



Inequality aversion and efficiency with ordinal and cardinal social preferences—An experimental study[☆]

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ARTICLE INFO

Article history:

Received 10 July 2006
Received in revised form 8 June 2010
Accepted 10 June 2010
Available online 22 June 2010

JEL classification:

C780
C910
D630

Keywords:

Fairness
Procedural justice
Bargaining

ABSTRACT

In this paper, we report on a series of free-form bargaining experiments in which two players have to distribute four indivisible goods among themselves. In one treatment, players are informed about the monetary payoffs associated with each bundle of goods; in a second treatment only the ordinal ranking of the bundles is given. We find that in both cases, inequality aversion plays a prominent role. In the ordinal treatment, individuals apparently use the ranks in the respective preference orderings over bundles of goods as a substitute for the unknown monetary value. Allocations that distribute the value (money or ranks, respectively) most equally serve as natural “reference points” for the bargaining processes. Frequently, such “equal split” allocations are chosen by our subjects even though they are Pareto dominated. Whether a Pareto optimal allocation is chosen or not depends on whether or not it is a Pareto improvement relative to the “equal split” reference allocation. We find less Pareto-damaging behavior due to inequality aversion in the ordinal than in the cardinal treatment.

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1. Introduction

Recent research in explaining observed behavior of individuals in laboratory experiments has focused on the question of how to model the agents' *distributional preferences*, see, e.g., Fehr and Schmidt (1999), Bolton and Ockenfels (2000), and Charness and Rabin (2002) (henceforth F&S, B&O and C&R, respectively). The common assumption in these models is that agents are motivated not only by their own material payoff but by the entire distribution of monetary rewards. Specifically, F&S and B&O suggest parametric forms of the utility function incorporating different notions of *inequality aversion* according to which utility decreases with the differences in individual payoffs. By contrast, C&R propose a model of *social-welfare* preferences according to which agents are concerned with maximizing a combination of the aggregate payoff for the group

[☆] We thank an editor, an associate editor, and two anonymous referees for valuable comments and suggestions. A former version of this paper circulated under the title “Equitable Allocations in Experimental Bargaining Games: Inequality Aversion versus Efficiency” (Bonn Econ Discussion Paper Series, No. 29, 2004). We are grateful to Steven Brams, Gary Charness, Heike Henning-Schmidt, Sebastian Kube, Karl Schlag, Reinhard Selten, Avner Shaked and William Thomson for discussions and valuable comments on earlier versions of this and our related work. We thank Sebastian Kube and Javier Sanchez Monzon for research assistance, and Thorsten Chmura, Thomas Pitz and the staff at the Experimental Lab at the University of Bonn for helping to conduct the experiments. Financial support by the Department of Economics at the University of Bonn and the Fletcher Family Research Grant at Bowdoin College is gratefully acknowledged.

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and the payoff of the worst-off individual. The two approaches have been compared and tested against each other by Engelmann and Strobel (2004).¹

By assigning significance to differences and sums of monetary rewards, the proposed models of social preferences use individual utility information in a *cardinal* and *interpersonally comparable* way. While this can be justified, e.g., by assuming quasi-linearity of the underlying preferences, it also shows that the applicability of the existing models is restricted to situations in which individual monetary rewards are known to all agents and in which preferences over allocations can be adequately described in terms of the distribution of monetary rewards.

The purpose of the present paper is to demonstrate that the basic intuitions behind the distributional preference approach can be fruitfully applied in more general situations. To this end, we conducted a series of free-form bargaining experiments in which two players had to jointly determine an allocation of four indivisible goods. In one treatment both agents were informed about the specific monetary value associated with the bundles of goods for each player (the same bundle usually had different monetary value for the two players). In the other treatment, each player was only informed about her own and the opponent's ordinal ranking of the bundles, i.e. only the ordinal ranking of the monetary payments associated with each bundle was given. Despite the lack of numerical payoff information in the latter treatment, we find that individuals rely on interpersonal comparisons also in this case. Indeed, we find strong evidence that agents use the rank of a bundle in the respective preference ordering as a substitute for its unknown monetary value. Taking these ranks as the basis for interpersonal comparisons, the motives behind the formation of distributional preferences, such as inequality aversion or social concerns in general, are relevant also in the treatment with ordinal information. In fact, the comparison between the two treatments reveals that individual behavior can be accounted for by a simple unifying *qualitative* theory of distributional preferences. Specifically, the outcomes that we observed in our bargaining experiments suggest that a significant proportion of agents' behavior is guided by the following rule:

Conditional Pareto Improvement from Equal Split (CPIES):

First, determine the most equal distribution of rewards. If this allocation is Pareto optimal, then choose it. Otherwise, if there is the possibility to make everyone better off, implement such a Pareto improvement provided that this does not create “too much” inequality.

If the monetary rewards are known, the “most equal” distributions are of course the ones with minimal difference of the numerical payoffs for the two agents.² If, on the other hand, only the ordinal rankings of the bundles of goods are given, then the “most equal” distributions are those with minimal difference of the ranks in the respective preference orderings. Similarly, “too much inequality” is to be understood in terms of differences in monetary payoffs and ranks, respectively. Of course, how much precisely “too much” is depends on individual preferences and varies from subject to subject.

The above rule combines elements of the inequality aversion approach of F&S and B&O on the one hand, and the social-welfare preference approach of C&R on the other. With the former it shares the important role played by interpersonal equality, with the latter the demand for Pareto optimality (in the payoff space).³ Interpersonal inequality plays a twofold role here. First, the absence of inequality determines an initial *reference* point for the bargaining problem. Secondly, it serves as a *constraint* in the process of achieving a Pareto optimal outcome. In contrast to C&R's results, we systematically find Pareto-damaging behavior in the treatment with known monetary rewards.⁴ Interestingly, however, such behavior is only very rarely observed in the ordinal treatment. Our conjecture is that this is due to the uncertainty about the differences in final payments associated with differences in ordinal ranks. Indeed, it seems that rank inequality becomes acceptable because it does not *necessarily* correspond to unequal monetary payoffs. One conclusion from our study is thus that, by making inequality precisely quantifiable, monetary payoff information hinders the realization of Pareto improvements.

The CPIES rule allows two different interpretations. The first is purely outcome-oriented: whether or not an allocation is compatible with the CPIES rule can be decided simply by looking at the resulting inequality and by determining whether or not it is a Pareto improvement relative to the most equal allocation. The second interpretation of the CPIES rule is as a proper procedure according to which bargaining partners first determine a “disagreement point” which then serves as the reference distribution for the later bargaining process. In Section 4 below, we look at both interpretations. In terms of statistical analysis, the relevance of the CPIES rule is more easily tested in its outcome-oriented version. On the other hand, an analysis of the communication protocols of the experiments shows that the CPIES rule indeed frequently materializes in the procedural sense: the equal reference distribution is explicitly proposed, or mentioned in the discussion although not necessarily suggested, and then the bargaining partners either settle on a Pareto improvement from there or choose the equal distribution.

Our experimental design differs from the literature in several respects. First, while most of the existing studies on distributional preferences have focused on variants of either dictator or ultimatum games, we consider free-form bargaining

¹ See, among others, also the comments by Bolton and Ockenfels (2006) and Fehr et al. (2006), as well as the reply by Engelmann and Strobel (2006).

² In our setting with two players, there are at most two such distributions in the feasible set. With more than two players, the meaning of “most equal” distribution can be made precise using the theory of inequality measurement, for instance, by applying the (partial) criterion of Lorenz dominance.

³ Pareto optimality is defined in *payoff space* as opposed to utility space, since the relevant notion of optimality here is based on the distribution of material payoffs (respectively, ranks), not on the subjective distributional preferences.

⁴ C&R's model does allow for inequality aversion and can incorporate Pareto-damaging behavior for suitable values of the parameters. However, C&R's experimental results suggest parameter values that exclude Pareto-damaging behavior.

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