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Guilt, Inequity, and Gender in a Dictator Game*

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Abstract

This research investigates the motivations in sharing decisions in a dictator game, trying to distinguish the role of guilt aversion from other social preferences, such as altruism and inequity aversion. Using an experimental design that incorporates exogenous variations in beliefs and endowments, we manipulate probabilities to generate scenarios with varying expected sharing costs. This approach allows for an in-depth examination of how sharing behaviors correlate with second-order beliefs across different cost conditions. Focusing on the guilt and inequity aversion channels, the study also explores how gender influences behavior.

Keywords: expectations, guilt aversion, inequity aversion, opportunity costs, gender differences.

JEL classification codes: A13; C91; D01; D64.

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*We thank Carlo Andreatta and Sem Manna for useful comments. Our experiment was designed in 2021 and conducted in 2022 at Tor Vergata University (Rome.) The hypotheses of the experiment were not pre-registered. However, our hypotheses were articulated before the experiment. For the gender analysis, no directional assumptions were made in advance as previous evidence is mixed.

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1 Introduction

Dictator games are commonly used to study sharing behavior, with two main motivations explaining why individuals share. The first suggests that sharing is driven by social preferences such as altruism and fairness, where individuals are concerned with their own outcomes and reducing inequality between themselves and others (Fehr and Schmidt, 1999, 2010). Based on guilt aversion, the second motivation proposes that individuals are willing to forgo some material gains to avoid the feeling of guilt for not meeting someone else's expectations. This means that a dictator's generosity is influenced by what they believe the recipient expects to receive, highlighting the role of psychological factors in decision-making (Battigalli and Dufwenberg, 2007).[1]

Determining the weights of different motivations for sharing from empirical evidence is difficult,[2] but it is important because they have different behavioral implications across social contexts and, hence, different policy implications. Motivated by these considerations, our paper presents an experimental study designed to explore the behavioral motivations underlying sharing decisions in a dictator game. We focus on disentangling the effects of belief-dependent preferences, specifically guilt aversion, from other social preferences like altruism or inequity aversion.

With a new experimental design incorporating exogenous variations in beliefs and endowments, we examine how guilt and inequity aversion influence participants' decisions to share resources. Involving 384 undergraduate students of Rome Tor Vergata University, our experiment created scenarios with high and low expected sharing costs. This allowed us to investigate the correlation between sharing behaviors and second-order beliefs under different (expected) cost-of-sharing conditions. In this setup, we also explored the potential influence of gender on sharing decisions, hypothesizing that gender might affect sensitivity to guilt and inequality.

Our study extends a series of research works that emphasize the impact of

[1] Battigalli and Dufwenberg (2007) put forward a portable model of belief-based guilt aversion, building upon earlier research tailored to various specific scenarios (see Battigalli and Dufwenberg, 2022, for a comprehensive survey on belief-dependent motivations in games).

[2] It should be noted that beliefs and actions are ex post correlated regardless of which of the two motivations guides the observed generosity (Khalmetski, 2016). Testing the motivations thus requires introducing techniques that allow for exogenous variations of expectations (Vanberg, 2008; Khalmetski, 2016; Di Bartolomeo *et al.*, 2019).

endowments on decision-making in dictator games and trust games. Chowdhury and Jeon (2014) compared how impure-altruism motivation fares against inequity aversion in a dictator game setting. In their experimental design, the endowment was varied for both dictators and recipients, while a fixed additional amount was available for sharing. Their results bolster the theory of impure altruism, revealing that increased shared income correlates with higher levels of giving.

In similar experiments, Korenok *et al.* (2012, 2014) demonstrated that different endowments significantly influence the amount a dictator chooses to give. Notably, Korenok *et al.* (2014) found that, in dictator games, the reluctance to take from others is stronger than the urge to give, challenging the notion that refraining from taking is equivalent to giving. This result is illustrated by scenarios where recipients earn more when dictators must take more to reach the same final payoffs. Viet Nguyen (2019) found that dictators share less when they know that others have received substantially larger endowments. In contrast, dictators do not notably increase their sharing when they themselves possess a larger endowment. These findings underscore the influence of inequity aversion and self-serving fairness norms in decision-making processes. In their study of the dictator and trust games with varying initial inequality levels, Di Bartolomeo and Papa (2016) observed that conditional motivations like reciprocity are significant when inequality levels are low. However, as inequality increases, the influence of these conditional motivations decreases, with participants' actions reflecting more unconditional motivations, such as altruism.

Our research is closely related to studies that explore the effects of guilt aversion in dictator games, such as those by Ellingsen *et al.* (2010) and Khalmetski *et al.* (2015).[3] This body of literature underscores the difficulty in distinctly differentiating between theoretical models and, more broadly, the challenges in eliciting beliefs, as Khalmetski *et al.* (2015) noted. In their dictator-game experiments, Khalmetski *et al.* (2015) found that the expectations of recipients significantly influence the giving behaviors of dictators. Their findings reveal that this influence can be positive or negative, adding complexity to the interpretation of results. Furthermore, they observed that dictators are conscious of how recipients perceive the intentions behind their actions. From a methodological perspective, Vanberg

[3] Cartwright (2019) provides a survey of belief-based guilt aversion in trust and dictator games.

(2008) introduced a design to elicit beliefs through exogenous variation of expectations. His approach combines asymmetric information with the probability of changing partners in the game. We adopt a similar method. The details of our mechanism will be explained in the following section.

Our analysis, which also focuses on how gender differences affect motivations, is related to studies examining behavioral variations across genders. The pioneering study of Andreoni and Vesterlund (2001) investigated gender differences in a dictator game by categorizing subjects into three distinct groups based on their resource allocation decisions. This study revealed notable gender differences: men were more likely to be categorized as selfish or to treat their own and others' payoffs as substitutes, aiming to maximize total payoffs. In contrast, women tended to focus more on ensuring equality in payoffs, i.e., valuing the minimum of one's own and the other's payoffs.[4] Eckel and Grossman (2008) found mixed results in various versions of the dictator game. They observed that women were more generous, particularly when generosity was costly, while men tended to be more generous when the cost was lower. Their experiment, which made gender information available, suggests that such information might influence outcomes. For instance, Dufwenberg and Muren (2006) discovered that female recipients generally received more than male recipients, but no significant difference was found in the donations made by male and female dictators. However, Ben-Ner *et al.* (2004) reported quite different results.[5]

Overall, data from dictator games does not conclusively support a general statement that males are more generous than females or vice versa. However, related to our paper, Engels's (2011) survey suggests that cost factors might influence men's giving behavior more than women's. Similarly, Cox and Deck (2006) found that women tend to react more significantly to a decrease in their budget than men.[6] Regarding guilt aversion, by using psychological surveys in a trust game, Nihonsugi *et al.* (2022) found that men exhibit higher guilt aversion than women.

[4] Niederle (2016, section 4A) has comprehensively surveyed gender-related dynamics in dictator-style games. This survey, however, does not cover psychological factors. See also Croson and Gneezy (2009) and Engel (2011).

[5] See also Mago and Razzolini (2019).

[6] Based on Andreoni and Vesterlund (2001). See also Visser and Roelofs (2011) and Boschini *et al.* (2012). Leider *et al.* (2009) and Balafoutas *et al.* (2012) found directional, but non-significant evidence.

However, it is important to acknowledge that the literature on gender differences with respect to psychological factors is relatively limited (Di Bartolomeo *et al.*, 2023).

The rest of the paper is structured as follows. We begin by detailing the experimental design and procedures, including the setup of the modified dictator game and the implementation of exogenous variations to isolate the effects of belief-dependent preferences and sharing costs. The results section presents a comprehensive data analysis, highlighting the essential findings and their implications for understanding the role of guilt aversion and other social preferences in sharing decisions. Additionally, we explore the potential gender differences in responses to sharing incentives and belief manipulations. The paper concludes with a discussion of the findings.

2 Experimental design and procedures

2.1 Experimental design and exogenous variations

Our design is built on the simple game described in Figure 1. This is a mini-dictator game with random initial endowments. First, chance splits M tokens between the dictator and the recipient, assigning d_1 or d_2 tokens to the dictator with, respectively, probability x or $(1 - x)$ and the rest to the recipient (i.e., $M - d_i$ tokens with $i \in \{1, 2\}$). Next, the dictator is asked either to share the total number of tokens (M) in two equal parts $(\frac{M}{2}, \frac{M}{2})$ or to maintain the status quo $(d_i, M - d_i)$. The recipient knows the chance probability x, but does not observe the realization, i.e., the dictator's endowment. The dotted line emphasizes that if the dictator shares, recipients cannot infer the dictator's move from observing their own payoffs.

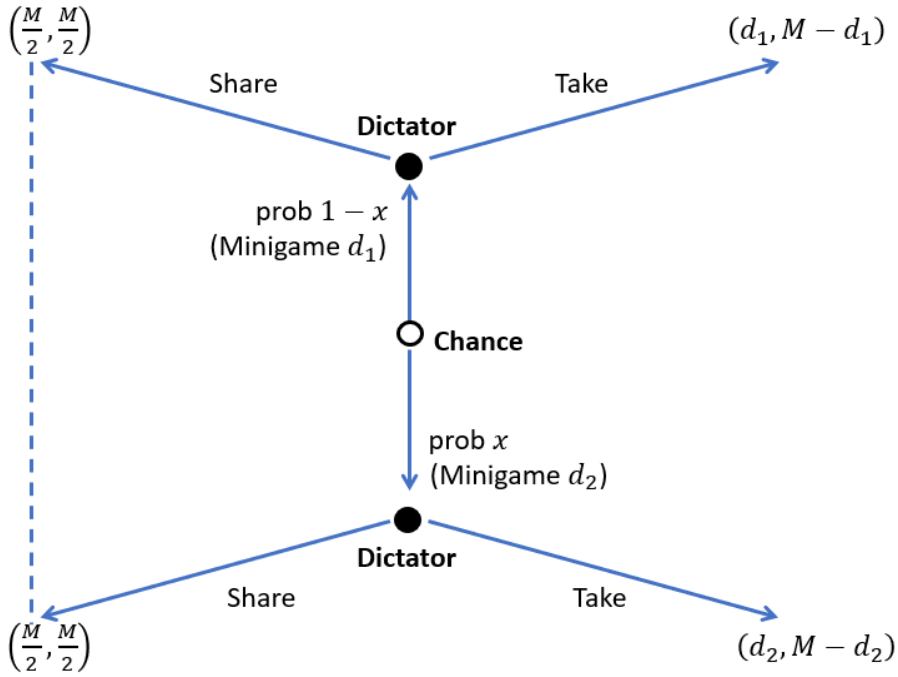


Figure 1 – Mini-dictator game with random initial endowments

Note that the recipient's **first-order belief** (the subjective probability assigned to "share") cannot depend on the realized endowment, but it may depend on the chance probability x. Since the information structure is made common knowledge, it is reasonable to assume that the same holds for the **second-order belief** of the dictator (the subjective expectation of the recipient's first-order belief).

In our experiment, $M = 40$, $d_1 = 24$, and $d_2 = 40$. Henceforth, for the sake of brevity, we refer to the "subgame" where the dictator holds the whole total endowment as the **40-0 game**, while the other is called the **24-16 game**.[7] A relatively high opportunity cost of sharing characterizes the former, i.e., the equal

[7] Technically, these are not true (sub)games, because there is an information set of the recipient across them. To simplify our terminology, we ignore this objection.

payoff distribution costs 20 tokens to the dictator in the 40-0 subgame and only 4 tokens in the 24-16 game. Our design involves two treatments, which differ in the value of the probability x.

1. **Treatment 1** ($T1$): we fix x equal to 0.25.
2. **Treatment 2** ($T2$): we fix x equal to 0.75.

The goal of our experimental design is to disentangle, at least partially, the motivations for sharing behaviors related to belief-dependent preferences (guilt aversion) and mere distributional preferences such as inequity aversion.

Our *auxiliary hypothesis*—which we are going to test—is that the recipient believes that the dictator is more likely to share in the 24-16 game than in the 40-0 one. Note that this might not be the case. Indeed, the relationship between guilt or inequity aversion and the opportunity cost of sharing is non-trivial: in the 24-16 game, the cost of sharing is low, but the marginal benefit for the recipient is also low; whereas, in the 40-0 game, the cost of sharing is high and recipient's marginal benefit is also high. This relationship is analyzed in Appendix A, where we present a model that is general enough to encompass the relevant cases of our experiment.[8] To ease language, we refer to the 40-0 game (24-16 game) as the situation with high (low) material opportunity cost of sharing, but it is evident that the two cases are also associated with different psychological benefits if the dictator chooses to share. This fact should be kept in mind when interpreting the outcomes of the experiment.

Under our auxiliary hypothesis, the elicited recipient's first-order beliefs (FOBs) and dictator's second-order beliefs (SOBs) are expected to be high in $T1$ and low in $T2$. Intuitively, the rationale is as follows. Recipients do not observe the subgame drawn by Chance, but they know x, which is different in $T1$ and $T2$. In treatment $T1$, they know that the opportunity cost of sharing is more likely to be low for the dictator. Thus, they tend to think that the dictator is more likely to share in such a case. SOBs follow the same pattern as long as dictators follow the same reasoning, taking into account that recipients only know x.

[8] See also Battigalli *et al.* (2024a, 2024b).

Since our manipulation of the chance probability x only yields the desired exogenous variations under the aforementioned auxiliary hypothesis, we have to test it. Formally, we test

$$H1\text{: } FOB(T1) > FOB(T2) \text{ and } SOB(T1) > SOB(T2),$$

where $FOB(X)$ and $SOB(X)$ denote the average FOBs and SOBs observed in treatment $X \in \{T1, T2\}$.

By using exogenous variations, we can then disentangle sharing motivations stemming from guilt aversion and those driven by inequity aversion. On the one hand, we can compare dictators' behavior with high or low SOBs in each subgame by comparing $T1$ and $T2$ (exogenous variation in the beliefs). On the other hand, we can compare dictators' behavior across subgames within each treatment, i.e., keeping SOBs fixed (exogenous variation in sharing costs).

The exogenous variation in beliefs provides evidence for guilt aversion if

$$\begin{aligned} H2a &: \quad \text{share}(T1|24-16) > \text{share}(T2|24-16) \\ H2b &: \quad \text{share}(T1|40-0) > \text{share}(T2|40-0) \end{aligned}$$

where share$(X|Y)$ is the average share rate observed in the X treatment when Chance draws Y.

By using our exogenous variation in sharing costs, we can compare the behaviors observed in the case of low-sharing opportunity costs to those observed in the case of high-sharing opportunity costs for the same given (high or low) SOBs. Keeping everything else equal, this situation captures the effects of the different opportunity costs to share. Formally,

$$\begin{aligned} H3a &: \quad \text{share}(T2|24-16) > \text{share}(T2|40-0) \\ H3b &: \quad \text{share}(T1|24-16) > \text{share}(T1|40-0) \end{aligned}$$

In a nutshell, $H3$ measures the effects on the average sharing rate of an increase in the opportunity cost of sharing from 4 to 20 when SOBs are respectively low ($H3a$) or high ($H3b$).

Finally, we test the whether the impact of the change in the cost of sharing is the same in the two treatments ($H4$), i.e.,

$$H4: \text{ share}(T2|24\text{-}16) - \text{share}(T2|40\text{-}0) = \text{share}(T1|24\text{-}16) - \text{share}(T1|40\text{-}0)$$

where the l.h.s. (r.h.s.) measures the potential increase in the sharing rate due to an opportunity cost reduction when SOBs are supposedly low (high). Under our auxiliary hypothesis, observing that $H4$ holds would be consistent with the idea that preferences are not belief-dependent or that guilt aversion equally affects the case of high and low sharing opportunity costs when $H2$ holds.

As anticipated, we intend to analyze the hypotheses described in this section from the perspective of gender differences. On this matter, our position is agnostic, as we do not have a presumption of results since the literature does not provide a clear direction. As argued in the introduction, studies involving gender on generosity, aversion to inequity, and guilt aversion, in fact, do not give a definitive stance.

2.2 Procedures

Our experiment was conducted at Tor Vergata University (Rome) in May 2022. It involved 384 undergraduate students (12 sessions) recruited using an online recruitment system. Upon arrival at the lab, subjects were randomly assigned to isolated computer terminals.[9] Two assistants handed out instructions and checked that participants correctly followed the procedures. Before starting any task, subjects completed a short questionnaire to test their comprehension.

Each session consisted of 8 rounds (with perfect stranger matching) in a within-subject design. Each round implemented the following sequence of a five-stage procedure.

1. Role assignment. Player roles A and B are randomly assigned, and pairs are formed.

2. Probability of distribution (treatment). Participants are informed about the

[9] The experiment was programmed and conducted with the software z-Tree.

probability x associated to the round. In each round, this probability can be either 0.25 ($T1$) or 0.75 ($T2$).

3. Belief elicitation. Recipients' FOBs and dictators' SOBs are elicited. This stage has two parts: a) first-order beliefs: each recipient is asked to guess the dictator's action; b) second-order beliefs: dictators are asked to guess their paired subject's first-order beliefs.[10]

4. Endowment assignment. Endowments are randomly assigned according to the probability x. Only dictators are informed about the assignment (asymmetric information).

5. Dictator's action. Dictators chose to share their endowments equally (20-20) or to keep the randomly determined status quo.

At the end of each session, one of the rounds was randomly chosen for payments determined by agents' choices. In contrast, belief elicitation was paid for all the others, implying that subjects had no incentive to hedge against bad outcomes and thus misreport their beliefs. All the game payoffs were described in terms of "tokens," with 1 token = 0.50 euros. In addition, each subject received a fixed show-up fee of 3 tokens.

3 Results

3.1 A first look at the data

Our results are reported in Tables 1 and 2. Table 1 reports the elicited average FOBs and SOBs; Table 2 reports the average sharing rates for different treatments ($T1$ and $T2$) and sharing costs (24-16 and 40-0 game). The tables also report the standard deviations/number of observations below the sharing rates (expressed in percentage points).

Table 1 shows that our exogenous variations worked well ($H1$). We obtain that a different probability of playing the 24-16 subgame leads to different FOBs (column (a)) and SOBs (column (b)). The values in each row are not statistically

[10] For details, see Appendix B.

different from each other. In contrast, those in row (2) are statistically higher than those in row (1) (tests are omitted).[11]

In a nutshell, subjects are on average more confident that dictators choose to share when the opportunity cost of sharing is more likely to be low (i.e., the 24-16 game is more likely). We also test the SOBs between dictators who played the 40-0 and 24-16 games (columns (c) and (d)). These should be (and indeed are) unaffected by the subgame selected at random as expectations are elicited before the subjects in the dictator role are informed about the subgame they are playing (tests are omitted).

Table 1 – FOBs and SOBs

	FOBs	*SOBs*		
		All	High sharing cost (40-0 game)	Low sharing cost (24-16 game)
	(a)	(b)	(c)	(d)
(1) Low prob. to play 24-16 [$T2$]	35%	36%	36%	36%
	0.31/1024	0.31/1024	0.31/512	0.31/512
(2) High prob. to play 24-16 [$T1$]	48%	48%	49%	48%
	0.31/1024	0.31/1024	0.31/512	0.31/512

After verifying that the exogenous variations worked, we can investigate the sharing motivations using Table 2, which reports the average sharing rates for different treatments ($T1$ and $T2$) and sharing costs (24-16 and 40-0 game). Because $H1$ holds, different treatments correspond to different SOBs (high and low).

[11] All the statistics reported (and omitted) in the paper are obtained using the Wilcoxon signed rank test, which compares averages at the session level. Our data are independent at the session level but not at the individual level. The Wilcoxon signed rank tests account for such data structure.

Table 2 – Share rates

	High sharing cost (40-0 game)	Low sharing cost (24-16 game)
	(a)	(b)
(1) Low SOBs ($T2$)	35%	41%
[Low prob. to play 24-16]	(0.48/512)	(0.49/512)
(2) High SOBs ($T1$)	42%	46%
[High prob. to play 24-16]	(0.49/512)	(0.50/512)

We begin investigating guilt aversion ($H2$) by comparing the sharing rates within columns. Dictators with high SOBs are more likely to share both in the case of high and low sharing costs (i.e., columns (a) and (b)). However, differences are only weakly statistically significant. Specifically, among those who face a high sharing cost, we observe a difference of 7 percentage points (p.p.) resulting from 42% vs. 35%: $Z = 1.81$, $p = 0.070$ ($H2b$); among those who face a low sharing cost, we observe a difference of 5 p.p. resulting from 46% vs. 41%: $Z = 1.50$, $p = 0.133$ ($H2a$).

Now, we look at the effects of different opportunity-sharing costs ($H3$) by comparing the sharing rates by rows. Dictators with a low cost of sharing are more likely to share both in the case of high (row (1)) and low (row (2)) SOBs. However, the differences are not statistically significant. Among those who face high SOBs, we observe a difference of 4 p.p. resulting from 46% vs. 42%: $Z = 0.10$, $p = 0.918$ ($H3b$). Among those who face low SOBs, we observe a difference of 6 p.p. resulting from 41% vs. 35%: $Z = 1.14$, $p = 0.255$ ($H3a$).

Finally, we explore the issue of guilt sensitivity ($H4$). A diff-in-diff test is used. We compare the effects of changes in the monetary costs of sharing when SOBs are high ($46\% - 42\%$) and low ($41\% - 35\%$). The increase in the cost reduces the sharing rate in both cases. However, no difference is observed (4 p.p. vs. 6 p.p.: $Z = -0.90$, $p = 0.365$). Of course, the result is not surprising because we had already found that both compared differences were not significantly different from zero (i.e., $H3a$ and $H3b$ do not hold).

3.2 Eve vs. Adam

Our findings seem to suggest that expectations about sharing do not play a significant role in dictators' decision-making. However, as anticipated, we believe that gender could play a role. Although we are agnostic regarding the directional hypotheses of gender, we think that gender may significantly affect behavior. For example, from an evolutionary point of view, one may guess that the sense of guilt may be more marked in females.[12] The idea is that, due to the traditional role of women within the family home, accounting for others' beliefs may be more relevant for females, given the nature of their functions aimed mainly at subjects belonging to the family. Instead, in the case of males, the more frequent interactions with external subjects, often different and unknown, could make moral (impersonal) norms more relevant for social interactions than letting down others. Other examples and arguments could be advanced, even in opposite directions;[13] the empirical results are, in fact, not unequivocal—as described in the Introduction. This section aims to explore this gender issue in our context.

Our results are reported in Tables 3 and 4. Similarly to the previous section, Table 3 reports the elicited average FOBs and SOBs, and Table 4 reports the average sharing rates for different treatments and sharing costs.

Using Table 3, we first test our exogenous double variation by considering gender. Note that we consider the gender of subjects but not the gender interaction, i.e., dictators and recipients are unaware of the co-player's gender. Table 3 again shows that both exogenous variations worked well ($H1$). We obtain that a different probability of playing the 24-16 subgame leads to different FOBs and SOBs. The values within each row are not statistically different from each other, while those in row (2) are statistically higher than those in row (1) (tests are omitted). Moreover, no gender difference is found in FOBs and SOBs.

[12] Adopting a Darwinian perspective, evolutionary psychology underscores how more adaptive traits and behaviors tend to prevail in the competition for survival. Gender differences, such as in reproductive strategies and mate preferences, could therefore exert an influence on social interactions. See, e.g., Buss (2016).

[13] See, among others, Dufwenberg (2002), who proposes a marital investment game featuring a trusting wife with a guilt-averse husband.

Table 3 – FOBs and SOBs by gender

	FOBs		*female SOBs*		*male SOBs*	
	40-0	24-16	40-0	24-16	40-0	24-16
	(a)	(b)	(c)	(d)	(e)	(f)
(1) Low prob. to	36%	35%	38%	35%	35%	37%
play 24-16 [$T2$]	0.31/462	0.31/562	0.31/229	0.30/233	0.31/283	0.32/279
(2) High prob. to	50%	47%	49%	47%	48%	49%
play 24-16 [$T1$]	0.31/462	0.31/562	0.31/229	0.31/233	0.32/283	0.31/279

As the exogenous variations work, we can investigate motivations for sharing by looking at Table 4, which reports the average sharing rates for different dictators' genders, treatments, and sharing costs. The table shows that the sharing rate of females (47%) is higher than that of males (39%) when SOBs and sharing costs are high, i.e., $Z = 2.07$, $p = 0.039$. All other bilateral gender comparisons feature no statistically significant differences.

Table 4 – B's Share rates by gender

	females		*males*	
	40-0	24-16	40-0	24-16
	(a)	(b)	(c)	(d)
(1) Low SOBs ($T2$)	35%	40%	35%	42%
[Low prob. to play 24-16]	0.48/229	0.49/233	0.48/283	0.49/279
(2) High SOBs ($T1$)	47%	46%	39%	46%
[High prob. to play 24-16]	0.50/229	0.50/233	0.49/283	0.50/279

We begin investigating guilt aversion ($H2$) by comparing the sharing rates of females (and males) for high and low sharing costs. Females are always more likely to share when their SOBs are high. The same occurs for males. However, the effects on females are statistically significant only in the case of high sharing cost, while these are never significant for males. Specifically, when the sharing cost is high, the effects on females are 12 p.p., whereas, in the case of low sharing cost, the effects on females are halved (6 p.p.).[14] For males, the effects are 4 p.p. in both cases.[15]

Now, we investigate the effects on the average sharing rate of an increase in the opportunity-sharing cost from 4 to 20 when SOBs are low ($H3a$) or high ($H3b$). Male dictators experiencing a higher cost of sharing are less likely to share both cases. However, the differences are not statistically significant.[16] Female dictators experiencing a higher cost of sharing are less likely to share only in the low SOBs case. However, again, differences in both cases are not statistically significant.[17]

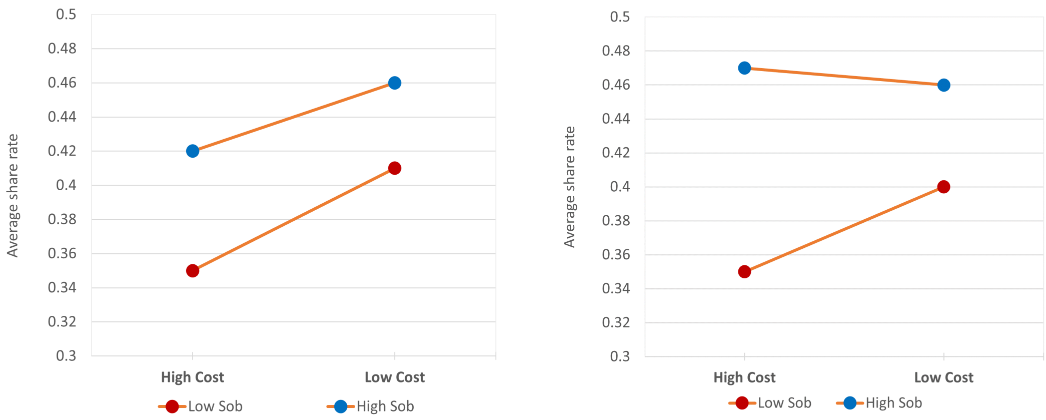
The effects of a change in the cost of sharing are better captured by a diff-in-diff test ($H4$), illustrated in Figure 2. The right and left panels refer to the case of females and males, respectively. The fall in the cost seems to affect dictators differently according to their gender. In the case of the males, the sharing rates increase by the same amount for both high and low SOBs, leaving the difference unchanged (4 p.p. vs. 4 p.p.: $Z = 0.16$, $p = 0.877$). By contrast, in the female case, the difference falls since the high cost increases the rate when expectations are low, but it almost does not affect the dictator's choice when SOBs are high (6 p.p. vs. 12 p.p.: $Z = 1.86$, $p = 0.063$).

[14] In the case of high sharing costs, the effects are 12 p.p., i.e., 47% vs. 35%: $Z = 2.20$, $p = 0.028$ ($H2b$). In the case of low sharing cost, the effects are 6 p.p. and not statistically significant, i.e., 46% vs. 40%: $Z = 0.67$, $p = 0.501$ ($H2a$).

[15] In the case of high sharing costs, the effects are 4 p.p. and not statistically significant, i.e., 39% vs. 35%: $Z = 1.04$, $p = 0.301$ ($H2b$). In the case of low sharing costs, the effect on males is again 4 p.p., i.e., 46% vs. 42%: $Z = 0.96$, $p = 0.339$ ($H2a$).

[16] Among those who face low SOBs, we observe a difference of 7 p.p. resulting from 42% vs. 35%: $Z = 0.93$, $p = 0.352$ ($H3a$). Among those who face high SOBs, we observe a difference of 7 p.p. resulting from 46% vs. 39%: $Z = 1.04$, $p = 0.301$ ($H3b$).

[17] Among those who face low SOBs, we observe a difference of 5 p.p. resulting from 40% vs. 35%: $Z = 1.21$, $p = 0.224$ ($H3a$). Among those who face high SOBs, we observe a difference of -1 p.p. resulting from 46% vs. 47%: $Z = -1.19$, $p = 0.234$ ($H3b$).



Panel (a) [males] Panel (b) [females]

Figure 2 – The effects on the average sharing rates of reductions of the monetary cost of sharing for different levels of SOBs by gender (diff-in-diff).

Our outcomes reveal significant gender differences. We find that females are prone to share when they are more confident that others expect them to share. The effect of higher expectations on the sharing rate for women is up to 12 percentage points. However, this outcome is observed only if the opportunity cost of sharing is high. The difference-in-difference analysis also suggests that an increase in opportunity cost significantly amplifies the extent of guilt experienced by females, more so than in scenarios where these costs are lower. These experimental outcomes may seem counter-intuitive. To interpret them we need to remember that when the cost of sharing is high, the inequity of taking is also high. Hence, in such a case, the psychological benefits of reducing inequality could be high as well depending on the individual perception of them, which can be gender dependent. Possibly, as the inequity of taking/keeping increases, females tend to anticipate a greater sense of guilt from taking, underscoring a heightened responsiveness to the psychological benefits of their altruistic decisions. In contrast, males' aversion to inequality seems independent of what others expect.

4 Conclusions

Our study reveals nuanced insights into other-regarding behavior in dictator games. The findings suggest that expectations about sharing and the opportunity cost of sharing play a role in dictators' decision-making. The two factors interact with each other. As the cost of sharing increases, the material incentive to do so decreases. However, the psychological incentive may grow as well because an increase in the cost of sharing corresponds to greater initial inequality. Accounting for this fact, our experimental results reveal significant gender differences in guilt aversion. Our interpretation of the data is then that, as the inequality of the status-quo allocation increases, females tend to share more because they anticipate a greater sense of guilt for not sharing.

Appendix A – Theoretical background

We consider a simple dictator game, where payoffs reflect payments, not—necessarily—utilities, as individual choices may be affected by beliefs and social preferences (e.g., inequity aversion or pangs of guilt). Given an initial allocation of $d \in (\frac{M}{2}, M]$ for the dictator and $\frac{M}{2} - d$ for the recipient, the dictator is faced with a choice: to keep the *status quo*, which is to **take** the initial allocation, or to opt for an egalitarian outcome, which is to **share**, resulting in an equal distribution for both parties. Choosing to take the dictator's payoffs are d, while the recipient's ones are $M - d$. Instead, if the dictator chooses to share, payoffs are $(\frac{M}{2})$ for both. The decision based solely on monetary payoffs is always to take, regardless of the amount of d. Assuming social preferences, we are instead interested in understanding how different values of d can influence the dictator's choices due to inequity aversion or pangs of guilt. Henceforth, we will assume that it is commonly known that the recipient does not observe d. However, note that d is revealed ex-post if the dictator chooses to take. The game corresponds to our mini dictator "subgames" in Figure 1.

Inequity-adverse dictator. Inequity aversion is introduced by considering a generic utility function of the dictators defined on their monetary payoffs (m_D) and on those of the recipients (m_R). In the relevant domain, as $m_D \geq m_R$, utility can be written as:

$$u(m_D, m_R) = v\left(m_D\right) - \theta_{\text{ia}} I\left(\left|m_D - m_R\right|\right) = v(m_D) - \theta_{\text{ia}} I\left(m_D - m_R\right), \quad (1)$$

where v is the Von Neumann–Morgenstern utility of money, $I : \mathbb{R}_+ \to \mathbb{R}_+$ is a strictly increasing function such that $I(0) = 0$, and subscript "ia" stands for *aversion to (favorable) inequity*, which is somewhat similar to *altruism*. The functional form (1) assumes the same aversion to both kinds of inequity, but only the aversion to favorable inequity matters if $m_D \geq m_R$ for every feasible pair of material payoffs.

Share is strictly preferred if $v\left(\frac{M}{2}\right) > v(d) - \theta_{\text{ia}} I(2d - M)$, that is,

$$\theta_{\text{ia}} > \hat{\theta}_{\text{ia}}(d) := \frac{v(d) - v\left(\frac{M}{2}\right)}{I(2d - M)} > 0 \quad (2)$$

where the threshold $(\hat{\theta}_{\text{ia}}(d))$ is positive because $d > \frac{M}{2}$, v and I are strictly increasing, and $I(0) = 0$.

Assuming differentiability, $\hat{\theta}'_{\text{ia}}(d) > 0$ iff

$$\frac{v'(d)}{v(d) - v\left(\frac{M}{2}\right)} > \frac{2I'(2d - M)}{I(2d - M)}. \quad (3)$$

in words, the ratio between the increase in the utility of money of the dictator at the margin and the total increase from equal to unequal shares must be higher than twice the analogous ratio of marginal and total increase in inequality.

Proposition 1 *Assuming an absolutely continuous cdf F_{ia}, the share rate is $1 - F_{\text{ia}}\left(\hat{\theta}_{\text{ia}}(d)\right) = Fr\left(\theta_{\text{ia}} > \hat{\theta}_{\text{ia}}(d)\right)$, which is (strictly) decreasing in d if and only if the threshold $\hat{\theta}_{\text{ia}}(d)$ is (strictly) increasing in d. We can state that the expected share rate behaves as follows: i) in the affine-v-linear-I model, the share rate remains constant with respect to d; ii) in the affine-v-concave-I model, the share rate decreases as d increases; iii) in the concave-v-linear-I model and the affine-v-convex-I model, the share rate increases with an increase in d.*

Proof. i) In the *affine/linear case* v' and I' are constants, $v(d) - v\left(\frac{M}{2}\right) = v' \cdot \left(d - \frac{M}{2}\right)$, and $I(2d - M) = I' \cdot (2d - M)$; thus, $\hat{\theta}'_{\text{ia}}(d) = 0$: $\frac{v'(d)}{v(d) - v\left(\frac{M}{2}\right)} = \frac{v'}{v' \cdot \left(d - \frac{M}{2}\right)} =$

$\frac{2}{2\left(d-\frac{M}{2}\right)} = \frac{2I'}{I'\cdot(2d-M)} = \frac{2I'(2d-M)}{I(2d-M)}$. ii) If v is *affine* and I is *strictly concave*, then $\hat{\theta}'_{\text{ia}}(d) > 0$. Indeed, $\frac{v'(d)}{v(d)-v\left(\frac{M}{2}\right)} = \frac{v'}{v'\cdot\left(d-\frac{M}{2}\right)} = \frac{2}{2\left(d-\frac{M}{2}\right)} > \frac{2I'(2d-M)}{I(2d-M)}$, where the latter inequality holds because $\frac{I(2d-M)}{2d-M} > I'(2d-M)$ by strict concavity and $I(0) = 0$. iiia) If v is *strictly concave* and I is *linear*, then $\hat{\theta}'_{\text{ia}}(d) < 0$. Indeed, $\frac{v'(d)}{v(d)-v\left(\frac{M}{2}\right)} < \frac{2}{2\left(d-\frac{M}{2}\right)} = \frac{2I'}{I'\cdot(2d-M)} = \frac{2I'(2d-M)}{I(2d-M)}$, where the inequality holds because $\frac{v(d)-v(M/2)}{d-M/2} > v'(d)$ by strict concavity of v. iiib) If v is *affine* and I is *strictly convex*, then $\hat{\theta}'_{\text{ia}}(d) < 0$. Indeed, $\frac{v'(d)}{v(d)-v\left(\frac{M}{2}\right)} = \frac{v'}{v'\cdot\left(d-\frac{M}{2}\right)} = \frac{2}{2\left(d-\frac{M}{2}\right)} < \frac{2I'(2d-M)}{I(2d-M)}$, where the latter inequality holds because $\frac{I(2d-M)}{2d-M} < I'(2d-M)$ by strict convexity of I and $I(0) = 0$. ■

Guilt-averse dictator. The belief-dependent utility of guilt-averse dictator can be written as:

$$u(m_D, m_R, \alpha_R) = v(m_D) - \theta_{\text{g}} G\left([\mathbb{E}_{\alpha_R}(\mathbf{m}_R) - m_R]^+\right), \tag{4}$$

where $\mathbf{m}_R$ is a function of behavior, α_R is the recipient's belief about behavior, or first-order belief (FOB), and G is differentiable and strictly increasing, with $G(0) = 0$. In any dictator game, the recipient is passive and α_R is the initial belief of the recipient on the choice of the dictator to share.

In our game, the recipient cannot be disappointed by share, while take is disappointing because $(M-d) \leq \mathbb{E}_{\alpha_R}(\mathbf{m}_R) \leq \frac{M}{2}$. Thus, share is preferred if

$$v\left(\frac{M}{2}\right) > v(d) - \theta_{\text{g}} \mathbb{E}_{\beta_D}\left(G\left(\mathbb{E}_{\alpha_R}(\mathbf{m}_R) - (M-d)\right)\right), \tag{5}$$

where β_D is the dictator's belief on α_R. Note that the FOB α_R is a uni-dimensional variable, represented by the subjective probability assigned by the recipient to share: $\alpha_R = \text{P}_R(\text{share})$, $\mathbb{E}_{\alpha_R}(\mathbf{m}_R) = \frac{M}{2}\alpha_R + (M-d)(1-\alpha_R) = \left(d - \frac{M}{2}\right)\alpha_R + (M-d)$. In words, the recipient certainly gets at least $(M-d)$ (lowest payoffs), and with probability α_R his payoffs increase by $\Delta m_R = \frac{M}{2} - (M-d) = d - \frac{M}{2}$ from the baseline $(M-d)$ to the higher payoffs $\frac{M}{2}$. Therefore, $G\left(\mathbb{E}_{\alpha_R}(\mathbf{m}_R) - (M-d)\right) = G\left(\left(d - \frac{M}{2}\right)\alpha_R\right)$.

Assuming that β_D is not the Dirac measure concentrated on $\alpha_R = 0$, that is, maxsupp$\beta_D > 0$, $\mathbb{E}_{\beta_D}\left(G\left(\mathbb{E}_{\alpha_R}\left(\mathbf{m}_R\right) - (M-d)\right)\right) > 0$. Thus, we get

$$\theta_{\mathrm{g}} > \hat{\theta}_{\mathrm{g}}\left(d, \beta_D\right) := \frac{v\left(d\right) - v\left(\frac{M}{2}\right)}{\mathbb{E}_{\beta_D}\left(G\left(\mathbb{E}_{\alpha_R}\left(\mathbf{m}_R\right) - (M-d)\right)\right)}. \tag{6}$$

Since, in our framework, it is commonly known that the recipient does not observe d, it makes sense to check the dependence of the threshold on d keeping β_D fixed.

The second-order belief (SOB) of the dictator, β_D, can be represented as a probability measure (or cdf) on the unit interval $[0,1]$. With this,

$$\mathbb{E}_{\beta_D}\left(G\left(\mathbb{E}_{\alpha_R}\left(\mathbf{m}_R\right) - (M-d)\right)\right) = \int_0^1 G\left(\left(d - \frac{M}{2}\right)\alpha_R\right) \mathrm{d}F_{\beta_D}\left(\alpha_R\right).$$

Given our assumptions, we can differentiate under integration; thus,

$$\frac{\partial}{\partial d}\mathbb{E}_{\beta_D}\left(G\left(\mathbb{E}_{\alpha_R}\left(\mathbf{m}_R\right) - (M-d)\right)\right) = \int_0^1 G'\left(\left(d - \frac{M}{2}\right)\alpha_R\right) \alpha_R \mathrm{d}F_{\beta_D}\left(\alpha_R\right) > 0,$$

where the latter inequality holds because $G' > 0$ and maxsupp$\beta_D > 0$. With this,

$$\frac{\partial\hat{\theta}_{\mathrm{g}}\left(d, \beta_D\right)}{\partial d} = \frac{v'\left(d\right)\mathbb{E}_{\beta_D}\left(G\left(\left(d - \frac{M}{2}\right)\boldsymbol{\alpha}_R\right)\right) - \frac{\partial \mathbb{E}_{\beta_D}\left(G\left(\left(d-\frac{M}{2}\right)\boldsymbol{\alpha}_R\right)\right)}{\partial d}\left(v\left(d\right) - v\left(\frac{M}{2}\right)\right)}{\left[\mathbb{E}_{\beta_D}\left(G\left(\left(d - \frac{M}{2}\right)\boldsymbol{\alpha}_R\right)\right)\right]^2}.$$

Since $v' > 0$, $G(x) > 0$ for $x > 0$, and maxsupp$\beta_D > 0$, the first term in the numerator is strictly positive; since $\frac{\partial}{\partial d}\mathbb{E}_{\beta_D}\left[G\left(\left(d - \frac{M}{2}\right)\boldsymbol{\alpha}_R\right)\right] > 0$ and $v(d) > v\left(\frac{M}{2}\right)$ the signed second term is strictly negative. Therefore, based on the assumptions made so far, we cannot establish whether the indifference threshold is increasing or decreasing in the default payoffs of the dictator, d.

When G is linear, G' is a strictly positive constant, which we may assume to be 1 w.l.o.g. and we obtain:

$$\hat{\theta}_{\mathrm{g}}\left(d, \beta_D\right) := \frac{v\left(d\right) - v\left(\frac{M}{2}\right)}{\mathbb{E}_{\beta_D}\left(G\left(\mathbb{E}_{\alpha_R}\left(\mathbf{m}_R\right) - (M-d)\right)\right)} = \frac{v\left(d\right) - v\left(\frac{M}{2}\right)}{\left(d - \frac{M}{2}\right)\hat{\beta}_D},$$

where $\hat{\beta}_D := \mathbb{E}_{\beta_D}\left(\boldsymbol{\alpha}_R\right) = \int_0^1 \alpha_R \beta_D\left(\mathrm{d}\alpha_R\right)$ is the key aspect of the SOB typically measured in experiments. This yields the obvious result that the higher the SOB, the higher the willingness to share (the lower the threshold).

Proposition 2 *Assuming an absolutely continuous cdf* F_{g}*, the share rate is* $1 - F_{\mathrm{g}}\left(\hat{\theta}_{\mathrm{g}}(d)\right) = Fr\left(\theta_{\mathrm{g}} > \hat{\theta}_{\mathrm{g}}(d)\right)$*, which is (strictly) decreasing in* d *if and only if the threshold* $\hat{\theta}_{\mathrm{g}}(d)$ *is (strictly) increasing in* d*, the expected share rate behaves as follows. A) Assume that* G *is linear. Then, if the dictator is risk averse (loving), the threshold is (increasing) decreasing in* d*. By contrast, if the dictator is risk-neutral, the threshold is constant with respect to* d*. B) Assume that* v *is affine and* G *is non-linear. Then, the threshold is strictly increasing (decreasing) in* d *if* G *is strictly concave (convex).*

Proof. We are interested in the dependence of the threshold on d. A) Assuming that G is linear, then $\frac{\partial\hat{\theta}_{\mathrm{g}}(d,\beta_D)}{\partial d} = \frac{v'(d)\left(d-\frac{M}{2}\right)-\left(v(d)-v\left(\frac{M}{2}\right)\right)}{\left(d-\frac{M}{2}\right)^2\hat{\beta}_D}$, which is negative if $v'(d)\left(d-\frac{M}{2}\right) < \left(v(d) - v\left(\frac{M}{2}\right)\right)$. The condition always holds if v is strictly concave (i.e., the dictator is risk averse). By contrast, it always does not hold if v is strictly convex (i.e., the dictator is risk loving). In this case the threshold increases in d. B) Now assume that v is affine (i.e., the dictator is risk neutral) and G need not be linear. Without loss of generality, v may be assumed to be the identity. Assuming that G is linear, we obtain $\frac{\partial\hat{\theta}_{\mathrm{g}}(d,\beta_D)}{\partial d} = \frac{\mathbb{E}_{\beta_D}\left(G\left(\left(d-\frac{M}{2}\right)\boldsymbol{\alpha}_R\right)\right)-\frac{\partial}{\partial d}\mathbb{E}_{\beta_D}\left(G\left(\left(d-\frac{M}{2}\right)\boldsymbol{\alpha}_R\right)\right)\left(d-\frac{M}{2}\right)}{\left(\mathbb{E}_{\beta_D}\left(G\left(\left(d-\frac{M}{2}\right)\boldsymbol{\alpha}_R\right)\right)\right)^2}$. Recall that the expected value (or integral) of a concave (convex) function is concave (convex). With this, the threshold is strictly increasing ($\frac{\partial}{\partial d}\hat{\theta}_{\mathrm{g}}(d, \beta_D) > 0$) if G is strictly concave, it is strictly decreasing ($\frac{\partial}{\partial d}\hat{\theta}_{\mathrm{g}}(d, \beta_D) < 0$) if G is strictly convex. Finally, the threshold is clearly constant w.r.t. d ($\frac{\partial}{\partial d}\hat{\theta}_{\mathrm{g}}(d, \beta_D) = 0$), if constant in d if G is linear. ■

Appendix B – Beliefs elicitatation

Elicitation of first-order beliefs. Subject As could make their guess by ticking one of the five-point scale reported in Table A (Vanberg, 2008). Beliefs are then re-scaled to 1, 0.75, 0.50, 0.25, and 0. Thus, the numbers in Table 1 represent the averages of As' re-scaled responses. The payoffs correspond to a quadratic scoring rule for probability values 85%, 68%, 50%, 32%, and 15% because, due to the risk neutrality assumption, quadratic scoring yields flat payoffs as probabilities approach one (see Vanberg, 2008: p. 1472).[18]

Table A – Incentives for the elicitation of first-order beliefs (tokens)

B will	choose *Share*			choose *Take*	
	Certainly	Probably	Unsure	Probably	Certainly
Please tick your guess	O	O	O	O	O
Your earnings if B					
chooses *Share*	0.65	0.60	0.50	0.35	0.15
chooses *Take*	0.15	0.35	0.50	0.60	0.65

Elicitation of second-order beliefs. Soon after subject Bs were told whether their paired subject had been switched or not, they were asked to guess the partner's guess. Specifically, they had to guess which of the five points of Table A had been ticked by their counterpart. Correct guesses were paid 0.50 tokens.

References

Andreoni, J., and L. Vesterlund (2001), "Which is the fair sex: Gender differences in altruism," *The Quarterly Journal of Economics*, 106: 293-312.

Balafoutas, L., R. Kerschbamera, and M. Sutter (2012), "Distributional preferences and competitive behavior," *Journal of Economic Behavior & Organization*, 83: 125-135.

Battigalli, P., and M. Dufwenberg (2007), "Guilt in games," *American Economic Review*, 7: 170-176.

Battigalli, P., and M. Dufwenberg (2022), "Belief-dependent motivations and psychological game theory," *Journal of Economic Literature*, 60: 833-882.

Battigalli, P., G. Di Bartolomeo, and S. Papa (2024a), "Guilt aversion and inequality in dictator games," *mimeo.*

[18] We also verify the robustness of our results to the quadratic scoring rule. Details are available upon request.

Battigalli, P., G. Di Bartolomeo, and S. Papa (2024b), "Inequity aversion in dictator games," *mimeo.*

Ben-Ner, A., F. Kong, and L. Putterman (2004) "Share and share alike? Gender-pairing, personality, and cognitive ability as determinants of giving," *Journal of Economic Psychology*, 25(5): 581-589.

Boschini, A., A. Muren, and M. Persson (2012), "Constructing gender differences in the economics lab," *Journal of Economic Behavior & Organization*, 84(3): 741-752.

Buss, D. (2016), *Evolutionary Psychology. The New Science of the Mind*, New York: Routledge (5th edition).

Cartwright, E. (2019), "A survey of belief-based guilt aversion in trust and dictator games," *Journal of Economic Behavior & Organization*, 167: 430-444.

Chowdhury, S., M. and J. Y. Jeon (2014), "Impure altruism or inequality aversion? An experimental investigation based on income effects," *Journal of Public Economics*, 118(C): 143-150.

Cox, J. C., and C. A. Deck (2006), "When are women more generous than men?," *Economic Inquiry*, 44: 587-598.

Croson, R., and U. Gneezy (2009), "Gender differences in preferences," *Journal of Economic Literature*, 47(2): 448-474.

Di Bartolomeo, G., and S. Papa (2016), "Trust and reciprocity: Extensions and robustness of triadic design," *Experimental Economics*, 19: 100-115.

Di Bartolomeo, G., M. Dufwenberg, S. Papa, and F. Passarelli (2019), "Promises, expectations & causation," *Games & Economic Behavior*, 113: 137-146.

Di Bartolomeo, G., M. Dufwenberg, S. Papa, and L. Razzolini (2023), "Guilt aversion and other motivations: Eve versus Adam," mimeo.

Dufwenberg, M. (2002), "Marital investments, time consistency and emotions," *Journal of Economic Behavior & Organizatio*, 48: 57-49.

Dufwenberg, M., and A. Muren (2006), "Generosity, anonymity, gender," *Journal of Economic Behavior & Organization*, 61(1): 42-49.

Eckel, C. C., and P. J. Grossman (2008), "Forecasting risk attitudes: An experimental study using actual and forecast gamble choices," *Journal of Economic Behavior and Organization*, 68(1): 1-17.

Ellingsen, T., M. Johannesson, S. Tjøtta, and G. Torsvik (2010), "Testing guilt aversion," *Games & Economic Behavior*, 68(1): 95-107.

Engel, C. (2011), "Dictator games: A meta study," *Experimental Economics*, 14: 583-610.

Fehr, E., and K. M. Schmidt (1999), "A theory of fairness, competition, and cooperation," *The Quarterly Journal of Economics*, 114(3): 817-868,

Fehr, E., and K. M. Schmidt (2010), "On inequity aversion: A reply to Binmore and Shaked," *Journal of Economic Behavior & Organization*, 73: 101-108.

Khalmetski, K. (2016), "Testing guilt aversion with exogenous shift in beliefs," *Games & Economic Behavior*, 97: 110-119.

Khalmetski, K., A. Ockenfels, and P. Werner (2015), "Surprising gifts: Theory and laboratory evidence," *Journal of Economic Theory*, 159: 163-208.

Korenok, O., Millner E. L., and L. Razzolini (2012), "Are dictators averse to inequality?," *Journal of Economic Behavior & Organization*, 82: 543-547.

Korenok, O., E. L. Millner, and L. Razzolini (2014), "Taking, giving, and impure altruism in dictator games," *Experimental Economics*, 17: 488-500.

Leider, S., M. M. Möbius, T. Rosenblat, and Q.-A. Do (2009) "Directed altruism and enforced reciprocity in social networks," *The Quarterly Journal of Economics*, 124(4): 1815-1851.

Mago, S. D., and L. Razzolini (2019), "Best-of-five contest: An experiment on gender differences," *Journal of Economic Behavior & Organization*, 162(C): 164-187.

Nguyen, C. V. (2019), "The effect of inequality in stakes on sharing behavior: Evidence from an experimental study," *Economics Letters* 184, 108638.

Niederle, M. (2016), "Gender." In *Handbook of Experimental Economics*, 2nd ed., edited by J. Kagel and A. E. Roth, Princeton: Princeton University Press: 481-553.

Vanberg, C. (2008), "Why do people keep their promises? An experimental test of two explanations," *Econometrica*, 76: 1467-1480.

Visser, M. S., and M. R. Roelofs (2011), "Heterogeneous preferences for altruism: Gender and personality, social status, giving and taking." *Experimental Economics*, 14: 490-506.