each individual is the receiver of the final distribution offer and examine the relationship between accepting the final offer and the transfer in the dictator game. Other-regarding preferences appear not to explain the tendency to accept offers (Poisson model with session fixed effects, $p = 0.30$, see Table A4 in the Supplementary Material). The data suggests that neither other-regarding nor self-interested subjects are more likely to give in.

Table 3. Analysis of the bargaining process.

Dependent variable:	Negotiated payoff allocated to the third subject		
	I	II	III
Transfer dictator game	0.285^{***}	0.191^{***}	0.188^{***}
(Sender)	(0.031)	(0.032)	(0.031)
Transfer dictator game	0.090^{***}	0.014	0.001
(Receiver)	(0.032)	(0.032)	(0.033)
First offer		0.349^{***}	0.458^{***}
		(0.058)	(0.126)
ID accepted offer			0.033
			(0.362)
First offer x			-0.021
ID accepted offer			(0.019)
Observations	703	524	524
Log Likelihood	-1,988.096	-1,496.084	-1,493.076
Wald Test	207.999^{***}	259.650^{***}	269.073^{***}

Tobit models. Fixed effects on session level. Robust standard errors. *** p < .01, ** p < .05, * p < .10.

Next, I look closer into the bargaining process. The data indicates that not only are the payoff shares of the bargainers equal in the outcomes, but they are already equal when they propose the offers. From round 6 to 20, the subjects make 720 first offers. In none of these offers does the proposer offer to pay more for the payoff share of the third subject than the other bargainer. In response to received offers, the subjects make, in sum, 2288 counteroffers, of which 890 (38.9 percent) suggest an increase in the payoff share of the third subject. In only 31 (3.5 percent) of these offers do the bargaining subjects propose to reduce their own payoff share more than the payoff share of the other bargainer to pay for the higher transfer to the third actor. Out of these 31 offers, 21 ultimately equalize the payoff shares between the bargainers since the standing offer benefited the proposer of the counteroffer. When subjects suggest increasing the payoff share of the third actor, they primarily suggest reducing their own payoffs equally (57.1 percent) or they suggest that the other bargainer should pay more for the higher transfer to the third actor (39.4 percent). In sum, the bargaining dynamics imply that subjects virtually never want to pay more for the payoff share of the third subject. Equal sharing appears to not only be integral to the bargaining outcomes but also an important motive during to the negotiations.

Finally, I investigate the first offers and their influence on the outcome. Beginning with Chertkoff and Conley (1967), several researchers find that first offers set an anchor that determines the course of the negotiations. To examine this relationship, I first exclude all 179 agreements in which the first offer is simultaneously the accepted offer since the first offer and the outcome are identical by definition in those cases. Within the remaining subset, I include the payoff share allocated to the third subject in the first offer of this round as an explanatory variable of the final share while keeping the other-regarding preferences of the bargainers as control variables. Regression II in Table 3 suggests that the first offer has a significant impact on the outcome. The anchor effect also remains robust when bargainers negotiate longer, as indicated by Regression III. The latter regression includes a variable that accounts for the number of offers that are exchanged before the final offer is accepted and an interaction effect between this variable and the first offer. Additionally, testing who is more likely to make first offers reveals that subjects with stronger other-regarding preferences make significantly more first offers (Poisson model with session fixed effects, $p = 0.01$, see Table A5 in the Supplementary Material).

6. Conclusion

Whenever bargainers have to decide on how to allocate payoffs among a group of actors, socially concerned coalition members may be willing to distribute payoffs to third actors. The question is, what deal can the bargainers make to take third actors into account and who is willing to forgo payoffs to benefit the third actor? In this study, I examine negotiated distribution outcomes in a controlled experimental environment to identify the influence of other-regarding preferences on the bargaining outcomes and dynamics.

I find that preferences aggregate systematically when subjects bargain bilaterally about the distribution of payoffs between themselves and a third subject. In more than 90 percent of the bargaining outcomes, the payoff shares are equal between the bargaining partners. Many subjects care about how much of the payoff is allocated to the third subject, but they also care about how much the other bargainer contributes to benefit the third subject. Since unilateral transfers would increase inequality between the bargainers, transfers to third subjects depend on both bargaining subjects. In other words, the bargaining problem involves two conflicting fairness aspects, and a bargaining solution must respect both. If there is a conflict between the distributional preferences of the bargainers, the outcome depends on the subject who has stronger preferences. Similar to the study of Ingersoll and Roomets (2020), the free-form bargaining outcomes in this study can be best explained by assuming pairwise inequality aversion (Fehr and Schmidt 1999).

Furthermore, the analysis allows for linking the bargaining behavior to the individual distribution decisions made in the choice tasks. Individuals that are more inequality averse in the EET or transfer more in the dictator game are also more likely to transfer higher payoff shares to the third subject in the bargaining game, even though, depending on the other bargainer and the relative strength of their preferences, single negotiated distribution decisions can deviate from the own preferred outcome. Due to the specific preference aggregation mechanism, the outcomes tend to become more extreme and, in a majority of cases, the bargainers either share payoffs equally or exclude the third subject completely from any payoffs. Moreover, the analysis of the bargaining process reveals that the proposer of the final offer has a stronger influence on the outcome. Similarly, first offers impact the distribution outcomes significantly.

The employed free-form bargaining game leads to different interpretations about the influence of other-regarding preferences on bargaining outcomes than existing structured bargaining experiments or individual distribution tasks. Results from the ultimatum game (Güth and Van Damme 1998) leads to the conjecture that responders care about their own relative payoff share and are less concerned about pairwise differences (Bolton and Ockenfels 2008). When dictators condition their transfer to a recipient on a second dictator, subjects frequently compensate for low transfers of the second dictator even though this results in disadvantageous inequality. Yet, when they can communicate, the transfers align (Panchanathan et al. 2013). The different results raise an important methodological issue. Evidence based on a tightly structured bargaining protocol certainly contributes to a richer understanding of institutional factors. At the same time, in some instances, they appear to create different outcomes than less structured bargaining protocols. For example, evidence suggests that communication decreases the number of fair offers in structured multilateral bargaining settings (Agranov and Tergiman 2014; Baranski and Kagel 2015). In this study, the results suggest that the possibility of back-and-forth-interaction leads to different outcome patterns compared to structured bargaining experiments. A high level of structure can imply different levels of bargaining power, but, more importantly, it also restricts the interaction between bargainers. Any form of interaction can influence the available information in the bargaining situation and may change the perceived responsibility of the decision-makers. Considering that many negotiations in natural environments are hardly structured, it appears important to learn more about these differences.

In this study, I used well-researched social utility functions, integrated them in the Nash bargaining solution and tested them against each other in a free-form bargaining game. The employed models focus purely on other-regarding preferences, but disregard other factors such as risk preferences (Binmore et al. 1986) or diminishing marginal utility of money (Gauriot et al. 2020). Hence, they are potentially subject to an omitted-variable bias. In case of the best performing bargaining solution, which makes a considerable share of corner predictions, this might not be very harmful because the predictions are generically unresponsive to small changes in the curvature. Nevertheless, if sufficiently different, the curvature affects the behavior on a theoretical level. This might especially play a role in situations in which actors with very different preferences bargain with each other and, thus, limits the generalizability of the presented results. Combining Fehr and Schmidt's (1999) utility model with a curvature in the utility predicts that small differences in bargaining power or risk aversion will not affect the bargaining outcomes. Indeed, risk aversion has so far not proven to affect free-form bargaining outcomes (Schwaninger et al. 2019).

Altogether, this study shows that bilateral bargaining agreements can decrease and increase transfers to third subjects, depending on the subject with the stronger preferences. The questions of how they interact with more refined preference models and institutional factors in settings that employ little structure on the bargaining protocol offer interesting future research avenues.

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