

Reference dependent altruism in demand bargaining[☆]Yves Breitmoser^a, Jonathan H.W. Tan^{b,*}^a EUV Frankfurt (Oder), Germany^b University of Nottingham, United Kingdom

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ABSTRACT

We seek to extend our understanding of bargaining preferences, and do so experimentally using the three-player *demand bargaining game*. In this game, two non-proposers simultaneously state their demands, then the proposer offers, and at least one demand must be satisfied otherwise the proposal fails. Different preferences induce different behavioral patterns. Observed proposals tend to match the lower but not the higher of the two demands. Demands are around the equal split even with experience. This pattern is incompatible with continuous utility functions such as Fehr–Schmidt inequity aversion and CES altruism, which predict competitive demands, but compatible with discontinuous utilities, which we capture in a model of reference dependent altruism.

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1. Introduction

When interests are misaligned in groups such as committees, directorial boards, and parliaments, agreement may be reached through negotiation. The asymmetry of bargaining power features in many of such contentions, and the consequent exercise of power determines the extent to which the competing interests of heterogeneous individuals in a group or diverse groups in society are served. It is important to understand bargainers' preferences, which determine the extent to which power is realized and the welfare distributions that result. Existing research explains "generosity" with altruism (Andreoni and Miller, 2002; Cox et al., 2007), inequity aversion (Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000), or a combination of the two (Kohler, 2011; Tan and Bolle, 2006). Whereas inequity aversion is conditional in that it is referential, e.g. to some group and outcome (Fehr and Schmidt, 1999), pure altruism is not.

This paper is concerned with the reference dependence of bargaining preferences. This is motivated by evidence on the relevance of focal points. For example, Murnighan et al. (1988) find that many bargaining agreements were made at focal points such as "50–50". Knez and Camerer (1995) show the relevance of social comparisons and reference points in three-player ultimatum games. Norms can also serve as reference points for people who, rather than being concerned with fair

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distributions per se, want to appear fair to observers (Dana et al., 2006, 2007; Andreoni and Bernheim, 2009; Bicchieri and Chavez, 2010).

The concept of reference dependence is appealing both in individual choice and in strategic choice settings. Prospect Theory (Kahneman and Tversky, 1979) is an influential explanation of decisions in the face of risk, and it has inspired concepts such as loss aversion equilibrium (Shalev, 2000, 2002), reference dependent equilibrium (Kőszegi and Rabin, 2006, 2007), and personal equilibrium (Kőszegi, 2010). Fehr–Schmidt inequity aversion, which describes conditional altruism and spite (“guilt” and “envy”) around a reference point, organizes behavior in many games including ultimatum bargaining (Güth et al., 1982). Butler (2007) theoretically relates behavior in ultimatum bargaining with outside options to Prospect theoretic utilities. Neilson (2006) formally shows that Prospect Theory and inequity aversion are special cases of a general form of reference dependence.¹

Our paper adds to this effort by ascertaining the reference dependence of bargaining preferences and then analyzing how utility is shaped around the reference point. We ask if utilities are kinked at the reference point as described in Fehr–Schmidt inequity aversion, S-shaped as described in Prospect Theory, or discontinuous (i.e. jumping at the reference point) as we shall describe in the model of reference dependent altruism. This cannot be identified clearly in standard dictator and ultimatum games, for which both continuous and discontinuous models organize behavior similarly. In majority bargaining (e.g. in parliaments), however, continuous utility yields asymmetric outcomes, in contrast to discontinuous utility which leads to more equitable outcomes. Thus, we use a three player majority bargaining game for identification purposes.²

Our experimental game is an adaptation of the demand commitment game of Vidal-Puga (2004) and Breitmoser (2009).³ In this *demand bargaining game*, two parties simultaneously make demands for their respective surplus shares. The proposer is then informed of the competing demands, after which he proposes how to share the surplus. Proposals are implemented if they satisfy at least one demand, otherwise the game is replayed with roles randomly assigned anew. A payoff maximizing proposer satisfies only the lower of the two demands and offers the more demanding player nothing. This fuels a race to the bottom in which non-proposers (“demanders”) competitively undercut each other until demands are equal or close to zero. In this way, public demand commitments confer the bargaining power to the proposer. This result holds, e.g. with social preferences, as long as utility functions are continuous, but if utility is discontinuous there and the jump is large enough then players will not undercut the reference point.⁴

In our experiment, we observe that non-proposers do not reduce demands below their “fair share”, which is the ex ante expected payoff induced in this game and serves as reference point, and that proposers strategically satisfy the lower of two demands, but also give non-strategically to the other party. Observed behavior is compatible with our proposed model of “reference dependent altruism” (RDA), which modifies models of inequity aversion such as the one by Fehr and Schmidt (1999) and constitutes a model of social preferences with reference dependent altruism weights. In its simplest form, one’s utility is $u_i = x_i + \alpha x_j$ if $x_i \geq x^*$ and $u_i = x_i + \beta x_j$ otherwise, where x_i, x_j are payoffs and x^* is the reference point. Thus, $\alpha \geq 0 > \beta$ induces the jump discontinuity at the reference point which explains behavior in demand bargaining. Notably, RDA is also compatible with pro-social choice in various related contexts such as dictator games, as dictators have $x_i \geq x^*$ and thus the altruistic branch $\alpha \geq 0$ is active, ultimatum proposals (where again $x_i \geq x^*$ and thus $\alpha \geq 0$ is active) and ultimatum responses, where typically $x_i < x^*$ and thus spite $\beta < 0$ sets in.

Section 2 defines and analyzes the game theoretically under various assumptions on preferences, such as inequity aversion, non-linear altruism, and reference dependent altruism. Section 3 describes experimental design and logistics. Section 4 presents the results. Section 5 discusses and concludes.

2. The game

The game has three players, $N = \{1, 2, 3\}$, and proceeds in rounds. In each round, a proposer is drawn randomly. Non-proposers state demands, and the proposer is informed of the demands and states a proposal. If the proposal satisfies at least one demand, it is implemented. Otherwise a new round begins with probability.95, and the game ends in disagreement (payoffs being zero) with probability.05. In the experiment, the subjects can allocate €24 at a smallest currency unit of

¹ For this, Neilson (2006) introduces a separability axiom in relations to a reference variable, such as initial payoff or own wealth in the case of inequity aversion or Prospect Theory, respectively, and the difference between other variables and this reference variable.

² Other experiments on variants of three-player ultimatum game have shown that proposers make generous offers to avoid rejection by demanding co-players (e.g. Croson, 1996; Kagel et al., 1996; Straub and Murnighan, 1995). Güth and van Damme (1998) analyzed a three-player ultimatum game where only one of two non-proposers had veto power. On average those with veto power received higher offers than those without. Güth et al. (1996) showed that when responders were put in the proposer role, they tried to exploit other responders, indicating a lack of fairness concerns between fellow responders.

³ Demand commitments are known to shape behavior in many circumstances, including everyday interactions (“I will not do . . . , unless you do . . .”) as well as in parliamentary decision making (Winter, 1994a,b; Cardona-Coll and Mancera, 2000; Montero and Vidal-Puga, 2007, 2011). In political processes, demands are formulated in public addresses or political “platforms” prior to elections and in parliamentary debate. Players commit to their demands in order to maintain their reputation, which is assumed to be the case rather than being modeled explicitly in demand commitment games.

⁴ Roth et al. (1991) and Grosskopf (2003) analyzed bargaining games with “seller” and “responder” competition, respectively. Dufwenberg and Gneezy (2000) tested a Bertrand game with seller competition for an exogenously set demand schedule. Our game has two main differences: (1) our random role allocation and infinite horizon induces ex ante expected payoffs that is used as the reference point, and (2) our game has proposers who observe demands before making offers that do not necessarily have to be equal to either demand and this allows for generosity to the other non-proposer.

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