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Ultimatum bargaining over losses and gains – An experimental comparison

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ABSTRACT

Subjects in the loss domain tend to split payoffs equally when bargaining. The ultimatum game offers an ideal mechanism through which social scientists can investigate whether equal splits are the consequence of the proposers' generosity or due to their anticipation that the responders will reject lower offers. This paper experimentally compares ultimatum bargaining that takes place in a loss domain with that under a gains domain. The results reveal that, although responders do not expect more in the loss domain, proposers do make higher offers. As such, proposers reach agreements more often in the loss domain than they do in the gains domain, and responders receive higher payoffs.

1. Introduction

Distribution problems challenge both individual and corporate actors. Many real-life situations, for example, resource allocation within households, budget allocation within universities, the EU Member States' allocation of refugees, etc., highlight the extent to which the distribution challenge impacts everyday life. The latter example also highlights how, in many situations, it is not only gains that need to be divided, but also losses. Another example of bargaining situations that can be framed with both loss and gain domains are those related to CO_2 emissions. In the gains domain, reducing emissions increases the quality of the future climate. In the loss domain, lower emissions reduce the impact that the already incurred loss has on the good climate. Based on these examples, two fundamental questions arise: How do actors decide what course of action to take in situations in which they have to bargain over losses? And what influences their decision?

Bargaining is the distribution of a divisible good between two parties and is central to social sciences. Explanations of bargaining behavior based on social preferences play an increasing role in various disciplines including sociology, psychology, and economics (Berger et al., 2012), and research has produced abundant evidence that illustrates the social components of people's preferences (Brandts and Fatas, 2012). The outcomes of bargaining activities have also been studied extensively over the last decades (Güth et al., 1982; Güth, 1995; Güth and Kocher, 2014). However, the majority of the existing work has focused on the distribution of gains, and there is less published data available on the distribution of losses. The investigation of bargaining behavior in the loss domain is not trivial. It is relevant from a practical point of view because it "is as unavoidable and as problematic as the problem of negotiating over gains" (Buchan et al., 2005, p. 2). The problem is also important from a

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theoretical viewpoint. Understanding how people operate both gains and losses is necessary to derive further assumptions that can improve or correct theories of bargaining. Possible extensions could potentially combine the findings of sociology, psychology, and behavioral economics studies with bargaining theories; e.g., reference dependence fairness considerations, social identity, loss aversion or different risk preferences. This paper seeks to address the existing gap in understanding of the distribution of gains and losses in published data by discussing the results of ultimatum bargaining over losses and compares the results with those of ultimatum bargaining over gains.

The implementation of losses in experiments is difficult. To overcome selection effects, subjects in experiments that involve losses have to be compensated for participating in the experiment. Hence, prior to the experiment, they typically receive a monetary amount that compensates them both for the losses and their participation. This compensation may mean that the participants do not subsequently operate in the same way as they would if they were facing a real loss (Güth and Kliemt, 2003). A comparison of different implementations of losses concluded that subjects perceive monetary losses to be real if the compensation is paid several days prior to the experiment (Rosenboim and Shavit, 2012). Another way of implementing losses is to introduce waiting time (Kroll et al., 2014; Berger et al., 2012). That is, instead of losing money, after the experiment, the subjects are confined to a closed cabin for an amount of time that corresponds to the degree of their loss. However, implementing a system of this nature has two main drawbacks: (1) While subjects have similar preferences for money, they might have different preferences regarding waiting time (Hartman, 2007); and (2) Earlier comparisons of waiting time and money show that subjects do not behave in the same way when bargaining over waiting time as they do when bargaining over money (Ellingsen and Johannesson, 2009). Another loss setup is that of the cold pressor test (Schosser et al., 2016); i.e., instead of facing a monetary loss, subjects face a pain induced by cold water, with the duration of the pain corresponding to the extent of the loss. Although the cold pressor test is suitable for investigating the impact of losses on individual choices, it is not applicable in situations that involve collective decision making. In addition, the required equipment is expensive and difficult to handle; hence, based on our previous experience, the cold pressor test is not applicable to experiments that involve several subjects.

Recent experimental research on unstructured bargaining; i.e., bargaining situations in which both players simultaneously make their offers and chat with their bargaining partner prior to their offer (Kroll et al., 2014), indicates that equal splits are the most common methods of distribution in the loss domain, even in situations in which one party has a higher bargaining power than the other. In this paper, we investigate whether this phenomenon is replicated in the ultimatum game. The results of our study revealed that outcomes that are close to equal splits are more likely to be observed in the loss domain than they are in the gains domain. This paper argues that equal splits are the consequence of a change in the behavior of the proposer and that proposers make lower demands when placed in positions of loss than they do when bargaining over gains. However, this is not in reaction to responders demanding a bigger share.

The remainder of this paper is structured as follows: Section 2 motivates the game-theoretic solution and briefly discusses some alternative predictions, Section 3 provides an overview of the experiment, Section 4 presents the results of the investigation, and Section 5 discusses the implications of the observations.

2. Game design and theoretical background

The ultimatum game is one of the simplest forms of bargaining. One player, the proposer, receives a pie and distributes it between himself and the second player, the responder (Güth et al., 1982). The responder then decides whether to accept or reject the distribution. In the event of the latter, both players receive nothing. In the subgame, which is a perfect Nash equilibrium (Nash, 1951) of the ultimatum game, the responder accepts every distribution that pays marginally more than nothing. Expecting this, the proposer maximizes his own share by allocating the smallest realizable share to the responder.

2.1. Game design

We experimentally investigated bargaining behavior based on the following game: As proposer, the player distributed a pie of size, s, by choosing how much of the pie, a, he wanted to keep for himself and, thus, how much the responder received, $s - a$. Simultaneously, as the responder, the player specified the maximum share, b, the proposer could withhold. The share $s - b$ can be seen as the responder's aspiration level (Nowak et al., 2000). At the end of the ultimatum game, we randomly chose half of the subjects to be paid off as proposers and the other half as responders. Afterward, we matched responders and proposers to groups of two. If the responder accepted the proposer's offer, i.e., if it was within the share the responder was willing to concede ($a \leq b$), the proposer received a, and the responder received $s - a$. Otherwise, both players received nothing for the ultimatum game.

2.2. Game-theoretic solution

A strategic configuration where no player can unilaterally deviate and become better off in absolute terms is defined as a Nash equilibrium (Vega-Redondo, 1997). Given that definition, the standard ultimatum game has a continuum of Nash equilibria. Indeed, any distribution of the whole pie that is accepted by both players is consistent with Nash equilibrium. The standard game-theoretic solution concept for an ultimatum game is that of a subgame perfect Nash equilibrium (Selten, 1975). For the ultimatum game (in the gains domain), the standard game-theoretic solution is found through backward