More Risk - Less Solidarity?
An Experimental Investigation

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Abstract

A solidarity game was conducted where participants were able to choose between two lotteries with same expected values. However, in one lottery, the risky one, participants faced a higher probability to receive no endowment. The winners were then able to discriminate between subjects risk attitude when it came to voluntary transfers from winners to losers in randomly formed three person groups. The results indicated that risk takers were not fully held responsible for their self-inflicted neediness, although they received on average fewer transfers than non-risk-takers. In fact, group favoritism is observed, where non-risk-takers transferred more to loosing non-risk-takers and risk-takers transferred more to loosing risk-takers. This behavioral pattern was stable across different versions of group compounding, profession and gender. Nevertheless, a gender effect was found with regard to lottery choice and the amount of money transferred.

Zusammenfassung

Es wurde ein Solidaritätsspiel durchgeführt, in dem die Teilnehmer aus zwei Lotterien mit gleichen Erwartungswerten wählen konnten. Allerdings war die Wahrscheinlichkeit zu verlieren und keinen Gewinn zu erhalten bei der riskanten Lotterie höher. In Dreiergruppen, bestehend aus Gewinnern und Verlierern, hatten die Gewinner die Möglichkeit freiwillig etwas von ihrem Gewinn an die Verlierer abzugeben. Dabei konnten sie zwischen dem Risikoverhalten der Verlierer unterscheiden. Die Ergebnisse offenbaren, dass risikoreiche Verlierer nicht komplett für ihre selbstverschuldete „Armut“ verantwortlich gemacht wurden, obwohl sie im Durchschnitt weniger Transfers erhielten als Verlierer die kein Risiko eingegangen sind. Vielmehr ist ein Favorisieren der eigenen Gruppe zu beobachten, wobei „risikolose Gewinner“ mehr an „risikolose Verlierer“ transferiert haben und „risikoreiche Gewinner“ mehr an „risikoreiche Verlierer“ transferierten. Dieses Verhaltensmuster ist stabil über verschiedene Gruppenzusammensetzungen, die fachliche Ausrichtung und das Geschlecht der Teilnehmer des Experiments. Im Gegensatz dazu wurde ein geschlechtsspezifischer Effekt bei der Wahl der Lotterie und bei der Höhe der Transfers beobachtet.

Contents

1. Introduction

Other-regarding preferences have been subject of study for several years now. Selten and Ockenfels (1998) (named SO in the following) came up with a new experimental game to contribute to that field of study. In that game, called solidarity game, participants in groups of three were either endowed with a certain amount of money or receive nothing, whereas the allocation is based on a random procedure. Further, the "winners" in that game were able to make transfers to the "losers" of the random procedure. However, all subjects had to decide on transfers before they were told whether they are winners or losers. So they made their transfers conditional on being a winner. This approach of conditional transfers can be assign to the strategy method (Selten (1967) via Büchner, Coricelli and Greiner (2005)).

It was shown that participants indeed transferred money, although the game was played anonymously, which then was explained by solidarity. In that context SO define solidarity as "willingness to help people in need who are similar to oneself but victims of outside influences" (SO, p. 518). Moreover, it is stated that this solidarity "aims at a reciprocal relationship" (SO, p. 518) based on the fact that participants do not know whether they are winners or losers when deciding on transfers and that they give money, hoping that others do the same. However, in a following solidarity game by Büchner, Coricelli and Greiner (2005) (henceforth BCG) it is argued that reciprocity cannot be an underlying motivation for transfers, as behavior was found not to change when participants know whether they are winner or loser before deciding on transfers. This approach, contrasting the strategy method, is called partial play method (PPM).

I would oppose the doubt in reciprocity. Although participants act in a one-shot game and know whether they are winner or loser, a form of empathetic reciprocity applies. This is based on the consideration, that winners clearly know that they could have been in need and that it was only due to chance that they become "rich" and not "needy" [1]. Furthermore, I am convinced that participants do not act in complete isolation when taking part in economic experiments. Participants make use of their experience and have a time horizon that exceeds the limit of a one-shot game. To support this hypothesis, the results of Fehr and Gächter (2002) can be mentioned, where altruistic punishment was observed in one-shot public goods games although it was costly and was not able to influence the cooperation in further rounds of the game.

In addition, there have been other solidarity games conducted by Ockenfeld and Weimann (1999)[2] (OW in the following), Bolle, Breitmoser, Heimel and Vogel (2008)[3] (BBHV in the following) and Thral and Radermacher (2008) (TR in the following). The latter examined how

[1] However, as empathetic reciprocity differs from altruism at least in the point that an observable and fair (see Bolton, Brandts and Ockenfels (2005)) allocation process is involved, the role of empathetic reciprocity could be examined by conducting a solidarity game where the allocation phase and the decisions of transfers are separated. With empathetic reciprocity at play, transfers should decrease with increasing time between allocation of endowment and transfers as one could expect the memory to be discounted.

[2] OW conducted a SO replication in Magdeburg to test whether there is a difference in the behavior of East-Germans and West-Germans (represented by the SO experiment conducted in Bonn).

[B]BBHV tested various theories on social preferences on the basis of results from a solidarity game.

underlying processes alter the behavior of subjects. In that experiment, the participants were able to choose between a safe income and a higher, but risky one. The behavior in this risk setting was then compared to a replication of the original SO version of the solidarity game. However, it was beyond the scope of TR to fully examine the role of risk taking on solidarity.

Based on the information above, this paper provides a new approach of studying solidarity resting upon a solidarity game which differentiates between subjects with varying attitudes towards risk taking. This is achieved by offering participants a choice between the SO random procedure and an alternative lottery that gives a higher endowment but leaves them needy with a higher probability. Therefore, this approach is also tightly connected to the experiment of Cappelen, Sørensen and Tungodden (2005), who found that people are held responsible for factors that are totally within their control. This concept is called equality of opportunity (see Roemer (1998)). So, solidarity (the willingness to help the needy) and equality of opportunity (holding people responsible for their actions) are two patterns of human behavior that have been found. However, they oppose each other in our game as the group of risk taking participants influenced the chance of losing, whereas the other group was just unlucky.

The experimental design will be presented in section two, section three presents the results of the experiment and section four concludes.

2. Experimental Design

The pen and paper experiment took place on the 5th of May 2009 in a lecture hall at Europa-Universität Viadrina in Frankfurt (Oder), Germany, in two sessions lasting about one hour each[4]. The subjects were 231 students from the faculties of economics and business, law and cultural science. They were instructed to take a seat in such a way that they could not see each other's choices. The subjects chose a pseudonym with which they could collect their earnings a few days later from a secretary otherwise not involved in the experiment. A show-up fee of 3 € was given to all subjects.

In the beginning, subjects were given two forms[5]. The first gave general instructions on the procedure. It explained that there were the two random processes A and B between which the subjects would have to chose, thereby influencing their chances of receiving a certain initial monetary endowment. It was stated that participants choosing lottery A receive 10 € with a probability of two-thirds and 0 € with a probability of one-third and participants choosing lottery B receive 20 € with a probability of one-third and 0 € with a probability of two-thirds. The general instructions also explained that each subject would know about his/her own initial endowment before making choices concerning voluntary contribution. Finally, subjects were informed that after the experiment had taken place the forms of all participants would be randomly divided into

[4] Effort was taken to prevent subjects from participating twice.
[5] A translation of the instructions and forms can be found at http://econ.euv-ffo.de/jc/General%20Instructions1.pdf

three-person groups according to which the actual payments would be computed. Within each group winners would receive their initial endowment minus their voluntary contributions and losers would receive what had been contributed to them by the winners. The second form asked subjects to choose between random processes A and B. They were also asked what percentage of the whole group they expected would choose A and B, respectively.

After the second form had been filled in, each subject had to choose a closed envelope out of a box. Envelopes for random process A contained forms indicating a win in two-thirds of the cases and a loss in one-third. Envelopes for random process B contained forms indicating a win in one-third of the cases and a loss in two-thirds. Once all subjects were supplied with their envelopes, they were instructed to open them and fill in the questions on the new forms contained in the envelopes.

Winners were asked:

- how much they wanted to donate to a single loser in their group who had chosen A,
- how much they wanted to donate to a single loser in their group who had chosen B,
- how much they expected the other winners to give on average in these two cases,
- how much they wanted to give to each of two losers in a group where they were the only winner if both losers belonged to group A,
- how much they wanted to donate in the same group constellation but both losers belonging to B
- and how much they wanted to donate to each loser if one loser belonged to A and the other belonged to B.

Losers were asked how much they expected to receive in a group with one winner and in a group with two winners. Losers were also asked exactly the same questions as the winners based on the hypothetical situation that they had ended up as winners. Note that in the case of a group with two winners, each of the subjects had to make independent choices, i.e. they were not informed about the donation of the other winner or about their choice of the lottery. After the forms had been filled in, they were re-collected by the experimenters.

3. Results

Based on earlier research, on results from solidarity games and other experimental games, one could draft some hypothesis about the behavior that the participants may reveal. Starting with the first decision participants had to make, one would expect that individuals are indifferent between lottery A and lottery B as both offer the same expected payoffs. This leads to participants selecting the lotteries randomly which would cause an equal split of the population between the lotteries. However, as the expected value can be seen as the average earning from an infinitely repeated lottery, equal expected values might be misleading. In lottery A the chance to win is 2/3, so double the chance to win as compared to lottery B. Because

participants play a one-shot game, it is possible that they consider the fact that lottery A has double the probability to earn something compared to B and therefore tend more to choose lottery A. So, it is ex ante hard to predict how participants allocate between random procedures A and B.

TR found that players who chose the risky option receive less transfers. Such a result was explained by participants by saying that it is the risky-players' own fault to be in need and therefore do not deserve help. In that regard, Cappelen et al (2005) observed that people are held responsible for factors that were completely under their control and that individuals find it unfair to hold others responsible for factors that are independent of their decisions. In our case, losing for A-players is beyond their control as they had no chance to avoid it. On the contrary, B-players decided to take extra risk, which was completely under their control. Therefore, the first hypothesis is:

Hypothesis 1: *B-losers receive fewer transfers than A losers.*

If hypothesis one holds, it cannot automatically be concluded that both, A- and B-players, favor A-losers. However, TR found that risk takers transfer less to people if their neediness is self-inflicted and not due to bad luck. These findings again match the observations of Cappelen et al (2005), where people are held responsible for their decisions. Based on that, the second hypothesis is:

Hypothesis 2: *A-winners and B-winners transfer less to B-losers than to A-losers.*

Further, Sunden and Surette (1998), found that males are more committed to risky choices, Chaudhuro and Gangadharan (2003) argue that women are more risk averse than men and SO found that males transfer less than females in their solidarity game. Accordingly, Hypothesis 3 and Hypothesis 4, the hypotheses on a gender effect, are stated.

Hypothesis 3: *Males choose the risky lottery more often than females.*

Hypothesis 4: *Males transfer less than females.*

In addition, many papers (see e.g. Marwell and Ames (1981)) found that economists behave more self-centered or egoistically than participants with another educational background. Following those findings, Hypothesis 5, the education effect hypothesis, is formulated.

Hypothesis 5: *Economics and business students transfer less to losers than students from other faculties do.*

Starting again with the choice of the lottery, the results show a slight majority of 52.81 % for lottery B, the risky choice. Consequently, 47.19 % chose the less risky lottery A[6]. As found before by Sunden and Surette (1998), one can observe a gender effect. Whereas 62.35 % of the male participants acted more risky, only 47.22 % of the female participants acted the same way, which is significantly less[7]. Therefore, Hypothesis 3 can be supported.

There also seems to be an educational effect, indicating that economics and business students choose the risky lottery more often than students from other faculties. However, the educational effect vanishes when controlling for the sex[8]. This is due to the fact that 48.53 % of the participating students from the faculty of business and economics are male, whereas the share of male participants in other faculties is 20.43 %.

In the following, the transfers made will be presented. First, the findings are compared (as far as possible) to results from previous experiments. For this purpose, the transfers by A-winners to A-losers will be considered as they reflect the standard SO case[9]. Table 1 displays the transfers in this experiment against transfers found in the literature. It can be seen that the findings are in line with previous results, although our transfers in the one-loser-case (x_1) are at the bottom of the scale[10]. Interestingly, the difference in transfers between the one- and the two-loser-case (x_2) is smaller in our experiment than in the others. An explanation for that result will be given when presenting the different types of giving behavior.

Table 1: Average transfers in different solidarity games

	N	x_1	x_2
This study (from A to A)	73	1.27 €	1.13 €
SO	118	2.46 DM	1.56 DM
OW	58	1.62 DM	1.01 DM
BCG SO-R	30	1.39 €	0.96 €
BCG PPM	20	1.53 €	1.05 €
BBHV	100	2.30 €	-
TR	24 each	1.38 €/ 1.27 €	1.00 €/ 0.90 €

For TR, the first amount refers to the transfers of the original SO treatment in the first session and the second amount refers to the SO treatment of the second session. In the first session, the risk treatment was played first, whereas in the second session the SO treatment was played first.

[6] A two-sided binomial test indicates a weakly statistically significant difference with p=0.0992.
[7] p=0.027 (two-sided Mann-Whitney-U-Test)
[8] For males p=0.6509 and for females p=0.3271 (both two-sided Mann-Whitney-U-Tests)
[9] But only in so far that A-players additionally know that there was an alternative (more risky) choice.
[10] This is insofar interesting as we did not apply a double- or single-blind-procedure, which should increase transfers due to less social distance (for the importance of social distance in giving see e.g. Hoffman, McCabe Smith (1996) or Charness and Gneezy (2000)).

3.1 Conditional transfers

It needs to be stated that the conditional transfers, in contrast to SO, are not conditional on whether the participants win, but on the fact whether the recipient chooses lottery A or B[11].

In their paper, TR came to the conclusion that people who opt for the risky lottery receive fewer transfers. These findings can be confirmed by our experiment, though it is just an aggregated result and will be partially revised in the following analysis.

3.1.1 One-loser-case

Table 2 shows the transfers in the one-loser-case. It can be seen that losers who chose the higher risk receive indeed fewer transfers. The difference between the average of 1.43 € for A-losers and the average of 1.22 € for B-losers is significant with p-value 0.0129 (two-sided Wilcoxon-signed-rank-test). Table 2, furthermore, shows how the transfers are compounded. On average, A-winners give 12.68 % of their endowment to A-losers compared to an average transfer of 8.79 % from B-winners to A-losers. A two-sided Mann-Whitney-U-test indicates that the giving behavior differs significantly in that case (p=0.0637). With regard to B-losers, A-winners give 7.24% and B-winners give 11.25 % of their endowment on average, indicating a weakly significant difference[12]. Further, the within subject comparison shows that B-winners transfer more to B-losers than to A-losers and A-winners transfer more to A-losers than to B-losers, whereas both comparisons are significant on the 1 % level (two-sided Wilcoxon-signed-rank-test).

So, Hypothesis 1 proves true for the one-loser-case, giving further support to the observation that people are held responsible for factors that are completely under their own control. However, this pattern is limited as Hypothesis 2 needs to be rejected for the one-loser-case. Although A-winners still act according to the responsibility-principle, B-winners reveal support for other risk takers. Thus, the influence of responsibility vanishes and is replaced by actions based on group belonging.

The behavioral pattern of group belonging is also visualized in Figure 1, where the cumulative distribution functions show the probability of transferring a certain amount x or less. The graphs show that the probability of transferring x or less than x is larger for cross-group transfers than for transfers within one group.

3.1.1 Two-loser-case

The two-loser-case in the experiments of SO, BCG and TR is characterized by lower transfers

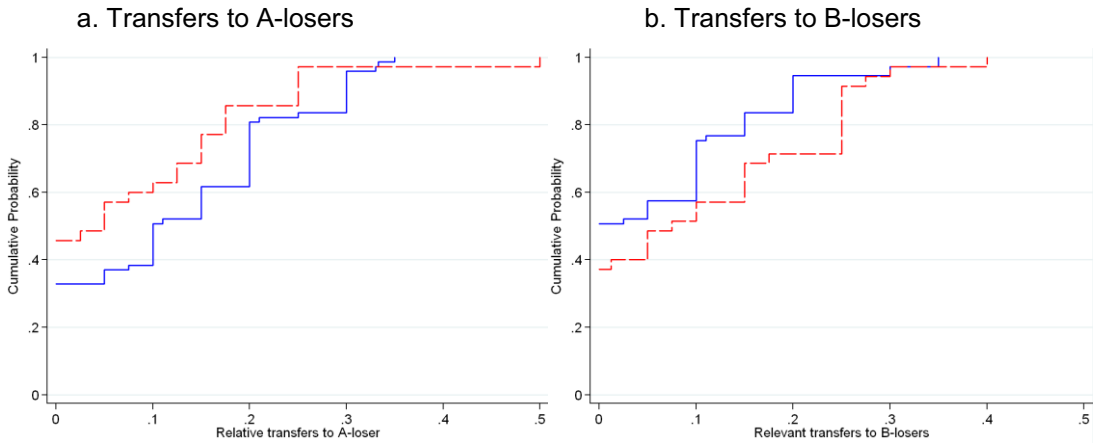
[11] To recall, instead of Selten's strategy method, a partial play method as in BCG was applied, so that participants know whether they are winner or loser when making their transfers.
[12] p=0.0843 (two-sided Mann-Whitney-U-test)

Table 2: Transfers in the one-loser-case

To A-loser		To B-loser	
1.43 €		1.22 €	
From A-winners	From B-winners	From A-winners	From B-winners
12.68 %	8.79 %	7.24 %	11.25 %

Relative transfers represent shares of the endowment that were transferred on average.

Figure 1: Cumulative distribution functions of relative transfers towards A- and B-losers



Blue (solid) graphs are cumulative distribution functions of transfers by A-winners, red (dashed) graphs are cumulative distribution functions of transfers by B-winners

than in the one-loser-case. With regard to average transfers, that pattern likewise occurs in our experiment[13]. As can be seen in Table 3, the average transfer falls from 1.43 €, in the one-lose-case, to 1.22 € for A-losers and from 1.22 € to 1.08 € for B-losers, in case both losers choose the same lottery. Again, the structural pattern of favoring group belonging can be observed and most of the within- as well as the between-subject comparisons are highly significant with p-values ranging between 0.0179 and 0.0000[14].

Apart from the two-loser-case with both losers choosing the same lottery (the pure case), a two-loser-case with mixed losers exists. Again, the general giving pattern of favoring group belonging is in line with the findings of the other two-loser-case and the one-loser-case and is therefore not displayed.

However, Table 4 shows that transfers in the two-loser-case with mixed losers (right hand side of each table) are significantly higher than in the pure case (left hand side of each table)[15].

[13] Surprisingly, that general pattern does not hold in the within-subject comparison as will be shown by the categorization of giving behavior.
[14] P-values are based on two-sided Mann-Whitney-U-tests and Wilcoxon-signed-rank-test. The only exception is the between-subject comparison of transfers to B-losers, which has p=0.2525 (two sided Mann-Whitney-U-test).
[15] p=0.0466 for the A-loser cases and p=0.0254 for the B-loser cases (both two-sided Wilcoxon-signed-rank-tests)

Table 3: Transfers in the two-loser-case if both losers choose the same lottery

To each A-loser 1.22 €		To each B-loser 1.08 €	
From A-winners	From B-winners	From A-winners	From B-winners
11.29 %	7.06 %	6.78 %	9.64 %

Relative transfers represent shares of the endowment that were transferred on average.

Comparing transfers by each individual suggests that this result is not due to outliers but a consequence of individual decisions. 21 subjects choose higher transfers if there was only one A-loser, whereas only 10 participants transferred more in case there were two A-losers. Accordingly with transfers to B-losers, 17 participants favored the mixed case and six winners transferred more if both losers choose lottery B. One possible explanation for that result could be that winners use the chance to discriminate between losers in their group to provide a better standing for losers who choose the same lottery as they do.

Table 5 supports this explanation as transfers more often increase for losers of the same group. However, Fisher's exact test reveals only a weakly significant difference with regard to A-loser (p=0.081) and no significant difference with regard to B-losers (p=0.125).

Table 4: Comparison of two-losers-cases

To each A-loser	To the one A-loser	To each B-loser	To the one B-loser
1.22 €	1.29 €	1.08 €	1.17 €

Table 5: Share of transfers that changed from pure to mixed two-loser-case

a. Transfers to A-losers

Lottery	No change	Increase	Decrease
A	71%	23%	5%
B	71%	11%	17%

b. Transfers to B-losers

Lottery	No change	Increase	Decrease
A	82%	11%	7%
B	71%	26%	3%

Due to rounding, shares for transfers to A-losers do not amount to 100 %.

3.2 Types of giving behavior

Following SO, the giving behavior of each subject can be classified based on the relation of transfers in the one- and in the two-loser-case. SO observed four types that have been confirmed in the later experiments by OW, BCG and TR. The "egoistic" type is characterized by transferring nothing in the one-loser-case (x_1) and transferring nothing in the two-loser-case (x_2), so being $x_1=x_2=0$. The second type, "fixed total sacrifice", can intuitively be explained by a two-

step decision process. First, the subject decides on how much of the endowment to give and then second, he/she divides it by the number of recipients. This kind of behavior leads to transfers that are double as high in the one-loser-case compared to the two-loser-case. Formally, we would find $x_1=2x_2>0$. However, SO observe transfers that do not exactly fit into the "fixed-total-sacrifice"-scheme but can account for this type after rounding "to an integer multiple of the prominence level 1.00" [16] (SO, p. 522), so they fulfill the criteria $x_1\approx 2x_2>0$. Following the notation by SO, I will refer to the first case as "exact fixed-total-sacrifice" and the second case as "fixed-total-sacrifice by rounding". Another type of giving behavior is revealed by subjects, who give the same amount to each loser no matter how many losers exist. This type is called "fixed gift to loser" and satisfies $x_1=x_2>0$. The last type observed by SO and the following experiments was an "intermediate" type characterized by $2x_2>x_1>x_2>0$. The "intermediate" subjects transfer relatively more to losers in the two-loser-case than subjects who belong to "fixed-total-sacrifice" would transfer, but do not consider them as much as the "fixed gift to loser" type. Additionally, we identified a type that has not been observed by SO and OW and was observed by BCG only for a negligible fraction. This type is characterized by $x_2> x_1$.

The share of subjects within each type in the experiment are displayed in Table 6 and compared to the shares in previous experiments. It can be seen that the share of egoistic types is in line with the results from SO, OW and the partial play treatment from BCG. In that regard, the principle of favoring group belonging is backed as more B-winners are egoistically towards A-losers and more A-winners are egoistically towards B-losers. Nevertheless, B-winners reveal a higher share of egoists on average. Equivalently, the results for "fixed gift to loser" and the "intermediate" type are also in line with previous findings. However, our results contain the new type $x_2> x_1$. So, transfers are higher in the two-loser-case than in the one-loser-case. There might be two explanations for this behavior. On the one hand, subjects could favor equal payoff for each of the three group members. On the other hand, it could be free-riding in the one-loser-case. Intuitively, one could assume that a winner has some kind of inequity aversion or the costs for transferring payoffs are too high so that he relies on the other winner to reduce this inequality in the one-loser-case but takes his responsibility to reduce the inequality in the two-loser-case himself. Having a closer look on the experimental data, it appears that the second case, the free-riding hypothesis, should receive more support as many of the transfers in the one-loser-case are zero for this type.

In addition, Fisher's exact test shows that types differ by group belonging based on transfers to B-losers and based on transfers to A-losers ($p=0.000$). All these results are based on transfers in the two-loser-case where both losers choose the same lottery.

[16] For a theory of prominence levels and a calculation of those levels see Albers and Albers (1983) and Selten (1987).

Table 6: Types of giving behavior

		Egoistic	Exact fixed total sacrifice	Fixed total sacrifice by rounding	Fixed gift to loser	Intermediate	$x_2>x_1$	Others
To A	From A	22%	14%	19%	21%	3%	19%	3%
	From B	43%	6%	14%	11%	11%	14%	-
To B	From A	38%	11%	10%	15%	3%	21%	3%
	From B	37%	6%	14%	11%	17%	14%	-
SO		21%	36%	16%	16%	11%	-	-
OW		47%	26%	9%	14%	5%	-	-
BCG-PPM		25%	15%	20%	25%	15%	-	-

Due to rounding, the shares of types from B-winners to B-losers do not amount to 100 %.

3.3 Gender effect

As already touched in the analysis of choices for the lottery, subjects in the experiment reveal a gender effect. This effect occurs regularly in economic experiments and shows that males are often more self-centered than women. In the solidarity game environment, SO found such a gender effect, indicating that males belong more often to the "egoistic" type than females do and tend to transfer less than females. However, the gender effect is not stable as the absence of this effect e.g. in BCG shows.

With regard to transfers, it can be seen in every case that males transfer on average less than females in the same situation (see Table 7). These findings are mostly significant in within- as well as between-subject comparisons. One of the exceptions is the giving behavior of males, when not controlling for their lottery choice, which is not significantly lower if transfers go to B-losers. However, this is not surprising as a high share of males chose lottery B and we observed a positive effect of group belonging on transfers.

Interestingly, the general pattern of favoring losers from the same group remains when controlling for sex. Two-sided Wilcoxon-signed-rank-test indicate that those within-subject comparisons are significant at least on the 5 % level, with the only exception of female B-winners, who do not transfer significantly less to A-losers (p=0.1458, two-sided Wilcoxon-signed-rank-test). In addition, the between subject comparison of subjects from the same group but different gender is significant for the group of A-winners (p=0.0299 for transfers to A-losers, p=0.0134 for transfers to B-losers, two-sided Mann-Whitney-U-tests), however, it is not for the case of B-winners. This might be due to fewer observations in the group of B-winners.

The gender effect is also visible in comparison of types of giving behavior as can be seen in Table 8[17]. Although males more often chose lottery B and we observed favoritism towards the own group, males can significantly more often be classified as "egoistic" in that case (p=0.0009,

[17] The gender effect can also be found based on transfers to A-losers. There the share of "egoistic" males is 43 % compared to a share of 21 % females, which is significantly different with p=0.0164 (two-sided Mann-Whitney-U-test). The exact Fisher test gives p=0.069.

two-sided Mann-Whitney-U-test). Further, Fisher's exact test also confirms that there is a difference in types between gender (p=0.008).

Based on these findings, Hypothesis 4 can be confirmed.

Table 7: Gender effect for transfers in the one-loser-case

To A-losers 1.43 €				To B-losers 1.22 €			
From Males 0.93 €		From Females 1.69 €		From Males 0.91 €		From Females 1.38 €	
From A-winners 12.68 %		From B-winners 8.79 %		From A-winners 7.24 %		From B-winners 11.25 %	
Males	Females	Males	Females	Males	Females	Males	Females
8.58 %	14.57 %	5.18 %	11.19 %	3.96 %	8.75 %	8.84 %	12.86 %

Table 8: Gender effect in types of giving behavior in transfers to B-losers

		Egoistic	Exact fixed total sacrifice	Fixed total sacrifice by rounding	Fixed gift to loser	Intermediate	$x_2>x_1$	Others
To B	Males	59%	3%	3%	14%	11%	11%	-
	Females	27%	13%	6%	14%	15%	23%	3%

Due to rounding, the shares of types do not amount to 100 %.

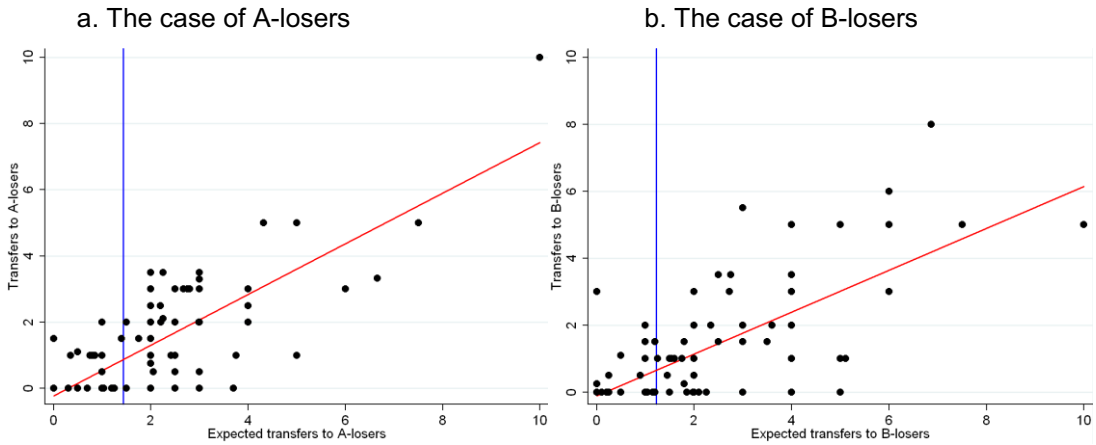
3.4 Expectations

Expectations play a major role in economic and social exchange. Among others, reputation, social distance and moral distance are connected to expectations about others and have shown to be important in exchange situations or unilateral transfers (see Gächter and Falk (2002), Hoffman et al (1996) and Aguiar, Branas-Garza and Miller (2008)). Therefore, to act optimal with regard to one's own preferences, it is necessary to have correct expectations. However, the earlier experiments by SO and OW found that expectations differ systematically from actual transfers. They observe a so called "false consensus effect", meaning that a subject's expectations are correlated with its own action. So, subject giving relatively high transfers would overestimate the amount transferred by others and subjects who give relatively little generally underestimate the transfers made by others.

This kind of behavior can also be observed in our experiment. Figure 2 displays the expected average transfers by each subject on the x-axis and the actual transfers made one the y-axis. If expectations were correct, all plotted data points should lie along the blue (vertical) reference line which indicates the average of actual transfers. However, the data shows the false-

consensus effect displayed by the linearly fitted values on the red (slopy) line that has a positive slope, indicating positive correlation between both values.

Figure 2: Plotted values for expectations and transfers for each subject (one-loser-case)



X-axis depicts expectations on transfers, y-axis depicts actual transfers; blue (vertical) lines are at the level of average actual transfers; red (slopy) lines are a linear fit for observed data points

Still, it cannot be stated which variable is the dependent and which is the independent one as this relation is based on the form of decision making process. SO assume that on the one hand, subjects could first form their expectations about other subject's transfers, then compare their level of other-regarding preferences with the assumed average level of the other subjects and then choosing their action. So, a subject that expects to have a higher valuation of other's payoffs than other subjects would transfer more than the expected average transfers. On the other hand, it could be vice versa so that individuals first decide on their action and then form expectations about others by comparing their level of other-regarding preferences with the expected average of the other's. However, it might also be plausible to assume that subjects form expectations and decide on their action parallel in some kind of iterative procedure.

Although it is not possible to test in that context in which direction causality goes, it can be shown that (expected) behavior of other individuals influences peoples' actions. In that regard, Fischbacher, Gächter and Fehr (2001) showed in a public goods experiment that 50 % of their participants were conditionally cooperative in such a way that they increased their transfers if other participants did so as well. As can be seen, the concept of conditional cooperation can be applied to the role of expectations found in the solidarity games. The only difference is whether participants know the actions of others for sure or whether they form expectations on their behavior[18].

[18] In that regard, it is important to state that participants in the underlying experiment were incentivized to reveal their real expectations. That was done by rewarding the expectation that was nearest to the true value with 10 €.

Apart from the graphic results, applying a Tobit regression[19] gives further support for the findings of Fischbacher et al (2001). The first model consists of transfers to A-losers as dependent variable and expectations of transfers towards A-losers as the only explaining variable, with a marginal effect of 0.61 and p=0.000. With regard to B-losers, the same method gives a marginal effect of 0.46 and p=0.000[20]. So it can be seen that expectations significantly influenced participants transfer and, therefore, participants acted conditional on the (expected) behavior of others.

3.5 Parametric estimates

The previous findings receive further support by estimating a model to explain the transfers in the one-loser-case. As many of these transfers were zero, a Tobit model is applied to account for this corner solution outcome by left-censoring at 0. Table 9 shows the results for the model, whereas the independent variables are “Lottery B”, a dummy to account for group belonging, expectations on transfers, “male”, a dummy variable for the participants’ sex, the age, semester and another dummy variable indicating the belonging to the faculty of economics and business[21].

The model explaining the transfers to A-losers exhibits all previously found patterns, although it is controlled for varies factors. It can especially be seen that group belonging has the biggest impact and is highly significant, supporting our central finding. Furthermore, expectations and sex influence the giving of winners as was observed before and is highly significant here. In addition, the semester of the participants had a significant impact as well. It is also important to note that there is no education effect when controlling for the other factors. Therefore Hypothesis 5 can be rejected. However, the picture looks quite different with regard to B-losers. Here, only expectations are significant. An explanation for that contradictory finding can be seen in Table 10, which shows ordinary least square (OLS) estimations for the expectations. For that model, the explanatory power, based on the adjusted R^2, is more than three times as high for case B. Accordingly, it can be seen, that the choice of the lottery has a far greater influence on expectations if they are about transfers to B-losers. In general, it can be seen that expectations for B are quite well explained by the other variables. As a consequence,

[19] As numerous transfers are not different from zero, a Tobit regression is applied to account for this corner solution outcome.

[20] The value of the log likelihood function for case A is -151.89 and for case B this value is -149.23. To have an intuitive idea of the explanatory power of the model, OLS regressions, specified equivalently, give R^2=0.56 for transfers towards A-losers and R^2=0.49 for transfers towards B-losers.

[21] Although it can be expected that the age and semester are highly correlated, they indeed have a correlation coefficient of 0.67, they are both included into the regression. This is due to the fact that both account for different effects as age is only an indicator of the time of existence for an individual and the semester indicates the time that an individual took part in higher education. Furthermore, when removing these two variables, no huge changes in coefficients occur and the variance inflation factor (VIF) is below the value of two in every model, indicating that multicollinearity should not be a problem.

Table 9: Tobit estimates on relative transfers to A- and B-losers (marginal effects)

	Transfer to A-losers Marginal effects		Transfers to B-losers Marginal effects	
Lottery B	-0.066	***	-0.006	
	(0.028)		(0.036)	
Expectations	0.040	***	0.026	***
	(0.008)		(0.047)	
Male	-0.043	***	-0.029	
	(0.026)		(0.032)	
Age	0.006		0.003	
	(0.007)		(0.009)	
Semester	-0.007	**	-0.003	
	(0.005)		(0.006)	
Economist	-0.012		-0.024	
	(0.027)		(0.033)	
Number of obs.	107		107	
Log likelihood	27.667		6.226	

Expectations are expectations on transfers to A-losers if the dependent variable is transfers to A-losers and it is expectations about transfers to B-losers if the dependent variable is transfers to B-losers
Standard errors in brackets
*** indicating significance on 1 % level, ** indicating significance on 5 % level, * indicating significance on 10 % level

Table 10: OLS estimates on expectations about transfers to A- and B-losers

	Exp. transfers to A Coefficients		Exp. transfers to B Coefficients	
Lottery B	0.899	***	1.919	***
	(0.337)		(0.379)	
Male	-0.002		-0.199	
	(0.343)		(0.386)	
Age	-0.112		-0.209	**
	(0.094)		(0.105)	
Semester	0.012		0.106	
	(0.067)		(0.076)	
Economist	-0.782	**	-0.743	*
	(0.370)		(0.416)	
Const.	4.793	**	6.253	***
	(1.973)		(2.216)	
Number of obs.	107		107	
Adjusted R2	0.05		0.18	

Standard errors in brackets
*** indicating significance on 1 % level, ** indicating significance on 5 % level, * indicating significance on 10 % level

when regressing on the transfers, a part of the explanatory power of variables, such as the choice of the lottery, is included in the expectations. However, that does not necessarily mean that those independent variables do not have an impact on transfers to B-losers. The reason for that effect might be the design of the questionnaire, in which participants were asked about their expectations towards A-loser and B-losers, but the question did not differentiate between the groups of winners. Therefore it is somewhat unclear on which basis participants built their expectations.

4. Conclusion

My results provide evidence that participants in the solidarity game are only partially held responsible for their actions. On the one hand, A-winners do hold the risk-taking B-losers responsible for their risk taking, as transfers are significantly lower in this case. Moreover, participants indicated with written comments that B-losers do not deserve help because it was their own fault to become needy. This part of the result is very much in line with the findings of Cappelen et al (2005) who found that individuals are held responsible for factors that are totally under their control. However, the behavior of B-winners indicates a deviation from the responsibility argument. These players favor B-losers over A-losers and therefore do not react in a negative way on self-inflicted neediness. So it can be concluded that the responsibility argument was replaced by intergroup favoritism. Furthermore, it is remarkable that this pattern of group belonging is stable over several adjustments as it prevails also in the pure and mixed two-loser-cases and even for males and females, who otherwise tend to behave differently.

References

Aguiar, F., Branas-Garza, P., Miller, L. M. (2008). Moral Distance in Dictator Games, Judgment and Decision Making. Vol. 3, No. 4, pp. 344-354.

Albers, W., Albers G. (1983). On the Prominence Structure of the Decimal System. In: Scholz, R. W. (Ed.), Decision Making under Uncertainty, Elsevier, Amsterdam, pp. 271-287.

Bolle, F., Breitmoser Y., Heimel J., Vogel C. (2008). Multiple Motives- Evidence from the Solidarity Game. Mimeo.

Bolton, G., Brandts, J., Ockenfels, A. (2005). Fair Procedures: Evidence from Games Involving Lotteries, The Economic Journal, Vol. 115, pp. 1054-1076.

Büchner, S., Coricelli, G., Greiner, B. (2007). Self Centered and Other Regarding Behavior in the Solidarity Game. Journal of Economic Behavior and Organization, Vol. 62, Issue 2, pp. 293-303.

Bolton, G. E., Ockenfels, A. (2000). ERC- A Theory of Equity, Reciprocity, and Competition. American Economic Review, Vol. 90, pp. 166-193.

Cappelen, A., SØrensen, E., & Tungodden, B. (2005). Responsibility for what? An experimental approach to fairness and responsibility. Discussion Papers of the Norwegian School of Economics and Business Administration.

Charness, G., Gneezy, U. (2000). What's in a Name? Anonymity and Social Distance in Dictator and Ultimatum Games. Department of Economics, UCSB, Departmental Working Papers, Paper wp11-01.

Chaudhuri, A., Gangadharan, L. (2003). Gender Differences in Trust and Reciprocity. The University of Auckland, Economics Working Paper Series 248.

Costard, J., Liepmann, H. (2009). Reactions towards risky behavior in a solidarity game – An experimental approach –, unpublished seminar paper.

Fehr, E., Schmidt, K. M. (1999). A theory of fairness, competition, and cooperation. The Quarterly Journal of Economics, Vol. 114, pp. 817-868.

Fischbacher, U., Gächter, S., Fehr, E. (2001). Are people conditionally cooperative? Evidence from a public goods experiment. Economic Letters, pp. 397-404.

Gächter, S., Falk, A. (2002). Reputation and Reciprocity: Consequences for the Labour Relation. The Scandinavian Journal of Economics, Vol. 104, pp.1-26.

Hoffman, E., McCabe, K., Smith, V. (1996). Social Distance and Other-Regarding Behavior in Dictator Games, American Economic Review, Vol. 86, No. 3, pp. 653-660.

Marwell, G., Ames, R. (1991). Economists free ride, does anyone else? Journal of Public Economics, Vol. 15, pp. 295-310.

Ockenfels, A., Weimann, J. (1999). Types and Patterns: An Experimental East-West-German Comparison of Cooperation and Solidarity. Journal of Public Economics, Vol. 71, pp. 275-287.

Roemer, J. E. (1998). Equality of opportunity. Cambridge, MA: Harvard University Press.

Selten, R. (1967). Die Strategiemethode zur Erforschung eingeschränkt rationalen Verhaltens im Rahmen eines Oligopolexperimentes. In: H. Sauermann (Ed.), Beiträge zur Experimentellen Wirtschaftsforschung, Tübingen: Mohr, pp. 136–168.

Selten, R. (1987). Equity and Coalition Bargaining in Experimental Three-Person Games. In: Roth, A. (Ed.), Laboratory Experimentation in Economics, Cambridge: University Press, pp. 42-98.

Selten, R., Ockenfels, A. (1998). An Experimental Solidarity Game. Journal of Economic Behavior & Organization, Vol. 34, pp. 517-539.

Sunden, A. E., Surette, B. J. (1998). Gender Differences in the Allocation of Assets in Retirement Savings Plans. American Economic Review Papers and Proceedings, Vol. 88, No. 2, Papers and Proceedings of the Hundred and Tenth Annual Meeting of the American Economic Association, pp. 201-211.

Thral, N., Radermacher, R. (2008). Bad Luck vs. Self-Inflected Neediness – An Experimental Investigation of Gift giving in a Solidarity Game. Working Paper Series in Economics, University of Cologne, No. 28.