

Lange, Andreas; Brock, J. Michelle; Ozbay, Erkut Y.

**Conference Paper**

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

Beiträge zur Jahrestagung des Vereins für Socialpolitik 2010: Ökonomie der Familie - Session: Social Preferences, No. E13-V1

**Provided in Cooperation with:**

Verein für Socialpolitik / German Economic Association

*Suggested Citation:* Lange, Andreas; Brock, J. Michelle; Ozbay, Erkut Y. (2010) : Dictating the Risks - Experimental Evidence on Norms of Giving in Risky Environments, Beiträge zur Jahrestagung des Vereins für Socialpolitik 2010: Ökonomie der Familie - Session: Social Preferences, No. E13-V1, Verein für Socialpolitik, Frankfurt a. M.

This Version is available at:

<https://hdl.handle.net/10419/37310>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*

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

J. Michelle Brock, Andreas Lange and Erkut Y. Ozbay

University of Maryland

24 February 2010

## 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. We find that the propensity to give in a standard dictator-game serves as a good predictor for behavior 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. We further find that decision-makers give up less income than in the standard dictator game when giving increases only the chances of the recipient to gain income rather than increasing the recipient's income for sure. Our results thereby shed important light on how existing theories of social preferences can extend to a risky environment. (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. 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. 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. Such giving decisions are often interpreted as a preference for equitable or efficient outcomes (Fehr and Schmidt 1999, Charness and Rabin 2002, 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.

In this paper, we study if and how such social preferences extend to environments of risky decision making. 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 if individual perceptions of fairness relate to comparisons of outcomes/payoffs or rather to comparing opportunities, i.e. to the procedure that determines the outcomes (e.g. Fehr and Schmidt, 1999, Cox and Deck 2005, Bolton and Ockenfels 2000, Trautmann 2009). While a fifty-fifty split in dictator games is an example of fairness based on outcome, Machina (1989) provides a classical example of procedural fairness: a mother with two children is indifferent between allocating the indivisible treat to either of her children, but she strictly prefers

giving the treat based on a result of coin toss. Although being a fair procedure, it will not result in a fair outcome as only one child can get the treat. While the ethical debate on outcome vs. procedural fairness is usually rooted in normative considerations (e.g. Grant 1995), we yield new insights into this debate by considering the *choices* of individuals. That is, we 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).

To explore these determinants of giving under risk, we run a series of modified dictator games. We first replicate the standard dictator game<sup>1</sup> Our first set of modified treatments coincides with the standard dictator game in terms of expected payoffs. However, the payoff to the decision-maker or to the recipient or to both is subject to risk. For example, we consider treatments in which the dictator receives a certain amount of money. By sacrificing some of his monetary payoff he 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 gives the maximal amount, the recipient wins the prize for sure. Another set of treatments involve a transfer of lottery tickets. 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 in particular allow us to differentiate between social preferences that are based on *ex ante* or *ex post* comparisons: 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.

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

---

<sup>1</sup> 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, most studies show that a significant proportion of dictators give positive amounts.

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 generally 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). While these authors consider how binary choices between a safe and a risky option for the dictator depend on the corresponding payoffs to the recipient. They do not consider 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:

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

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.<sup>2</sup> The ex ante utility is then given by

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

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

---

<sup>2</sup> 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  $CE(F^i) = \phi^{-1}\left(\int \phi(c^i) dF^i(c^i)\right)$ .

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 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 at the University of Maryland. A total of 152 subjects were recruited from among UMD undergraduates representing a variety of undergraduate majors, including but not limited to economics, finance, chemistry, government, and biology. Each session involved from 8 to 32 subjects. Subjects 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). 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 ( $100\text{ECU} = 10\text{USD}$ ). 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 the recipient's expected value is identical). A risk-averse dictator with preferences based on ex ante comparisons would give less in *T2* than in *T1* if he is interested in efficiency (e.g., the sum of certainty equivalents), but might give more if considering the minimum of certainty equivalents. 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. 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 less giving in *T2* than in *T3*.



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

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

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  $x^{T4} = 50$ .<sup>3</sup>

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 *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  $100 - x/2$

---

<sup>3</sup> 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*.

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.

#### 4. Experimental Results

The results on the dictators' choices and the recipients' expectations are summarized in Table 2 and 3. They 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 less 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. 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: 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. 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 these expectations with the actual choices, we see that expectations and choices 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, in extensions of the current dictator game to an

ultimatum game context, for example, wrong expectations could 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 the first evidence on these questions.

In particular, we address the issue 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. By providing

the first evidence on how such uncertainties might affect the propensity of people to give up consumption in order to benefit others, our experimental results can have a significant impact on how policy makers perceive these situations.

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, it appears worthwhile to explore how downside versus upside risk affects behavior or how the availability of insurance options change transfer decisions. We leave those questions to future research.

## References

Andreoni, J. (1990). Impure altruism and donations to public goods: A theory of warm glow giving. *The Economic Journal*, 100, 464-477.

Andreoni, J. and B.D. Bernheim (2009), Social Image and the 50-50 Norm: A Theoretical and Experimental Analysis of Audience Effects. *Econometrica*, 77, 1607-1636.

Benabou, R., and J. Tirole. (2006). Incentives and prosocial behavior. *The American Economic Review*, 96(5), 1652-1678.

Bohnet, I., F. Greig, B. Hausmann, and R. Zeckhauser (2008). Betrayal aversion: Evidence from Brazil, China, Oman, Switzerland, Turkey, and the United States, *American Economic Review*, 98, 294-310.

Bohnet, I. and R. Zeckhauser (2004). Trust, Risk, and Betrayal, *Journal of Economic Behavior and Organization*, 55, 467-484.

Bolton, G. E., Brandts, J., and Ockenfels, A. (2005). Fair procedures: Evidence from games involving lotteries. *Economic Journal*, 115, 1054–1076.

Bolton, G. E., and A. Ockenfels. (2000). A theory of equity reciprocity and competition. *American Economic Review*, 100, 166-193.

Bolton, G. E., and A. Ockenfels. (2010). Risk taking and social comparison, *American Economic Review*, forthcoming.

Camerer, C. (2003). *Behavioral Game Theory: Experiments on Strategic Interaction*. Princeton, NJ: Princeton University Press.

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

Cox, J. C., & Deck, C. A. (2005). On the nature of reciprocal motives. *Economic Inquiry*, 43(3), 623–635.

Dana, J., R.A. Weber and J. Xi Kuang (2007). “Exploiting moral wiggle room: experiments demonstrating an illusory preference for fairness”, *Economic Theory* 33, 1432-0479.

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

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

Grant, S. (1995). Subjective probability without monotonicity: or how Machina’s mom may also be probabilistically sophisticated. *Econometrica*, 63, 159-189.

Machina, M. (1989). Dynamic Consistency and Non-expected utility Models of Choice under Uncertainty. *Journal of Economic Literature*, 27, 1622-1668.



## 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	StD 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	StD 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	StD 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%, 10%) 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)

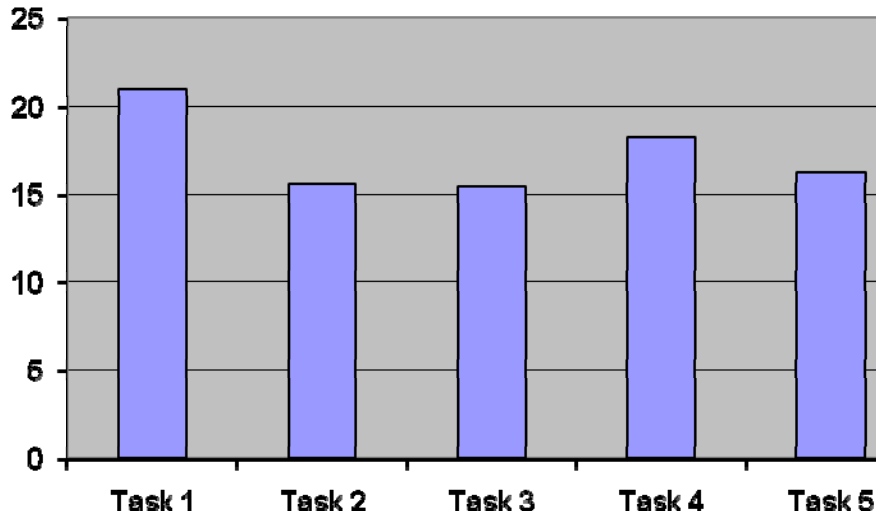
Standard errors in brackets. \*\*\* (\*\*, \*) indicates significance at 1% (5%, 10%) level.

**Table 8.** Summary statistics of people contributing a positive amount across all tasks

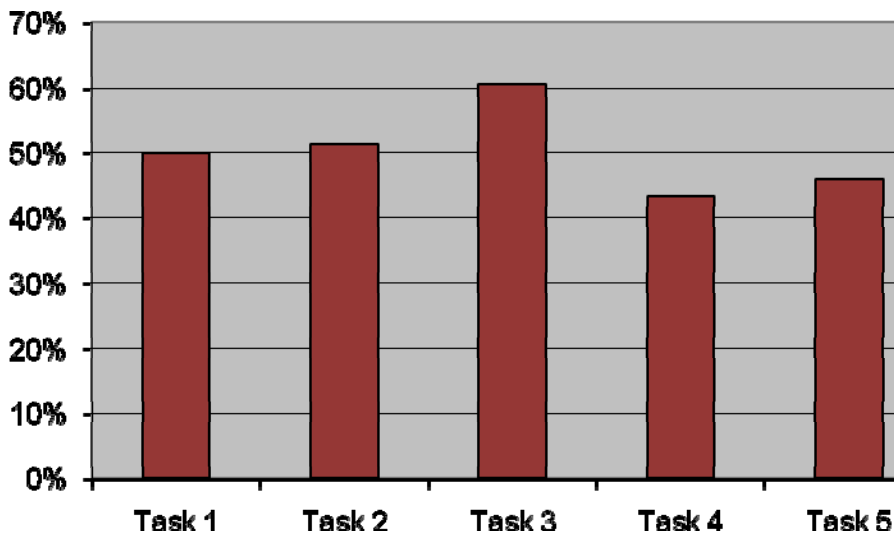
	Number of subjects	Mean of choices	StD of choices	Number of subjects with $0 < x < 50$	Number of subjects with $x = 50$	% of subjects with $x = 50$	% of subjects with $0 < x < 50$
T1	20	43.80	24.26	8	10	40%	50%
T2	20	34.60	20.47	13	5	65%	25%
T3	20	27.75	17.23	15	5	75%	25%
T4	20	40.30	23.86	9	8	45%	40%
T5	20	39.90	19.61	9	8	45%	40%
T6	20	48.75	25.07	9	6	45%	30%

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

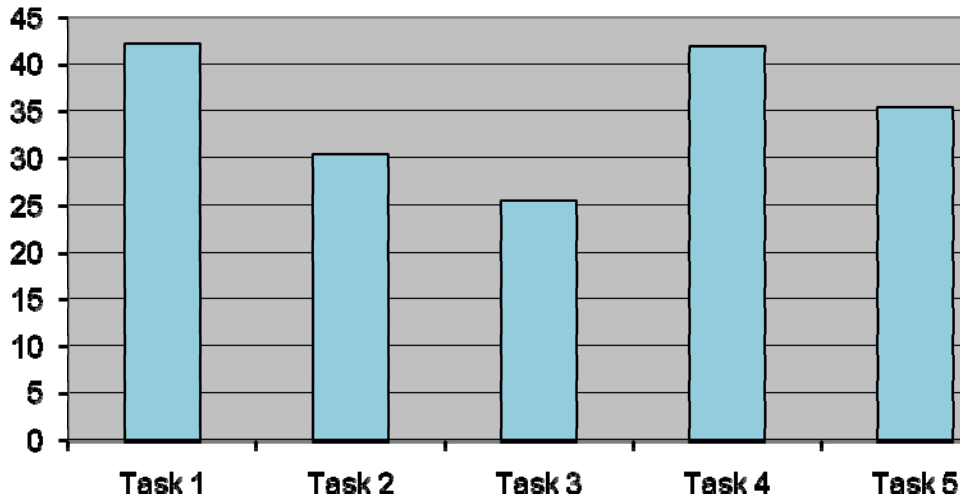
**Figure 1:** *Average contribution by task*



**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

