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Fairness in Economic Decision-making:

The Roles of Risk- and Social Preferences

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Abstract

There has been an ongoing debate on whether fair allocations in economic decision-making are based on strategic motives rather than true fairness. The current study examined some underlying factors, namely risk- and social preferences. A sample of 100 individuals ranging in age from 18 to 35 did the Dictator Game (DG) – without any risk of rejection, the Ultimatum Game (UG) Social and Non-social – with a risk of rejection leading to zero payoff, as well as the risk preference assessment. The results showed that individuals gave higher offers in the UG than in the DG, indicating strategic fairness. Risk-seekers gave lower overall offers, but gave higher offers in the UG – contrary to our prediction. Lastly, individuals gave higher offers in the social games (the DG and the UG Social) than in the non-social game (the UG Non-social), implicating a substantial role of social preferences in eliciting true fairness.

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Fairness in Economic Decision-making: The Roles of Risk- and Social Preferences

The traditionally accepted wisdom from behavioral economics is that humans are rational decision-makers who are merely interested in making the most of their personal profits (Camerer, Loewenstein, & Prelec, 2005). Nonetheless, findings from over two decades of experiments in economic behavior, have shown that the notion of humans as rational, self-interested agents may not hold. An invaluable tool in this research has been the Ultimatum Game (UG). The UG is a paradigm consisting of two players – a proposer and a responder. Given an amount of endowment (e.g. 20 points), the proposer must divide the amount he or she wants to keep and the amount offered to the responder. The responder can either accept the offer in which case he or she will receive the amount offered, or reject in which case both players will not receive any payoff. Based on the economic theory of self-interest, proposers would offer the lowest amount of the endowment, and responders would always accept offers regardless of the amount (Fehr & Schmidt, 2006). Quite the contrary, research conducted with different incentives across countries has shown that most proposers make offers between 40% and 60% (Oosterbeek, Sloof, & van de Kuilen, 2004), and that responders typically reject offers below 20% (Camerer, 2003; Nowak, Page, & Sigmund, 2000).

Although some researchers have emphasized that concern for fairness alone can explain the fair distributions (e.g. Camerer, 2003; Van Dijk, De Cremer, & Handgraaf, 2004; Van Dijk & Vermunt, 2000), other researchers have found that individuals make relatively fair offers not due to concern of fairness, but rather due to the perceived risk that lower offers are more likely to be rejected which leads to zero payoff (e.g. Ding, Ji, Chen, & Hitchman, 2014; Fellner & Güth, 2003; Straub & Murnighan, 1995). In other words, a fair distribution may imply strategic and self-interested behaviors of the proposer (Van Dijk et al., 2004). In turn, proposers are likely to

consider giving slightly selfish offers which are seemingly fair, as it is more profitable than a fair offer but somehow still acceptable (Chen, 2017). Rejections of unequal offers are perceived as costly punishment (e.g., Xiao & Houser, 2005). This “fear of rejection” hypothesis has found support in studies which demonstrated that individuals operate under self-serving fairness (e.g. Ding et al., 2014; Kagel, Kim and Moser, 1996). Therefore, a question was raised: Do individuals behave fairly because they purely have concerns for fairness towards others, or because they do not want to risk getting zero payoff – which again supports the notion that humans are merely self-interested agents?

The arguments have also been tested by utilizing the Dictator Game (DG) – in which there is no risk of rejected offers as the responder must accept the proposer’s offer. Forsythe, Horowitz, Savin, and Sefton (1994) compared the amount of offers proposers gave in the UG and the DG to test whether the fairness hypothesis held. Significant differences of offers in the UG and the DG – which were expected to be lower in the latter, indicated a selfish motive. On the other hand, identical distributions of fair offer in both games indicated individuals’ concerns for fairness. Instead of finding identical distributions, Forsythe, et al. (1994) found that proposers’ offers were significantly different between the two games, which were higher in the UG than in the DG. However, how proposers came to their final decisions to offer fairly and to what extent they deliberated on self-interested motives are still unclear (Chen, 2017). To tackle this, several fMRI studies have been conducted. One by Weiland, Hewig, Hecht, Mussel, and Miltner (2012) showed that proposers’ fair offers in the UG elicited a greater activation in the striatum – which was related to expectancy of rewards, relative to that of the DG. Furthermore, using a modified version of the UG in which proposers were given a binary choice of offers (i.e. fair offer and selfish offer), it was evidenced that proposers who chose a slightly selfish offer

over a fairer offer showed a greater activation in parts of the brain that signal higher gain and higher risk of rejection, namely anterior cingulate sulcus, anterior cingulate cortex gyrus, ventral tegmental area, and anterior insular cortex (Chen, 2017; Zheng & Zhu, 2013). These findings have supported the “fear of rejection” hypothesis that strategic motives rather than pure concerns for fairness underlie fair offers. In the current study, we investigated this by comparing proposers’ offers in the DG and in the UG similar to what was done by Forsythe, et al. (1994).

Other psychological traits have also been shown to influence human decision-making which diverges from economic ‘rationality’, such as risk preferences. The risk preference trait appears to be one of the factors that potentially explains proposers’ fear of rejection and consequently their offers. Risk-seeking individuals typically maximize to get above-average payoffs by taking higher risks (i.e. give lower offers), while risk-neutral and risk-averse individuals tend to play safer to avoid negative expected payoffs (i.e. give higher offers than risk seekers) for successful bargaining in the UG (e.g. García-Gallego, Georgantzís, & Jaramillo-Gutiérrez, 2012; Güth, Pull, Stadler, & Zaby, 2017). In the current study, we measured individuals’ risk preferences to see whether those who were not fond of risks gave higher overall offers. We also observed how the risk preference trait explained individuals’ offers in the DG where there was no risk of rejected offers, and in the UG where the risk occurred – if there was such a difference. We predicted that those with lower risk preferences gave higher offers in the UG than in the DG, which interval was higher than risk-seekers.

In contrast to risk preferences, pure concerns for fairness reflects social preferences (Wang, Li, Li, Wei, & Li, 2016). Linde and Sonnemans (2015) argued that findings in economic decision-making studies depend on whether individuals realize the responder was in fact a computer, as it can influence their social preferences and behaviors towards the responder.

Therefore, we analyzed how social preferences played a role in proposers' distributions by informing individuals before every session whether they would be playing with humans or computer lotteries. As far as we know, there are not many studies that compare proposers' allocations to humans relative to computer lotteries. Thus, we created a parameter dividing the games in the current study into social and non-social games. The DG and the UG Social were grouped as the social games, while the UG Non-social was the non-social game. In the social games, individuals were informed that they would be playing with real people who had already specified whether they would accept or reject every possible offer. Furthermore, individuals were told that the offers they make would affect those people's payoffs. In the non-social game, individuals were informed that they would be playing with generated computer lotteries with probabilities programmed to match human responses and that their offers would not affect the programmed responders' payoffs. Earlier research on economic decision-making has illustrated that fair distributions based on social preferences affect choices in interpersonal context even with the presence of risks (Leder & Betsch, 2016). Therefore, we estimated that the effect of elicited social preferences would lead to higher offers in the social games (i.e. the DG and the UG Social altogether) than in the non-social game (i.e. the UG Non-social). In other words, despite the likelihood of behaving based on a selfish motive (i.e. higher offers in the UG than in the DG), inducing social preferences might prompt concerns for fairness to some extent (i.e. higher offers in the social than in the non-social games).

Taken together, we aimed at testing how the traditional belief in economic rationality, or *Homo Economicus*, could explain individuals' decisions. We observed whether the presence of risks of rejection which potentially led to zero payoff drove individuals to behave more fairly. Moreover, we examined whether risk preferences as a psychological trait predicted decisions. In

accordance with Forsythe, et al. (1994) who found that fair offers were based on a strategic motive, we hypothesized that proposers would give higher offers in the UG than in the DG (Hypothesis 1). Testing the findings from earlier studies (i.e. García-Gallego et al., 2012; Güth et al., 2017), we expected lower risk preferences to go with higher overall offers (Hypothesis 2), and with higher offers in the UG than in the DG (Hypothesis 3). We also investigated how proposers behaved when it was explicit that they were playing with humans (i.e. social condition) relative to computer lotteries (i.e. non-social condition), congruent with the argument that inducing social preferences led to fairer behaviors (Leder & Betsch, 2016). Specifically, we predicted that proposers would give higher offers in the social games (the DG and the UG Social altogether) than in the non-social game (UG Non-social) (Hypothesis 4).

Method

Participants

This study was approved by the Ethical Committee for Psychology of Leiden University. Participants were 100 individuals with an age range between 18 and 35 years old ($M = 21.78$, $S.D. = 2.95$). Participation in the study was not restricted to students of Leiden University, although most participants were students of the university. The study sign-up was done either through the SONA system – an online study portal of Leiden University, or directly through the experimenters who handed out flyers of the current study in the university area. Participants chose to obtain either SONA credits (2 credits) to fulfil a course requirement, or a fixed amount of monetary compensation (€6.5) for participation in the study. They were also informed about the possibility of gaining extra cash up to €10 based on their decisions in the experiment, thus receiving maximally €16.5 in total.

Materials and Apparatus

Laptops utilized in the experiment were set with an open-source platform for experiments ‘*oTree*’ (Chen, Schonger, & Wickens, 2016). It comprised of 96 trials of the DG, the UG Social, the UG Non-social, as well as the one-trial risk preference assessment (Eckel & Grossman, 2002). All instructions were presented in English language.

Dictator Game (DG). Participants (i.e. proposers) initially got 20 monetary unit (MU) endowments (20 MU = €2.50). They had to offer either of two options– the lower option or the higher option to another individual (i.e. the responder). The decisions of the responders had been previously recorded to match current proposers’ offers. In the DG, proposers were informed that the responder would always accept their offers no matter how much they offered. In this game, each decision always affected the payment of the responder. Hence, we categorized the DG as a social game.

Ultimatum Game (UG). Proposers received 20 monetary unit (MU) endowments (20 MU = €2.50). Similar to the DG, they had to choose between two allocations per trial for the responder. However, while their offers would be either accepted or rejected, proposers did not know whether their offers were accepted or rejected. There were two categories in the UG: Social and Non-social. In the UG Social, proposers were informed that they were playing with real humans whose decisions had been previously recorded to match current proposers’ offers, and that each decision they made would affect responders. Along with the DG, the UG Social was categorized as a social game. In the UG Non-social, proposers were informed that they were playing with computer generated lotteries programmed to mimic real human’s behaviors, and that each decision they made would not affect responders. Hence, the UG Non-social was categorized as a non-social game.

Risk preferences. In the risk preference assessment as utilized in a similar study by Eckel and Grossman (2002), participants had to choose one of the six gambles. Each gamble had two possible outcomes, namely “Roll Low” or “Roll High” with specified probabilities of occurrence. For example, the first option (Gamble 1) was to roll low for a payoff of 28 MU (50% chance) versus roll high for a payoff of 28 MU (50% chance), the second option (Gamble 2) was to roll low for a payoff of 24 MU (50% chance) versus roll high for a payoff of 36 MU (50% chance), and so on until the sixth option (Gamble 6). The payoff differences between “Roll Low” and “Roll High” got more significant towards Gamble 6. Subsequently, participants specified which gamble they would like to choose, ranging from Gamble 1 to Gamble 6. While Gamble 1 indicated risk-neutral preferences, risk preferences increased towards Gamble 6. Therefore, the individual scores ranged from ‘1’ to ‘6’, in which higher scores indicated higher risk preferences. Their payments were also based on the options they chose, and on which of the outcomes occurred.

Procedure

Upon arrival, participants were given an information sheet and an explanation from the experimenters about the study. To participate in the study, participants had to fill in and sign an informed consent form. Afterwards, they entered a room with laptops set for use. For each participant, a new trial showed an identity code which became the participant’s identity for the rest of the study to anonymize the real identity. Participants were requested to read the instructions on the first page and filled in several questions related to the instructions they had read. This was aimed at testing participants whether they understood the instructions. Next, some participants did the UG Social followed by the UG Non-social, vice versa for other participants randomly assigned. Later, they played the DG and lastly, they did the risk preference assessment.

The program automatically calculated the total amount of extra money participants obtained based on their decisions throughout the tasks. Then, participants were given a debriefing sheet and received either the SONA credits or €6.5, as well as extra cash which differed per individual.

Results

Using IBM SPSS Statistics Version 24.0 (IBM Corp., 2015), a mixed random-intercept and fixed-slope regression model was formulated for a within-subject analysis. The outcome variable was the amount of MU proposers offered, based on two categorical and one continuous predictors: (1) The DG versus the UG (in which the UG Social and the UG Non-social were not distinguished) (2) The social games (the DG and the UG Social) versus the non-social game (the UG Non-social), and (3) Risk preference scores. Each main effect on the outcome variable was analyzed, including an interaction effect between the first categorical predictor (i.e. the DG versus the UG) and risk preference scores. For the parameter “DG vs. UG”, the DG was scored 0 and the UG was scored 1. For the parameter “Social vs. Non-social”, the non-social game (i.e. the UG Non-social) was scored 0 and the social games (i.e. the DG and the UG Social) were scored 1. Lastly, the parameter “Risk preference” comprised of individuals’ risk preference scores ranging from 1 to 6. The estimates of fixed effects are shown in Table 1.

Table 1

The estimates of fixed effects on the outcome variable “Offer”

Parameter	<i>B</i>	<i>SE</i>	<i>df</i>	<i>t</i>	<i>p</i>	95% CI
Intercept	7.99	.35	122.23	22.65	< .001	[7.29, 8.69]
DG vs. UG	1.07	.14	28663.01	7.49	< .001	[.79, 1.34]
Risk Preference	-.20	.10	113.55	-2.07	.04	[-.40, -.01]
DG vs. UG * Risk Pref.	.23	.04	28663.22	5.92	< .001	[.15, .31]
Social vs. Non-social	.62	.07	28663.01	9.17	< .001	[.48, .75]

Note. *p*-value is significant at the $p < .05$ level.

We hypothesized that proposers would give higher offers in the UG than in the DG (Hypothesis 1), and this hypothesis was confirmed. Playing the UG with the risk of rejection led to higher offers than playing the DG where there was no risk ($B = 1.07, t = 7.49, p < .001$). In line with Hypothesis 2, the overall amount of MU offered was negatively predicted by the risk-seeking trait, such that lower scores on risk preferences went with higher overall offers ($B = -.20, t = -2.07, p = .04$). We analyzed the role of risk preferences further by testing whether it could explain the finding which supported Hypothesis 1 (i.e. higher offers in the UG than in the DG). Although the trait determined the extent to which individuals allocated higher offers, we did not find any empirical support for Hypothesis 3 that lower scores on risk preferences went with higher offers in the UG than in the DG. Contrary to our prediction, we found a significant effect indicating that risk-seeking was positively related to offers in the UG ($B = .23, t = 5.92, p < .001$). Finally, we hypothesized that proposers would give higher offers in the social games (i.e. the DG and the UG Social) than in the non-social game (i.e. the UG Non-social) (Hypothesis 4). This hypothesis was confirmed, such that playing with real humans in the social games relative to playing with computer lotteries in the non-social game led to higher offers ($B = .62, t = 9.17, p < .001$).

The mean of proposers' allocations in the three games (i.e. the DG, the UG Social, and the UG Non-social) is depicted in Figure 1. Proposers gave the lowest offers in the DG ($M = 7.96, SD = 4.96$) followed by the UG Non-social ($M = 9.15, SD = 4.83$), and the highest in the UG Social ($M = 9.77, SD = 4.77$). We conducted a pairwise comparison for the three conditions, the results of which illustrated that proposers' offers were significantly higher in the UG Social than in the DG ($MD = 1.81, p < .001$) and in the UG Non-social ($MD = .62, p < .001$).

Furthermore, we found that proposers gave significantly higher offers in the UG Non-social than in the DG ($MD = 1.19, p < .001$).

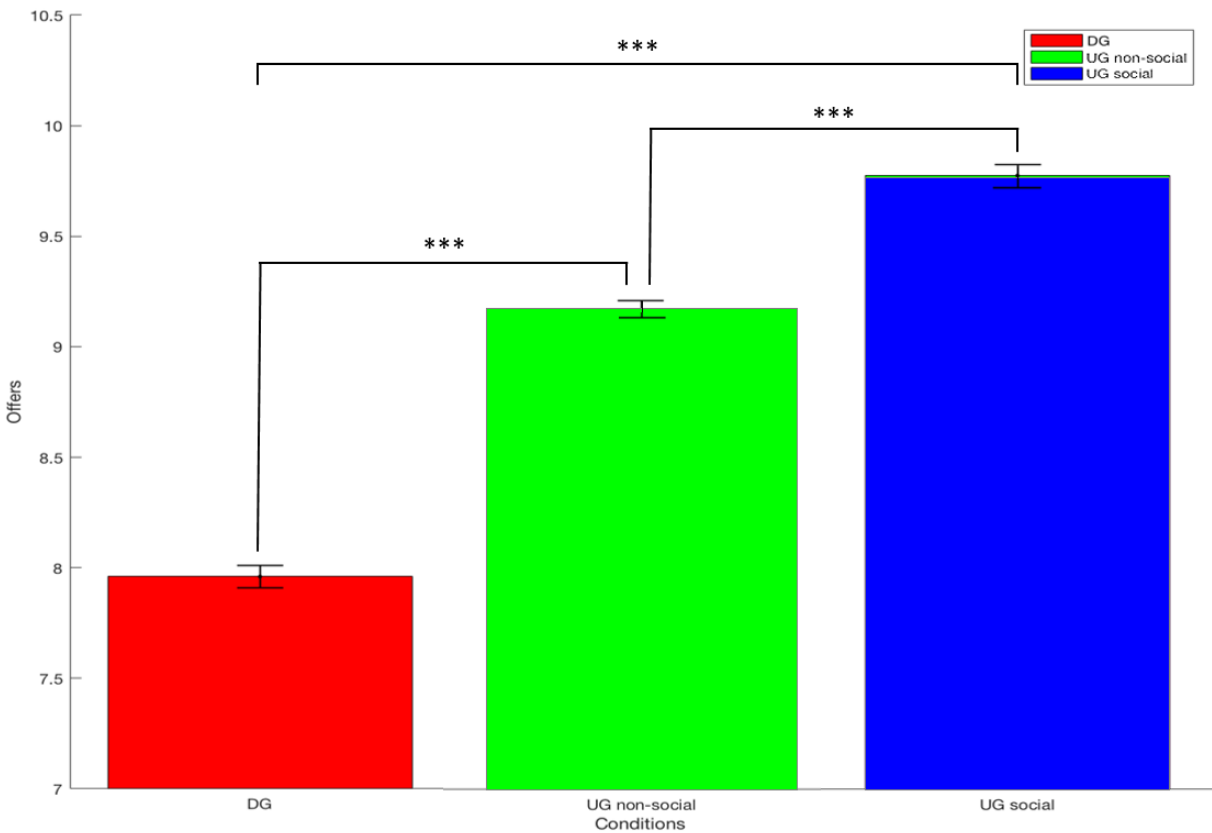


Figure 1. The mean of offers in the DG, the UG Non-social, and the UG Social (displayed mean $\pm .05$ SE). *** Different at $p < .001$.

Next, we conducted an additional analysis to support the main findings. Out of the two options per trial – the higher and the lower MU, we aimed to see how many times proposers chose the lower option to offer throughout the games. The results illustrated that the frequency of choosing the lower option for the responder differed significantly across the games, as depicted in Figure 2. Proposers chose the lower option most frequently in the DG which was 74.40% of the time. In the UG Non-social, the lower option was chosen 60.28% of the time. The game in which proposers chose the lower option for the responder least frequently was the UG Social, which was 52.53% of the time. Based on the pairwise comparisons, proposers chose the lower

option in the DG 14.12% of the time more frequently than in the UG Non-social ($p < .001$) and 21.87% of the time more frequently than in the UG Social ($p < .001$). Furthermore, we found that proposers chose the lower option 7.75% of the time more frequently in the UG Non-social than in the UG Social ($p < .001$).

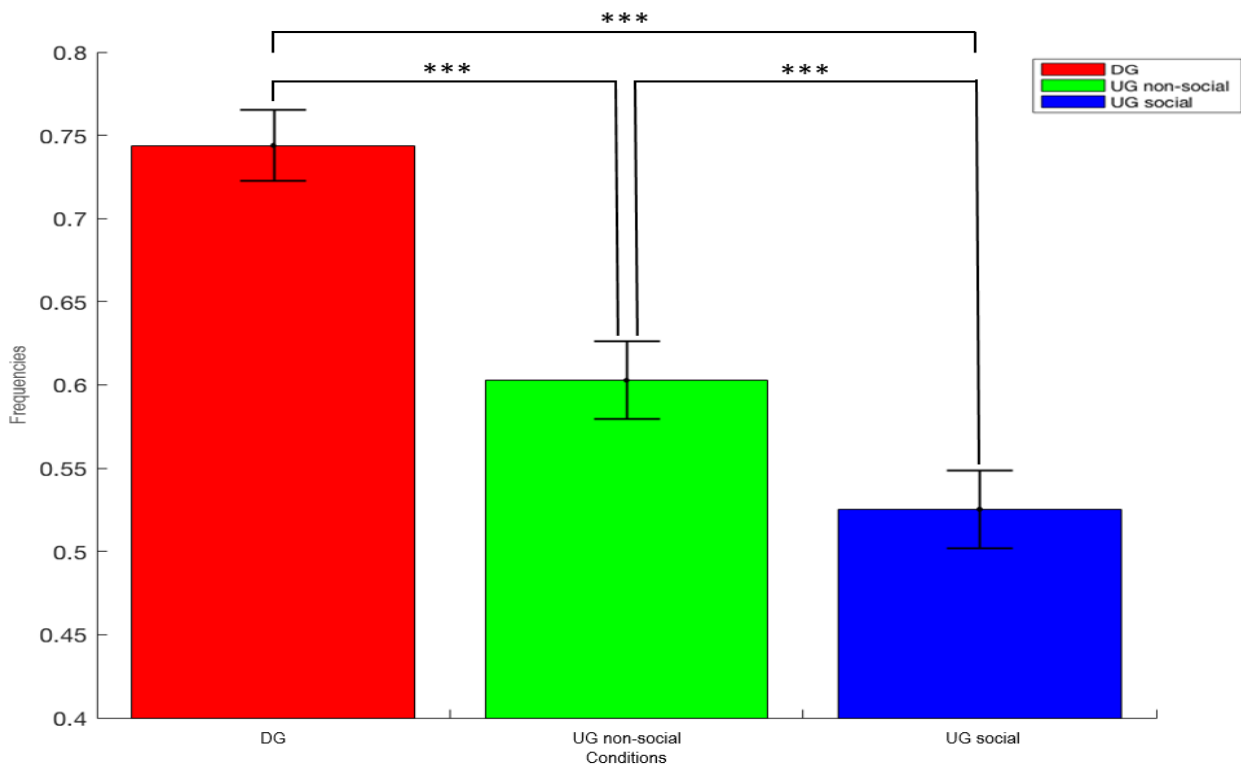


Figure 2. The frequencies of choosing the lower option in the DG, the UG Non-social, and the UG Social (displayed mean \pm .02 SE). *** Different at $p < .001$.

Discussion

According to Pillutla and Murnighan (1995), the motive of behaving fairly is either to appear fair, or to be truly fair. Van Dijk, Leliveld, and Van Beest (2009) distinguished instrumental (or strategic) fairness from true fairness. We aimed to investigate what underlies fairness in economic decision-making, which in this study might be due to fear of rejection (i.e. strategic fairness) or to pure concerns of fairness towards others (i.e. true fairness). We tested this by having participants playing both the DG and the UG. We examined whether the risk of

rejection and thus not getting the desired payoffs influenced proposers' behaviors. First, we hypothesized that proposers would give higher offers in the UG than in the DG (Hypothesis 1). Moreover, we observed whether risk preferences as a psychological trait predicted decisions. We expected lower scores on risk preferences to go with higher overall offers (Hypothesis 2), and with higher offers in the UG than in the DG (Hypothesis 3). We also investigated how proposers behaved when it was made explicit that they were playing with humans (i.e. social condition) versus computer lotteries (i.e. non-social condition), congruent with the argument that inducing social preferences led to fairer behaviors (Leder & Betsch, 2016). Specifically, we predicted that proposers would give higher offers in the social games (the DG and the UG Social) than in the non-social game (the UG Non-social) (Hypothesis 4).

Supporting Hypothesis 1, we found that participants (i.e. proposers) offered a higher amount of MU in the UG – with the risk of rejected offers leading to zero payoff, than in the DG – without such a risk. Moreover, out of two options of offer shown per trial – lower MU and higher MU, they chose the lower MU for the responder less frequently in the UG than in the DG. These results depicted individuals' tendency to behave selfishly when there are opportunities to do so. In line with prior studies, fair offers have been found to be based on strategic motives to reduce the probability of rejection and, in turn, to maximize own outcomes (e.g. Fehr & Schmidt, 2006). Hence, a question may be raised: Do these findings give us confidence to confirm that the traditional theory of individuals as rational economic men is flawless? Despite giving lower MU in the DG than in the UG, proposers' mean percentage in the DG was 39.80% (i.e. 7.96 MU offered out of 20 MU – the highest possible offer) rather than lower. Similarly, Fehr & Schmidt (2006) found that participants in their study did not always choose zero offer when there was actually such option. The fact that they did not give lower than that value on average indicated

some altruism instead of utter selfishness. In other words, the traditional economic belief is imperfect and unlikely to be a stand-alone concept in explaining economic decisions.

Previous research has shown that individuals' risk preferences varies and its relation to decision-making has been an interest in the research field. In the current study, we observed whether the risk preference trait played a role in determining proposers' decisions on overall offers. Confirming Hypothesis 2, the results showed that risk seekers gave lower overall offers than those scoring low on risk preferences. This particular finding illustrated the negative relationship between risk-seeking and fairness considerations. In line with past research, risk-seeking individuals have been found to give smaller offers while risk-averse individuals give higher offers in economic decision-making games (Müller & Rau, 2016). Therefore, we tested whether individuals' risk preferences could explain offer differences in the DG and in the UG supporting Hypothesis 1. We predicted that lower scores on risk-seeking preference would also go with higher offers in the UG than in the DG, or in other words, risk seekers would give lower offers in the UG (Hypothesis 3). Unexpectedly, the results revealed the opposite, such that risk seekers gave higher offers in the UG than in the DG. Similarly, Van Koten, Ortmann, and Babicky (2013) observed that proposers scoring low on risk preferences were also found to give higher offers in the DG. Wang (1996) argued that in some cases, the effects of individuals' risk preferences can differ across behavioral tasks. As evidenced in several studies on risk preferences and economic decision-making, individuals tend to make inconsistent decisions across games (Blanco, Engelmann, & Normann, 2011; Van Koten et al., 2013). Hence, the direction in which decisions in the risk preference assessment by Eckel and Grossman (2002) predicted decisions in the games was not as initially hypothesized, as individuals in general tend to consider problems as unique (Kahneman & Lovallo, 1993). Nonetheless, researchers have

emphasized that although decision patterns tend to differ across areas and risks, it is always influenced by the underlying general factor of risk preferences (Frey, Pedroni, Mata, Rieskamp, & Hertwig, 2017).

Lastly, we aimed to see how eliciting social preferences influenced proposers' decisions. We tested this by dividing the games into social (the DG and the UG Social) and non-social (the UG Non-social), in which proposers played with real humans in the former and computer lotteries in the latter. Supporting Hypothesis 4, the results indicated that this predicted proposers' offers, as evidenced that playing the social games relative to the non-social game predicted higher offers. Although appearing fair to maximize own outcomes has been shown through different distributions between the DG and the UG (Hypothesis 1), social preferences seemed to be prompted when social responsibilities for other individuals were highlighted as in the DG and the UG Social, in turn shaping individuals to behave socially or fairer (Leder & Betsch, 2016). The DG gave us an estimate of what people would do when they had no fear of their offer being rejected, which in turn gave us a "pure" measure of individuals' selfishness. The fact that proposers' offers in the DG was significantly lower than the UG Social means that at least a part of their behaviors in the UG Social was generally driven by fear of having their offers rejected. On the other hand, the fact that their offers in the UG Social was significantly higher than in the UG Non-social indicates that it was not just the fear of rejection driving the effect in the UG, but other considerations related to social preferences. Consistent with the main findings, the frequency of choosing the lower option to offer differed significantly across the games. Proposers chose the lower option for the responder more frequently in the DG than in the UG Social, showing the tendency to maximize their own outcomes. Nevertheless, this frequency also differed significantly between the UG Social and the UG Non-social. Specifically, proposers

chose the lower option for the responder less frequently in the UG Social than in the UG Non-social. Therefore, it cannot be said that people are rational agents who are merely interested in their own benefits. In situations where they sense social responsibilities for other people, their social preferences tend to shift in the positive direction, resulting in fairer behaviors (i.e. true fairness). Additionally, some researchers have witnessed that distributions in the DG increase when social distance between the proposer and the responder decreases, for instance by getting to know the responder's hobbies (Bohnet & Frey, 1999) or family name (Charness & Gneezy, 2008). In a study regarding charitable giving for hurricane victims by Eckel, Grossman, and Milano (2007), the donors' direct experiences with natural disasters (i.e. own or family) were found to influence the perceived impact of the hurricane, leading to an increase in giving.

Taken together, although the traditionally held belief is that individuals are rational thinkers aiming to maximize outcomes, the current study illustrated that it only explains human behaviors partially. The roles of risk- and social preferences in this study were shown to influence economic decisions and complement the traditional economic belief. The current study has successfully captured that the risk preference trait plays a vital role in economic decision-making. It is important to note that its impact varies across decision-making contexts, which is likely the reason why in our case, the direction in which the risk preference trait predicted decisions was different from the initial hypothesis. The current study has also demonstrated that inducing social preferences can result in true fairness being exhibited, although the tendency to act based on selfish motives may not be abolished entirely. Nevertheless, despite providing an answer for some particular situations, the current study is not the end-all answer as there are several limitations. The DG and the UG involved relatively small demands compared to the ones in real-life settings. Future research should therefore test the hypotheses with long-shot payoffs

resembling real-life choices and analyze whether the current findings are robust. Elucidating the underlying process behind strategic fairness, Strang, et al. (2015) observed the crucial involvement of the ventromedial prefrontal cortex (VMPFC) in computing expected values and integrating selfish goals with expected risks, and the dorsolateral prefrontal cortex (DLPFC) in performing this valuation. Neural approach is thus suggested to further explain the underlying process of how social preferences promote fairness in economic decision-making as evidenced in the current study. Finally, perceptions on fairness are often justified in market contexts. What appears as a selfish strategy is then understood as a survival strategy which will induce different behaviors (Camerer, 2003; Schotter, Weiss, & Zapater, 1996). Ironically, this may denote the limitation of behavioral economics in predicting economic behaviors across individuals and contexts precisely, but as Thaler (1992) stated in his papers concerning economic anomalies:

Rational models tend to be simple and elegant with precise predictions, while behavioral models tend to be complicated, and messy, with much vaguer predictions. But look at it this way. Would you rather be elegant and precisely wrong, or messy and vaguely right? (Thaler, 1992, pp. 198)

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