Dictating the Risks – Experimental Evidence on Norms of Giving in Risky Environments

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Abstract

We study if and how social preferences extend to risky environments. By providing experimental evidence on different versions of dictator games with risky outcomes, we establish that social preferences of players who give in standard dictator games are best described by concerns for the distribution of ex ante chances to win rather than considerations of ex post payoff distributions. The more money decision-makers transfer in the dictator game, the more likely they are to equalize to payoff chances under risk. Risk to the recipient does, however generally decrease the transferred amount. (JEL: D63, D64, C91, D80)

Keywords: dictator game, risk, social preferences

1. Introduction

In many real life settings, actions taken by some persons alter the risks of others. Examples are widespread: physicians frequently undertake (costly) efforts in order to increase the patients' *chances* to be healed. Climate policy involves (sure) abatement costs for the current generation while future benefits depend on the sensitivity of the climate to the atmospheric stock of greenhouse gases and are uncertain. Parents have safe and risky options to invest or save for their children. Donors to charities might not perfectly know the success of their investments. Common to all these examples is that a decision maker foregoes some benefits in order to increase payoff chances of others, rather than transferring income for sure. In this paper, we study how the riskiness of such transfers affects decisions.

With this, we contribute to a large experimental and behavioral literature that investigates potential social behavior of subjects: dictator, gift exchange, public good and other games show that some subjects are willing to transfer money to other players without having any material benefits (see Camerer 2003). Such giving decisions are often interpreted as a preference for equitable or efficient outcomes (Fehr and Schmidt 1999, Charness and Rabin 20002, Engelmann and Strobel 2004), as a preference for giving (Andreoni 1990), or as a desire for being seen as behaving fairly (Andreoni and Bernheim 2009, Benabou and Tirole 2006, Dana et al. 2007). Surprisingly little thought has been given so far to the role of risk in giving decisions or to if and how such social preferences extend to environments of risky decision making.

In this paper, we report experimental results from variations of a standard dictator game that capture different variants of risky transfers. By studying giving decisions in risky environments, we address the question of whether individual perceptions of fairness relate to comparisons of outcomes/payoffs or rather to comparisons of opportunities, i.e. to the procedure that determines the outcomes. The finding that some subjects display non-selfish behavior, e.g. choose a 50-50 split in dictator games, is the basis for theories on inequality aversion based on the final payoffs (see Fehr and Schmidt 1999 and Bolton and Ockenfels 2000). Falk, Fehr and Fischbacher (2008) show that besides distributional

preferences on the fairness of outcomes, the interpretation of fairness intentions plays an important role in subjects' decisions. Another strand of the literature considers procedural (or ex ante) fairness: Machina (1989) provides a classical example: a mother with two children may be indifferent between allocating the indivisible treat to either of her children, but she may strictly prefer giving the treat based on a result of coin toss. Although being a fair procedure, as it gives both kids the same chance to win, it will not result in a fair outcome as only one child can get the treat (see also Kircher, Ludwig and Sandroni 2009, Trautmann 2009). Just as in this example of not discriminating between the two kids, the ethical debate on outcome vs. procedural fairness is usually rooted in normative considerations (e.g. Grant 1995). In this paper, we yield new insights into this debate by considering the *choices* of individuals who are themselves directly affected by the outcome. That is, rather than deciding the allocation between two other persons as in Machina's example, the decision maker decides the allocation between herself and one other person. Doing so, allows us to discuss how social preference theories may extend to risky situations.

To explore the determinants of giving under risk, we run a series of modified dictator games. We first replicate the standard dictator game.[1] This standard dictator game highlights the decision makers' fairness in outcomes between the recipient and himself. We are interested in whether this fairness in outcomes translates into ex ante fairness in risky situations. Our modified treatments coincide with the standard dictator game in terms of expected payoffs. The payoff to the decision-maker or to the recipient or to both is, however, subject to risk. For example, we consider treatments in which the dictator receives a certain amount of money but the recipient does not. By sacrificing some of his monetary payoff, the dictator can increase the recipient's chance to win a prize. If the dictator does not give any money, then the recipient will definitely not get the prize. If he

[1] A vast literature has been devoted to studying giving behavior in such games in which one player (dictator) is asked to allocate a certain amount between himself and another player (recipient). While any dictator who is solely maximizing his or her own payoff should keep the entire endowment, Kahneman, Knetsch, and Thaler (1986) were first to show that most subjects choose an even split giving $10 to each player over an uneven split ($18, $2) that favored themselves. Following the first dictator experiment with a continuous choice (Forsythe et al. 1994), most studies show that a significant proportion of dictators give positive amounts (for summary see Camerer (2003)). List (2007) shows that if taking is allowed, less but still a significant portion of players does not choose the selfish outcome.

gives the maximal amount, the recipient wins the prize for sure. Another set of treatments involve a transfer of lottery tickets. This situation is similar to the mom's example, only that the decision maker needs to choose the *probability* with which *she herself* or the other person wins the prize (i.e. the treat). That is, the decision maker dictates the allocation of *chances* to win a given prize: giving zero, secure the prize to the dictator, increasing giving increases chances of winning for the recipient while decreasing the dictator's chances. These treatments allow us to evaluate whether – when valuing equality – individuals compare their outcomes *after* resolution of uncertainty (*ex post* comparison) or if they compare their *ex ante* chances to gain certain incomes (*ex ante* comparison): no player who solely considers ex post distribution of payoffs would give a positive amount if the lottery draws are exclusive, i.e. if only one of the players wins the prize. We complement these treatments with one in which the dictator *cannot* change the expected value allocated to himself and the recipient, but only their exposure to risk.

In our results we first establish that social preferences of most players who give non-zero amounts in a standard dictator game are best described as being defined over ex ante distribution of risk. These players do not appear to compare ex post payoffs, but rather look at equalizing the ex ante chances to win. Decisions are, however, affected by the riskiness of final payoffs: decision-makers generally give up less income than in the standard dictator game if the transfer is risky, that is, if it does not increase the recipient's income for sure but only her chances to gain income. We also show that the propensity to give in a standard dictator-game is a good predictor for giving in risky situations: those who transfer more money in the dictator game are more likely to equalize the *ex ante* situation, i.e. payoff chances in other games. Our results thus bring to light how existing theories of social preferences can extend to risky contexts.

Our paper is related to a couple of recent papers that examine the role of social comparisons for risk-taking (e.g. Bolton and Ockenfels 2010, Bohnet and Zeckhauser, Bohnet et al. 2008). These authors consider how dictator choices between a safe and a risky option for themselves depend on the corresponding payoffs to the recipient. They do not consider, however, how giving decisions are directly affected by risk. We believe

that our series of dictator choices that equal to standard dictator game in terms of expected payoffs gain substantial new insights into social preferences under risk.

The paper is structured as follows. In section 2, we motivate and describe our experimental design. Section 3 sets up the experimental design. We discuss our experimental findings in section 4 and relate those to the existing literature. Section 5 concludes.

2. Ex ante vs. ex post comparison

Existing models of social preferences consider individual preferences over certain payoffs, represented by a utility function $u(c^1, c^2)$ where (c^1, c^2) are (final) consumption of person 1 and 2, respectively. Charness and Rabin (2002) define $u(c^1, c^2)$ with a combination of own payoff, minimum payoff and efficiency concerns. Fehr and Schmidt (1999) and Bolton and Ockenfels (2000) study inequality aversion, where $u(c^1, c^2)$ captures aversion toward payoff *differences* between players. None of these authors looks at how these kind of social preferences extend to situations under risk. To address these issues, we consider individual preferences over joint payoff distributions $F(c^1, c^2)$. This framework allows us to differentiate between situations in which individuals compare their payoffs ex post or their payoff *chances* ex ante.

Under the assumption of expected utility maximization, preferences of an individual who focuses on ex post payoff comparisons are described by:

$$W^{\text{ex post}}(F) = \int u(c^1, c^2) dF(c^1, c^2) \qquad (1)$$

In contrast, to formalize preferences on ex ante comparisons of payoff chances, we assume that the marginal distributions F^1 and F^2, derived from $F(c^1, c^2)$, can be translated into certainty equivalents $CE(F^1)$ and $CE(F^2)$. Note that this formulation

assumes that the derivations of the respective certainty equivalents are independent.[2] The ex ante utility is then given by

$$W^{\text{ex ante}}(F) = u(CE(F^1(F)), CE(F^2(F))) \qquad (2)$$

For the standard dictator game, formulations (1) and (2) coincide and are represented by $u(c^1, c^2)$ when all payoffs are certain.

To highlight the differences under risk, consider an adaptation of Machina's example to an allocation of an undividable object between the decision-maker and the recipient. Any outcome leads to ex post inequality. In fact, if the decision-maker at least marginally prefers inequality in his rather than the other person's favor, she would choose an allocation procedure that secures the object to herself. Differently, ex ante inequality could perfectly be avoided using a allocation procedure that gives equal chances to the decision-maker and the other person to obtain the object. For example, 50/50 gamble would equalize the certainty equivalents and therefore avoid inequality from an ex ante perspective.

Our experimental treatments are designed to differentiate between these ex post and ex ante formulations and to lend insights into their structure.

3. Experimental Design

Our experiment consisted of a series of dictator games in which the dictator must allocate 100 tokens between himself/herself and a second player (recipient). We report the results of 6 tasks. Tasks differ according to the payoff consequences for each of the players. One

[2] For example, a player could evaluate the respective distributions using an expected utility functional $\int \phi(c)dG(c)$. The certainty equivalent of the respective marginal distributions is then given by $CE(F^i) = \phi^{-1}\left(\int \phi(c^i)dF^i(c^i)\right)$.

of the tasks replicates standard dictator game. In the other 5 tasks, the dictators allocate risk for their recipient counterparts or between themselves and their counterparts.

We conducted our experiment in September of 2009 in the Experimental Economics Laboratory at the University of Maryland. A total of 152 subjects were recruited from among University of Maryland undergraduates representing a variety of undergraduate majors, including but not limited to economics, finance, chemistry, government, and biology. Subjects first gathered in one room where they reviewed consent forms. After signing a consent form, all subjects were given a copy of the general instructions, which were also read aloud by an experimenter. Subjects were randomly assigned to be either person 1 (dictator) or person 2 (recipient). In the experiment, dictator and recipient words were not used. The dictator subjects were then led into a separate room. The recipient subjects remained in the first room. Each dictator was randomly matched with one recipient without revealing the identity to either of the subjects. No subjects were permitted to communicate before or during the session. An experimenter was present in each of the two rooms for the duration of the experiment. A copy of the instructions is included in the Appendix.

Dictators submitted all of their allocation decisions via computer. Computer stations were randomly assigned. Using computers allowed us to also randomize the order of tasks for each dictator. The receivers filled out decision forms using paper and pen. Their task was to determine how much they *expected* their dictator partner to allocate to them for each task. The recipients' decisions had no bearing on the final allocations and this was made clear before each session began. After all subjects completed all tasks, payment was determined from one randomly selected task round. Subjects received $1.00 in cash at the end of the session for each 10 experimental currency units (ECU's) they earned in the randomly selected task round. A $5 show-up fee was included in the subject payments, which were paid at the end of each session. Dictators and receivers were paid separately and in private.

Description of Tasks

In each task, the decision-maker was asked to allocate 100 tokens between himself and the recipient, giving away $x \in [0,100]$ and keeping $100 - x$ tokens. The payoff consequences differed between tasks and were denoted in Experimental Currency Units (ECU) during the experiment ($100ECU = 10USD$). Table 1 summarizes the payoff consequences for each task.

Task 1 (*T1*) replicates the ordinary dictator game for comparison with risky decisions: The players' payoffs are given by $(c^1, c^2) = (100 - x, x)$. The purpose of this task is to position our results within the existing work on the dictator game, as well as to serve as a benchmark for other tasks.

In Tasks *2* and *3*, the dictator receives a certain payoff in ECU equal to his token allocation $c^1 = 100 - x$, while giving recipient the chance to win a prize $P = 100$ tokens with probability $\pi(x) = x/100$, $x \in [0,100]$, in *T2* and a prize $P = 50$ tokens with probability $\pi(x) = x/50$, $x \in [0,50]$, in *T3*. Thus, the dictator does not face any risk himself. For the recipient a lottery is drawn to determine if he receives the payment. *T2* and *T3* resemble situations as described in the introduction, for example a physician's costly effort to increase the healing chances of patients or bearing greenhouse gas abatement costs to reduce climate change faced by future generations.

We can attribute any difference between the dictator's decisions in *T2* and *T3* and the standard dictator game (*T1*) to his assessment of the risk to the recipient as both the dictator's payoff and the recipient's expected value are identical. A risk-averse dictator with preferences based on ex ante comparisons would evaluate the certainty equivalent to the recipient below the expected value. If he is interested in efficiency (e.g., the sum of certainty equivalents), he would therefore give less in *T2* than in *T1*. If he is interested in equalizing ex ante chances by equalizing the certainty equivalents, he might allocate more tokens to the recipient. The reverse holds for risk-loving agents. If, on the other hand, the agent compares ex post payoffs and is highly averse to unfavorable inequality, he would reduce giving in *T2* compared with *T1*. Task *T3* avoids this unfavorable inequality as the recipient can only win a maximum of $c^2 = 50$. If agents are therefore

largely driven by ex post inequality concerns, we should expect more giving in *T3* than in *T2*.

Task 4 (*T4*) is aimed to test whether preferences based on ex ante or ex post comparisons are more appropriate to model dictators' allocation decisions under risk. In this treatment, both the dictator and recipient face risk. Here, the dictator distributes the *chances* to win a prize. The probability for winning the prize of $P = 100$ are given by $\pi^1(x) = 1 - x/100$ and $\pi^2(x) = x/100$. Thus the token allocations represent the chances of winning a lottery. In task *T4*, the draws are exclusive: either the dictator or recipient wins. Task *T4* was designed to differentiate between preferences based on ex ante and ex post comparisons. Note that ex post formulations of preferences (1) imply

$$W^{\text{T4,ex post}}(x) = (1 - x/100)u(100,0) + (x/100)u(0,100)$$

such that for any preference with $u(100,0) > u(0,100)$ we expect subjects to choose $x^{T4} = 0$. As long as agents put slightly more weight on their own than on others' payoffs, we have a clear theoretical prediction. Note that this assumption is satisfied by all models in the literature (e.g., Fehr and Schmidt 1999, Charness and Rabin 2002). Conversely, if agents have preferences based on ex ante comparisons as in (2), they will generally give positive amounts if, for example, they try to avoid inequality of certainty equivalents or try to maximize the minimal ex ante utility. In both cases, we expect subjects to choose $x^{T4} = 50$.[3]

Task 5 (*T5*) is identical to task *T4* except that instead of one lottery, two independent lotteries are drawn, one for each player. Here, one of the players, both players, or none of them wins the prize. In terms of ex post comparisons, *T4* and *T5* therefore differ. Ex ante (i.e. when evaluating certainty equivalents), these tasks are the same. Comparing *T4* and *T5* therefore also allows us to differentiate between ex post or ex ante comparisons.

We complement these five treatments with one additional task, *T6*, in which the dictator

[3] Note that the same prediction of zero giving would result if just give in the dictator game because of identifiable actions. In *T4* and *T5*, a zero payoff to the recipient could result even if the dictator gave all but one token to the recipient. Consistent with Dana et al. (2007), we would then also expect less giving than in *T1*.

cannot change the expected value allocated to himself and recipient, but can change the risks involved. The potential allocations are a 50/50-gamble between $x/2$ and $100 - x/2$ to person 1 and a 50/50-gamble between $50 - x/2$ and $50 + x/2$ to person 2. Independent lotteries are drawn for each player to determine if they win the high or low ECU amount. The purpose of this final treatment is to gain insights if social preferences affect the allocation of risks consistently with the allocation of expected payoffs. As such, predictions for task *T6* complement those in *T4*. Ex ante equality in chances would be generated by a choice of $x^{T6} = 50$, for which both players face a gamble between 25 and 75. We would therefore expect players with preferences based on ex ante comparisons who choose to give larger amounts in the standard dictator game to choose an allocation close to $x^{T6} = 50$. If, however, dictators are fully selfish (they give nothing in the dictator game) we would expect $x^{T6} = 100$ if they are risk-averse and $x^{T6} = 0$ if they are risk-loving. We thus predict that decisions in task *T1* should be informative for the absolute distance of between decisions in *T6* to 50.

In all treatments, recipients were not informed about the actual choice x, but only about their own final payoff. Dictators did not receive direct information about the final payoff to the recipient. The effect of such information on giving decisions is left to further research.

4. Experimental Results

The results on the dictators' choices and the recipients' expectations are summarized in Table 2 and 3. These tables provide the summary statistics of average choices as well as the proportion of players choosing $x = 0$ or $x = 50$ in each task. For example, average giving in the dictator game is $x = 21.07$ and thereby consistent with numbers reported in the literature (Camerer 2003). It can immediately be seen that significant positive giving occurs for all tasks. Figure 1 again shows the average contribution by task, while Figure 2 displays the percentage of subjects giving non-zero amounts (participation rate) and Figure 3 shows the average contributions for those that chose to give non-zero amounts. The summary statistics of these conditional contributions is given in Table 4.

Notably, the figures already show important differences between treatments. We explore those in detail below.

In a first step, we can study giving decisions in *T4* . Here, giving is significantly different from zero: 33 subjects (43%) chose to give positive amounts. The conditional contributions in *T1* and *T4* coincide (see Figure 3 and Mann Whitney test in Table 5). We therefore can clearly reject the hypotheses that ex post comparisons are able to explain their behavior.

Result 1: *Preferences based on ex post payoff comparisons cannot explain giving decisions under risk.*

In fact, while slightly more players choose $x = 0$ and fewer players choose $x = 50$ in Task 4 than in the standard dictator game, a Wilcoxon sign-rank test cannot reject the equality of the underlying distributions. This finding is consistent with an ex ante comparisons of payoff consequences, but cannot be explained by any preference structure that solely relies on ex post comparisons. In line with this result is the apparent similarity between *T4* and *T5*; behavior in *T4* and *T5* should be the same if evaluating payoff prospects ex ante, but they would differ in terms of ex post comparisons.

As another indication for preferences that consider ex ante chances rather than ex post payoff realizations, we can compare individual decisions in the standard dictator game with those in *T6*. In *T6*, the dictator faces a 50/50-gamble between $x/2$ and $100 - x/2$ while the recipient faces potential outcomes of $50 - x/2$ and $50 + x/2$. As such, the decision x does not affect the expected value for both players, but the risk allocation. For $x = 50$, both players face the same payoff chances. An ex ante oriented player who allocates more to the recipient in the dictator game can therefore be expected to choose closer to $x = 50$ in *T6*. Indeed, we can establish this result:

Result 2: *The more subjects give in a standard dictator game, the more they equalize the certainty equivalents for risky decisions.*

Table 6 provides evidence for this result based on a series of linear regression models that explain the choice in the respective tasks as a function of the choice in the standard

dictator game (*T1*). For example, the absolute value of the difference $|x^{T6} - 50|$ is smaller the larger the contribution in the dictator game (1% significance). That is, even if the decision does not involve a trade off of own expected value, agents' choices in the dictator game are informative for the allocation of risks between themselves and some recipient. Similarly, but perhaps less surprisingly, agents are more likely to give in all tasks (1% significance) the more they gave in the dictator game (Table 6).

We do find, however, evidence that risk faced by the recipient affects the dictators choices. A series of Wilcoxon sign rank tests reveals that agents give more in the standard dictator game than in *T2* (5% significance) and *T3* (10% significance), that is when the recipient's payoff is subject to risk while the dictator's is not. As such, we get the following result:

Result 3: *Players' decisions are affected by the recipient's exposure to risk.*

Further insights into this result can be obtained from explicitly comparing the distributions for the decisions (see Table 2). Table 7 provides a series of probit models where we explain the choice to participate (Column 2), choices being between 1 and 49 (Column 3), and choices being equal to 50 (Column 5) (always coded as a binary variable taking value 1 if the choice fits the criteria) by the decision tasks. For this we defined explanatory dummy variables that take value 1 if task is *T2*, *T3*, *T4*, *T5*, respectively.

Column 1 of Table 7 shows that contributions tend to be lower in the tasks involving risk than in the standard dictator game. While this result is also illustrated in Figure 1, Figures 2 and 3 reveal that this effect is primarily driven by a reduction in the conditional contributions, rather than by a change in the participation rate. In fact, a Mann-Whitney test (see Table 5) shows a difference in conditional contributions between 1 and 2 (5% level of significance) and 1 and 3 (1% level).

This result is consistent with the results in columns 2-4 of Table 7 that we decompose the choice options to distinguish between positive, giving between 1 and 49 and giving equal to 50. We find that fewer subjects choose to give 50 in *T2* and *T3*, than in the standard dictator game, while more agents give smaller amounts (between 1 and 49). This

observation is in line with findings by Dana et al. (2007): since the potential payoffs to the recipient do not depend on the dictator's choice, the dictator can exploit the "moral-wiggle room". The recipient will not be able to perfectly infer the dictator's action from observing the outcome.

It is interesting and puzzling to see, however, that the proportion of players giving zero is also smaller in *T3* than in *T1* (the difference between *T2* than in *T1* is insignificant). This indicates that some players who displayed selfish behavior in the standard dictator game give a positive amount, thereby giving the recipient a chance to win some large amount.

Our experimental design further allows us to compare the decisions made by dictators with the expectations of the recipient. While recipients' answers were not incentivized, we believe that the comparison of their expectations with the actual choices of the dictators provides interesting insights. Table 3 displays the respective averages, standard deviations, and proportion of subjects expecting $x = 0$ or $x = 50$. Figure 4 shows the averages of choices and expectations for all tasks.

Comparing expectations with actual choices, we see that they almost coincide for the standard dictator game. In presence of risk, however, expectations generally differ from choices.

For *T2* and *T3*, subjects expect more generosity than dictators actually provide (t-test at 1% significance, Mann-Whitney at 5% for *T3*). Recipients therefore do *not* expect the dictator's choices to change when only recipients are exposed to risk.

It is interesting to see, however, that the expectations for *T4* are significantly lower than those in the standard dictator game (1%, Wilcoxon). The expectations of recipients are therefore much more in line with potential ex post comparisons: 58% of them expect to get a zero allocation if the dictator allocates lottery tickets which only allow either person to win. They expect a more generous allocation in *T5* when both agents could potentially win (1%, Wilcoxon between expectations in *T4* and *T5*). This expectation, however, is not justified by the actual decisions (10% significance difference in T5, Mann-Whitney).

Finally, in task *T6* recipients expect a larger exposure to risk, i.e. they anticipate the dictator to choose safer options than these actually do (Mann-Whitney, 1% significance). This is in particular driven by recipients not expecting a risk-loving choice ($x = 0$): this extreme choice is taken by 16% of dictators while it was only expected by 3% of recipients. We can summarize this discussion as follows:

Result 4: *While correctly anticipating decisions in the dictator game, subjects are less able to predict choices when payoffs are risky.*

Result 4 has implications for extensions of the current experimental setup to strategic environments: it can be problematic to find equilibrium strategies when beliefs do not coincide with actual behavior. Similarly, when extending the current dictator game to an ultimatum game context, for example, wrong expectations may affect acceptance decisions if players' preferences depend on expectations (e.g., reference-based models).

5. Discussion and Conclusions

Many recent theories attempt to explain behavior in laboratory and field experiments by modeling some sort of social preferences. Giving in dictator, ultimatum, gift exchange, public good, and many other games has been rationalized using preference structures that allow for motivations other than selfishness, such as inequality aversion, concerns for efficiency, or consideration of lowest payoffs. It remained an open question, however, how such "social" behavior extended to situations that involve risk and how the theories can be extended. Our paper provides first evidence on these questions.

In particular, we address the issue of whether social preferences are based on comparisons of *final (ex post) payoffs* or on comparisons of *ex ante chances*. By observing decisions in situations that expose the decision-maker, another person, or both to risk, we differentiate between these two preference structures. We find that the behavior in a standard dictator game serves as a good predictor for social preferences under risk. Moreover, the behavior of a substantial fraction of subjects is consistent with dictators comparing ex ante chances, rather than ex post payoff.

Our findings also have widespread policy implications, with applications in fields ranging from charitable giving to healthcare to environmental conservation. Donations to charitable organizations must be made based on *beliefs* about how the money is used and if the financed projects are successful. Physicians make efforts to increase the chances of healing the patient but may never know the health outcome or benefit themselves from these efforts. Environmental policies, such as those aimed at climate change, regularly require costly actions whose benefits are uncertain and might accrue to someone other than the decision maker. In the case of climate policy, current generations decide on costly abatement of greenhouse gas emissions, while the potential benefits from reduced climate change are uncertain and will be experienced by future generations. Our results indicate how such uncertainties may affect the willingness of people to give up consumption in order to benefit others.

Our study clearly can only provide a first step towards a better understanding of giving decisions under risk that affect other subjects than the decision-maker. For example, while we fixed the attainable payoff levels in the lottery situations, it appears worthwhile to explore how downside versus upside risk affects behavior or how the availability of insurance options changes transfer decisions. We leave those questions to future research.

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Appendix A – Experimental Results

Table 1: *Summary of Tasks*

Task	Payoff for The dictator (ECU)	Payoff for Recipient (ECU)
T1	$100 - x$	x
T2	$100 - x$	0 or 100 determined by a lottery with chances of winning $x/100$
T3	$100 - x$	0 or 50 determined by a lottery with chances of winning $x/50$
T4	0 or 100 determined by a shared lottery, chance of winning $1 - x/100$	0 or 100 determined by a shared lottery, chance of winning $x/100$
T5	0 or 100 determined by an independent lottery, chance of winning $1 - x/100$	0 or 100 determined by an independent lottery, chance of winning $x/100$
T6	50/50 gamble between $x/2$ and $100 - x/2$ determined by an independent lottery	50/50 gamble between $50 - x/2$ and $50 + x/2$ determined by an independent lottery

Table 2. *Summary statistics of The dictator's choices.*

	Number of subjects	Mean of choices	SD of choices	Number of subjects with x=0	Number of subjects with x=50	% of subjects with x=0	% of subjects with x=50
T1	76	21.08	27.45	38	17	50%	22%
T2	76	15.57	20.13	37	9	49%	12%
T3	76	15.44	17.67	30	9	39%	12%
T4	76	18.24	27.12	43	12	57%	16%
T5	76	16.30	21.74	41	12	54%	16%
T6	76	48.16	33.59	12	17	16%	22%

Table 3. *Summary statistics of The recipient's expectations.*

	Number of subjects	Mean of choices	SD of choices	Number of subjects with x=0	Number of subjects with x=50	% of subjects with x=0	% of subjects with x=50
T1	76	21.43	23.80	32	18	42%	24%
T2	76	21.25	26.77	32	11	42%	14%
T3	76	23.51	20.74	20	17	26%	22%
T4	76	15.74	23.01	44	10	58%	13%
T5	76	22.72	23.06	29	17	38%	22%
T6	76	65.91	28.91	2	26	3%	34%

Table 4. Summary statistics of conditional giving, by task

	Number of subjects	Mean of choices	SD of choices	% of subjects with x=50	% of subjects with 0<x<50
T1	38	42.16	24.79	45%	45%
T2	39	30.33	18.44	23%	72%
T3	46	25.52	16.06	20%	80%
T4	33	42.00	26.36	36%	45%
T5	35	35.40	18.62	34%	57%
T6	64	57.19	28.62	27%	34%

* All subjects who give positive amounts in tasks 1-5 also give positive amounts in task6.

Table 5. Differences in Average Tokens Given, Conditional on Giving

Task	2	3	4	5
1	11.82**	16.64***	0.16	6.76
2		4.81	-11.67*	-5.07
3			-16.48***	-9.88**
4				6.60

Differences tested with two-sample Mann–Whitney tests.

*** (**,*)indicates significance at 1% (5%, 10%) level.

Table 6. Linear regression of choices in tasks on dictator game decisions.

	T2	T3	T4	T5	|T6-50|
T1	-0.45*** (0.07)	0.30*** (0.07)	0.43*** (0.10)	0.50*** (0.07)	-0.25*** (0.08)
const	6.18*** (2.33)	9.05*** (2.27)	9.25** (3.57)	5.81** (2.47)	32.06*** (2.77)
R-squared	0.37	0.22	0.19	0.39	0.12

Standard errors in brackets. *** (**) indicates significance at 1% (5%) level.

Table 7. *Maximum likelihood estimates in random effects regression (column 1) or probit models (columns 2-4), dictators' choices for the different tasks (baseline is dictator game T1)*

	Linear Random Effects model Choice	Probit Participate (Choice>0)	Probit Choice in [1,49]	Probit Choice=50
T2	-5.51** (2.64)	0.07 (0.28)	0.66** (0.27)	-0.65** (0.32)
T3	-5.63** (2.64)	0.57** (0.29)	1.13*** (0.28)	-0.65* (0.32)
T4	-2.84 (2.64)	-0.34 (0.29)	-0.12 (0.28)	-0.39 (0.31)
T5	-4.78* (2.64)	-0.21 (0.29)	0.21 (0.27)	-0.37 (0.30)
Const	21.07*** (2.65)	-0.02 (0.30)	-1.19*** (0.26)	-1.24*** (0.29)

Standard errors in brackets. *** (**,*)indicates significance at 1% (5%, 10%) level.

Figure 1: *Average contribution by task*

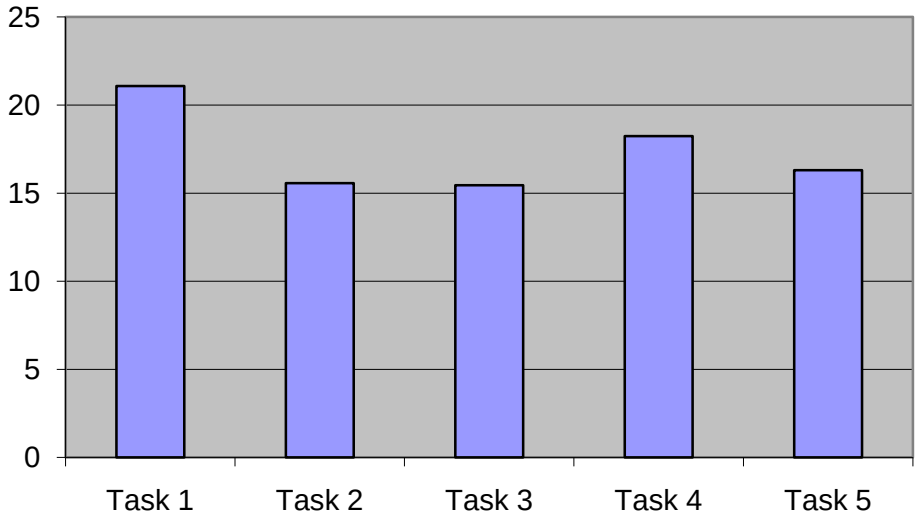


Figure 2: *Percent of subjects that choose to give non-zero amounts*

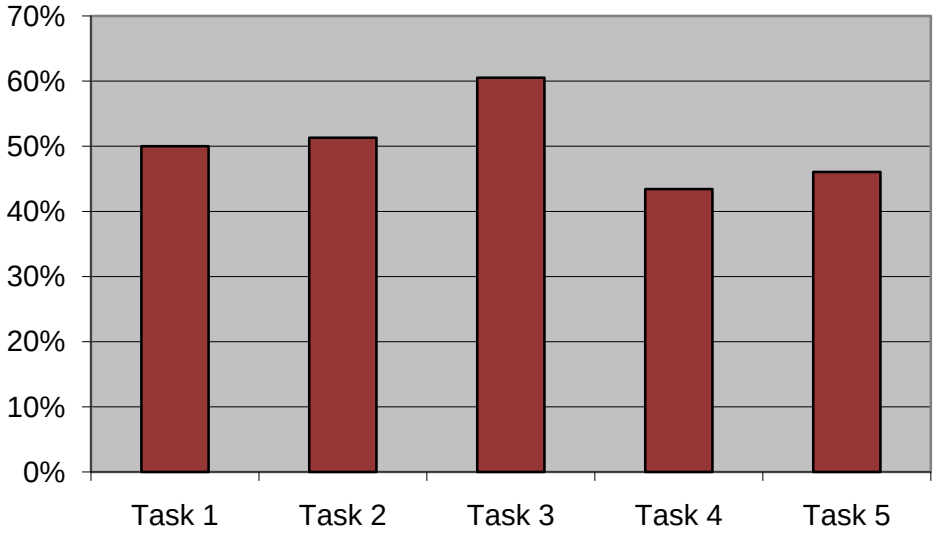


Figure 3: *Average tokens given, conditional on giving greater than zero*

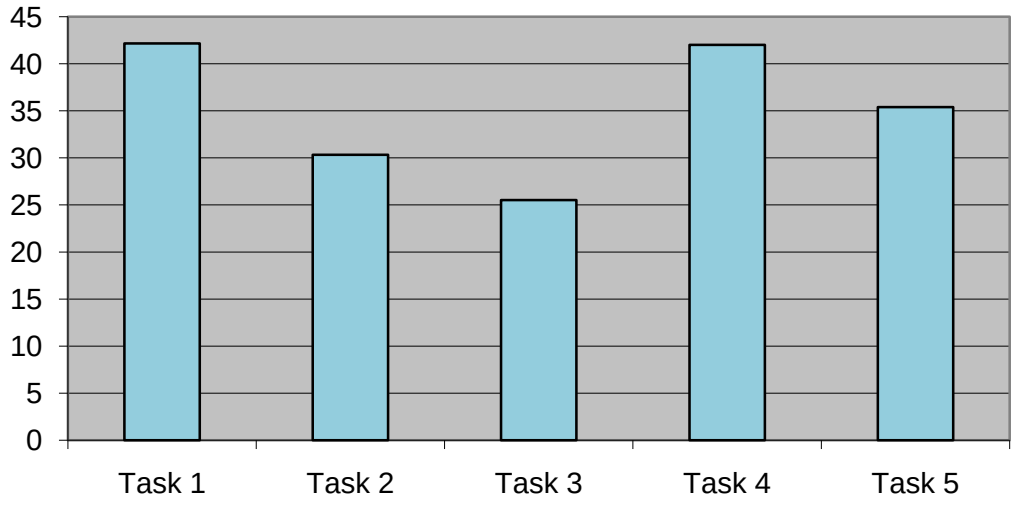
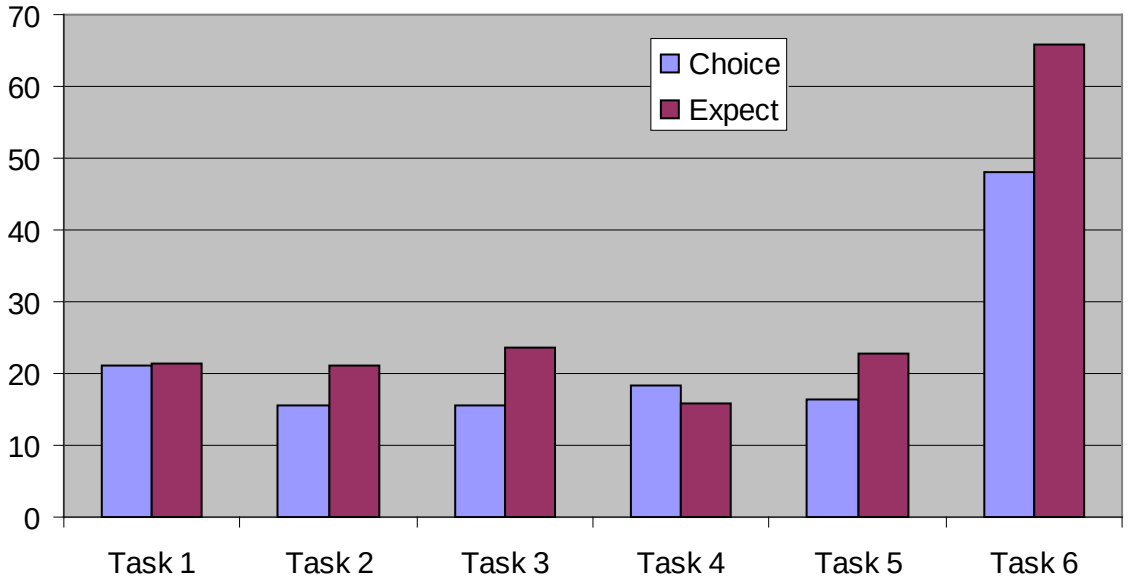


Figure 4: *Choices and expectations in the respective tasks*



Appendix B – Experiment Instructions

Experiment Instructions

General Rules

This is an experiment in economic decision making. If you follow the instructions carefully and make good decisions you can earn a considerable amount of money. You will be paid in private and in cash at the end of the session.

It is important that you do not talk, or in any way try to communicate, with other people during the session. If you have a question, raise your hand and a monitor will come over to where you are sitting and answer your question in private.

The experiment will consist of several independent rounds. In each, you will face a specific decision task. Tasks will be explained in detail before you have to make your decision.

In each round, you will be randomly matched with one other participant. This matching will change each round. You will not know which of the other people in the room you are matched with. Likewise, the other people in the session will not know with whom they are grouped.

In each round, you will have the opportunity to earn points. At the end of this session, one of the rounds will be randomly selected as the payment round. You will be paid in cash an amount that will be determined by the number of ECUs (**E**xperimental **C**urrency **U**nits) you earn during the randomly selected payment round.

At the beginning of the experiment, you will be assigned the role of either Person 1 or Person 2.

Those selected for the role of Person 2 will leave the room with one of the experimenters. They will be explained the decision tasks, but then wait until person 1 has made all decisions. They will later be paid in private. That is, the identity of the decision maker (person 1) will not be revealed.

Those selected as Person 1 will remain in the room and will take a seat at one of the computers. Once all of the Person 2 players have left the room, we will explain the decision rules for each of the decision tasks to the Person 1 players..

In all rounds, each Person 1 player will decide how to allocate 100 tokens between him- or herself and Person 2.

The total number of tokens must sum up to 100.

That is, **T**okens **K**ept (**TK**) by person 1 and **T**okens **G**iven (**TG**) to person 2 add up to 100.

$$\mathbf{TK + TG = 100.}$$

The payoff consequences of the token allocation may differ between the Person 1 and Person 2 and from round to round. Payoff consequences will be explained to all Person 1 and Person 2 players at the beginning of each round.

In each period you should record the number of tokens allocated to you and to the other person on the record sheet.

How earnings are determined

At the end of today's session, one round will be randomly selected as the payment round and payments will be determined based on the ECU earnings that round. Each round has the same probability of being chosen as the payment round. Your payments will be displayed on the computer.

Record the selected round and your profit in *ECU* for that round in the space provided at the bottom of the record sheet.

You will receive **$1.00** in cash at the end of the session for every **10 *ECU*** you have earned in the payment round. This amount is recorded in the space titled earnings. In addition, you will earn a $**5** as show-up fee.

If you have any questions during the experiment, please quietly raise your hand and one of the experimenters will come to you to answer your question. It is important that you do not talk with any of the other participants.

Instructions for the specific rounds – Person 1

Treatment 1

You have been randomly assigned to be Person 1. In this round, you will decide on the number of tokens for each of you that sum to 100.
That is, Tokens kept (TK) and Tokens given (TG) add up to 100.

TK + TG = 100.

If this round is selected for payments,

You will receive	TK ECU
Person 2 will receive	TG ECU as payoff

Please enter how many tokens you would like to allocate to Person 2 (TG). Recall, you can choose any number between 0 and 100.

Treatment 2

You have been randomly assigned to be Person 1. In this round, you will decide on the number of tokens for each of you that sum to 100.
That is, Tokens kept (TK) and Tokens given (TG) add up to 100.

TK + TG = 100.

If this round is selected for payments,

You will receive	TK ECU
Person 2 will receive	TG out of 100 lottery tickets which gives him or her the chance to win 100 ECU. That is, Person 2 has a TG out of 100 chance of winning 100 ECU.

The more tokens you allocate to the Person 2, the higher are Person 2's chances to win 100ECU, but the smaller will be your own payoff.

For example, if you allocate all 100 tokens to Person 2, the Person 2 has a 100 out of 100 chance to win 100ECU, that is Person 2 wins the prize for sure, while you do not get any payoff. Alternatively, if you allocate 0 tokens to Person 2, Person 2 has no chance to win the 100ECU prize, while you get a payoff of 100ECU.

Recall, you can choose any allocation to Person 2 between 0 and 100.
Please enter how many tokens you would like to allocate to Person 2(TG):

Treatment 3

You have been randomly assigned to be Person 1. In this round, you will decide on the number of tokens for each of you that sum to 100. You can allocate at most 50 tokens to the other person.
That is, Tokens kept (TK) and Tokens given (TG) add up to 100.

TK + TG = 100.

If this round is selected for payments,

You will receive	TK ECU
Person 2 will receive	2xTG out of 100 lottery tickets which gives Person 2 the chance to win 50 ECU.

That is, Person 2 has a 2xTG out of 100 chance of winning 50 ECU.

The more tokens you allocate to the Person 2, the higher are Person 2's chances to win 50ECU, but the smaller will be your own payoff. For example, if you allocate 50 tokens to Person 2, Person 2 receives 100 lottery tickets and therefore has a 100 out of 100 chance to win 50ECU. That is, Person 2 wins the prize for sure, while you do receive 50ECU for sure. Alternatively, if you allocate 0 tokens to Person 2, Person 2 has no chance to win the 50ECU prize, while you get a payoff of 100ECU.

Recall, you can choose any allocation for the Person 2 between 0 and 50.

Please enter how many tokens you would like to allocate to Person 2 (TG):

Treatment 4

You have been randomly assigned to be Person 1. In this round, you will decide on the number of tokens for each of you that sum to 100.
That is, Tokens kept (TK) and Tokens given (TG) add up to 100.

TK + TG = 100.

If this round is selected for payments,

You will receive	TK unique lottery tickets
Person 2 will receive	TG unique lottery tickets

At the end a lottery with a prize of 100 ECU will take place where one of the unique lottery tickets wins. **Exactly one, and only one, of you will win the prize**.

Your odds of winning equal TK over 100. Correspondingly, the odds for Person 2 will equal TG over 100. That is, the more tokens you allocate to the Person 2, the higher are Person 2's chances to win 100ECU, but the smaller are your own chances to win. For example, if you allocate all 100 tokens to Person 2, person 2 has a 100 out of 100 chance to win 100ECU, that is person 2 wins the prize for sure, while you do not get any payoff. Alternatively, if you allocate 0 tokens to Person 2, Person 2 has no chance to win the 100ECU prize, while you win for sure.

Recall, you can choose any allocation to the Person 2 between 0 and 100.
Please enter how many tokens you would like to allocate to Person 2 (TG):

Treatment 5

You have been randomly assigned to be Person 1. In this round, you will decide on the number of tokens for each of you that sum to 100.

That is, Tokens kept (TK) and Tokens given (TG) add up to 100.

TK + TG = 100.

If this round is selected for payments,

You will receive	TK lottery tickets
Person 2 will receive	TG lottery tickets

At the end, for you and Person 2, lotteries will be drawn with prizes of 100 ECU. Your odds of winning equal TK over 100. The odds for Person 2 will equal TG over 100. **The draws for you and Person 2 are independent. That is, both of you could win 100 points, only one of you could win, or both of you could end up without a prize.**

That is, the more tokens you allocate to the Person 2, the higher are Person 2 chances to win 100ECU, but the smaller are your own chances to win. For example, if you allocate all 100 tokens to Person 2, Person 2 has a 100 out of 100 chance to win 100ECU, that is person 2 wins the prize for sure, while you do not get any payoff. Alternatively, if you allocate 0 tokens to Person 2, person 2 has no chance to win the 100ECU prize, while you win for sure.

Recall, you can choose any allocation to Person 2 between 0 and 100.
Please enter how many tokens you would like to allocate to Person 2 (TG):

Treatment 6

You have been randomly assigned to be Person 1. In this round, you will decide on the number of tokens for each of you that sum to 100.
That is, Tokens kept (TK) and Tokens given (TG) add up to 100.

TK + TG = 100.

If this round is selected for payments,
You will have a 50/50-chance to either receive

50+TK/2 ECU
50-TK/2 ECU

Person 2 will face a 50/50-chance to either receive

50+TG/2 ECU
50-TG/2 ECU

In the extreme, if you do not allocate any tokens to Person 2, Person 2's payoff is 50ECU while you face a 50/50 chance to win 100ECU or win nothing. If you allocate all 100tokens to Person 2, you will have 50ECU for sure while Person 2 faces the 50/50 gamble of winning 100ECU or nothing. Alternatively, if you allocate 0 tokens to Person 2, Person 2 has no chance to win the 100ECU prize, while you win for sure.

Recall, you can choose any allocation to Person 2 between 0 and 100.
Please enter how many tokens you would like to allocate to Person 2 (TG):

Instructions for the specific rounds – Person 2

Decision 1

You will receive a number of tokens allocated to you by Person 1. The number of tokens allocated between you and Person 1 sums to 100. That is, Tokens kept (TK) and Tokens given (TG) add up to 100. TK + TG = 100.

If this round is selected for payments,

Person 1 will receive	TK ECU
You will receive	TG ECU as payoff

Please enter how many tokens you expect to receive from Person 1 (TG). Recall, Person 1 can allocate any number of tokens between 0 and 100.

Decision 2

You will receive a number of tokens allocated to you by Person 1. The number of tokens allocated between you and Person 1 sums to 100. That is, Tokens kept (TK) and Tokens given (TG) add up to 100. TK + TG = 100.

If this round is selected for payments,

Person 1 will receive	TK ECU
You will receive	TG out of 100 lottery tickets, which gives you the chance to win 100 ECU. That is, you have a TG out of 100 chance of winning 100 ECU.

The more tokens Person 1 allocates to you, the higher are your chances to win 100ECU, but the smaller will be Person 1's own payoff.

For example, if Person 1 allocates 100 tokens to you, then you have a 100 out of 100 chance to win 100ECU. That is you win the prize for sure, while Person 1 does not get any payoff. Alternatively, if Person 1 allocates 0 tokens to you, then you ahve no chance to win the 100ECU prize, while Person 1 gets a payoff of 100ECU.

Recall, Person 1 can choose any allocation to you between 0 and 100.
Please enter in the record sheet how many tokens you expect Person 1 (TG) to allocate to you.

Decision 3

You will receive a number of tokens allocated to you by Person 1. The number of tokens allocated between you and Person 1 sums to 100, but Person 1 can allocate to you at most 50 tokens. That is, Tokens kept (TK) and Tokens given (TG) add up to 100 (TK + TG = 100).

If this round is selected for payments,

Person 1 will receive	TK ECU
You will receive	2xTG out of 100 lottery tickets, each of which gives you an equal chance to win 50 ECU. That is, you will have a 2xTG out of 100 chance of winning 50 ECU.

The more tokens Person 1 allocates to you, the higher are your chances to win 50ECU, but the smaller will be their own payoff. For example, if Person 1 allocates 50 tokens to you, you receive 100 lottery tickets and therefore would have a 100 out of 100 chance to win 50ECU. That is, you win the prize for sure, while Person 1 receives 50ECU for sure. Alternatively, if Person 1 allocates 0 tokens to you, you have no chance to win the 50ECU prize, while Person 1 gets a payoff of 100ECU.

Recall, Person 1 can choose any allocation for you between 0 and 50.

Please enter in the record sheet how many tokens you expect Person 1 to allocate to you (TG).

Decision 4

You will receive a number of tokens allocated to you by Person 1. The number of tokens allocated between you and Person 1 sums to 100. That is, Tokens kept (TK) and Tokens given (TG) add up to 100. TK + TG = 100.

If this round is selected for payments,

Person 1 will receive	TK unique lottery tickets
You will receive	TG unique lottery tickets

At the end of the session a lottery with a prize of 100 ECU will take place where exactly one of the unique lottery tickets wins. **One, and only one, of you will win the prize**.

Your odds of winning equal TG over 100. Correspondingly, the odds for Person 1 will equal TK over 100. That is, the more tokens Person 1 allocates to you, the higher are your chances to win 100ECU, but the smaller are Person 1's own chances to win. For example, if you receive all 100 tokens from Person 1, you have has a 100 out of 100 chance to win 100ECU, that is you win the prize for sure, while Person 1 does not get any payoff. Alternatively, if you receive 0 tokens from Person 1, you have no chance to win the 100ECU prize, while Person 1 wins for sure.

Recall, Person 1 can choose any allocation between 0 and 100 for you.

Please enter in the record sheet how many tokens you expect Person 1 to allocate to you (TG).

Decision 5
You will receive a number of tokens allocated to you by Person 1. The number of tokens allocated between you and Person 1 sums to 100. That is, Tokens kept (TK) and Tokens given (TG) add up to 100. TK + TG = 100.

If this round is selected for payments,
Person 1 will receive TK lottery tickets
You will receive TG lottery tickets

At the end of the session, lotteries will be drawn for you and Person 1 with prizes of 100ECU each. Your odds of winning equal TG over 100. The odds for Person 1 will equal TK over 100. **The draws for you and Person 1 are independent. That is, both of you could win 100 points, only one of you could win, or both of you could end up without a prize.**

That is, the more tokens Person 1 allocates to you, the higher are your chances to win 100ECU, but the smaller are their own chances to win. For example, if Person 1 allocates all 100 tokens to you, you have a 100 out of 100 chance to win 100ECU. That is you win the prize for sure, while Person 1 does not get any payoff. Alternatively, if you Person 1 allocates 0 tokens to you, you have no chance to win the 100ECU prize, while Person 1 wins for sure.

Recall, Person 1 can choose any allocation between 0 and 100 for you.

Please enter in the record sheet how many tokens you expect Person 1 to allocate to you (TG).

Decision 6
You will receive a number of tokens allocated to you by Person 1. The number of tokens allocated between you and Person 1 sums to 100. That is, Tokens kept (TK) and Tokens given (TG) add up to 100. TK + TG = 100.

If this round is selected for payments,
Person 1 will have a 50/50-chance to either receive
50+TK/2 ECU
50-TK/2 ECU

You will face an independent 50/50-chance to either receive
50+TG/2 ECU
50-TG/2 ECU

Note that the lotteries faced by you and Person 1 are independent. If you receive from the other person a non-zero number of tokens, you will face a lottery of winning either something more than 50ECU or something less than 50ECU. Concurrently, Person 1 would face a separate lottery of winning something more than 50ECU or something less

than 50ECU. The outcome of your lottery does not impact the outcome of Person 1's lottery, and vice versa.

While the outcomes of the two lotteries are independent, Person 1's choice of token allocations determines the potential winnings of both players. If Person 1 allocates a non-zero number of Tokens to you, then each of you faces lotteries with the two potential outcomes of something greater than 50ECU and something less than 50ECU (potential outcomes are not necessarily the same between you).

In the extreme, if Person 1 allocates zero tokens to you (TG=0), then TG/2=0 and your payoff is 50ECU for sure. Person 1 would then face a 50/50 chance to win 100ECU or win nothing (50+100/2=100 and 50-100/2=0). Alternatively, if you receive all 100 tokens, Person 1 will have exactly 50ECU for sure while you face the gamble of winning 100ECU or nothing. So while the outcome of the lotteries are not connected, the potential gains from the lotteries are determined by the allocations chosen by Person 1.

Recall, Person 1 can choose any allocation between 0 and 100 for you.

Please enter in the record sheet how many tokens you expect Person 1 to allocate to you (TG).