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Abstract Using a loss-framed variant of the dictator game, we investigate how dictators split a loss between themselves and a recipient. In a loss context, we try to disentangle the effects of a more self-oriented preference from that of a higher social responsibility. We find that in the loss context, individuals offer more, and women offer more than men. This could be attributed to a more responsible response to a powerless recipient in a loss context.

Key-words: dictator game, loss, loss aversion, own/other-regarding preferences, social responsibility.

JEL codes: C91, D03.

1. Introduction

Imagine a loving grandmother of two grandsons she cherishes. When around, she loves to search her pockets and offer them all 1 euro coins she finds, so they can buy candies. She puts money in her pockets on purpose to give to the elder, which he afterwards shares with his brother. He is the one who decides of how much he keeps and how much he gives to his little brother. This week, she had 20 euros in small coins to offer. But soon enough, she realized that she forgot all her other money at home and she needed 10 euros for the taxi to go back to her place. She asked the older grandson to give her 10 euros back. Now he has a different choice: whose euros should he give back: his, his brother's, or some of both? In economics, this situation is described by the dictator game. The dictator game (DG) is a traditional workhorse intended to measure generosity or altruism (since Kahneman et al. 1986). In short, in this game, a first player (the dictator) decides how to split an endowment (e.g., $10) between himself and a passive second player, who is a simple recipient of what is left. The rational prediction for the self-interested dictator is to keep all the endowment in order to maximize his/her payoff. Nevertheless, although this does happen for a sizeable fraction of dictators, a significant proportion gives away an amount worth up to 50% of the endowment (Engel, 2011). This is interpreted to show that individuals are inevitably influenced by other-regarding preferences such as altruism, fairness and reciprocity concerns (Fehr and Schmidt, 2006), which challenge the classical assumptions of rationality and selfishness.

Several variants of the dictator game have been studied, mainly to investigate the effects of various situational and geographical parameters (Engel, 2011; Brañas-Garza et al. 2017). In all these papers, individuals share money from the endowment (which can be considered as a gain from the experimenter). However, one point has not yet been addressed. Indeed, a very frequent real-life situation is the one where individuals are incurring losses (e.g., being stolen, being fired, providing mandatory contribution to a resources-consuming situation such as receiving refugees, or experiencing a financial crisis) and it seems crucial to understand how people behave in this kind of situation. Imagine a business suffering from the economic crisis and incurring a significant loss, due to circumstances independent of its business operations (e.g., loss of a contract with Russia because of the Ukrainian conflict). Suppose the CEO of a company has some discretion regarding how to split this loss between him and subordinates. What will he do? Transferring all the loss to his subordinates is an option, while sharing it with his subordinates is another. We can even imagine that the boss might decide to incur the whole loss and keep his subordinates unaffected. Another example would be the current refugees' crisis. With numerous refugees arriving in Europe, European governments decided to settle a specific number of refugees that could be welcomed for each country. As receiving refugees implies various costs to be assumed, this decision can mathematically be seen as a relative monetary loss sharing situation, since some European countries (especially last entrants) had the decision of European founders "imposed" upon them. Choices in these cases dramatically depend on the other-regarding preferences of individuals (in addition to the negotiation).

This specific question, of whether other-regarding preferences lead to similar results in the gain and in the loss domains has, to our knowledge, rarely been studied. Our contribution aims at filling this gap and addresses the following main issue: *how do individuals share in the loss domain? Does sharing a loss offset the effect of other regarding preferences?*

We therefore introduce in this paper a dictator game in the loss domain. In the traditional DG, the dictator shares an endowment received from the experimenter. In this sense, we are in the gain domain, i.e. the dictator shares earnings. We hereafter call this dictator game the gain-framed DG. In our variant, both the dictator and the recipient have an initial endowment and an external loss is incurred so that money has to be returned to the experimenter. The dictator decides how this loss will impact each of them, i.e. how to split the losses between them. We thereafter call our variant of the DG the loss-framed dictator game.

The remainder of the paper is structured as follows. Section 2 provides a short literature overview and formulates hypotheses. Section 3 describes the experimental strategy. Section 4 is devoted to results and discusses them. Section 5 concludes the paper and provides directions for further research.

2. Literature overview and hypotheses

As a reminder, the framing of decision situations has been found to impact both beliefs and behavior (see Ellingsen et al., 2012). The well-known Asian disease problem originally proposed by Tversky and Kahneman (1981) shows that the gain/loss context may have a dramatic impact on risk preferences, considered from a proper reference point. Since this original work, loss aversion as a behavioral tendency has been applied to numerous economic contexts as to explain inconsistent empirical behavior with expected utility theory (e.g., Herweg et al. 2010, Herweg and Schmidt. 2014). We build on the fact that losses loom larger than gains in lottery choices, and believe that it is perceptually different to split a certain amount of money in gain and loss contexts, even when the underlying outcomes and incentives are identical.

Splitting situations which are different from the traditional dictator game frame have been addressed over time. From those, three articles in the economic literature are close to our point since they somehow mix the splitting decision with the specificity of a loss frame.

First, in Antinyan (2014), the author has a close, yet very different question related to losses and other-regarding preferences of decision makers. He considers a scenario implemented on Amazon Mechanical Turk in which a dictator is faced with a story about a loss that has occurred to an endowment of money *before* he has to determine a hypothetical split. The paper shows that other-regarding motives of the dictators do not vanish when losses are introduced before the sharing decision. Nevertheless, our design differs on several dimensions: it has incentivized decisions, while Antinyan (2014) had hypothetical ones; the choice in Antinyan (2014) still showed how much of the remaining pie was given to the recipient, which is different from how much to take away, the question addressed here;

splitting a reduced endowment after incurring a loss and directly splitting a loss which is deducted from an initial endowment are different framings that are not likely to be equivalent from the behavioral perspective.

Second, List (2007) and Bardsley (2008), bring evidence from a modified version of the dictator game, the "taking" game, in which the dictator has to split money owned by the recipient. "The simple manipulation of the action set leads to drastic changes in behavior: many fewer agents are willing to give money when the action set includes taking". (List, 2007). The situation is similar to ours in that that money from another person has to be taken, however, our situation is symmetric (while the one in the taking game is not), since the Dictator has the possibility to take money both from him and the Recipient. The authors emphasize the role of the "situation" in decision making, and not only of preferences. "In the dictator game, the traditional action set invokes expectations of the givers and receivers that seemingly "demand" a positive gift, since a zero transfer is equivalent to being entirely selfish with money that an authoritative figure has just kindly endowed. In lieu of the fact that this same authoritative figure asks the subject if she would like to share the endowment, the wheels of motion for giving are set in place. By allowing choices that are not entirely selfish in the nonpositive domain, the social norms of the game change, providing the dictator with the "moral authority" to give nothing. In this spirit, subjects are using the contextual cues of the game to figure out which set of norms given in dictator games applies to the particular "problem at hand". (List, 2007)

Third, Buchan et al. (2005) compare behaviors in the ultimatum game depending on whether gains or losses are at stake. They find that both proposers' offers and receivers' demands are larger in losses than in gains. They also show that these results are robust across various countries (the U.S., China and Japan). In the ultimatum game, the behavior of the proposer may however be driven by a strategic reaction to a change in the receiver's behavior. Does the proposer offer more in the loss domain because he anticipates that the receiver will be more demanding or because he is intrinsically pleased to offer more? This is the reason why we investigate the effect of losses in a dictator game where strategic issues are absent.

Following Antinyan (2014), our main question is at the crossroads of two theoretical backgrounds. On the one hand, prospect theory (Kahneman and Tversky, 1979) suggests that losses loom larger than gains. The decrease of expected utility from a monetary loss is higher than the increase of expected utility derived from a similar monetary gain. Thus a dictator in the gain-framed DG, whose reference point is zero, will get a lower marginal utility from each monetary unit he allocates to himself than will the dictator in the loss-framed DG (whose reference point is the endowment). Moreover, a growing literature supports that agents in loss contexts tend to be more selfish (De Dreu et al., 1994, De Dreu, 1996, Poppe and Valkenberg, 2003) and less concerned with ethics than individuals in gain contexts (Kern and Chugh, 2009; Grolleau et al., 2016). Thus, due to loss aversion, we can expect the dictator to

be less generous in loss frames than in gain frames when splitting a monetary loss between the recipient and himself.[1]

Hypothesis 1: In a loss-framed DG the dictator is less generous than in a gain-framed DG.

On the other hand, the social exchange theory (Emerson, 1962; Blau, 1964) and resulting empirical studies (Greenberg, 1978) suggest that power imbalance can lead to feelings of social responsibility, bringing the more powerful person to act in a socially responsible manner, by sacrificing his own incomes in order to help powerless other(s). Handgraaf, Van Dijk and Vermunt (2008) stress that the fact that the recipient is powerless and easily exploitable in dictator games, could convince dictators to act pro-socially. There is some evidence that these social concerns are still present and may be even amplified in a loss-framed DG than in a gain-framed DG. For instance, in an ultimatum game, Buchan et al. (2005), Leliveld et al. (2009) and Zhou and Wu (2011) showed that unfair offers were perceived as being more unfair in the loss context than in the gain context by the recipients. In other words, "unfairness in losses looms larger than unfairness in gains" (Buchan et al., 2005). This could plausibly be explained by the fact that participants tend "to associate loss with "unfair" and gain with "fair"" (Zhou et al., 2011). This might lead to greater generosity in the field of losses, and would imply that in the loss-framed DG, the dictator should adopt a behavior intended to balance the loss effect with other-regarding preferences. In other words, on average, the dictator should be at least as generous as in the gain-framed DG.

Hypothesis 2: In the loss-framed DG, the dictator is at least as generous as in the gain-framed DG.

2. Experimental design and strategy

A total of 796 students participated in a laboratory experiment conducted in Besançon and Dijon (two close medium sized cities in the East of France) between December 2015 and January 2016. All participants were drawn from the same subjects' pool, i.e., undergraduate business students from the university of Bourgogne Franche-Comté. Subjects were recruited thanks to public announcement in classes and ads at the campus. We implemented a "two-treatments between-subjects" design, one for the gain-framed DG and one for the loss-framed DG. More precisely, 390 students participated in a gain-framed DG, and 406 students were assigned to a loss-framed DG. Attention was paid as to avoid any overlap between students from different sessions. In order to ensure that treatments were similar in

[1] We recently found a Phd thesis (Hillenbrand, 2016) presenting an experiment close enough to ours in the sense that the author also implements a game where an individual must decide how to share a loss between him and another person. However, in addition to all the other differences with our design (e.g binary choice, repeated game etc.), the game presented in this thesis is not strictly speaking a standard dictator game because the receiver has does not have a passive role. Indeed, he is the dictator of another person. Thus, in this experiment, the participant has to decide how to share a loss with another dictator, which will then do the same with another dictator, etc. Thus, social responsibility towards a powerless individual cannot be the motivation for giving. All individuals in this experiment have same power, which could explain in large part our differences in results. For more details, see Hillenbrand (2016), pages 41 to 62.

distribution by age, gender and region, students were recruited on a same procedure and only at their arrival they were randomly assigned to one of the treatments. The general sample is relatively gender balanced with 46% females and 54% males. One participant was involved in one single session (and thus in one single treatment). Participants were informed that on a random basis they either played the role of Dictator or the role of Recipient (labelled as Player A and Player B in the instructions). The experiment consisted of a one-shot decision and lasted for about 20 minutes. The average final payments of the experiment were € 7.36 for dictators and € 2.64 for recipients. All parameters of the experiment were common knowledge. The content and instructions for both treatments were identical in all respects, with the exception of the description of the gain and loss-framed DG. Participants were told that the pairings were anonymous; neither participant would ever know the identity of the other. Detailed experimental instructions are provided in Appendix 1.

Treatment 1: The gain-framed DG

A first player, the dictator, decides how to split an endowment *E* between himself and the second player. The second player (the recipient) has a passive role and can only accept the decision of the dictator, who can choose not to offer anything to him/her (the receiver will in this case have a null final gain) or on the contrary to give him a positive portion *x* of *E*. If the dictator seeks to maximize his/her payoff, he will not share with the recipient *(x* will be equal to *0)* and keep all the endowment *E*, otherwise the final payments are *E* - *x* for the dictator and *x* for the recipient.

Treatment 2: The loss-framed DG

Two players receive each an equal endowment of *E*. Nevertheless, they incur a general loss of *E* that has to be shared by the dictator between himself/herself and the recipient. The recipient has a passive role and can only accept the decision of the dictator. The dictator decides of the part *E-x* of the *E* loss he wants the recipient to incur, and the recipient finishes the game with *E* - (*E* - *x*) = *x;* the dictator incurs the remaining loss *x*, i.e. he finishes the game with *E* - *x*. If the dictator seeks to maximize his/her payoff, he/she will make the other player incurring the whole loss (E - *x* = *E*) and this will lead to a final payoff of *E* (0) for the dictator (recipient). In our experiment, for the sake of external relevance, we opted for *E* = 10 euros.

Mathematically speaking, the treatments are equivalent (final earnings are *E* - *x* and *x* respectively for the dictator and the recipient), they only differ in the framing associated to the sharing decision. In the gain-framed DG, the allocation that leaves the recipient with nothing has a label of zero, while the same allocation in the loss-framed DG is labeled –*E*. A dictator who takes into account the recipient's loss aversion will therefore expect a higher marginal utility of transfers in the loss frame than in the gain frame, and ceteris paribus may transfer more. On the other hand, transfers also represent a loss for the dictator himself in that frame. If we denote x_L, respectively x_G the amount the dictator decides to let to the recipient at the end of the game in the loss-framed, respectively the gain-framed DG, our

experiment seeks to estimate x_L relatively to x_G. Other-regarding preferences, such as altruism or inequity aversion may lead the dictator to generally prefer a less unequal sharing, but loss aversion can crowd-out other-regarding preferences in a loss-framed DG, leading him/her to make the recipient incurring a larger part of the loss (Hypothesis 1, therefore $x_L < x_G$). In contrast, social responsibility may induce the dictator to be as much, or even more generous in the loss-framed DG than in the gain-framed DG (Hypothesis 2, therefore $x_L \geq x_G$). By the means of our experiment, we provide empirical support to test these diverging theoretical predictions.

3. Results and discussion

The aggregate results are presented in Table 1 and Figure 1. Decisions in the loss-framed DG treatment are presented in terms of positive offers comparable to offers in the gain-framed DG treatment (for instance, a transferred loss of $E - x = 6$ euros corresponds to an offer of $x = 4$ euros).

Table 1: Mean offers by treatment

	Gain-framed DG (n = 195)	Loss-framed DG (n = 203)
Mean offer *x* (s. d.)	2.39 (2.20)	2.89 (2.09)
% of endowment *E* = 10	23.9%	28.9%

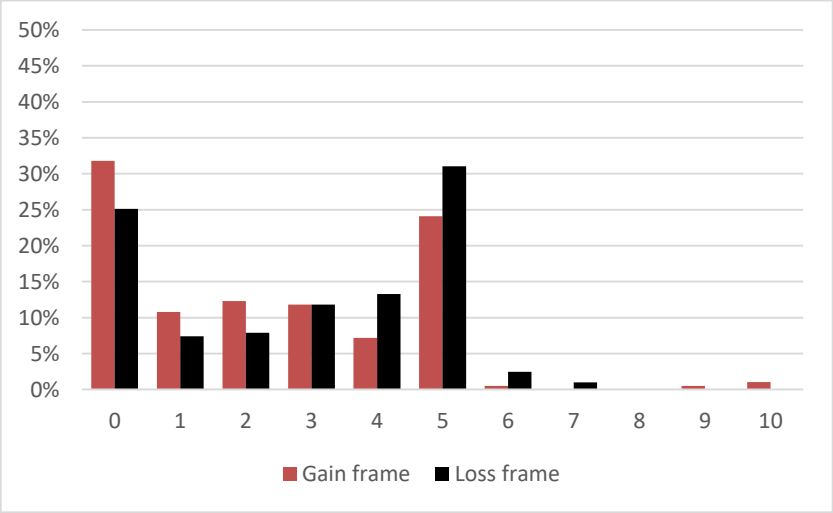

Fig.1 Distribution of offers to the recipient by dictators in the gain-framed and loss-framed DG

The average payoff of recipients in the gain-framed DG, i.e. 23.9% of the endowment (s.d., 22%) is not really surprising and is consistent with the standard literature result of an average donation equal to about 20%-30% of the endowment (Engel, 2011). In our experiment, this treatment serves as a control to make an insightful comparison with the loss-framed DG. The

average payoff of recipients in the loss-framed DG corresponds to a loss transfer of 71.1% of the endowment, which is equivalent to a donation of 28.9% of the endowment (s.d, 20.9%). Interestingly, dictators are significantly more generous in the loss-framed DG than in the gain-framed DG (T-test, p-value: 0.019, Wilcoxon Mann-Whitney, p-value: 0.013[2]). Figure A.1 in Appendix 2 allows us to easily see a more extreme selfish behavior of individuals in the context of gains than in the context of losses: the percentage of dictators leaving only 20% or less of the endowment to the recipient is 55% in the gain-framed DG, whereas it is only 40% in the context of losses. Hence, we reject the null hypothesis of same distributions in the two treatments. Hypothesis 2 is supported, while hypothesis 1 is not.

Result 1: Dictators are more generous in the loss domain ($x_L > x_G$).

In short, it seems that at the whole sample level, sharing a loss, instead of offsetting other-regarding preferences, slightly increases their effect… but is this pattern similar for women and men? Is there a gender effect present in the domain of losses? Several studies provide evidence that women tend to be more generous than men in the standard dictator games (Eckel and Grossman, 1998; Engel, 2011) and have a more empathic response than men (Mestre et al. 2009). Does this standard result extend to loss-framed situations?

To investigate the gender issue, we separated male and female dictators and examined the decisions of each subgroup (Figures 2 and 3).

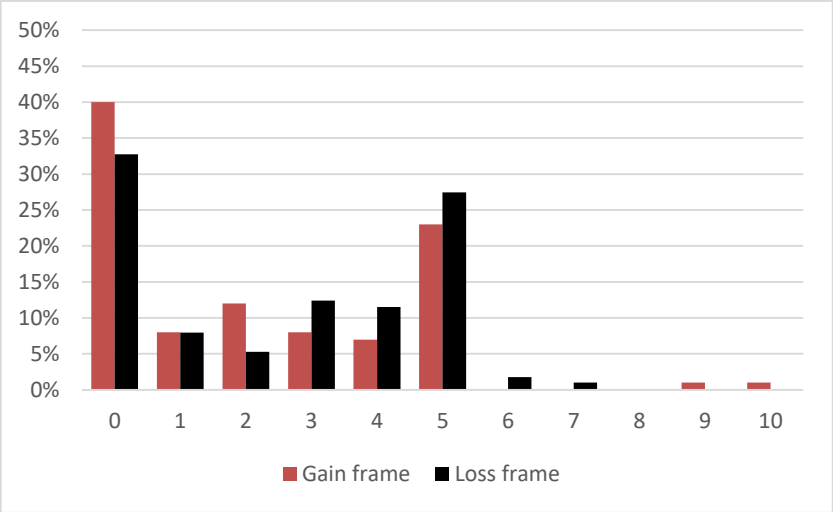

Fig.2 Distribution of offers to the recipient by **male** dictators in the gain-framed and loss-framed DG

[2] All tests are two-sided.

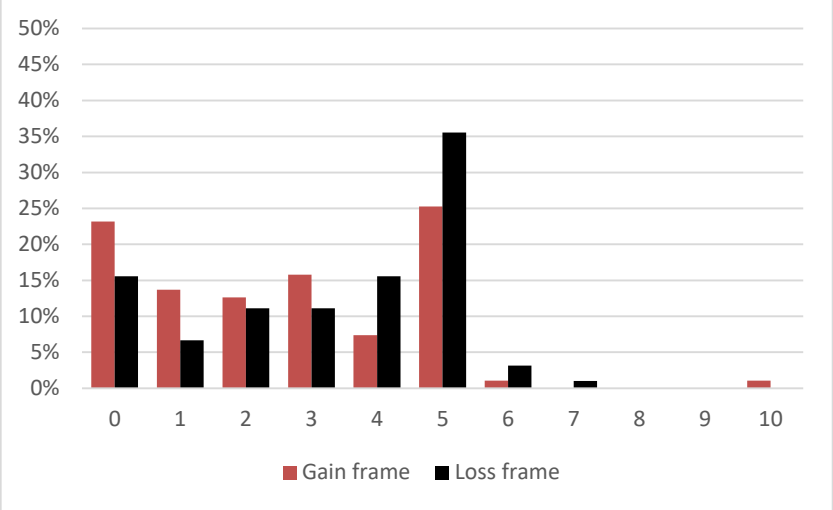

Fig.3 Distribution of offers to the recipient by **female** dictators in the gain-framed and loss-framed DG

According to Figure 2, most men either give nothing, or 50% of their endowment. Figure 4 provides a visual comparison of average offers per treatment and gender. The mean value of the donation represents 21.9% (s.d., 23%) of the endowment in the gain-framed DG and 25.6% (s.d., 21.6%) in the loss-framed DG. Despite the fact that men seem to adopt a more selfish behavior in the context of gains than in loss framed (see figure A.3 in Appendix 2, the share of male dictators leaving only 20% or less of the allocation to the recipient is 60% in the gain-framed DG, whereas it is 46% in the context of losses), the effect of the loss-frame is not significant for men (Mann-Whitney, p-value= 0.19). A linear difference in differences (DID) regression explaining the payoff of recipients confirms our previous observations. The framework for this analysis is the following model:

$$x_i = \alpha_0 + \alpha_1 loss_i + \alpha_2 woman_i + \alpha_3 loss_i + \alpha_4 loss_i \, x \, woman_i + \varepsilon_i \,,$$

where the dependent variable x_i, is the amount offered to the recipient or equivalently the recipient's payoff; $loss_i$ is a dummy treatment indicator equal to 0 in the gain-framed DG and to 1 in the loss-framed DG; $woman_i$ is a dummy gender indicator equal to 0 for men and to 1 for women; $loss_i$ x $woman_i$ is an interaction term; $\varepsilon_{it} \rightarrow N(0, \sigma_\varepsilon^2)$ is a residual error term. The model is estimated by using the Ordinary Least Squares method. Estimation results are reported in Table 2. The fact that the coefficient loss is not significant confirms that men (i.e. the effect of the loss framing for woman = 0) do not offer more in the loss-framed DG.

Table 2: Linear data regression explaining the offer to the recipient by treatment and sex variables

Variables	Coefficients
loss	0.377
	(0.198)
woman	0.409
	(0.181)
loss x woman	0.335
	(0.435)
Intercept	2.186***
	(0.000)
N	398
R^2	0.033
Prob > F	0.004

Notes: *** Denotes that parameter estimate is statistically significant at the 1% level, ** at the 5% level. p-values are in parentheses. 'Prob > F' tests the hypothesis that all coefficients excluding the constant are zero.

These findings lead to announcing a second result:

Result 2: Men are not more selfish in a loss-frame as compared to a gain frame.

Interestingly, a significant proportion of female dictators choses a 50-50 split, which may reflect a real aversion to inequality (Figure 3). Figure 4 shows that the mean value of donations is 25.9% (s.d., 20.7%) of the endowment in the gain-framed DG and 33.1 % (s.d., 19.4%) in the loss-framed DG. These results are consistent with the postulate suggested by Andreoni and Vesterlund (2001) that "men are more likely to be either perfectly selfish or perfectly selfless, whereas women tend to be 'equalitarians' who prefer to share evenly". Few women adopt the selfish behavior of men[3]. Moreover, from the Wilcoxon Mann-Whitney test, we find a positive and significant effect of loss on women (p-value= 0.012). This is again confirmed by the econometric regression (Table 2). We can estimate the marginal effect of the loss framing for women (i.e. when woman = 1) by computing loss + loss x woman. The estimated effect is 0.712** (p = 0.024), showing that women offer significantly more in the loss-framed than in the gain-framed DG. Thus, we can announce a third result:

Result 3: Women are more generous in a loss context than in a gain frame.

[3] Indeed, it may be noted that the share of men with selfish behavior (leaving 20% or less of the endowment) in the gain-framed DG is almost twice as high as the share of women with selfish behavior in the loss-framed DG (see Figures A.2 and A.3 in Appendix 2). Thus, a gender effect and a framing effect might be present.

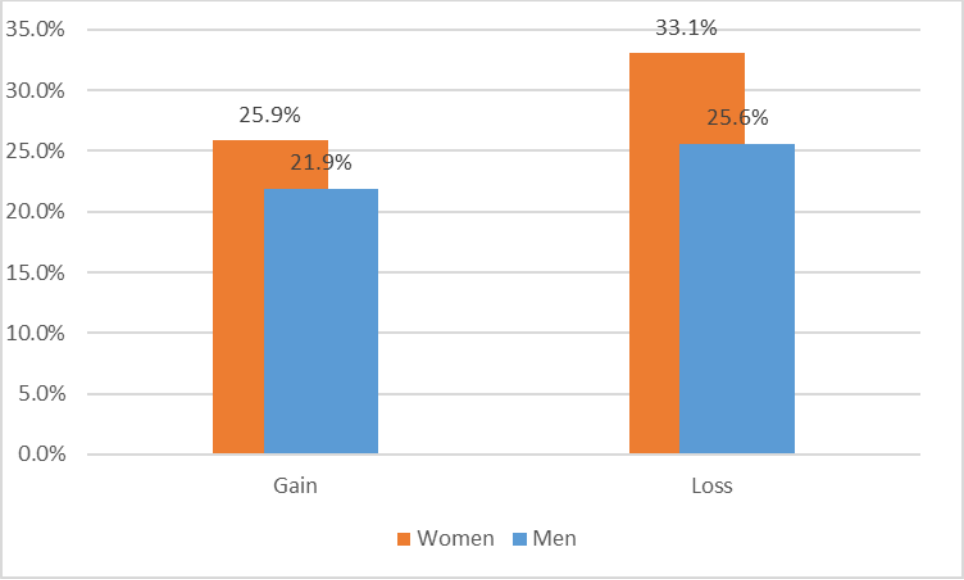

Fig.4. Average percentage of the endowment offered to the recipient by gender in the gain-framed and loss-framed DG

We find the standard result according to which women tend to be more generous than men in the gain-framed DG. However, this result is not significant (Mann-Whitney test, p-value: 0.09). This is also confirmed by the regression in Table 2 (the variable woman is not significant).

As for the loss-framed DG, the gender effect is significant (Mann Whitney, p-value: 0.013). This is again confirmed by the regression in Table 2. To see this, we compute the marginal effect of being a woman in the loss framing (i.e. when loss = 1) which is woman + loss x woman, equal to 0.744** (p = 0.014). Hence, women offer significantly more than men in the loss framed-DG. Thus, the result according to which women are more generous than men in a loss-framed DG is supported.

Result 4: Women are more generous than men in a loss context.

Why are men less affected by loss than women? According to several authors (e.g. Bolton and Katok, 1995, Eckel and Grossman, 1998, Engel, 2011), women tend to be more generous than men in a gain-framed DG. Moreover, Andreoni and Vesterlund (2001), Carlsson et al. (2005), among others, found that women tend to be more inequality-averse than men. Regarding the possible differential effect of a loss frame, some research supported that women tend to be more empathetic than men (e.g. Mestre et al., 2009, Toussaint and Webb, 2005, Macaskill et al., 2002, Gault and Sabini, 2000, Lennon and Eisenberg, 1987). Based on the prediction above that "unfairness in losses looms larger than unfairness in gains", we can infer that women dictators would adopt a more generous behavior, especially in the loss-framed DG, whereas for men the loss aversion prevails over other motives and leads to less generous offers, irrespective of the DG frame. It seems that for men, the two divergent specific effects of the loss context (i.e. loss aversion and a greater impact of social responsibility) tend to cancel out

each other, while for women, higher empathy (and thus other-regarding preferences) significantly prevails over loss aversion. Thus, women are more likely to give a higher donation in a context of losses than in the gain domain. An explanation could be either that men are less sensitive to social responsibility and are therefore less generous with a powerless recipient, or that men are more averse to losses than women.

5. Conclusion

Thanks to an original experimental design, we provided answers to two main research questions related to the generosity of dictators in a loss context (as compared to a gain one) and possible gender differences. We have shown that sharing decisions are dependent on framing. Indeed, the loss frame can provide all individuals in the dictator games (i.e. both dictators and recipients) with a perception that makes them feel entitled to the endowment received. Dictators could simply try to protect this entitlement, but they will also understand that recipients can be also attached to this entitlement. In other words, the endowment serves as a reference point that is higher than the reference point of participants in the gain frame, both for dictators (who want to keep the money) and for recipients (whom dictators want maybe not to hurt that much). Unlike the predictions of the prospect theory (unless prospect theory also applies to inequity aversion), dictators seem, on average, significantly more generous in a loss-framed DG than in a gain-framed DG. This could be due to the specific context of the dictator's game. Indeed, in this context, the dictator has all the power, and is therefore responsible for the wellbeing (or unhappiness) of the recipient. Admittedly, losing a certain amount of money has more impact on utility than earning the same amount, therefore, at first glance, we could think that the dictator is going to be less generous in the loss-framed DG than in the gain-framed DG. However, “unfairness in losses looms larger than unfairness in gains”, thus participants tend to associate loss with “unfair” and gain with “fair”, therefore, having someone lose a certain amount of money has more impact on our utility than having someone earn the same amount. Thus, the situation of the recipient is even less enviable in a loss context, which is quite intuitive. Our results are therefore in line with the conclusions of Buchan et al. (2005), Leliveld et al. (2009) and Zhou and Wu (2011). But investigating the effect of losses in a dictator game where strategic issues are absent allows us to say that the proposer offers more in the loss domain because he is intrinsically motivated to do it, not only because he anticipates that the receiver will be more demanding.

There are two divergent specific effects in action, but, according to our results, the net effect of social responsibility with respect to loss aversion is on average higher for women than for men: we observe that women’s offers are significantly larger in the loss context than in the gain context; for men, this difference exists but is not significant. It seems that the gender effect that has been found in the standard dictator game (see Eckel and Grossman, 1998, Engel, 2011) is even larger in the loss context. As Antinyan (2014) had pointed out from the article by Van Dijk and Vermunt (2000): "exploiting the powerless may be as easy as ‘stealing

candy from a baby,' but, like the actual theft of a baby's candy, increasing one's own outcomes at the expense of the powerless may be considered as an inappropriate act"… and we would be tempted to add "... especially for a woman". In fact, the gap in generosity between women and men seems to increase from the gain treatment to the loss treatment. Thus, we observe that sharing a loss has more impact on women than on men. Therefore, our results allow to extend the literature on gender effects to the context of losses: our observations are in line with the postulate of Andreoni and Vesterlund (2001), Carlsson et al. (2005) and many others, showing that women tend to be more socially-oriented than men. Indeed, much fewer women adopt the selfish behavior of men, and this is even truer in the loss domain. The most interesting result of this study (i.e. dictators' offers increase in the domain of losses, especially for women) would mainly come from a social preference rarely studied in experimental economics: social responsibility. In a context of losses, this should push us to think of a better manner to make individuals sensitive to losses, such as Adam Smith (1759) predicted: we cannot share "the misery of others" if not aware of it.

Our main finding seems relevant in several ways. First, it may help to identify circumstances under which people are more disposed to share equally with the others. Indeed, when individuals are in a situation framed as a possible loss from a reference point, they seem to be more likely to share losses equally as compared with a situation framed as a gain, which is good news for altruism in cases of disaster, for instance.

Second, a natural implication of our result for decision makers is to devote enough attention to gain–loss perception and to potentially unintended effects from framing: loss frames are clearly more efficient to enhance sharing.

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Appendix 1: Experimental Instructions

Instructions translated in English

The gain-framed treatment

Welcome!

In the following experiment, you will be matched with another participant on a random basis. One of the participants will be the labelled as 'Participant A' and the other will be labelled as 'Participant B'. The identity of participants will remain anonymous. You will never know the person with whom you were matched and he/she will never know who you are. There is not right or wrong answer. Only your decision matters.

An initial endowment of €10 is to be shared between Participant A and Participant B. However, only Participant A will decide how to split this money amount between the two participants. Participant B has no decision to take. She/he is just waiting for the decision of Participant A. The participants will be paid accordingly.

You are a participant A.

What amount of money do you allocate to Participant B (between €0 and €10)?

€_ _

Accordingly, the amount you keep for yourself is:

€_ _

Of course, the total amount must be equal to €10. Otherwise, your decision will not be reliable and cannot be applied.

Finally, please indicate your age: I am _____ years old and your gender: _____.

Thanks for your participation!

The loss-framed treatment

Welcome!

In the following experiment, you will be matched with another participant on a random basis. One of the participants will be the labelled as 'Participant A' and the other will be labelled as 'Participant B'. The identity of participants will remain anonymous. You will never know the person with whom you were matched and he/she will never know who you are. There is not right or wrong answer. Only your decision matters.

Each participant has an initial endowment of €10. However, on these €20 (sum of the endowment of Participants A and B), €10 must be returned. Either one of the two participants or both must return money to the experimenter. Nevertheless, only Participant A has to decide how to split the return, knowing that his/her decision will determine her/his payoff and the payoff of Participant B. The sum of these two amount(s) must be equal to €10. Participant B has no decision to take. She/he is just waiting for the decision of Participant A. The participants will be paid accordingly.

You are a participant A

How much do you take from the endowment of Participant B to return it to the experimenter (between €0 and €10)?

€_ _

What remains (10-taking on B's endowment) is the end payoff of Participant B.

How much do you take from your endowment to return it to the experimenter (between €0 and €10)?

€_ _

What remains (10-taking on A's endowment) is the end payoff of Participant A.

Of course, the total amount taken must be equal to €10. Otherwise, your decision will not be reliable and cannot be applied.

Finally, please indicate your age: I am _____ years old and your gender: _____.

Thanks for your participation!

Appendix 2: Additional figures

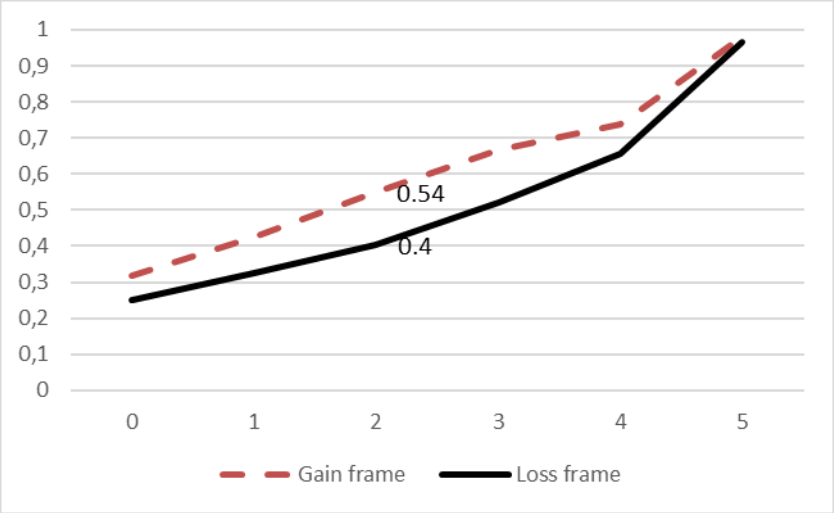

Fig.A.1 Cumulative frequencies of offers to the recipient by dictators in the gain-framed and loss-framed DG

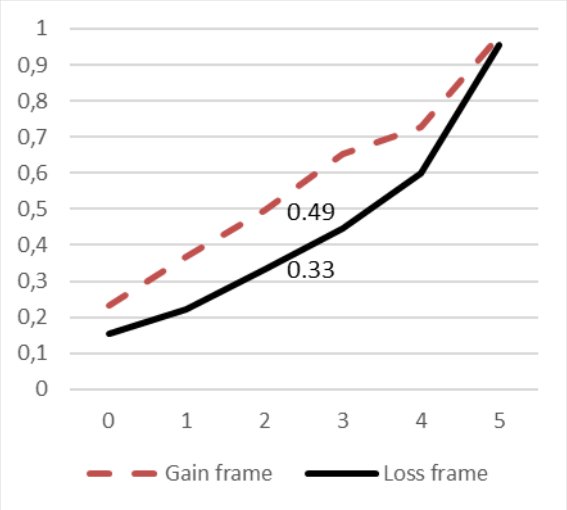

Fig.A.2 Cumulative frequencies of offers to the recipient by **female** dictators in the gain-framed and loss-framed DG

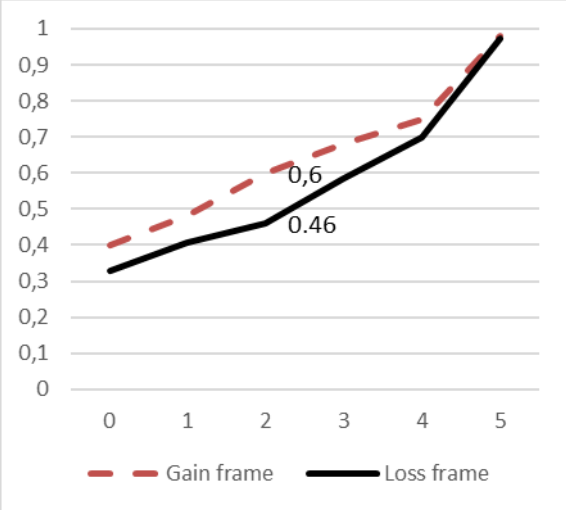

Fig.A.3 Cumulative frequencies of offers to the recipient by **male** dictators in the gain-framed and loss-framed DG