Other-Regarding Preferences and Giving Decision in Risky Environments: Experimental Evidence

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MICKAEL BEAUD[†], MATHIEU LEFEBVRE[‡] AND JULIE ROSAZ[§]

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This paper investigates if and how other-regarding preferences governing giving decisions in dictator games are affected in risky environments in which the payoff of the recipient is random. We demonstrate that, whenever the risk is actuarially neutral, the donation of dictators with a purely *ex post* view of fairness should, in general, be affected by the riskyness of the recipient's payoff, while dictators with a purely *ex ante* view should not be. Our experimental data give weak empirical support to the purely *ex post* view of fairness.

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1 Introduction

In almost any situation, the decision to give is made under some uncertainty about the recipient. In particular, depending on various factors such as asymmetric information and transaction costs, it may be difficult or costly for donors to perfectly observe (both before and after the donation) the actual wealth conditions of the recipient. For instance, when giving to a charity, donors do not know exactly if their money will be spent for those in need. Though this uncertainty may affect the willingness to give. In one experiment, Eckel and Grossman (1996) observed that student subjects are more generous when they know their gift benefits an established charity rather than another anonymous student subject. Furthermore, people would be ready to devote resources to learn about the recipients of their gifts. Fong and Oberholzer-Gee (2011) showed that a third of student subjects are willing to sacrifice resources to know if the recipient is a disabled or a drug user, suggesting that the nature and the origin of the recipient's wealth conditions matter for many donors.

In the present paper, we use dictator games laboratory experiments *à la* Kahneman *et al.* (1986) to investigate if and how individual giving decisions are affected in risky environments in which the recipient's wealth is random. In the standard dictator game laboratory experiment, one anonymous subject – called the dictator – makes a one-shot division of an endowment (provided by some anonymous experimenters) between himself/herself and an other anonymous subject – called the recipient – who has to accept the division. The only modification that we brought to this design is that we give an endowment to both the recipient and the dictator (while keeping an additional endowment to be divided by the dictator) and we carefully manipulate the riskiness and the nature of the recipient's endowment as a treatment variable.

In all our treatments, the dictator has a riskless monetary endowment of €5 and, in addition, has to make the division of €10 between him/her and the recipient. Thus, the experimental monetary payoff of the dictator is given by

$$u^D = 15 - g \tag{1}$$

where $g \in \{0, 1, ..., 10\}$ represents his/her donation, that is the amount transferred to the recipient. In our first benchmark treatment (*T1* hereafter), the recipient has a riskless endowment of €5. The experimental monetary payoff of the recipient is given by

$$u^R = 5 + g \tag{2}$$

In our second treatment (*T2* hereafter), the recipient has a risky endowment taking either value €0 or value €10 with equal probability. Compared with *T1*, the recipient in *T2* has to bear an additive and actuarially neutral background risk - taking either value $-$€5 or value €5 with equal probability – affecting his/her experimental monetary payoff. The presence of this background risk, that is an exogenous risk which remains out of the control of both the dictator and the recipient, implies that the recipient's initial endowment is either greater (€10 $>$ €5) or smaller (€0 $<$ €5) than the one of the dictator. This contrasts with the previous situation in *T1* in which both the recipient and the dictator were endowed with €5 for sure. Thus, the experimental monetary payoff of the recipient in *T2* is a random variable, denoted $\widetilde{u}^R$, taking either value $u^R - 5$ or value $u^R + 5$ with equal probability. It is written as a lottery as

$$\widetilde{u}^R = \left(u^R - 5, \frac{1}{2}; u^R + 5, \frac{1}{2}\right) = \left(g, \frac{1}{2}; 10 + g, \frac{1}{2}\right) \tag{3}$$

with expected value

$$E\widetilde{u}^R = u^R \tag{4}$$

In a third treatment (*T3* hereafter), the recipient has the possibility to choose between the riskless endowment of €5 and the risky endowment taking either value €10 or value €0 with equal probability. Put differently, the recipient has to select either the riskless payoff function in (2) or the risky one in (3).

In all our treatments, the expected monetary payoff of the recipient is kept constant (equal to €5) and the information regarding the recipient's payoff is common knowledge. In particular, the dictator knows if the recipient's endowment is either riskless (as in *T1*) or risky (as in *T2*) and if this wealth condition is due to the choice of the recipient (as in *T3*) or to the choice of the experimenter (as in *T1* and *T2*).

The comparison of *T1* with *T2* allows us to observe the impact of the recipient's risk exposure on dictators' giving decisions. The comparison of *T3* with *T1* and *T2* yields observations of the impact of the origin of the recipient's risk exposure on dictators' giving decisions.

This paper is thus closely related to the literature on the effect of different endowment in dictator games but it is also related to some recent studies on giving in the presence of risk. By giving an endowment to both the recipient and the dictator, Korenok *et al.* (2012) have shown that the inequality in the distribution of endowments is a key determinant of the dictator's transfer, which typically decreases as the recipient's endowment increases and becomes closer to the one of the dictator. Chowdhury and Jeon (2014) have also pointed out the existence of a pure income effect such that when the common endowment of the dictator and the recipient increases, the dictator's transfer increases monotonically.

On the other hand, Bolton and Ockenfels (2010) designed an experiment in which a subject selects between a safe option and a risky option. In one treatment, the choice of the subject only impacts his/her own payoff, and in the others treatments, it is taken in a social comparison context where it also affects the payoff of another anonymous subject. They found that the safe option is chosen less frequently when it yields unfavorable inequality, and that *ex post* inequalities that may result from the choice of the risky option have no impact. Cappelen *et al.* (2013) studied the fairness views about risk taking by also investigating the trade-off between a safe option and a risky option, and allowed for *ex post* distribution of the total earnings within anonymously paired subjects who were commonly informed about the choices and the outcomes for both of them. They found that the origin of inequalities, resulting either from differences in luck or differences in choices, matter for many subjects who agreed to eliminate inequalities resulting from differences in luck within pairs of risk-takers, but disagreed to eliminate those resulting from differences in choices.

In addition, many papers interested in individual view of fairness in risky environments have also used dictator games laboratory experiments where some risk affects the amount of the dictator's transfer to the recipient. An important question in this literature is about *ex ante* (procedural) and *ex post* (consequential) notions of fairness. Krawczyk and Le Lec (2010) looked at situations where the dictator had an option to share chances to win a prize with the recipient, and where either both the dictator and the recipient face riskless payoffs or both face risky payoffs. In the later case, they also introduced ‘competitive’ conditions where the dictator allocates mutually-exclusive chances to win a prize (i.e. one’s success implies the other’s failure) and ‘noncompetitive’ conditions where he/she allocates independent ones. Thus, they obtained two risky treatments and one riskless benchmark treatment to be compared. The authors demonstrated that dictators with a purely *ex ante* view of fairness should behave in the same way in all treatments, while dictators with a purely *ex post* view of fairness should not share any chance to win in the competitive risky treatment. They observed a significant fraction of subjects sharing chances to win in the competitive risky treatment (suggesting that models featuring a purely *ex post* view of fairness cannot explain the data), but sharing less than in the noncompetitive risky treatment (suggesting that models featuring a purely *ex ante* view of fairness cannot explain the data as well). They concluded that models intending to explain giving decision in risky environments should rely on a mix of *ex ante* and *ex post* views of fairness. Brock *et al.* (2013) have also shown that both *ex ante* and *ex post* fairness considerations explain decisions to give which finally ends to a reduction of transfers in risky environments. More recently, Cettolin *et al.* (2017) have introduced some actuarially neutral risk affecting the dictator’s transfer in a multiplicative way. They show that the presence of risk tends to decrease giving and that the dictators’ risk preferences are important determinants of their generosity under risk. Apart of fairness considerations, the dictator’s degree of risk aversion appears to be significantly and positively related to the amount transferred to the recipient.

In contrast with existing literature, we study cases where the risk is an additive background risk, that is an exogenous risk affecting the recipient’s payoff in an additive way and remaining out of the control of both the dictator and the recipient. Thus, in all our treatments, the endowment of the dictator and his/her transfer to the recipient are riskless. It is only the recipient’s endowment and, hence, his/her final payoff that may be risky. In addition, the background risk we introduce is actuarially neutral. Therefore, for any given value of the dictator’s transfer, the expected payoff of the recipient is kept constant among our treatments. This allows us to disentangle between *ex ante* and *ex post* views of fairness. Indeed, because the expected value of the recipient's payoff is kept constant in all our treatments, dictators with a purely *ex ante* view of fairness should not be affected by the background risk and no treatment effect should be observed. On the other hand, treatment effects should, in general, be observed for dictators with *ex post* concerns. Intuitively, the reason is that the presence of the background risk makes it impossible for dictators exhibiting *ex post* inequality aversion to equalize final payoffs or at least to achieve their preferred difference in final payoffs. For instance, if the dictator choose the equal split when the recipient is exposed to the background risk, then the dictator's final payoff will be €10, whereas the one of the recipient will be either €15 or €5, depending on the outcome of the background risk.

Our experimental data show no statistically significant impact of the recipient's risk exposure on dictators' giving decisions. This result appears to be robust to both the experimental design (within or between subjects) and to the origin of the recipient's risk exposure (chosen by the recipient or imposed to him/her), and it tends to give weak support to a purely *ex post* view of fairness among dictators. Furthermore, as in Cettolin *et al.* (2017), we find a significant and positive correlation between dictators' risk tolerance and their willingness to give. The paper is structured as follows. Section 2 presents some theoretical predictions regarding the optimal donation of the dictator. Section 3 describes the experimental procedure and the results. Section 4 concludes.

2 Theoretical predictions

The theoretical predictions regarding the dictator's optimal donation and how it would be affected by our treatment effects depend on the assumptions made about his/her preferences. Firstly, it is clear that the optimal donation of self-interested dictators would be zero whatever the payoff of the recipient. Therefore, all dictators with self-interested preferences would give zero in all our treatments.[1]

In contrast, dictators with other-regarding preferences may well donate positive

[1] Dictators with spiteful preferences would of course also give zero in all our treatments.

amounts and be sensible to our treatment effects by reacting to the riskiness of the payoff of the recipient. In this section, we consider that the dictator seeks to maximize a somehow general other-regarding preferences function that may exhibit altruism and/or inequality aversion. Following Brock *et al.* (2013), we show that the optimal donation of dictators with a purely *ex ante* (resp. *ex post*) view of fairness would be unaffected (resp. affected) by the presence of an additive and actuarially neutral background risk affecting the payoff of the recipient. Therefore, we predict that dictators with a purely *ex ante* view of fairness should not be affected by our treatment effects while, in general, dictators with a purely *ex post* view of fairness should be.

2.1 Dictator's other-regarding preferences : Altruism and inequality aversion

Let us start by considering the riskless treatment *T1*. The dictator is supposed to behave according to the following other-regarding preferences function which is a straightforward specification of the theories of impure altruism (Becker, 1974; Andreoni, 1989, 1990) and inequality aversion (Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000) applied to the dictator game:

$$V_{T1} = U\left(u^D, u^R, g\right) \tag{5}$$

The first two arguments u^D and u^R are defined by (1) and (2). They represent the utility of the dictator and the utility of the recipient, respectively.[2] In addition, the dictator and the recipient are supposed to be risk-neutral in the usual sense, i.e. they evaluate any random monetary payoff by its expected value. The third argument g is simply the amount transferred to the recipient, and represents the warm glow the dictator may get from his/her donation *per se*. In this framework,

[2] We assume that utilities are observable and comparable. Precisely, we assume that the dictator measures utilities by experimental monetary payoffs. Moreover, the experimental payoff of a subject may be interpreted as his/her *in-lab* utility. Of course, the *out-lab* utility of the recipient is not observed by the dictator who, however, knows that the recipient is another anonymous student subject so that the dictator may expect that the *out-lab* utility of the recipient is close to his/her own *out-lab* utility (at least on average).

the preferences function of the dictator is obviously supposed to be non-decreasing in each argument, and the degree of convexity of the indifference curves of the dictator between u^D and u^R is intended to capture his/her degree of inequality or difference aversion. More generally, the shape of the preferences function U of the dictator captures the way he/she aggregates his/her own utility u^D, the one of the recipient u^R, and the warm glow he/she gets form his/her gift g.[3]

In the benchmark riskless treatment *T1*, the optimal donation of the dictator is given by

$$g^*_{T1} = \underset{g \in \{0,1,\ldots,10\}}{\arg\max}\ V_{T1}. \tag{6}$$

Obviously, the model predicts that all dictators exhibiting a sufficiently strong degree of inequality aversion would unambiguously choose the equal split. Indeed, the equal split removes the difference in payoffs that the experimenters had arbitrarily introduced between the dictator and the recipient. In the same way, all dictators getting a sufficiently strong warm glow and/or exhibiting a sufficiently strong degree of pure altruism would choose positive donations.

2.2 Ex ante and ex post views of fairness

We now consider treatment *T2* where the recipient's endowment is affected by an additive and actuarially neutral background risk. We first consider the impact of the background risk on dictators exhibiting a purely *ex ante* view of fairness. Dictators with a purely *ex ante* view of fairness would simply consider the *ex ante* expected value of the random payoff of the recipient. Therefore, they would seek to maximize the following preferences function aggregating *ex ante* payoffs:

$$V_{T2}^{\textit{ex ante}} = U\left(u^D, E\widetilde{u}^R, g\right) = V_{T1}. \tag{7}$$

[3]The present theoretical model is intended to be tested through (empirical) experiments. Thus, our approach is positive and we do not discuss the normative point of how the preferences of the dictator should be. Put differently, we do not adopt a social welfare point of view. However, another possible interpretation of the same formal model is that the dicator is a social planner and that U is a social welfare function, or that the dictator is an individual behind the veil of ignorance regarding his/her payoff (u^D or u^R).

Because the background risk is actuarially neutral, as observed in (3), the preferences function of dictators with a purely *ex ante* view of fairness remains exactly the same with or without background risk. As a result, their optimal donation would be unaffected by the riskiness of the recipient's payoff and no difference should be observed between the risky treatment *T2* and riskless benchmark treatment *T1*:[4]

$$g_{T2}^{*\,\textit{ex ante}} = \underset{g\in\{0,1,\ldots,10\}}{\arg\max}\, V_{T2}^{\textit{ex ante}} = g_{T1}^{*}. \tag{8}$$

On the other hand, dictators with a purely *ex post* view of fairness would take into account, separately, the two equiprobable final payoffs distributions depending on the outcome of the background risk, and would seek to maximize the following preferences function aggregating *ex post* payoffs:

$$V_{T2}^{\textit{ex post}} = EU\left(u^D, \widetilde{u}^R, g\right) \neq V_{T1}. \tag{9}$$

Therefore, dictators with a purely ex post view of fairness would, in general, be affected by the the riskiness of the recipient's wealth. As a result their optimal donation in the risky treatment *T2* would differ from their optimal donation in the riskless benchmark treatment *T1*:

$$g_{T2}^{*\,\textit{ex post}} = \underset{g\in\{0,1,\ldots,10\}}{\arg\max}\, V_{T2}^{\textit{ex post}} \neq g_{T1}^{*}. \tag{10}$$

The presence of the background risk implies that dictators with an *ex post* view of fairness have to consider the two equiprobable possibilities that either the recipient's endowment will be greater (€$10 >$ €5) or smaller (€$0 <$ €5) than their own. This contrast with the previous situation in *T1* where the recipient and the dictator had the same riskless endowment (€5). For instance, if the dictator chooses the equal

[4] Assuming risk aversion to evaluate the recipient's utility would lead to a slightly different dictator's preferences function, and the associated dictator's optimal donation would therefore be affected. Indeed, denoting π as the risk premium of the recipient, the preferences function of the dictator would become $U\left(u^D, u^R - \pi, g\right)$, where $u^R - \pi$ represents the certainty equivalent of the recipient's random payoff $\widetilde{u}^R$. The background risk would thus be formaly equivalent to a sure loss. If the risk premium is sufficiently small, we may expect only a weak quantitative effect on the dictator's donation.

split in *T1*, then both the dictator and the recipient obtain €10 as final payoff. But if the dictator chooses the equal split in *T2*, then the dictator obtains €10 while the recipient obtains either €15 or €5 depending of the outcome of the background risk.

To illustrate the impact of background risk on the behavior of dictators with a purely *ex post* view of fairness, let us consider that the dictator behaves according to a preferences function *à la* Fehr and Schmidt (1999) exhibiting aversion to absolute difference between the dictator and the recipient final payoffs. In the present context, this piecewise linear preferences function would be increasing for $g \leq 5$ (advantageous inequality aversion) and decreasing for $g \geq 5$ (disadvantageous inequality aversion). As a result, such dictators would choose the equal split in the riskless treatment *T1* and both the dictator and the recipient would receive €10 as final payoff. Hence, we observe that the dictator would clearly be worst off if he/she doesn't move from the equal split when the recipient is exposed to the background risk in *T2*. This is because the dictator would suffer either from *ex post* disadvantageous inequality if the recipient's payoff is €$15 >$ €10 or from advantageous inequality if the recipient's payoff is €$5 < 10$€. Because the dictator cannot reduce both advantageous and disadvantageous inequality at the same time, if we assume that disadvantageous inequality is more harmful than advantageous inequality, then we can obviously predict that such dictators would reduce their donation (to reduce disadvantageous inequality) when the recipient is exposed to the background risk in *T2* compared to the riskless benchmark treatment *T1*.

It is important to note, however, that the above prediction regarding the negative impact of the background risk on donation is not a general results for inequality-averse dictators with a purely *ex post* view of fairness. For instance, we would obtain the opposite conclusion, i.e. a positive impact of the background risk on donation, for dictators with other-regarding preferences à la Bolton and Ockenfels (2000) exhibiting aversion to relative difference between the dictator and the recipient final payoffs. To see this, let us consider a sufficiently inequality averse dictator choosing the equal split in the riskless treatment *T1*. As above, we observe that the dictator would clearly be worst off if he/she doesn't move from the equal split when the recipient is exposed to the background risk in *T2*. This is because the dictator would suffer either from *ex post* disadvantageous inequality if his/her share is €$10/$€25 ($= 2/5 < 1/2$) or from advantageous inequality if his/her share is €$10/$€15 ($= 2/3 > 1/2$). As the dictator cannot reduce both advantageous (measured by $2/3 - 1/2 = 1/6$) and disadvantageous inequality (measured by $2/5 - 1/2 = -1/10$) at the same time, and because disadvantageous inequality is as harmful as advantageous inequality in this model, and because advantageous is higher ($1/6 > 1/10$) in case of equal split, then we can obviously predict that such dictators would increase their donation (to reduce advantageous inequality) when the recipient is exposed to the background risk in *T2* compared to the riskless benchmark treatment *T1*.

3 Experimental procedures and results

Our experiments consist of one-shot standard dictator games as presented in the introduction of this paper. In a first step we use a between-subjects design but, as it will be exposed below, we rely on a within-subject design as a robustness test of our results.[5]

3.1 Procedures

The difference between the treatments is about the potential riskiness of the recipient's endowment although its expected value remain constant among treatments. In the riskless treatment *T1*, the dictator knows that the recipient's endowment is €5. In the risky treatment *T2*, the dictator knows that the recipient's endowment is either €0 or €10 with equal probability. Recall that in treatment *T3* the recipient has to make a choice between a certain endowment (a case that we call $T3_c$ hereafter) or a risky endowment (a case that we call $T3_r$ hereafter). This is common knowledge. Therefore, in treatment *T3,* before making his/her decision, the dictator knows the choice of endowment made by the recipient.

In addition to the dictator game, we elicited participants' risk attitude using a portfolio choice task in which the investor has to allocate some wealth between

[5] The instructions of both designs are presented in the appendix.

a safe and a risky asset (Gneezy and Potters, 1997; Beaud and Willinger, 2015). Subjects received €10 available for the the portfolio task. The safe asset has a riskless rate of return of 1 (the amount invested in the safe asset is simply secured) while the risky asset has a risky rate of return taking either value 0 (the amount invested in the risky asset is lost) or value 3 (the amount invested in the risky asset is tripled) with equal probability. Because the expected rate of return of the risky asset is strictly larger (equal to 1.5) than the one of the safe asset (equal to 1), the equity premium is positive (equal to 0.5). In this context, it is known that any expected utility maximizer and risk averse subject (with monotonic preferences) should invest a strictly positive amount in the risky asset and this amount should be greater for less risk averse subjects. Also, a risk neutral or risk seeking subject should invest the entire endowment of €10 in the risky asset.

We have also elicited dictators' beliefs about recipients' risk preferences by asking them to estimate the investment choice made by the other group member. This task is elicited in offering a €5 prize if they rightly evaluate the other's portfolio choice. At the end of each session, we also recorded individual demographic characteristics. At the end of the experiment, one of the two main tasks (dictator game or risk elicitation) was actually randomly drawn for payment.

Our experiments were conducted at the *Laboratoire d'Economie Expérimentale de Strasbourg* (LEES hereafter) of the University of Strasbourg. In total, 358 students took part in 16 sessions which corresponds to 179 dictator-recipient pairs. There were 57 dictator-recipient pairs in the 4 sessions of *T1* (42% of whom were female), 57 dictator-recipient pairs in the 5 sessions of *T2* (53% of whom were female) and 65 in the 6 sessions of *T3* (47% of whom were female). Average earnings were €13.4 with standard deviation €4.9. A session lasted on average 25 minutes.

3.2 Results

Summary statistics on the dictators choices are reported in Table 1 for each treatment. The table provides the average transfer (and standard deviation) as well as the proportion of dictators choosing the equal split (i.e. $g = 5$) and that of those who give nothing (i.e. $g = 0$). In our riskless benchmark treatment *T1*, the average transfer is €2.23 and the proportion of dictators who give nothing is 35%. Therefore, at least 65% of subjects feature other-regarding preferences. The proportion of those who choose the equal split is 18%. These observations are in line with the results from previous laboratory experiments on dictator games (Engel, 2011).

Table 1: Summary statistics of dictators decisions

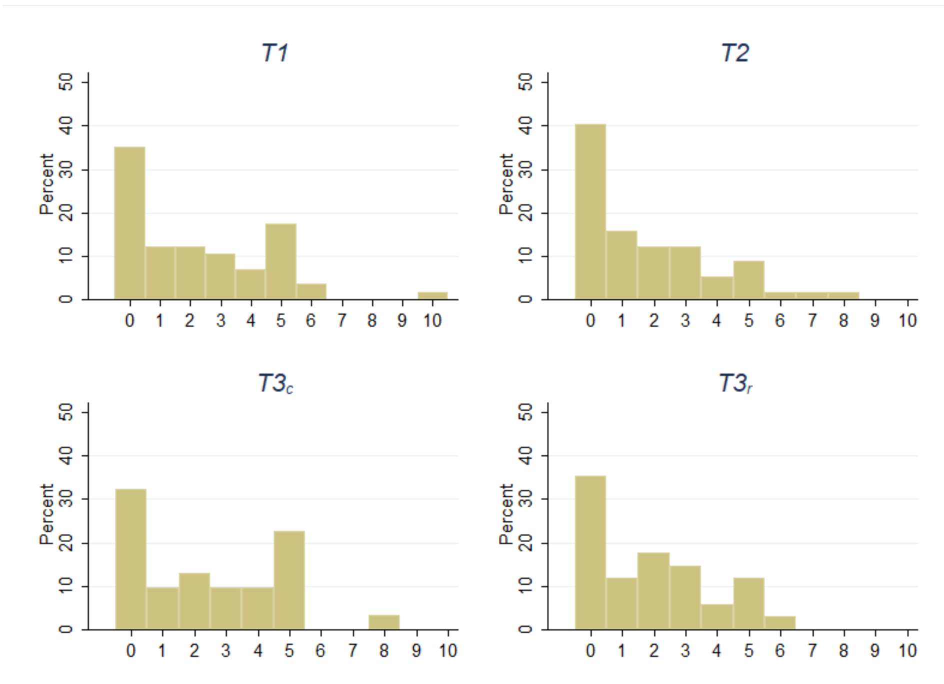
Treatment	*T1*	*T2*	*T3*		
Nature of the recipient's endowment	Riskless	Risky	Riskless	Risky	All
Number of dictators	57	57	31	34	65
Average transfer in €	2.23 (2.28)	1.79 (2.07)	2.42 (2.25)	1.91 (1.88)	2.16 (2.08)
% of dictators who gives €5	18	9	23	12	17
% of dictators who gives €0	35	40	32	35	34

Notes: Standard deviations in parentheses

In treatment *T2*, when the recipient's initial endowment is risky, the average transfer is lower than in *T1* and drops at €1.79. The proportion of dictators choosing the equal split falls at 9% and that of those who give nothing increases at 40%. However according to a two-sided Wilcoxon-Mann-Whitney rank-sum test (MW hereafter), the average transfers in the two treatments are not significantly different ($p = 0.313$). An Epps-Singleton non-parametric test (ES hereafter) on the hypothesis of the same distribution is not rejected ($p = 0.524$). We also observe no significant difference between *T1* and *T2* when we only compare the proportion of dictators who give zero or when we condition the sample on those who sent a positive amount.

When we look at the possibility for the recipients to choose the nature of their initial endowment in *T3*, there does not seem to have much difference with *T1* in the proportion of donors and the average amount given. But recall that among the recipients some have decided to receive the fixed amount of endowment and others have chosen the risky endowment. When we separate these two types of subjects and compare with the two first treatments, three important results emerge. First those who have voluntary chosen the risky endowment ($T3_r$) appear to receive less on average than those who received a fixed amount ($T3_c$) but the difference is not significant (MW: $p = 0.423$; ES: $p = 0.748$). Second there is no difference between the transfers made to those who receive a fixed endowment in *T1* and those who have chosen to receive a fixed endowment in $T3_c$ (MW: $p = 0.687$; ES: $p = 0.922$). Third there is also no difference between those who faced a risky endowment in *T2* and those who have actually chosen the risky endowment in $T3_r$ (MW: $p = 0.611$; ES: $p = 0.699$). There is also no difference regarding the proportion of dictators choosing the equal split and that of those who give nothing. These results are confirmed by Figure 1 which shows no important changes in the distribution of transfers between the four cases.[6]

Figure 1: Distribution of transfers by treatment and nature of the recipients' endowment



These results clearly contradict the possibility that the subjects made their decision based on a purely *ex post* view of fairness such that their preferences are based exclusively on final payoffs (i.e. after the resolution of the background risk). On the other hand, our observations are consistent with other-regarding preferences

[6]Except for the proportion of those equally splitting the endowment, but the differences between treatments are not significant.

exhibiting a purely *ex ante* view of fairness such that their preferences are based exclusively on expected payoffs (i.e. before the resolution of the background risk). This independently of how the risk comes into the picture.

In order to confirm these results, Table 2 reports regressions that explain the decision to give when controlling for several factors. Especially, we introduce as explaining variables the dictator's risk tolerance and the dictator's belief about the recipient's risk tolerance. We also control for gender, the field of study and the importance of religious aspect in daily life. In specifications (1)-(3) and (6), we report Tobit estimations of the determinants of the amount transferred to the recipient. In specification (4)-(5) and (7)-(8), we report Probit estimations of the determinants of the choice of an equal split and of the choice to give nothing to the recipient.

In column (1), we look at the effect of the risky endowment when it cannot result from the recipient's choice and we find no significant differences between treatments. There is also no significant effect of the dictator's risk tolerance on the amount transferred to the recipient, neither has the belief about the recipient's risk tolerance. In specifications (2)-(5) we test the difference between our three treatments. Specification (2) shows the same qualitative results as in (1). There is no significant difference between the three treatments. In specification (3) we control for the choice made by the recipient in *T3*. Here again while controlling for a series of factors, the choice made by the recipient does not impact the transfer made by the dictator. In specifications (4) and (5), we look at the treatment effect on the proportion of egalitarian behavior and purely selfish behavior. Table 2 shows no significant difference between treatments on the probability of splitting equally the endowment or to give nothing. There is also no effect of risk tolerance on the decision.

Interestingly, when we look at treatment *T3* alone, we observe an effect of the risk borne by the recipient on the transfer made by the dictator. If the recipient chooses the risky endowment, the dictator decreases his or her transfer. The probability to send zero amount is also increased in that case. Furthermore, we find a significant and positive effect of the individual degree of risk tolerance and a negative and significant effect of the belief on the recipient's risk tolerance on the amount sent. On the contrary, both effects are negative and significant on the probability to send zero. This tends to confirm the results obtained by Cettolin *et al*. (2017) that showed that giving is positively and significantly associated with risk seeking attitude when the recipient's wealth is risky. In our case this effect only appears when the dictator knows that the situation is actually due to the recipient's choice.

Table 2: Determinants of individual choices

Treatments:	*T1*,*T2*	*T1*,*T2*,*T3*				*T3*		
Dependent variable:	Transfer	Transfer	Transfer	Equal split	Zero sent	Transfer	Equal split	Zero sent
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
T2	-0.916	-0.782	-0.790	-0.502	0.203			
	(0.647)	(0.621)	(0.618)	(0.337)	(0.248)			
T3		-0.188	0.355	0.157	-0.149			
		(0.595)	(0.728)	(0.347)	(0.303)			
T3*risky endow.			-0.695	-0.324	0.126	-1.487	-0.783	0.945
			(0.715)	(0.367)	(0.292)	(0.677)	(0.523)	(0.466)
Risk seeking	-0.057	-0.000	0.003	0.038	-0.027	0.203	0.065	-0.140
	(0.113)	(0.082)	(0.081)	(0.043)	(0.033)	(0.101)	(0.084)	(0.069)
Other's risk seeking	0.090	0.115	0.138	0.038	-0.034	0.286	0.012	-0.185
	(0.118)	(0.087)	(0.088)	(0.046)	(0.036)	(0.115)	(0.088)	(0.076)
Constant	2.532	1.565	1.481	-1.356	-0.366	1.562	-0.161	-0.652
	(0.993)	(0.824)	(0.823)	(0.439)	(0.330)	(1.050)	(0.870)	(0.623)
N	114	179	179	179	179	65	65	65
Pseudo R^2	0.014	0.010	0.012	0.106	0.032	0.099	0.266	0.247

Notes: Standard errors in parentheses.

Specifications (1)-(4) report Tobit model and specifications (5)-(6) report probit models.

All regressions contain control for gender, field of study and religion importance.

3.3 Robustness test: within-subject design

The results so far show no effects of the background risk affecting the recipient's payoffs on the giving behavior of the dictator. It confirms previous observations by Brock *et al.* (2013) and Krawczyk and Le Lec (2010) that show that preferences based on purely *ex post* comparisons cannot explain giving decision under risk. However, both studies could not disentangle between *ex ante* and *ex post* views of fairness to their design. Brock *et al.* (2013) still observe that dictator's giving decision is affected by the recipient's exposure to risk. Which is not the case in our experiment.

In order to confirm our between-subject results we implement an additional experiment as a robustness test. The choices are exactly the same as before except that the treatments are implemented in a within-subject design. This experiment has the advantage to be comparable to previous studies that used within-subject design (Brock *et al.*, 2013; Krawczyk and Le Lec, 2010; Cettolin *et al.*, 2017). As in the between-subject experiment, in a first part, subjects are paired and one subject is the dictator while the other is the recipient. They play under the condition that the recipient's endowment is certain. In a second part, subjects where allocated to a new pair and the recipient's endowment is risky.[7] The endowment and the lottery are the same as before.

To account for possible order effect, we ran two treatments denoted $T_{1\text{-}2}$ and $T_{2\text{-}1}$. In $T_{1\text{-}2}$, subjects first played *T1* (the recipient's endowment is riskless) and then *T2* (the recipient's endowment is risky). The roles stay the same in the two parts. In $T_{2\text{-}1}$, subjects first play *T2* and then *T1*. Again, the roles stay the same in both parts of the treatment. For sake of comparability with the between-subject experiment, we elicited individual risk tolerance using the portfolio choice task, as well as dictators' belief about recipients' risk tolerance. To keep the potential gains similar in the two experiments, one of the three games was randomly chosen for payment.[8]

[7]We did not introduce the possibility for the recipient to choose between a certain and a risky endowment since we did not observe significant difference with the two first treaments in the between-subject design. It allows us also to control for order effects more easily.

[8]For details, see the detailed instructions in the appendix

The within-subject treatments were also conducted at the LEES. In total 132 students took part in 6 sessions which corresponds to 66 dictator-recipient pairs. They were 66 subjects in the 3 sessions of $T_{1\text{-}2}$ (66.67% of whom were female) and 66 in the 3 sessions of $T_{2\text{-}1}$ (54.55% of whom were female). Average earnings were €12.1 with standard deviation €5.9.

Table 3: Summary statistics of dictators decisions - within-subject design

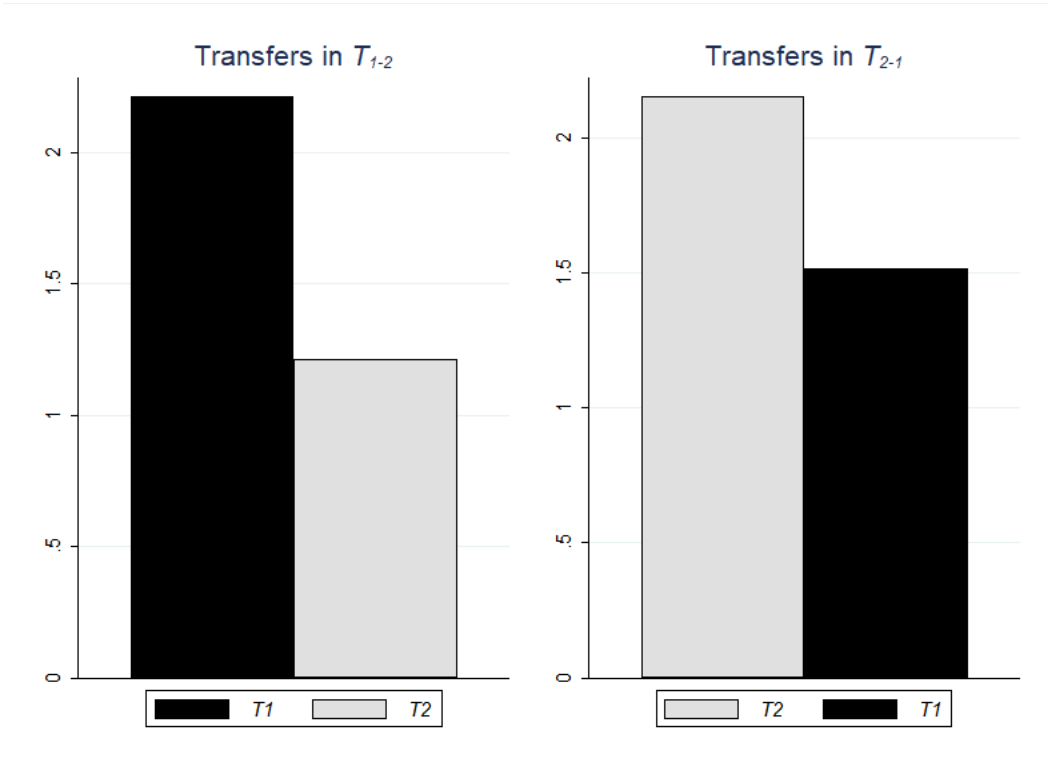
Recipient's endowment	*T1* Riskless	*T2* Risky
	Average transfer in €	
Total	1.86 (1.82)	1.68 (2.01)
$T_{1\text{-}2}$	2.21 (1.89)	1.21 (1.52)
$T_{2\text{-}1}$	1.51 (1.70)	2.15 (2.33)
	% of dictators who gives €5	
Total	17	14
$T_{1\text{-}2}$	24	6
$T_{2\text{-}1}$	9	21
	% of dictators who gives €0	
Total	35	45
$T_{1\text{-}2}$	24	45
$T_{2\text{-}1}$	45	45
Number of dictators	33	33

Notes: Standard deviations in parentheses

Figure 2 and Table 3 present the results. On average, we find no significant difference between the amount transferred in *T1* (€1.86) and *T2* (€1.68). When played first, *T1* and *T2* gives the same average amount sent to the recipient, €2.21 and €2.15 respectively. Also when they are played second, we observe a drop of the average amount transferred to €1.51 in *T1* and €1.21 in *T2*. There is no significant difference between *T1* and *T2* in both cases[9] but there is a significant

[9]There is no significant difference between *T1* and *T2* when both are played first (MS: $p = 0.579$; ES: $p = 0.110$). There is also no significant difference between *T1* and *T2* when both are played second (MS: $p = 0.569$; ES: $p = 0.501$).

Figure 2: Distribution of transfers by treatment - within-subject design



order difference for each *T1* and *T2*.[10] Interestingly, we observe well-known results for repeated dictator games where gifts tend to decline along the periods but we do not observe an effect of the nature of the recipient's endowment.

Looking at the percentage of dictators who choose the equal split or decide to send zero, we again find no significant difference between *T1* and *T2*, in total or taking into account the order they are played.

4 Conclusion

Several recent papers have been interested in studying social behavior in situations that involve risk. In particular, the question to know if and how individual giving

[10]For the same subjects, transfers are significantly higher in *T1* than in *T2* when *T1* is played first (Wilcoxon match-pairs signed rank test: $p = 0.005$). Similarly, transfers are higher in *T2* than in *T1* when *T2* is played first (Wilcoxon match-pairs signed rank test: $p = 0.023$).

decisions are affected when the donors do not know with certainty the wealth of the recipient is still open. In order to answer this question, it is necessary to understand how social or other-regarding preferences, in the presence of risk, are based on *ex post* comparisons of final payoffs or on comparisons of *ex ante* chances. In this paper, we provide new evidence that tend to give weak support to a purely *ex post* view.

In contrast with the previous literature, we study cases where the risk is an additive background risk that remains out of control of both the dictator and the recipient. By comparing situations in which the recipient's initial endowment is risky or not, and because in all situations the expected value of the recipient's payoff is kept constant, we can differentiate between *ex ante* and *ex post* view of fairness. Contrary to other studies, we do not find that giving behavior is the result of a mix of *ex ante* and *ex post* fairness, we find no statistically significant impact of the recipient's risk exposure on the dictators' giving decisions. It suggests that the behavior of most subjects is more consistent with an *ex ante* view of fairness than an *ex post* view. Moreover these results are robust to the use of a between-subject or a within-subject design, and to the origin of the recipient's risk exposure.

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Appendix: Instructions

For Online Publication.

This is a translation of the original French version.

Between-subject design: Instructions for the benchmark riskless treatment *T1*

You are about to participate in an experiment to study decision making. Please read carefully the instructions, they should help you to understand the experiment. All your decisions are anonymous. You will enter your choices in the computer in front of you.

The present experiment consists of two parts: "Part 1" and "Part 2". The instructions for the Part 1 are included herefater. The instructions for Part 2 will be distributed once everybody has completed Part 1. At the end of the experiment, one of the two parts will be randomly drawn for real pay. You will then be paid in cash your earnings in euros.

During the experiment you are not allowed to communicate. If you have questions then please raise your hand and one experimenter will come to you and answer your question in private.

In this experiment, there are two types of subjects (in equal number): player A and player B. You are randomly assigned a type for the entire experiment. It will be revealed privately before starting the experiment. You will be randomly paired to a player of another type than yours such that one player A is matched with one player B.

Part 1

At the begining of the game, each player, whatever his or her type, receives an endowment of 5 euros.

Additionally, players A have to share 10 euros between them and the players B they are paired with. The players A are free to send to the player B any amount between 0 and 10. The only compulsory limitation is that the amounts are integers (0, 1, 2, etc.). Players B have no decision to make.

The earnings for each type of players are the following:

- Player A's earnings: 5 euros + (10 euros - the amount sent to player B).
- Player B's earnings: 5 euros + the amount received from player A.

Example 1 : If the player A sent 3 euros to the player B.

- Player A's earnings: 5 + (10 - 3) = 12 euros.
- Player B's earnings: 5 + 3 = 8 euros.

Example 2 : If the player A sent 5 euros to the player B.

- Player A's earnings: 5 + (10 - 5) = 10 euros.
- Player B's earnings: 5 + 5 = 10 euros.

Example 3 : If the player A sent 7 euros to the player B.

- Player A's earnings: 5 + (10 - 7) = 8 euros.
- Player B's earnings: 5 + 7 = 12 euros.

Part 2 (*given at the end of Part 1, identical for all treatments*)

Part 2 is independent from Part 1.

In this part of the experiment, you receive an endowment of 10 euros. You must decide which part of this amount you wish to invest in a risky option. You can choose any amount (in integer only) between 0 and 10.

The risky option consists of a coin toss. The risky option will bring you 3 times the invested amount if Heads is drawn and 0 if Tails is drawn.

Your final earnings are equal to the amount kept + the earnings of your investment.

Examples :

1. If you decide to invest 5 euros, your earnings will be 20 euros if Heads is drawn (5 euros + 3*5 euros invested in the risky option) and 5 euros if Tails is drawn (5 euros + 0*5 euros from your investment in the risky option).
2. If you decide to invest 0 euro, your final earnings will be 10 euros whatever the result of the coin toss.
3. If you decide to invest 10 euros. Your final earnings will be 30 euros if Heads is drawn (0 euro + 3*10 euros invested in the risky option) and 0 euro if Tails is drawn (0 euro kept + 0*10 euros from your investment in the risky option).

To avoid calculations, the table below displays the earnings according to the amount invested in the risky option and the result of the coin toss.

Investment	Earnings	
	If Heads	If Tails
0	10	10
1	12	9
2	14	8
3	16	7
4	18	6
5	20	5
6	22	4
7	24	3
8	26	2
9	28	1
10	30	0

Between-subject design: Instructions of Part 1 for the risky treatment *T2*

Part 1

At the begining of the game, player A receives an endowment of 5 euros.

The endowment of player B is risky and depends on the result of a coin toss. If the result of the coin toss is Tails, player B has an endowment of 0 euro. If the result is Heads, player B receives an endowment of 10 euros. The result of the coin toss will be only known at the end of the experiment.

Additionally, players A have to share 10 euros between them and the players B they are paired with. The players A are free to send to the player B any amount between 0 and 10. The only compulsory limitation is that the amounts are integers (0, 1, 2, etc.). Players B have no decision to make.

The earnings for each type of players are the following:

- Player A's earnings: 5 euros + (10 euros - the amount sent to player B).
- Player B's earnings depend on the result of the coin toss:
  - If Tails, player B's earnings: 0 euros + the amount received from the player A.
  - If Heads, player B's earnings: 10 euros + the amount received from the player A.

Example 1 : If the player A sent 3 euros to the player B:

- Player A's earnings: 5 + (10 - 3) = 12 euros.
- Player B's earnings:
  - If Tails, player B's earnings: 0 + 3 = 3 euros.
  - If Heads, player B's earnings: 10 + 3 = 13 euros.

Example 2 : If the player A sent 5 euros to the player B:

- Player A's earnings: 5 + (10 - 5) = 10 euros.
- Player B's earnings:
  - If Tails, player B's earnings: 0 + 5 = 5 euros.
  - If Heads, player B's earnings: 10 + 5 = 15 euros.

Example 3 : If the player A sent 7 euros to the player B:

- Player A's earnings: 5 + (10 - 7) = 8 euros.
- Player B's earnings:
  - If Tails, player B's earnings: 0 + 7 = 7 euros.
  - If Heads, player B's earnings: 10 + 7 = 17 euros.

Between-subject design: Instructions of part 1 for the choice treatment *T3*

Part 1

At the begining of the game, player A receives an endowment of 5 euros.

Player B must make a choice between two alternatives:

- Choice 1: an endowment of 5 euros
- Choice 2: a risky endowment that depends on the result of a coin toss. If the result of the coin toss is Tails, player B has an endowment of 0 euro. If the result is Heads, player B receives an endowment of 10 euros. The result of the coin toss will be only known at the end of the experiment.

Player A and player B are informed about the choice (1 or 2) made by player B.

Additionally, players A have to share 10 euros between them and the players B they are paired with. The players A are free to send to the player B any amount between 0 and 10. The only compulsory limitation is that the amounts are integers (0, 1, 2, etc.).

The earnings for each type of players are the following:

- Player A's earnings: 5 euros + (10 euros - the amount sent to player B).
- Player B's earnings depend on the choice:
  - If player B made the choice 1, player B's earnings: 5 euros + the amount received from the player A.
  - If player B made the choice 2, player B's earnings depend on the result of the coin toss:
    - If Tails, player B's earnings: 0 euros + the amount received from the player A.
    - If Heads, player B's earnings: 10 euros + the amount received from the player A.

Example 1 : If the player A sent 3 euros to the player B:

- Player A's earnings: 5 + (10 - 3) = 12 euros.
- Player B's earnings depend on the choice:
  - If player B made the choice 1: 5 + 3 = 8 euros.
  - If player B made the choice 2, player B's earnings depend on the result of the coin toss:
    * If Tails, player B's earnings: 0 + 3 = 3 euros.
    * If Heads, player B's earnings: 10 + 3 = 13 euros.

Example 2 : If the player A sent 5 euros to the player B:

- Player A's earnings: 5 + (10 - 5) = 10 euros.
- Player B's earnings depend on the choice:
  - If player B made the choice 1: 5 + 5 = 10 euros.
  - If player B made the choice 2, player B's earnings depend on the result of the coin toss:
    * If Tails, player B's earnings: 0 + 5 = 5 euros.
    * If Heads, player B's earnings: 10 + 5 = 15 euros.

Example 3 : If the player A sent 7 euros to the player B:

- Player A's earnings: 5 + (10 - 7) = 8 euros.
- Player B's earnings depend on the choice:
  - If player B made the choice 1: 5 + 7 = 12 euros
  - If player B made the choice 2, player B's earnings depend on the result of the coin toss:
    * If Tails, player B's earnings: 0 + 7 = 7 euros.
    * If Heads, player B's earnings: 10 + 7 = 17 euros.

Within-subject design: Instructions for T_{1-2}

You are about to participate in an experiment to study decision making. Please read carefully the instructions, they should help you to understand the experiment. All your decisions are anonymous. You will enter your choices in the computer in front of you.

The present experiment consists of three parts: "Part 1" "Part 2"and "Part 3". The instructions for the Part 1 are included herefater. The instructions for Part 2 and Part 3 will be distributed once everybody has completed the previous part. At the end of the experiment, one of the three parts will be randomly drawn for real pay. You will then be paid in cash your earnings in euros.

During the experiment you are not allowed to communicate. If you have questions then please raise your hand and one experimenter will come to you and answer your question in private.

In this experiment, there are two types of subjects (in equal number): player A and player B. You are randomly assigned a type for the entire experiment. It will be revealed privately before starting the experiment.

Part 1

At the begining of the experiment, you are randomly paired to a player of another type than yours such that one player A is matched with one player B.

Each player, whatever his or her type, receives an endowment of 5 euros.

Additionally, players A have to share 10 euros between them and the players B they are paired with. The players A are free to send to the player B any amount between 0 and 10. The only compulsory limitation is that the amounts are integers (0, 1, 2, etc.).

Players B have an independent decision to take. They must give theirs opinion on the amount shared by the players A of their pair. This prediction has no impact on their payment.

The earnings for each type of players are the following:

- Player A's earnings: 5 euros + (10 euros - the amount sent to player B).
- Player B's earnings: 5 euros + the amount received from player A.

Example 1 : If the player A sent 3 euros to the player B.

- Player A's earnings: 5 + (10 - 3) = 12 euros.
- Player B's earnings: 5 + 3 = 8 euros.

Example 2 : If the player A sent 5 euros to the player B.

- Player A's earnings: 5 + (10 - 5) = 10 euros.
- Player B's earnings: 5 + 5 = 10 euros.

Example 3 : If the player A sent 7 euros to the player B.

- Player A's earnings: 5 + (10 - 7) = 8 euros.
- Player B's earnings: 5 + 7 = 12 euros.

Part 2 (*given at the end of Part 1*)

Part 2 is independent from the Part 1.

At the begining of this part, you are randomly paired to a player of another type than yours such that one player A is matched with one player B. The pair is different than the one you belonged to in Part 1.

Player A receives an endowment of 5 euros.

The endowment of player B is risky and depends on the result of a coin toss. If the result of the coin toss is Tails, player B has an endowment of 0 euro. If the result is Heads, player B receives an endowment of 10 euros. The result of the coin toss will be only known at the end of the experiment.

Additionally, players A have to share 10 euros between them and the players B they are paired with. The players A are free to send to the player B any amount between 0 and 10. The only compulsory limitation is that the amounts are integers (0, 1, 2, etc.).

Players B have an additional independent decision to take. They must give their opinion on the amount shared by the players A of their pair. This prediction has no impact on their payment.

The earnings for each type of players are the following:

- Player A's earnings: 5 euros + (10 euros - the amount sent to player B).
- Player B's earnings depend on the result of the coin toss:
  - If Tails, player B's earnings: 0 euros + the amount received from the player A.
  - If Heads, player B's earnings: 10 euros + the amount received from the player A.

Example 1 : If the player A sent 3 euros to the player B:

- Player A's earnings: 5 + (10 - 3) = 12 euros.
- Player B's earnings:
  - If Tails, player B's earnings: 0 + 3 = 3 euros.
  - If Heads, player B's earnings: 10 + 3 = 13 euros.

Example 2 : If the player A sent 5 euros to the player B:

- Player A's earnings: 5 + (10 - 5) = 10 euros.
- Player B's earnings:
  - If Tails, player B's earnings: 0 + 5 = 5 euros.

- If Heads, player B's earnings: 10 + 5 = 15 euros.

Example 3 : If the player A sent 7 euros to the player B:

- Player A's earnings: 5 + (10 - 7) = 8 euros.
- Player B's earnings:
  - If Tails, player B's earnings: 0 + 7 = 7 euros.
  - If Heads, player B's earnings: 10 + 7 = 17 euros.

Part 3 (*given at the end of Part 2*)

Part 3 is independent from the parts 1 and 2.

In this part of the experiment, you receive an endowment of 10 euros. You must decide which part of this amount you wish to invest in a risky option. You can choose any amount (in integer only) between 0 and 10.

The risky option consists of a coin toss. The risky option will bring you 3 times the invested amount if Heads is drawn and 0 if Tails is drawn.

Your final earnings are equal to the amount kept + the earnings of your investment.

Examples :

1. If you decide to invest 5 euros, your earnings will be 20 euros if Heads is drawn (5 euros + 3*5 euros invested in the risky option) and 5 euros if Tails is drawn (5 euros + 0*5 euros from your investment in the risky option).
2. If you decide to invest 0 euro, your final earnings will be 10 euros whatever the result of the coin toss.
3. If you decide to invest 10 euros. Your final earnings will be 30 euros if Heads is drawn (0 euro + 3*10 euros invested in the risky option) and 0 euro if Tails is drawn (0 euro kept + 0*10 euros from your investment in the risky option).

Investment	Earnings	
	If Heads	If Tails
0	10	10
1	12	9
2	14	8
3	16	7
4	18	6
5	20	5
6	22	4
7	24	3
8	26	2
9	28	1
10	30	0

To avoid calculations, the table below displays the earnings according to the amount invested in the risky option and the result of the coin toss.

Within-subject design: Instructions for T_{2-1}

The instructions are the same as for T_{1-2} except for the order of Part 1 and Part 2.