Inequity, Reciprocity, and Efficiency-Preferences in the Ultimatum-Revenge Game *

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Abstract

This article presents the results of a simple proposer-responder bargaining game that allows to differentiate among fairness that are based on distributional concerns and fairness that are based on reciprocal concerns. If a responder accepts the offer the game follows the traditional ultimatum game structure, that is, for a given pie P the proposer receives the payoff $P - x$, and the responder earns the offer x. However, if the responder rejects the offer x, she earns κx for a fixed factor $0 \leq \kappa < 1$ and chooses the payoff for the proposer from the interval $[0, P - \kappa x]$. The data from laboratory experiments indicate that only a minority of subjects behaved according to the reciprocal-kindness models, while even less subjects behaved according to distributional fairness models. Rather, I find a heterogeneous population of responders showing responses that mixed both models. In contrast to other results from variations of the ultimatum game, the ultimatum-revenge game yields little opportunistic behavior of responders. Moreover, for a significant number of subjects, efficiency concerns influenced behavior. (*JEL D63, D64*)

Keywords: efficiency, fairness concerns, inequity aversion, reciprocity

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1 Introduction

The experimental literature has made substantial progress to incorporate fairness into the formal economic analysis. Following common wisdom, accumulated evidence of field as well as experimental studies in the last two decades indicate that pro-social preferences are important for subjects' behavior. Subjects are willing to sacrifice own payoffs in order to change other players' payoffs. The contemporary economic theory on preferences reflects these results by assumption of interdependent preferences (see, e.g., Sobel, 2005). Yet, there is an ongoing debate about how to formalize fairness concerns (see, e.g., Bolton & Ockenfels, 2005). The contemporary literature reflects fairness concerns either as distributional preferences (e.g., Fehr & Schmidt, 1999, Bolton & Ockenfels, 2000) or as reciprocal-kindness preferences (e.g., Rabin, 1993, Dufwenberg & Kirchsteiger, 2004, Falk & Fischbacher, 2006). Distributional models assume that people gain (dis)utility arising from differences between their own and other people's payoffs. According to reciprocal-kindness models, people gain utility by responding kindly to perceived kind actions by others or by responding unkindly to perceived unkind actions by others. The results of laboratory experiments find evidence that reciprocation matters[1] as well as that inequity matters.[2] Finally, some authors have stressed the importance of efficiency for fairness (Engelmann & Strobel, 2004).

This paper tries to differentiate between the various motives for fairness concerns more detailed. In particular, I will introduce a game that allows us to distinguish among reciprocal behavior, inequity avers behavior, and behavior motivated by efficiency in one experimental setting.

[1] Bereby-Meyer and Niederle (2005) observe different rejection rates in three-person ultimatum persons depending whether the proposer or the (not involved) third party receives the conflict payment.

[2] Falk, Fehr and Fischbacher (2003) show that intention influences acceptance rates for similar distributions, but report also rejections of kind, but strongly unequal offers in mini-ultimatum games.

For this purpose, I test the ultimatum-revenge game in laboratory experiments. The ultimatum-revenge game follows the standard ultimatum game structure if a responder accepts the offer, that is, the proposer receives the payoff $P-x$, and the responder earns the offer x for a given pie P. However, the game differs substantially from the standard ultimatum game if the responder rejects the offer x. While the responder earns κx for a exogenously fixed factor $0 \leq \kappa < 1$, he freely determines the payoff for the proposer, y, from an interval $y \in [0, P-\kappa x]$. Of course, the unique subgame perfect equilibrium of the ultimatum-revenge game does not differ from that of the standard ultimatum game. Pure material self interest predicts that the smallest positive x will be offered and never rejected. However, if responders reject offers, they reveal fairness concerns. Particularly, in the ultimatum-revenge game they indicate the distribution of payoffs between the responder and proposer that maximizes their utility. According to models of distributional fairness, responders if rejecting an offer choose equitable payoffs for the proposers (i.e., $y = \kappa x$), whereas reciprocal-kindness models predict that responders will choose proposers' payoffs from the lower border of the interval (i.e., $y = 0$). Finally, with respect to efficiency concerns, responders are expected to choose proposers' payoff only from the upper border of the interval (i.e., $y = P - \kappa x$). As a consequence, the experimental test allows us to analyze the distribution of distributional, reciprocal, and efficiency concerned preferences within a given population exhibits of subjects.

This article is organized as follows: Section two will introduce the ultimatum-revenge game and develops expectations based on a inequity avers as well as reciprocity preferences. Section three analyzes experimental data of the game with respect to the heterogeneous structure of fairness considerations. Finally, section four concludes the article.

2 The ultimatum-revenge game

Consider the following simple bargaining game with two players. A proposer is endowed with some monetary pie of size P. The proposer has to propose an offer x of P for the responder. If the responder accepts the offer, the proposer keeps the remaining $P - x$, while the responder earns x. If the responder rejects the offer, the responder earns κx with a commonly known parameter $\kappa \in [0, 1)$. Furthermore, the responder can freely choose for the earnings of the proposer, denoted as y, from the interval $y \in [0, P - \kappa x]$. Therefore, the payoff functions for proposer, π_p, and the responder, π_r, are

$$\pi_p = \delta_r(P - x) + (1 - \delta_r)y$$
$$\pi_r = \kappa x + \delta_r(1 - \kappa)x, \tag{1}$$

where $\delta_r = 1$ if the responder accepts the offer x, and $\delta_r = 0$ otherwise. I refer to the payoff for responders who reject their offer as the conflict payment. Obviously, assuming both players to have selfish, risk-neutral preferences yields a unique subgame perfect Nash-equilibrium that is identical to that in the standard ultimatum game. The responder will accept any positive offer. Anticipating this, the proposer chooses the offer to equal the smallest amount possible.

Figure 1 illustrates the game tree of the ultimatum-revenge game, which, of course, is a variation of the ultimatum game. Restricting the interval for y to $y = 0$ and parametrization $\kappa = 0$ yields the standard two-person ultimatum game (Güth, Schmittberger & Schwarze, 1982). However, rejection in the standard ultimatum game may show inequity aversion since it favors an equal split $\{0, 0\}$ compared to a more unequal distribution of the pie, but may also exhibits a hostile answer (i.e., 0) to an unkind offer. Yet, responders in the "unrestricted" ultimatum-revenge game have the opportunity to differentiate their responses. Like in many real world examples, responders have some range for their responses to

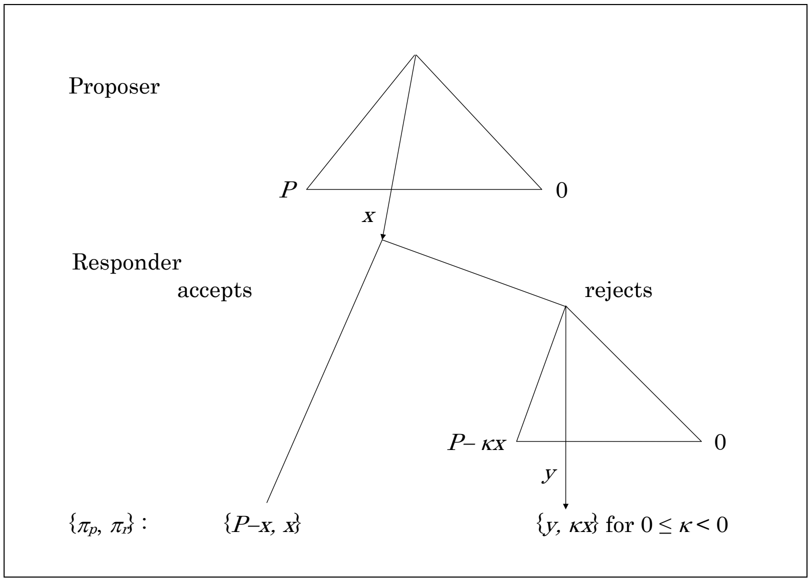

Figure 1: Game tree of the ultimatum-revenge game

unacceptable offers. For instance, workers may slow down their effort, or they refuse to work overtime.

There are several experimental studies that attempt to estimate interdependent preferences (e.g., Andreoni, Castillo & Petrie, 2003). This paper follows this tradition. Like similar games,[3] responders choose responses that maximize their utility. Consequently, the resulting distribution of earnings for the responder and the proposer can be characterized as a point on an indifference curve that tangles a line that illustrate the interval of possible responses. Figure 2 shows a rejection and the resulting response of an offer in the ultimatum-revenge game. Notice that in this game, the interval of possible responses for each offer x is characterized by a horizontal line that intersects the vertical axis at κx.

For several differing offers, this allows us to classify a subject's choice according to the trajectory that connects her responses to rejected offers. Particularly, for the further analysis I will focus on the preferences of responders since the decisions of proposers are influenced by their own

[3]For instance, consider the convex ultimatum game (see Suleiman, 1996, Charness & Rabin, 2002, Andreoni, Castillo & Petrie, 2003).

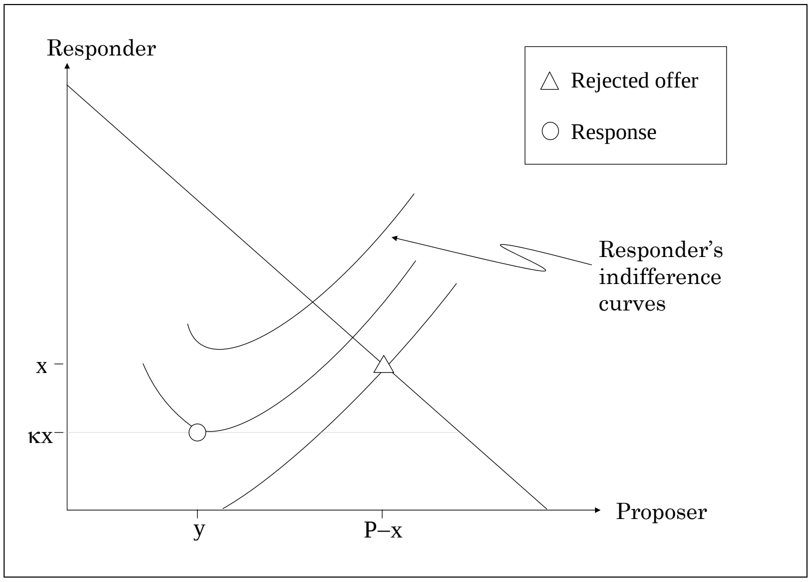

Figure 2: Rejection and response in the ultimatum-revenge game

preferences, but also beliefs about responder's preferences. For inequity aversion subjects would like to reduce the inequity in payoffs between players. Following the approach by Fehr and Schmidt (1999), I will model inequity aversion as a simple linear model of responder's utility $u_r(\pi_r, \pi_p)$.[4] The utility function of an inequity avers responder can be written

$$u_r(\pi_r, \pi_p) = \delta_r(x + \alpha(|x - (P - x)|) + (1 - \delta_r)(\kappa x + \alpha(|\kappa x - y|)), \quad (2)$$

where the parameter α indicates the marginal disutility caused by the inequity in payoffs between the responder and the proposer, that is, it is assumed that $\alpha < 0$. Notice, that the original model introduces two parameters that allows to distinguish between favoring and unfavoring inequity. However, for our further analysis we can neglect this difference. Responders optimize their utility with respect to δ_r and y. Obviously, for all $\delta_r = 0$, the model predicts for any $\alpha < 0$ that responders minimize the inequity in payoffs by $y = \kappa x$. Therefore, we can predict for a subject that is strongly, two-sided inequity avers[5] a trajectory connecting the responses with slope 1, as shown in Figure 3(a).

[4]The predictions for the ultimatum-revenge game do not differ if we apply more complex inequity aversion as suggested in Bolton & Ockenfels, 2000.

[5]That is, the subject rejects all offers accept from the equal split of $\{P/2, P/2\}$.

The former model of interdependent preferences paid solely attention to the consequences of the game. Distributive consequences triggered exclusively rejections. However, similar consequences might be perceived quite differently considering the way the results are reached. For this reason, preference models that incorporate reciprocity concerns evaluate the intention of an action. Actions that are perceived as kind lead to kind response, while unkind actions trigger unkind response. Of course, this raises the question, how we define kindness in a very simplified way. Following recent literature, for instance, Dufwenberg & Kirchsteiger, 2004, Falk & Fischbacher, 2006, we can model kindness (unkindness) as positive (negative) deviations from the equal distribution of payoffs. Therefore, the total nonmonetary utility of responses can be formalized as the product of the kindness/unkindness of the offer and the the kindness/unkindness of the response. This allows us, if the responder accepts, to define a kind response to kind/unkind offers as $(x-(P-x))(P-x)$. Note that the response (that is, the second term) is a positive number. Whenever the offer is unkind ($(x-(P-x))$ is negative) the share $(P-x)$ causes disutility to the responder. If the responder rejects, we express kind/unkind response to unkind offers as $(x-(P-x))(2y-(P-\kappa x))$. Here, the response depends on the decision y of the responder. It varies between $P-\kappa x$ for $y=P-\kappa x$ and $-(P-\kappa x)$ for $y=0$. Note that for responders who receive unkind offers, the total nonmonetary utility is positive only if $y < {}^{(P-\kappa x)}/_{2}$. Thus, the utility function of a reciprocal responder equals

$$\begin{aligned} u_r(\pi_r, \pi_p) = {} & \delta_r(x + \beta(x-(P-x))(P-x)) \\ & +(1-\delta_r)(\kappa x + \beta(x-(P-x))(2y-(P-\kappa x))), \end{aligned} \tag{3}$$

where the parameter β indicates the marginal utility caused by reciprocal behavior, that is, it is assumed that $\beta > 0$. Responders optimize their utility with respect to δ_r and y. Obviously, for all $\delta_r = 0$, the model predicts that $\beta(x-(P-x))$ is negative. Therefore, if responders reject offer, it follows for any $\beta > 0$ that responders maximize their utility resulting from unkind response by $y = 0$. Furthermore, for strong marginal reciprocity β, rejections of (very) kind offers are rational, if responses is very kind. Then, responders maximize their utility by responding $y = P - \kappa x$ to kind offers. Therefore, we can predict for a subject that is strongly, two-sided reciprocal[6] a piecewise trajectory with slope -1 responding to kind offers and a vertical trajectory responding to unkind offers, as shown in Figure 3(b).

Finally, recent studies stress the importance of efficiency concerns for the decision of responders (Engelmann & Strobel, 2004). The analysis with respect to efficiency concerns is very difficult, since has hardly been formalized. Particularly, is remains unclear, why responders reject offers. Efficiency concern is defined with respect to the total sum of payments to responders and proposers. Therefore, I introduce a simplified model of efficiency preferences as the weighted sum of payoffs to both players. Hence, the utility function of an efficiency concerned responder equals

$$u_r(\pi_r, \pi_p) = \delta_r(x + \gamma(P - x)) + (1 - \delta_r)(\kappa x + \gamma y), \qquad (4)$$

where the parameter γ indicates the marginal utility caused by efficiency concerns, that is, it is assumed that $\gamma > 0$. Notice, that the ultimatum-revenge games keeps the pie to be distributed among responder and proposer constant. Only if the responder decides to shrink y, efficiency is lost. Therefore, if responders reject offers, it follows for any $\gamma > 0$ that they maximize their utility considering efficiency concerns by $y = P - \kappa x$. Thus we can predict for a subject that has efficiency concerns, but rejects all offers accept from the equal split of $\{P/2, P/2\}$[7] a trajectory with slope -1, as shown in Figure 3(c).

[6] That is, the subject rejects all offers accept from the equal split of $\{P/2, P/2\}$.

[7] The reason for the rejections may be due to some "exogenous" reasons (e.g., errors, confusion).

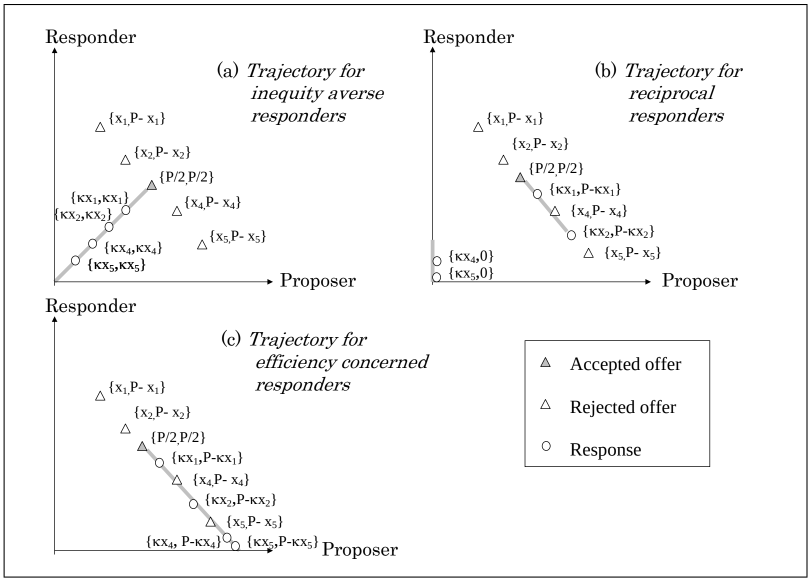

Figure 3: Trajectories for various types of rejecting responders

3 Experimental results

The laboratory experiments were conducted at the EconLab at the University of Bonn, Germany in October and November 2006. Experiments were computerized using zTree (Fischbacher, 1999). For the recruitment of subjects, I used ORSEE (Greiner, 2004). Participants were undergraduate students from various fields of studies. In total, 306 subjects participated; exactly 50% of all subjects were females. The median age among participants was 23 years. Copies of the instructions were handed out to participants and read out aloud thereafter. Participants questions concerning the experiments were then answered privately by the instructors. Finally, all participants had to answer an electronic questionnaire testing participants understanding of the game and the pay-off structure. Before participants answered the questionnaire, we made clear that the only purpose of the questionnaire was to improve the understanding of the game's rules. Wrong answers were privately explained and corrected before the experiment started.

Each participant participated in one anonymous ultimatum-revenge game playing either the role of the proposer or the role of the responder. In the instructions, I referred to proposers as persons A and to responders as persons B. Offers were called proposals which were to accept or to reject. Commonly known, the pie size was set to $P = 12$ Euro. Offers could only be made in integers. For responders, I applied the strategy vector method, that is, responders had to made their decisions for all possible offers before they were informed about the actual offer. Responders were asked to decide for all possible offers one after another. Thus, responders had to make in total 13 acceptance/rejection decisions, and, if they rejected offers, determine the payoff of proposers; the order of possible offers differed randomly for all responders. Thereafter, they were asked to state which offer they consider as fair, and which offer they expected to receive. Finally, an offer of one proposer was randomly assigned to a responder, and payoffs were realized according to the decisions made by the responder for this particular offer. Participants were informed about their payoffs. Then, they had to answer a short socio-demographic questionnaire, before they pick up their payoffs privately.

In order to test the robustness of fairness concerns in the ultimatum-revenge game, I introduced two treatment conditions. For one condition, HIGH, the commonly known parameter κ equaled $\kappa = 0.5$, while in the other condition, LOW, $\kappa = 0.25$. In total, 76 proposers and 76 responders participated in the HIGH treatment, while 77 proposers and 77 responders participated in the LOW condition. The average length of the experiment was 30 minutes including the instruction time and the time for paying off subjects. 84% of actual offers in the HIGH condition (81% in the LOW condition) were accepted; average payoffs for proposers were 5.52 Euro in HIGH and 5.43 Euro in LOW (standard deviations 1.90 and 2.61, respectively), average payoffs for responders were 5.24 Euro in HIGH and 4.42 Euro in LOW (standard deviations 1.59 and 2.01, respectively).

3.1 Offers and expected offers

The analysis of offers made by proposers reveals an important treatment effect. The average offer made in the HIGH condition, 5.55, are significantly higher than the average offer made in the LOW condition, 4.81.[8] The result can be explained by the fact that for a given offer, the responder has a higher conflict payoff in the HIGH condition than in the LOW condition. Along findings in other ultimatum experiments (e.g., see Camerer, 2003), proposers increase offers for increasing conflict payoffs for responders.

However, quite astonishingly, there is no treatment effect with respect to expected and stated fair offers by responders.[9] The mean expected offer in the HIGH condition, 5.47, and the average expected offer in the LOW condition, 5.26, are significant smaller than the stated fair offers, 6.02 and 5.88, respectively.[10] Notice, that the fair offer exceeds slightly the equal split. Partly, we have to attribute this result to the fact that there were no financial incentives for responders' statements. In general, responders expect to receive to some extend unfair offer, while the treatment condition seems to have little influence on expected and stated fair offers. Summarizing the results, we find that there is a treatment effect for proposers' behavior, while the results for expectations and fair offers of responders is hardly influenced by their conflict payoff.

3.2 Rejections

For the analysis of rejection decisions, I will define an upper and a lower acceptance threshold for responder i, tr_i^u and tr_i^l, as following

$$tr_i^u := \max\{x|\delta_{r,i}(x) = 1\}$$
$$tr_i^l := \min\{x|\delta_{r,i}(x) = 1\}, \qquad (5)$$

[8] $p = 0.001$; Wilcoxon rank-sum test, two-sided.
[9] $p = 0.52$ and $p = 0.53$; Wilcoxon rank-sum tests, two-sided.
[10] $p = 0.44$ and $p = 0.46$; Wilcoxon rank-sum tests, two-sided.

	$\|tr_i^l\|$	0	1	2	3	4	5	6	7	$\|tr_i^u\|$	9	10	11	12	total
HIGH		0	4	3	4	4	34	7	1		1	1	7	48	57
LOW		1	7	6	7	18	20	5	0		0	1	3	60	64

Table 1: Number of responders according to acceptance thresholds

where $\delta_{r,i}(x)$ denotes the acceptance decision of responder i for a certain offer x. Note that both, fairness concerns based on inequity aversion as well as fairness concerns based on reciprocity, predict regularity with respect to rejections, that is, $\delta_{r,i}(x) = 1 \ \forall x \in [tr_i^l, tr_i^u]$. In total, 32 of 153 responders exhibit rejection decisions that violate regularity. These are approximately 21% of all responders. However, we can attribute most of these violations to the difficulty arising from the random order procedure of presenting possible offers. Responders submitted their decision one after another without being able to change their decisions once they submitted them. I chose this procedure, since the entire process avoids an order effect of presenting possible offers. Furthermore, it is less abstract than a decision sheet that shows all possible offers in some kind of menu. Yet this procedure is error prone. If we allow at most for one violation of decision regularity, the number of responders exhibiting irregular rejection behavior reduces to 8 subjects, which are approximately 5% of all responders. Nevertheless, for the further analysis, I exclude the data of all responders violating strong regularity. This yields us clear-cut results for the acceptance thresholds of responders. The number of responders that choose corresponding thresholds, $\|tr_i^l\|$ and $\|tr_i^u\|$, respectively, are reported in Table 1. Notice, that responders with $tr_i^u = 12$ and either $tr_i^l = 0$ or $tr_i^l = 1$ choose the optimal selfish strategy in the ultimatum-revenge game, since standard game theory predicts responders to be indifferent between accepting and rejecting offers of 0. In total, only 9 responders did so. Hence comparison with typical results from other variations of the ultimatum game (e.g., see Andreoni, Castillo & Petrie, 2003), the ultimatum-revenge game yields less opportunistic behavior of responders. Furthermore, we observe that the vast majority of responders exhibits an upper acceptance threshold of 12. Computing the average tr_i^u yields 11.79 for the HIGH and 11.92 for the LOW condition. These thresholds do not differ significantly.[11] However, with respect to the lower acceptance threshold, there is a significant difference between treatment conditions. The average tr_i^l for the HIGH condition, 4.52, is significantly higher than the average tr_i^l for the LOW condition, 3.78.[12] Therefore, unlike the expectations and stated fairness, the behavior of responders differ with the conflict payment. Lower conflict payment increases the average acceptance of smaller offers. Quite astonishingly, there is even one responder in the HIGH condition whose lower acceptance threshold exceeds the equal split.

To summarize the results we observed for rejection behavior of responders, the ultimatum-revenge game yields less opportunistic behavior than other variations of the ultimatum game. Moreover, in contrast to the statements of responders, the acceptance of low offers is influenced by the conflict payment.

3.3 Responses

In order to classify the responses of responder, I will introduce a normalization of y. Let us define the normalized distance to equity for a certain response, $d(y)$, as

$$d(y) = \begin{cases} \frac{y-\kappa x}{\kappa x} & \text{if } y \leq \kappa x, \\ \frac{y-\kappa x}{P-\kappa x} & \text{otherwise.} \end{cases} \tag{6}$$

Notice, that $d(y) \in [-1, 1]$. Apparently, $d(y) = -1$ characterizes an unkind responses, so that $d(y) = -1$ corresponds with a vertical trajectory connecting responses. Likewise, $d(y) = 0$ characterizes an equal responses and corresponds with with a trajectory of slope 1. $d(y) = 1$

[11] $p = 0.13$; t-test, two-sided.
[12] $p = 0.003$; t-test, one-sided.

	$\|d(y)\|$	-1	(-1,0)	0	(0,1)	1	$\emptyset$	sum
HIGH		13	26	4	11	0	3	57
LOW		24	15	7	11	0	7	64

Table 2: Number of responders according to mean response classification

characterizes a trajectory with slope -1. This can be due to efficiency concerned responses given that the corresponding x satisfies $x < P/2$, whereas it could characterize a kind response or an efficiency concerned response given that for the corresponding x it holds $x > P/2$. However, I have to stress an important difficulty. Obviously, choosing $y = 0$ for a rejected offer of $x = 0$ is an unkind as well as an equal response. For this offer, we cannot differentiate between the two motives. Therefore, I will exclude the decisions for $x = 0$ for the further analysis. Finally, there are few responders who choose the optimal selfish strategy. The average distance to equity for their responses is not defined, which I denote with $\emptyset$. From the remaining data, I calculate the average distance to equity. I obtained a classification of responders according to their average distance of their responses to equity. The numbers of responders within each response class, $\|d(y)\|$, are reported is Table 2.

Note that there were few rejections of high offers. Two responders were classified with respect to their response to rejected high offers. In addition, for two responders (one in HIGH, the other in LOW), the signs of $d(y)$ for $x \leq P/2$ and $d(y)$ for $x > P/2$ differ. Except form the classification of the former two subjects, the effect of the latter distance for the classification of responders is almost negligible, so that I will not present a separate classification according to cases of $x \leq P/2$ and $x > P/2$. Obviously, with respect to the results showed in Table 2, the experimental evidence can neither support the claim that all responders reveal inequity avers preferences nor do all responders reveal reciprocal preferences. Rather, the data shows that there is a heterogeneous population of responders revealing inequity avers, reciprocal, but mixed preferences. Moreover, there is a minority of responders who seem to care – to some extend – for efficiency. Overall, the classification of responders suggests that the ultimatum-revenge game triggers various kinds of responses. Generally, responses seem to be "more" reciprocal than inequity avers. In both treatment conditions, only a small minority of responders behaved selfishly. For the HIGH condition, we find approximately 23% reciprocal responders, 7% inequity avers responders, 19% efficiency concerned responders, and 46% responders who mixed reciprocity and inequity aversion. Mixed responses decrease for lower conflict payments. In the LOW condition, the data indicates approximately 37% reciprocal responders, 11% inequity avers responders, 17% efficiency concerned responders, and 23% responders who mixed reciprocity and inequity aversion. Notice that I tried to tried to relate the response classes with socio-demographic characteristics. However, there are no significant correlations between the average distance of responses to equity and any variable from the socio-demographic questionnaire (e.g., age, sex, number of siblings, working experience).

Of course, the preferences mixing reciprocal responses and inequity avers responses, and the preferences mixing inequity avers responses and efficiency concerned responses appear to be the most interesting cases. In order to characterize them more precise, I will calculate the average response to each possible offer across all responders with these classes. For the estimated $d(y)$ Figure shows the corresponding average trajectories.[13] Figures 4(a) shows average responses for responders belonging to the mixed classes in the HIGH condition, while Figure 4(b) shows average responses for responders belonging to the mixed classes in the LOW condition. The figures demonstrate that average behavior for these classes is rather "closed" to inequity averse responses suggesting that inequity aversion is a more important motive for their responses than reciprocity or efficiency concerns.

[13] Average responses for $x > P/2$ are omitted, since there are insufficient few observations.

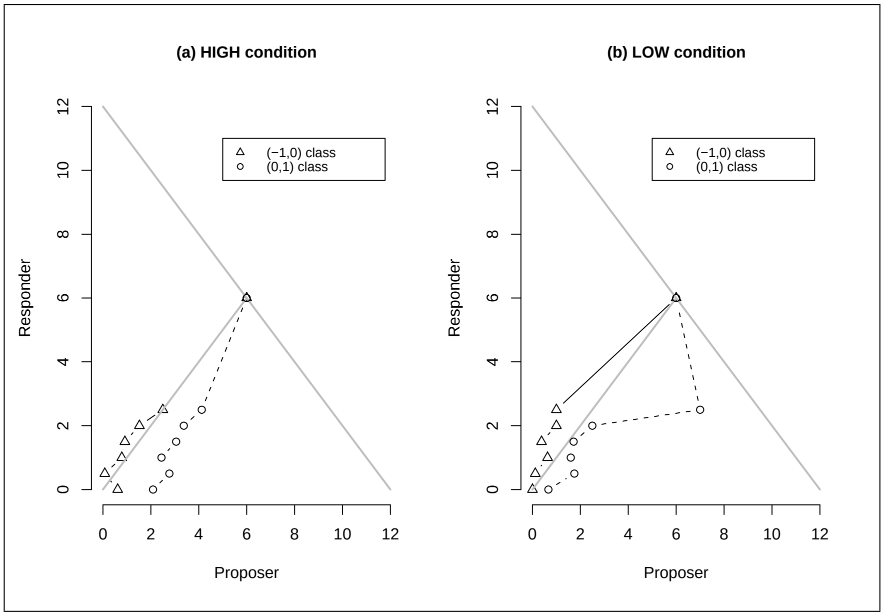

Figure 4: Average responses of responders in the mixed classes

4 Conclusion

The purpose of the this paper was to to differentiate between the various motives for fairness concerns more detailed. The current paper demonstrated that neither motive can exclusively explain responses. The experimental data for the ultimatum-revenge game suggests serious shortcomings of "pure" inequity aversion and "pure" reciprocity models. To the contrary, I find a heterogeneous population of responders revealing inequity avers, reciprocal, and also mixed preferences. Furthermore, there is a minority of responders which even seems to care for overall efficiency. In sharp contrast to results from other variations of the ultimatum game, the ultimatum-revenge game yields less opportunistic behavior of responders. Rather, the classification of responders suggests that the ultimatum-revenge game triggers various kinds of fairness. The comparison between the HIGH condition and the LOW condition indicates that decreasing the conflict payment influences the behavior of responders quite substantially leading to reciprocal responses.

References

[1] Andreoni, J., M. Castillo & R. Petrie (2003), What do bargainers' preferences look like? Experiments with a convex ultimatum game, *American Economic Review* **93**, 672-685.

[2] Bereby-Meyer, Y. & M. Niederle (2005), Fairness in bargaining, *Journal of Economic Behavior and Organization* **56**, 173-186.

[3] Bolton, G.E. & A. Ockenfels (2000), ERC: A theory of equity, reciprocity, and competition, *American Economic Review* **90**, 166-193.

[4] Bolton, G.E. & A. Ockenfels (2005), A stress test of fairness measures in models of social utility, *Economic Theory* **25**, 957-982.

[5] Camerer, C.F.(2003), *Behavioral Game Theory*, Princeton: Princeton University Press.

[6] Charness, G. & M. Rabin (2002), Understanding social preferences with simple tests, *Quarterly Journal of Economics* **117**, 817-869.

[7] Dufwenberg, M. & G. Kirchsteiger (2004), A theory of sequential reciprocity, *Games and Economic Behavior* **47**, 268-298.

[8] Engelmann, D. & M. Strobel (2004), Inequity aversion, efficiency, and maximin preferences in simple distribution experiments, *American Economic Review* **94**, 857-869.

[9] Falk, A. & U. Fischbacher (2006), A theory of reciprocity, *Games and Economic Behavior* **54**, 293-315.

[10] Falk, A., E. Fehr & U. Fischbacher (2003), On the nature of fair behavior, *Economic Inquiry* **41**, 20-26.

[11] Fehr, E. & K. Schmidt (1999), A theory of fairness, competition, and cooperation, *Quarterly Journal of Economics* **114**, 817-868.

[12] Greiner, B. (2004), An online recruitment system for economic experiments. In: Kremer, K & Macho, V. (eds.), *Forschung und wissenschaftliches Rechnen 2003*, GWDG Bericht **63**, Göttingen: Gesellschaft für Wissenschaftliche Datenverarbeitung, 79-93.

[13] Güth, W., R. Schmittberger & B. Schwarze (1982), An experimental analysis of ultimatum bargaining, *Journal of Economic Behavior and Organization* **3**, 367-388.

[14] Rabin, M. (1993), Incorporating fairness into game theory and economics, *American Economic Review* **83**, 1281-1302.

[15] Sobel, J. (2005), Interdependent preferences and reciprocity, *Journal of Economic Literature* **43**, 392-436.

[16] Suleiman, R. (1996), Expectations and fairness in a modified ultimatum game, *Journal of Economic Psychology* **17**, 531-554.