

# DISTRIBUTIONAL CONCERNS: EQUITY- OR EFFICIENCY-ORIENTED?<sup>1</sup>

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## **Abstract:**

This paper provides experimental evidence that in binary-choice Dictator Games the majority of participants are efficiency rather than equity-oriented - even if their own payoff is reduced by the respective choice. Therefore, altruistic and – as a consequence – reciprocal motives need to be modelled explicitly if we aim to predict behavior in experiments correctly.

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## I Motivation

Results from experimental economics have shown that the assumption of a completely selfish homo oeconomicus is only sometimes consistent with the behavior of homo sapiens (see Kagel, Roth [1995]).<sup>2</sup> Two recently published papers by Fehr, Schmidt [1999] (FS) and Bolton, Ockenfels [2000] (BO) demonstrated how simple models are able to organize a good deal of experimental data. Their concept is appealing to the extent that it is able to capture the behavior observed in some experiments irrespective whether that behavior was consistent (as in auctions) or inconsistent (as in Ultimatum Games<sup>3</sup>) with the standard economic model. Both, BO and FS, describe preferences as a combination of self-interest and of inequality aversion. The primary norms by which players are supposed to be guided in their decisions are, thus, egoism and *equity*.

Both models leave little room for altruism. In particular, they argue that altruism does not explain behavior in ultimatum games - the type of game FS (and to a lesser extent BO) use as the benchmark for their models. However, in the experiments chosen by FS and BO inequality aversion and other potential variables influence the decision process in the same direction.

In this paper, we, thus, ask whether models based on equity-oriented distributional preferences are sufficient to predict behavior in experiments where the influences of altruism and inequality aversion do not coincide. We describe altruism as the motivation to increase another person's payoff even if one's own payoff is decreased as a result. The norm to which altruistic players adhere is *efficiency*.<sup>4</sup>

A rigorous test revealing distributional preferences is to check whether payoff distributions that are typically rejected in strategic settings (as in Ultimatum Games) are accepted when the same payoff distributions are presented in a non-strategic setting of a cardinal Dictator Game. Our results support the predominance of efficiency-oriented distributional concerns. As the altruistic attitude may be influenced by previous decisions of other persons, we may further conclude that it matters whether a decision is embedded in a strategic or a non-strategic game. Approaches that are based on the relative payoff standing of each choice are not able to capture that central feature in the decision process.

## II Experimental Design and Tests

We conducted two experiments with binary-choice Dictator Games (Distribution Games) which allow for discrimination between altruism and inequality aversion. Our aim was to discover whose behavior can be explained by either one of the two variables. Models based on inequality aversion predict that participants will always make the same choice irrespective of the strategic setting of the game. In our first experiment, therefore, we asked persons to choose between different income distributions. These were similar to the choices at the second stage of those Ultimatum Game outcomes which build the

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<sup>2</sup> To explain these findings it was suggested in earlier papers that additional motives of altruism be introduced into the utility function (Becker [1976], Bolle [1991], Andreoni, Miller [1998]). Other models favored to introduce reciprocity (Rabin [1993], Dufwenberg, Kirchsteiger [1998]) or, more recently, various combinations of these (Charness [1996], Falk, Fischbacher [1999], Kritikos, Bolle [1999] Charness, Rabin [2000]).

<sup>3</sup> For a description of that type of game, cf. Güth [1995].

<sup>4</sup> Participants guided by inequality aversion make choices covering that type of altruism only when persons with *lower* payoffs are involved because such choices decrease the donor's *relatively* higher payoff.

basis for the approach of FS.<sup>5</sup> The participants were put in the same situation as responders in a "Mini Ultimatum Game", but without any strategic context. Instructions differed only insofar as there was no previous stage in our game so that we were able to compare the choices made in both types of games.

In the first round (see Appendix, Game 1), participants were asked whether they prefer a payoff of (1,4) (where the first entry is one's own payoff in DM, and the second the other person's payoff) to a zero payoff for both. This distribution was chosen because all sufficiently inequality averse participants (70% of the population according to FS) are expected to prefer (0,0) to (1,4), and all relatively egoistic participants (30% according to FS) to prefer (1,4) to (0,0). In the second round (Games 2-5) the same participants were asked according to the strategy method to make four different binary choices which correspond to the specific threshold levels of the FS - model.

There exists strong evidence regarding the behavior of participants in the Ultimatum Game so that it is not necessary to conduct another experiment. Moreover, FS transformed an (almost complete) data set of acceptance thresholds of responders in Ultimatum Games into a parametric distribution of their model.<sup>6</sup> In Table 1 we apply that parametric distribution as 'expectations of FS'.

**Test 1:** If participants are motivated by altruism or egoism they will accept any positive division in the Distribution Game. If they are inequality averse, participants will reject those income distributions which are rejected in the Ultimatum Game, as well.

In order to sustain our claim that altruistic motives have to be modelled, in the second experiment participants were confronted with choices that would not increase their own payoff. In Game 6 participants had the choice between (0, 15) and (0, 35), in Game 7 between (20, 10) and (10,40).

**Test 2:** In Game 6 altruistic persons will increase the other person's payoff, egoists will be indifferent, and the inequality averse will refuse to increase the other's payoff. In Game 7, altruists are expected to increase the other's payoff. All other participants will prefer the non-altruistic choice, either because their own payoff is higher or because the distribution of the payoffs is more favourable to themselves.

### III Results

As Table 1 shows, in Game 1 70 out of 80 participants (87,5%) preferred the payoff (1,4) to (0,0).<sup>7</sup> 10 persons were effectively inequality averse (12,5%). The difference is striking when comparing these results to FS's expectation that a constant share of 70% should reject such unequal payoffs. The results of Games 2 to 5 of Experiment 1 support this view. A majority of 60 participants (75%) behaved altruistically and chose (0,5), although their payoff remained zero while the payoff of somebody else was increased to DM 5. On the other end of the scale, no participant had a preference for equal payoffs only, while FS expected that there should have been about 8 players rejecting a split of (2,3). Furthermore, according to the approach of FS 56 players should prefer the payoff of (2, 3) to (0, 0), and (0, 0) to (1, 4), but there were only 10 players who did. All acceptance thresholds were significantly lower in the Distribution Game compared to the expectations of FS.

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<sup>5</sup> For the sake of brevity, we will concentrate in the remainder of this paper on FS, who provide a parametric distribution of their model. Our test, however, applies to all models of inequality aversion.

<sup>6</sup> For an overview over these results of the Ultimatum Game, cf. Table 1 in Fehr and Schmidt [1999].

<sup>7</sup> This compares to 100% (with 36 participants) in the same kind of experiment in Charness and Rabin [2000].

In the second experiment (Game 6), 43 persons (74%) selected (0, 35) as their preferred move, while 15 persons (26%) preferred (0, 15), significantly less than the expectations of FS. Moreover in Game 7, 29 persons (58%) - instead of none as expected by FS - preferred the altruistic choice which paid (10,40). Only 21 participants were egoistic or inequality averse and chose (20,10).

**Result:** Given that FS assert 30% of participants to be egoists and 70% inequality averse, our results confirm that 30% are egoistically motivated; of the remaining 70% of participants, the choices of 10-15% qualify as being inequality averse, while 55-60% can be described as altruistic. In Game 7 altruists chose (10,40), egoists and the inequality averse chose (20,10). In Games 5 and 6 altruists and about half the egoists (who were indifferent in their choice) preferred (0,5) to (0,0) and (0,35) to (0,15). Half of the egoists and all the inequality averse preferred (0,0) and (0,15). In Games 1, 3 (and 4) altruists and egoists accepted positive but relatively lower payoffs compared to their partners while a minority of inequality averse participants rejected relatively lower payoffs than (2,3).<sup>8</sup> In Game 2, all players accepted the equal split.

**Proposition:** In Dictator Games, altruistic motives – in addition to egoism – is a better predictor of behavior than inequality aversion.

#### IV Conclusions

We conducted two binary-choice Dictator Games where participants had to select their preferred income distribution. These games allow for a decisive test regarding the distributional concerns of participants because their decisions are not influenced by any strategic considerations. We found that the majority of participants are efficiency rather than equity-oriented so that altruistic motives have to be modelled explicitly in order to predict behavior successfully. Altruism and egoism are the leading behavioral variables of such decisions.

Consequently, inequality aversion also fails to *explain* the outcome in Ultimatum Games. In the Distribution Game most participants chose a payoff of (1,4) while many responders in Ultimatum Games rejected the same offer. This diverging result allows to conclude that the strategic setting of the game has a very strong impact on behavior. Equity considerations do not drive the behavior of the participants. To explain the outcome of both games, we rather need to evoke a combination of different variables. In addition to altruism and egoism which drive the behavior in the Dictator Games it might be negative reciprocity in the UB-Game where the responders' 'altruistic good will' is turned into negative reciprocity in response to a mean action of the proposer.<sup>9</sup>

Moreover, the choice of (20,10) over (10,40) is one typically made at any stage of a Centipede Game. Had the participants of the experiments behaved as if they were inequality averse, no cooperation from

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<sup>8</sup> Results from experiments which were conducted at the same time and in the same spirit support our findings. In Charness and Großkopf [2000] of 108 participants 67% preferred (similar to Game 7) a payoff of (600, 1200) to (625, 625), and 74% (similar to Game 6) preferred a payoff of (600, 1200) to (600, 600). In Charness and Rabin [2000] of 80 participants 52% preferred (similar to Game 7) a payoff of (375, 750) to (400, 400) and of 26 participants 67% preferred (similar to Game 6) a choice of (400, 750) to (400, 400).

<sup>9</sup> For other experiments designed to show that negative reciprocity might be the main reason of such rejections in the Ultimatum Game, cf. Blount [1995] and Kagel and Wolfe [1999].

the first stage of the game should have been apparent.<sup>10</sup> Here, it is shown that altruism may be the baseline for the cooperative behavior observed in Centipede Games.

In summary, these results tell us, first, that in order to explain the behavior in Dictator Games distributional concerns should be described as efficiency oriented.<sup>11</sup> Second, to capture the impact of the strategic setting in decisions intentions (as negative reciprocity) need to be modelled.

**Table 1: Experimental Procedure:**

In a classroom experiment, participants were confronted with an income distribution described by ( $y_{\text{for self}}$ ,  $y_{\text{for another person}}$ ), with the amount of money in German marks. They were asked: Which distribution do you prefer? Choices were sequentially presented to the participants. They wrote down their decisions together with a pseudonym and password. The decision forms were then collected and new ones distributed. Games (1) to (5) were conducted with the same 83 participants.<sup>a</sup> In (1) every participant was paid in DM. With respect to rounds (2) to (5) one of these four decision per person was randomly chosen and paid. Experiments (6) and (7) were conducted with different participants. After decisions (6) and (7), 8 decision forms were selected for payoffs. The amount  $y_{\text{for self}}$  was paid to the person who made the decision; the amount  $y_{\text{for another person}}$  was paid to another randomly selected anonymous person, from a parallel classroom for decisions (1) to (5), and from the same classroom for decisions (6) and (7). Participants received the amounts from a third party not involved in the experiment. The pseudonyms of the winners were named openly, and the winners were required to reveal their password to the third party in order to get paid.

**Results:**

Game	choice 1	choice 2	Number of participants	choice 2:		Binomial Test level of significance
				exper. results	expectations of FS <sup>b</sup>	
(1)	(1, 4)	(0, 0)	80	10 (12%)	70%	(-11,1) $p < 10^{-7}$
(2)	(2.5, 2.5)	(0;0)	80	0 (0%)	0%	
(3)	(2, 3)	(0;0)	80	0 (0%)	10%	(-2,78) $p = 0,0027$
(4)	(1, 4)	(0;0)	80	10 (12%)	70%	(-11,1) $p < 10^{-7}$
(5)	(0, 5)	(0;0)	80	20 (25%)	70% <sup>c</sup>	(-8,7) $p < 10^{-7}$
(6)	(0, 35)	(0, 15)	58	15 (26%)	70% <sup>c</sup>	(-7,2) $p < 10^{-7}$
(7) <sup>d</sup>	(10, 40)	(20, 10)	50	21 (42%)	100%	(-16,8) $p < 10^{-7}$

<sup>a</sup> We eliminated three observations because they made inconsistent choices between the first and second round.

<sup>b</sup> The expectations of FS are based on the average threshold levels of responders in those Ultimatum Games which FS use in their data set to derive the parametric distribution of their model. Predictions for games 1-6 also hold true for BO, while, for Game 7, BO cannot make any expectation.

<sup>c</sup> The remaining 30% of players in Games 5 and 6 were predicted to be indifferent between Choices 1 and 2. To be on the safe side of the test we suggested that they prefer Choice 1.

<sup>d</sup> For obvious reasons we used for this observation the approx. Gauss-Test.

<sup>10</sup> In Kritikos [2000] it is shown that in a Centipede Game with three stages with the same payoff choices at the second stage (20, 10) vs (10, 40) over 60% of the participants behaved cooperatively. A higher share of cooperators were found by McKelvey and Palfrey (1992) who used exponentially increasing exchange rates.

<sup>11</sup> When explaining behavior between anonymous players pure altruism might have limits. Different approaches suggest that altruistic decisions might be influenced by social norms and might diminish in a context where social norms are less influential (cf. Kritikos and Meran [1998], Oberholzer-Gee and Eichenberger [2000] and Ruffle [1998]). Moreover, the crucial influence of the transfer rate needs to be addressed in future research which may show to which extent altruistic choices depend on the degree of such efficiency enhancing moves.

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