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Bargaining power does not matter when sharing losses – Experimental evidence of equal split in the Nash bargaining game[☆]

Eike B. Kroll[a], Ralf Morgenstern[a], Thomas Neumann[a], Stephan Schosser[a,b,*], Bodo Vogt[a,c]

[a] Otto-von-Guericke University Magdeburg, Empirical Economics, Universitätsplatz 2, 39106 Magdeburg, Germany
[b] Technische Universität Kaiserslautern, Microeconomics, Gottlieb-Daimler-Str., 67663 Kaiserslautern, Germany
[c] Otto-von-Guericke University Magdeburg, Health Economics, Leipziger Str. 44, 39120 Magdeburg, Germany

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ABSTRACT

While experimental research on social dilemmas focuses on the distribution of gains, we analyze social preferences in the case of losses. In this experimental study, the participants share a loss in a Nash bargaining game, but waiting time, instead of monetary losses, serves as an incentive. Further, we assume that the participants prefer less, rather than more, waiting time. Our experiment consists of four versions of the Nash bargaining game to allow for a comparison of four classical negotiation concepts (Nash, equal loss, equal gain, and Kalai–Smorodinsky) and an equal split of the overall waiting time. Our experimental evidence shows that an equal split better predicts the outcome of a Nash bargaining game involving losses than classical concepts do. Furthermore, the findings support that the participants resort to equal splits at the cost of their overall welfare.

1. Introduction

Economists model the distribution of gains using the Nash bargaining game (Nash, 1950). Most solution concepts for the Nash bargaining game have two common characteristics: First, the solutions should be Pareto optimal, i.e. all of the divisible good should be distributed. Second, the solutions should be symmetric, i.e. decision makers facing identical bargaining situations should receive identical shares. The solution concepts differ in their predictions, especially if the decision makers' bargaining power differs, i.e. the bargaining situations are not symmetric. Here, the different solution concepts relate the outcome to two reference points: the disagreement point and the ideal point. The disagreement point represents the utility distribution if no agreement is reached. The ideal point is the hypothetical point at which all the bargainers receive the entire divisible good. Some solution concepts, for example, the Nash solution (Nash, 1950) and the equal gain solution (Chun, 1988)

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* Corresponding author. Tel.: +49-391-6711204; fax: +49-391-6711222.
E-mail address: stephan.schosser@ovgu.de (S. Schosser).

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suggest distributing the utility increase in relation to the disagreement point. Other solution concepts, for example, equal loss (Kalai, 1977), focus on the distribution of utility not perceived in relation to the ideal point, while still others consider both reference points, for example, the Kalai–Smorodinsky solution (Kalai and Smorodinsky, 1975).

The variety of possible theoretical solutions led to several experimental studies to determine the concept that best captures human behavior. An early evaluation of the Nash solution found that participants do not reach the result that it predicts (Nydegger and Owen, 1974), but that participants are more likely to end up in the Kalai–Smorodinsky solution (Heckathorn, 1978). More recent work often finds divisions close to equal splits, i.e. both participants receive identical payoffs at the end of the experiment. Distributions close to equal splits occur even if the punishment for not coming to an agreement clearly favors one participant over the other (Anbarci and Feltovich, 2013), or if the participants have incomplete information on one another (Butler et al., 2007). Hence, in empirical studies, there is an additional reference point, beside the disagreement point and ideal point: the status quo. The status quo is the participants' income distribution right before they get to know the bargaining situation. Starting with the status quo, the participants each take an equal share of the divisible good, i.e. they realize an equal split.

In experiments, the participants who surrender their bargaining power in favor of equal splits are frequently in non-cooperative bargaining situations, i.e. in bargaining situations which differ from the Nash bargaining game because the offers, rejections, and counteroffers are explicitly modeled. In ultimatum games, the first participant suggests a distribution of a divisible good, leaving the second participant to decide whether this distribution should be implemented or not (Güth et al., 1982). In this context, first participants offer 40% on average, although, by applying backward induction, the solution is to give the second participant the least possible share. About 16% of offers are rejected; with rejection rates increasing the more the offer differs from an equal split (see Oosterbeek et al., 2004 for a review). The situation is similar with respect to alternating offer games, in which the second participant can reject the first offer, but can make a counteroffer, which the first participant can then accept and so on (Ochs and Roth, 1989). Here, first participants often offer a share close to an equal split, instead of applying the backward induction solution and offering the backward induction solution – although this solution would favor them. In addition, offers deviating too far from an equal split are frequently rejected. In contrast to non-cooperative bargaining games, the Nash bargaining game allows for additional reference points, such as the disagreement point and the ideal point. We expect these additional reference points to make deviations from an equal split more likely.

Although the economic literature focuses on gains when analyzing the Nash bargaining game, bargaining over losses is interesting from both a theoretical and a practical perspective. According to prospect theory (Kahneman and Tversky, 1979), participants tend to value losses more than gains. However, whether participants perceive their payoff as a loss or as a gain – that is, the reference point to which they relate the outcome – depends on the decision maker's reasoning process, which might differ between decision makers and between decision problems (see, e.g. Thaler and Johnson, 1990). Hence, the importance of the three reference points in bargaining situations – the disagreement point, ideal point, and status quo – might change depending on whether there are gains or losses. For example, the ideal point is only theoretically relevant for gains, because it is never reached. However, the ideal point is important for losses. It characterizes the combined losses that the bargainers face before playing the Nash bargaining game. Hence, at the very least, the participants achieve the loss that the ideal point describes.

Most experimental studies on non-cooperative bargaining – when the bargainers make offers and counteroffers sequentially – have a stylized fact in common: The participants agree on distributions that lie anywhere between a game's theoretical prediction and equal splits. However, when bargaining over losses, the outcomes are often closer to the theoretical prediction, or imply more sophisticated reasoning than when bargaining over gains. In ultimatum games – that is, if the first participant makes an offer and the second participant can choose to accept or reject the offer –, first participants keep more of the pie for themselves if there are losses than if there are gains (Lusk and Hudson, 2010). In alternating offer games covering two stages – that is, if the second participant can make one counteroffer before the experiment ends, game theory predicts that bargainers come to an agreement in the first stage and not in the second stage. Experiments show that the frequency of agreements in stage one is higher for losses than for gains (Sadiraj and Sun, 2012). Investigations into the reasoning process in sequential bargaining – that is, if the bargainers repeatedly make offers and counteroffers – show that when the participants face losses, they invest more time in examining the game's parameters (Camerer et al., 1993) than they do when they decide over gains.

Besides the loss case's theoretical and experimental importance, losses are central when bargaining in practice: Given an insolvency, donors discuss how to distribute the remaining assets, i.e. how to reduce their individual losses; politicians discuss how to distribute and recycle nuclear waste; couples discuss how to distribute the loss in the quality of life after a divorce with their former partner; and academics frequently discuss how to distribute government-induced cuts between the departments at their universities. All these examples have similar properties: (1) If the bargainers do not come to an agreement, they are worse off than when finding an agreement, i.e. some form of disagreement point should be realized. (2) All the bargainers reach their maximal utility if the other bargainers take responsibility for the whole bad, i.e. there is an ideal point. (3) All the bargainers were better off before the bargaining was necessary. Given the need for bargaining, everybody is worse off in relation to the status quo before the bargaining started.

As a first contribution, we conducted an experimental study focusing on losses. Modeling losses in the lab is problematic (Rosenboim and Shavit, 2011), first, because achieving monetary losses is problematic from an ethical perspective. Second, if participants receive money to compensate a loss, they tend to not perceive the decision situation as a situation incurring