MASARYK UNIVERSITY

FACULTY OF ECONOMICS AND ADMINISTRATION

UNDERSTANDING HUMAN BEHAVIOR IN ECONOMIC CONTEXTS: EXPERIMENTAL EVIDENCE ON SOCIAL PREFERENCES AND DECISION-MAKING

HABILITATION THESIS

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ANNOTATION

The habilitation thesis "Understanding Human Behavior in Economic Contexts: Experimental Evidence on Social Preferences and Decision-Making" investigates human behavior in economic contexts through controlled experimental studies. In three chapters, three experimental studies that explore different aspects of human behavior and decision-making in various contexts are summarised. The first chapter investigates how framing affects altruistic behavior in the context of losses, revealing that social preferences in a dictator game are sensitive to how losses are framed, with more generous behavior observed when sharing a loss directly than in other loss-related settings. The second chapter explores donor coordination via an intermediary, finding that donors trust intermediaries more when they are heavily restricted in their discretion over funds, but this trust diminishes when intermediaries incur sunk overhead costs, as this creates ex-ante inequality and reduces donors' willingness to coordinate effectively. Lastly, the third chapter examines whether hormonal changes during the menstrual cycle influence decision-making, concluding that no systematic behavioral differences were observed between the ovulation and menstruation phases in terms of risk preferences, rule violation, or exploratory behavior. Together, these studies underscore the complexities of social preferences and decision-making in economic contexts.

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I want to express my gratitude to the participants of the experimental studies - without you, this habilitation thesis and my other research would not have been possible. I am also thankful to my colleagues at WU Vienna, MUEEL, and MUNI for their insightful discussions at various stages of the research projects. I am also grateful to my co-authors for pushing me further in my academic career. I would like to thank my partner, friends, and family for their endless love, patience, and encouragement.

DECLARATION

The author declares that he wrote the habilitation thesis "Understanding Human Behavior in Economic Contexts: Experimental Evidence on Social Preferences and Decision-Making" as a collection of previously published scholarly works of his own and listed all the co-authors and their contributions. The author further declares that during the preparation of this thesis, he used AI and AI-assisted technologies (namely Grammarly and OpenAI) for language enhancement, proofreading, and LaTeX formatting. The intellectual contribution and conceptual development of the thesis remain solely his. After using the technologies, the author reviewed and edited the content as needed and takes full responsibility for the content of the published thesis.

CONTENTS

INTRODUCTION

Fairness, reciprocity, well-being for others, or altruism - terms that we house under the roof of social preferences. There exists a wide stream of literature that provides evidence of these to drive or at least influence individuals' decision-making (see e.g. Charness and Rabin, 2002; Andreoni, 2006; Fehr and Schmidt, 2006; Cooper and Kagel, 2015; Fehr and Schurtenberger, 2018, for review articles). Understanding social preferences and decision-making processes is a key aspect of behavioral economics. Traditional economic theories (such as the Homo economicus models) typically assume that individuals act solely based on self-interest and maximizing their own benefits (Smith, 1776; Becker, 1976). However, empirical evidence increasingly challenges this assumption, demonstrating that individuals often behave differently, especially in situations where fairness, altruism, and reciprocity play significant roles (Fehr and Schmidt, 1999; Kahneman et al., 1986). However, the direct observation of decision-making processes in real-world settings can be obscured by various factors that highlight the role of experimentation in understanding how individuals make decisions.

This habilitation thesis consists of three essays – a series of experimental studies – that explore various aspects of social preferences and decision-making strategies. Each study provides unique insights into how individuals balance their personal interests with the well-being of others, respond to risks and uncertainties, or how their decisions are influenced by social norms and other contextual factors. By using different experimental designs, this research contributes to the broader body of knowledge in behavioral economics and social sciences, highlighting the role of experimental methods in uncovering the complexities of human behavior (Harrison and List, 2004).

The first essay, Chapter 1: Dictator Game and the Loss Framing Effect (summary of Antinyan et al., 2024), examines how the framing of monetary losses influences altruistic behavior within the context of a Dictator Game. This follows up the literature that suggests framing effects can significantly alter individuals' willingness to share their resources (e.g. Thaler, 1980; Tversky

and Kahneman, 1981). By manipulating the context in which losses are presented, the study explores how different loss frames (sharing a loss vs. sharing what remains after a loss) affect the generosity of individuals. The experimental results reveal that when losses are framed as something to be shared, individuals exhibit higher levels of generosity compared to scenarios where losses are framed as reductions in one's own endowment. This finding underscores the importance of context, suggesting that even subtle changes in framing can invoke different social norms and, consequently, different behaviors (in line with Kahneman and Tversky, 1984).

The second essay, Chapter 2: Trust and Sunk Costs in Charitable Giving (summary of Abraham et al., 2023), investigates the dynamics of trust and sunk costs in charitable giving. It examines the role of intermediaries in coordinating charitable donations and how the presence of overhead costs impacts donor behavior. Following the concept of "overhead aversion" by Gneezy et al. (2014), where donors prefer their contributions directly supporting charitable projects rather than administrative expenses, this study shows that donors are more likely to coordinate their contributions through intermediaries when there are strict limitations on how funds are allocated. However, it also finds that even minimal overhead costs can significantly diminish donor trust and willingness to coordinate.

The third essay, Chapter 3: Decision-Making Under Hormonal Fluctuations (summary of Fišar et al., 2023) ,focuses on decision-making under hormonal fluctuations, examining whether physiological factors, specifically hormonal changes during the menstrual cycle, influence economic preferences and decision making. While existing literature has documented shifts in social and mating behaviors linked to hormonal fluctuations (Gangestad and Simpson, 2000; Jones et al., 2019), this study finds no significant effects on selected behavioral outcomes. These findings suggest that while hormonal changes may influence certain social behaviors, their impact on economic preferences may be more limited. This adds to the discussion that decision-making under risk and uncertainty may be more stable and less susceptible to physiological changes than previously thought Schipper (2014); Wozniak et al. (2014).

The significance of this research lies in its potential applications across multiple domains, including public policy, organizational management, and personal financial planning. Understanding how individuals make decisions in various social contexts can inform the design of more effective

policies and interventions that promote cooperative behavior, enhance trust, and ensure fairer outcomes in different social and economic settings. For example, insights from the framing studies could be applied to design better communication strategies for public initiatives or charitable campaigns, while findings on trust and sunk costs could help NGOs optimize their fundraising approaches to maximize donor engagement. The results of the presented studies need to be taken in the perspective of experimental economics and the methodological limitations acknowledged.

This habilitation thesis represents a diverse collection of experimental designs, each offering original perspectives on the complex interplay between social preferences and decision-making. These experiments contribute to the larger body of behavioral economics and social science literature, adding to the overall understanding of these phenomena. Experiments in economics (research studies in general) can be seen as individual puzzle pieces that, when combined together, form the whole picture. The ambition of this habilitation thesis is to present a collection of these puzzle pieces - three essays - each addressing a different aspect of the underlying mechanisms and phenomena related to social preferences and decision-making strategies.

CHAPTER 1

DICTATOR GAME AND THE LOSS FRAMING EFFECT

In the economic literature, there is an ongoing debate regarding the impact of an individual's social preferences, particularly altruism, in situations involving losses. The essay Antinyan et al. (2024): *"Mind the Framing when Studying Social Preferences in the Domain of Losses"* investigates how different framings of monetary losses influence altruistic behavior within the context of the Dictator Game (Forsythe et al., 1994).[1] Previous literature addressing the question how monetary losses impact individual altruism have produced contradictory findings, with some suggesting that losses increase generosity (Thunström, 2019; Cochard, 2020), while others indicate higher selfishness (Fiedler and Hillenbrand, 2020; Benistant and Suchon, 2021) or no significant change in behavior (Cochard and Flage, 2024; Antinyan, 2014; Erkut, 2022). To address the discrepancies, we have designed three large-scale, fully incentivized online experiments incorporating existing experimental designs and our own design features.

In this chapter, I provide a summary of our experimental design and procedures, the main findings of our studies, and discuss the conclusions and implications of the results. All tables, figures, and highlighted results are presented as published in Antinyan et al. (2024) with formatting adjustments when necessary.

1.1 EXPERIMENTAL DESIGN AND PROCEDURES

We conducted three online experimental studies built on the traditional DG to understand how loss framing affects altruism. In Study 1, the dictators received endowments as windfall gifts, while in Study 2, the dictators participated in a real-effort task, similar to Charness et al. (2014)

[1] Dictator Game (DG) is a common two-player game in which one player determines the allocation of a certain amount between him and the second player. The second player does not have any active role. Refer to (Engel, 2011; Cochard et al., 2021) for meta-analysis of the DG results.

(see Figure 1.1), where the subjects decoded sets of letters into two-digit numbers to earn the endowment. Additionally, we also ran an online Study 3 to measure the intensity of positive and negative emotions of the dictators, and to assess whether the manipulations to induce loss were perceived as such. All studies consisted of three treatments - Control, Loss Manipulation 1 (LM1) and Loss Manipulation 2 (LM2). Table 1.1 provides a brief overview of the treatments' settings and parameters.

Table 1.1: Brief treatments summary.

	Dictator			Recipient's endowment
	Endowment No loss	Endowment Loss	Action	
Control	\$3	-	Share endowment	\$0
LM1	\$6	\$3	Share endowment	\$0
LM2	\$3	\$0	Share loss of \$3	\$3

Control The dictator is given \$3 (Study 1) or earns \$3 (Studies 2 and 3) endowement, while the recipient always starts with \$0. The dictator can decide how much money to send to the recipient, with the freedom to send any amount. The dictator's earnings are calculated as \$3 minus the amount sent to the recipient, while the recipient's earnings are calculated as \$0 plus the amount received from the dictator. In Studies 2 and 3, the dictator knows that the recipient did not participate in any real effort task before taking part in the experiment.

Loss Manipulation 1 (LM1) The dictator is given \$6 in Study 1 and earns \$6 in Studies 2 and 3. There is a 50% chance that \$3 will be deducted from the dictator's endowment. The recipient always receives \$0, which is known by the dictator. The dictator's task is to decide how much money to send to the recipient, with the freedom to send any amount. The dictator's earnings are calculated as her endowment (either \$6 or \$3) minus the amount sent to the recipient. The recipient's earnings are calculated as her endowment (\$0) plus the amount received from the dictator. In Studies 2 and 3, the dictator knows that her recipient did not participate in any real effort task before taking part in the DG.

Loss Manipulation 1 (LM2) The dictator is given an endowment of \$3. There is a 50% chance that the dictator will lose \$3. The instructions emphasize that only the dictator will

face the loss, not both the dictator and the recipient. The recipient starts with an endowment of $3, which the dictator is aware of. If the dictator experiences the loss, she must decide how much of the loss to share with the recipient, with the freedom to bear any amount of the loss she chooses. The dictator's earnings are calculated as her endowment ($3) minus the amount of the loss she has chosen to bear. The recipient's earnings are calculated as her endowment ($3) minus the share of the loss the dictator chooses for the recipient to bear. In Studies 2 and 3, the dictator is aware that the recipient did not participate in any real effort task before taking part in the experiment and received the $3 endowment as a windfall gift. This design choice aims to make this particular treatment comparable with the other treatments of Studies 2 and 3, in which the recipient does not exert any effort.

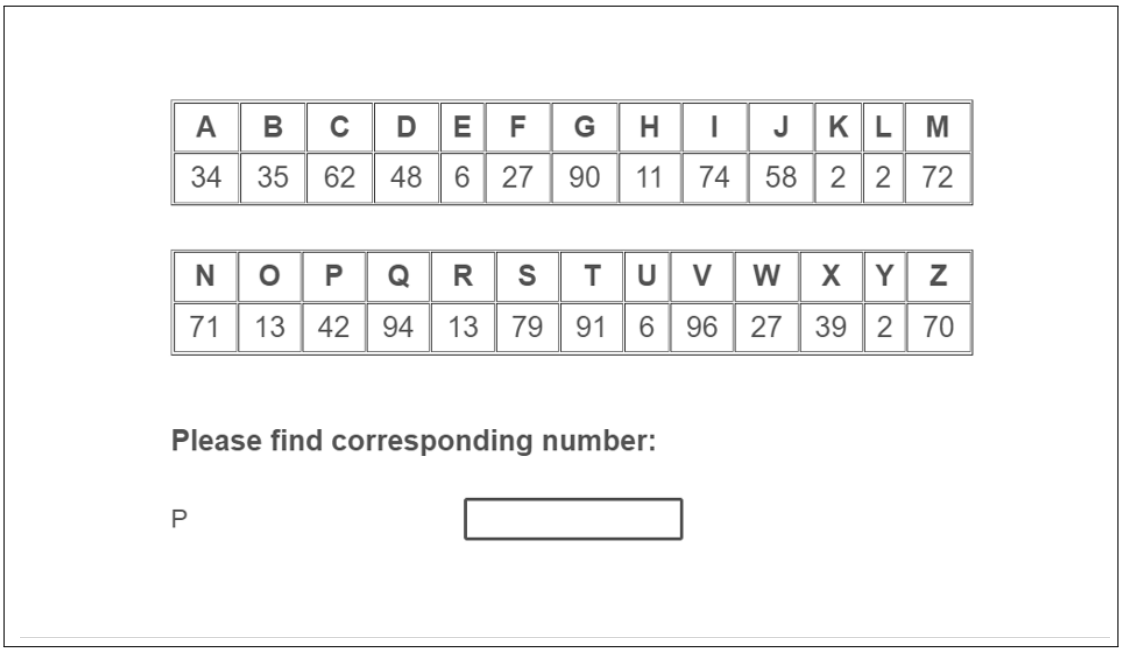


Figure 1.1: Decoding task screenshot

The studies were conducted using Qualtrics, and participants were recruited through the Prolific platform. All participants were U.S. residents with English as their first language and provided informed consent before being randomly assigned to different treatments and roles in the studies. After finishing the DG, participants also completed an incentivized belief elicitation task and a post-experimental questionnaire. Additionally, Study 3 specifically assessed emotional responses to treatment manipulations. In total, 3,284 participants took part in the studies. On average, participants earned $5.12 for approximately seven minutes of participation.

1.2 MAIN RESULTS

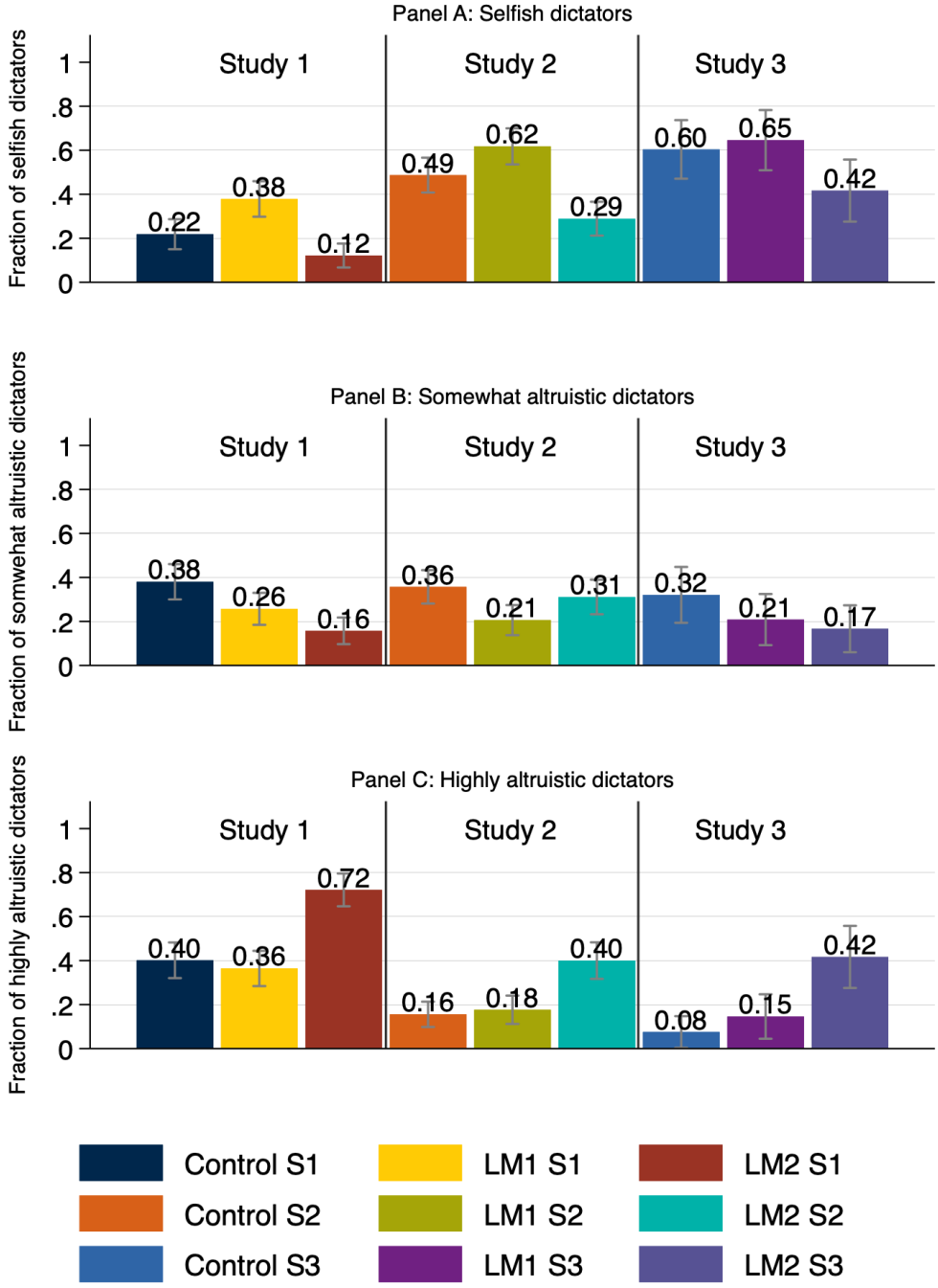
The results highlight the significant role that loss framing plays in determining prosocial behavior. In the LM1 treatment, where dictators faced a potential reduction in their endowment, there was an observed increase in selfish behavior compared to the control group. This finding suggests that the mere possibility of a loss can lead individuals to become more self-centered, reducing their willingness to share resources with others. In contrast, the LM2 treatment, which involved sharing a loss between the dictator and the recipient, elicited more generous behavior. Dictators in this condition were more likely to bear a larger portion of the loss themselves, resulting in higher allocations to the recipients. This behavior aligns with the "do-no-harm" principle, where individuals are reluctant to impose harm on others, even when it would benefit them personally. The study also found that the intensity of negative emotions associated with loss was similar across LM1 and LM2, suggesting that the differences in behavior were driven by the framing of the decision rather than the emotional impact of the loss itself.

The results from the real-effort task in Study 2 further supported these findings, showing that even when endowments were earned rather than given as windfall gifts, the framing of losses influenced altruistic behavior in the same way. Study 3 confirmed that the loss manipulations were successful in inducing perceptions of loss and triggering strong emotional responses, with no significant differences in emotional intensity between the LM1 and LM2 conditions.

In the analysis, we focus on the percentage of dictators who chose specific allocation decisions (extensive margin of allocation), namely on the proportion of *selfish*, *somewhat altruistic*, and *highly altruistic dictators* across different treatments. A dictator is considered *selfish* if her recipient receives \$0 due to her decision while she earns the maximum of \$3. The dictator is *somewhat altruistic* if her recipient earns between \$0 and \$1.5, and *highly altruistic* if the recipient earns at least \$1.5. Figure 1.2 depicts the fraction of the aforementioned types of dictators in our experiment. Comparing the average payoffs of the recipients across treatments, we would also assess the intensive margin of allocations; in other words the intensity of prosocial behavior (see Figure 1.3).

Our data suggest that the manipulation of the diversity of endowment sources was successful.

Figure 1.2: Extensive margin of allocations.

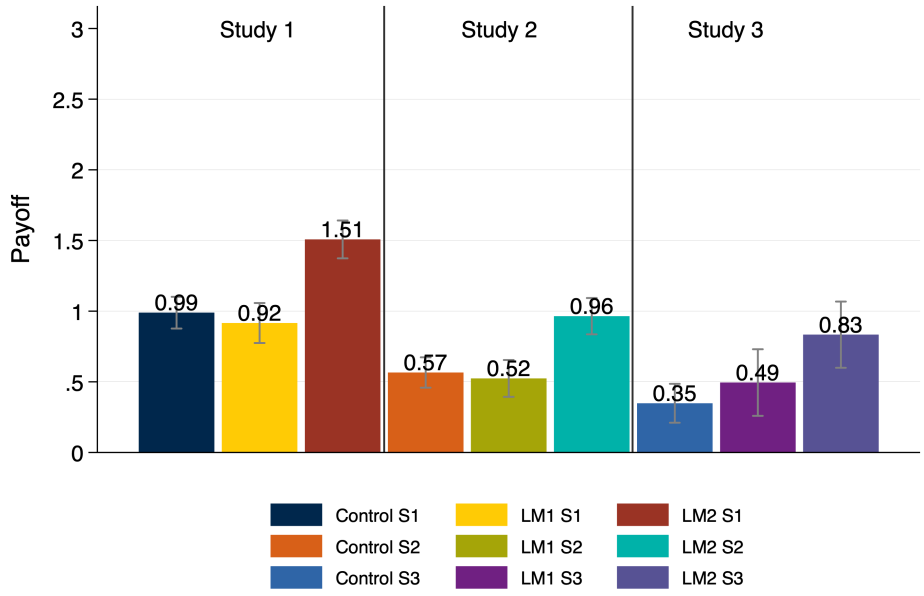


Note: The figure illustrates the fraction of selfish, somewhat altruistic, and highly altruistic dictators.

There was an increase in the number of selfish dictators, and a decrease in highly altruistic dictators in Study 2 compared to Study 1. Additionally, the average payoffs for recipients

were lower in Study 2 treatments compared to Study 1 treatments. These differences are statistically significant both in the extensive (according to χ^2 tests) and in the intensive (according to Mann-Whitney U tests) margins. A regression model with control over the observable socio-demographic characteristics results in qualitatively similar findings (see Table 1.2). This indicates that effort leads individuals to be less benevolent in the dictator game, which is consistent with existing literature (Cherry et al., 2002; Oxoby and Spraggon, 2008).

Figure 1.3: Intensive margin of allocations.



Note: The figure illustrates the average payoff of the recipient in each treatment with the corresponding 95 % confidence interval.

The impact of loss framing on dictators' pro-social behavior, in Study 1 can be observed in Figures 1.2 and 1.3. When focusing on treatment differences, we find that LM1's loss framing led to an increase in selfish behavior on the extensive margin, while LM2's framing reduced selfishness and increased altruism. In comparison, LM1 had more *selfish dictators* and fewer *highly altruistic* ones than LM2. On the intensive margin, Mann-Whitney U tests indicated no effect between the Control and LM1, but LM2 dictators were more generous than those in the Control group and LM1. We also tested the robustness of the findings using the procedure by List et al. (2019).

Result 1 *The framing of the loss plays a crucial role in determining dictators' choices: i) individuals are more prosocial in the intensive margin in LM2 than in LM1; ii) the fraction of selfish dictators is higher, while the fraction of highly altruistic dictators is lower in LM1 than in LM2.*

The impact of loss framing on dictators' pro-social behavior, in Study 1 can be also observed in Figures 1.2 and 1.3. In LM1, loss framing increased selfishness and reduced somewhat altruistic behavior, with no significant change in highly altruistic dictators, consistent with Study 1. In LM2, loss framing decreased selfishness and increased highly altruistic behavior, while the change in somewhat altruistic dictators was not significant. Comparisons between LM1 and LM2 showed significant differences across dictator types, similar to Study 1, except for an increase in somewhat altruistic dictators in LM2. Mann-Whitney U tests revealed significant differences between LM2 and Control, and LM1 and LM2, aligning with Study 1 results.

Result 2 *Even when the dictators exert effort to earn their endowments i) individuals are more benevolent in the intensive margin in LM2 than in LM1, ii) the fraction of selfish dictators is higher while the fraction of highly altruistic dictators is lower in LM1 than in LM2.*

In Study 3, our objective was to assess whether the loss manipulations in LM1 and LM2 effectively induced a sense of loss among participants. Successful loss induction would lead to higher negative emotions and lower positive emotions in LM1 and LM2 compared to Control. Our findings show that approximately 80% of the participants perceived the manipulations as a loss, with no significant difference between LM1 and LM2. Furthermore, negative emotions were more intense in LM1 and LM2 than in Control, while positive emotions were higher in the Control group.

Result 3 *The experimental manipulations are successful in inducing a perception of loss in LM1 and LM2 and trigger a strong emotional response. The nearly identical intensity of emotions in LM1 and LM2 and the equal fraction of dictators perceiving the reduction of their endowments as a loss in these treatments suggest that different loss frames affect the dictators similarly.*

1.3 CONCLUSIONS

The experiment provides robust evidence that the framing of monetary losses significantly impacts altruistic behavior. The results indicate that when individuals have to share a loss, they are more likely to act generously. However, when the focus is on the reduction of the dictator's own resources, selfish behavior tends to increase. These results have important implications for understanding how people make decisions in contexts involving financial losses. The study's contributions lie in its ability to reconcile conflicting findings in the literature by highlighting the critical role of framing in shaping social preferences.

1.4 IMPLICATIONS

The study Antinyan et al. (2024): *"Mind the Framing when Studying Social Preferences in the Domain of Losses"* makes a contribution to the ongoing debate in behavioral economics about how monetary losses influence altruistic behavior. Our research adds to the existing literature by stressing the vital role of framing in shaping individuals' social preferences, especially in the context of financial losses.

Previous studies have produced mixed results, with some suggesting that financial losses lead to increased generosity (Yin et al., 2017; Thunström, 2019; Cochard, 2020), while others have found that losses tend to make individuals more selfish (Fiedler and Hillenbrand, 2020; Benistant and Suchon, 2021). The inconsistent findings of these studies can be attributed to differences in experimental design, particularly how losses are framed and the origin of endowments. For example, studies that frame losses as shared between the dictator and the recipient (Thunström, 2019; Cochard, 2020) generally report more generous behavior compared to those that frame

losses as reductions in the dictator's own endowment (Antinyan, 2014; Benistant and Suchon, 2021).

The current study's findings support the hypothesis that loss framing is a key determinant of prosocial behavior. Specifically, the more generous allocations observed in the LM2 treatment align with the literature on the "do-no-harm" principle, which posits that individuals are less likely to impose harm on others when making decisions (Baron, 1995; Van Beest et al., 2003). This principle has been supported by studies showing that individuals are more likely to avoid actions that directly harm others, even when these actions could increase their own payoffs (Oxoby and Spraggon, 2008; Korenok et al., 2018).

Moreover, the study's incorporation of a real-effort task (Study 2) addresses concerns about windfall endowments of previous experiments. The results from Study 2 suggest that the effects of loss framing on altruistic behavior are robust, regardless of whether the endowments are earned or received as gifts. This finding is consistent with earlier research indicating that the source of endowments can influence decision-making, with earned endowments typically leading to more self-serving behavior (Cherry et al., 2002; Oxoby and Spraggon, 2008). However, our study shows that framing can mitigate this tendency, highlighting the importance of contextual factors in economic decision-making.

The study also adds to the literature by demonstrating that loss framing not only influences behavior but also affects the emotional responses of participants. The similarity in emotional intensity between the LM1 and LM2 treatments suggests that the observed behavioral differences are not merely a product of emotional reactions to loss but are instead driven by the social norms invoked by different frames. This aligns with findings from research on social norms, which shows that individuals' behavior is strongly influenced by perceived norms of fairness and reciprocity (Krupka and Weber, 2013; Ellingsen et al., 2012).

In conclusion, our experiment adds to the literature on social preferences by offering a more detailed understanding of how framing losses affects altruistic behavior. It tries to address the contradictory findings in previous studies and presents a framework to study social preferences in the context of losses. By emphasizing the significance of framing, this study offers an important piece to study the influence of prosocial behavior in economic situations.

Table 1.2: Study 1, Study 2 & Study 3 regression results

	Study 1				Study 2				Study 3			
	Selfish	Somewhat altruistic	Highly altruistic	Recipient's payoff	Selfish	Somewhat altruistic	Highly altruistic	Recipient's payoff	Selfish	Somewhat altruistic	Highly altruistic	Recipient's payoff
LM1	0.155**	-0.112*	-0.043	-0.076	0.137*	-0.144**	0.007	-0.063	0.014	-0.092	0.078	0.178
	(0.054)	(0.056)	(0.058)	(0.091)	(0.059)	(0.052)	(0.045)	(0.086)	(0.096)	(0.085)	(0.065)	(0.138)
LM2	-0.102*	-0.227***	0.329***	0.538***	-0.193***	-0.024	0.217***	0.367***	-0.212*	-0.140	0.353***	0.521***
	(0.046)	(0.052)	(0.057)	(0.090)	(0.057)	(0.056)	(0.052)	(0.087)	(0.097)	(0.081)	(0.082)	(0.139)
Female	-0.028	-0.030	0.059	0.000	-0.067	0.025	0.042	0.049	0.081	-0.090	0.009	-0.076
	(0.044)	(0.045)	(0.049)	(0.083)	(0.049)	(0.045)	(0.042)	(0.075)	(0.080)	(0.067)	(0.065)	(0.128)
Working	0.009	0.053	-0.063	-0.076	-0.083	-0.047	0.130**	0.180*	-0.041	0.137	-0.096	-0.115
	(0.043)	(0.047)	(0.050)	(0.083)	(0.052)	(0.048)	(0.042)	(0.079)	(0.095)	(0.072)	(0.079)	(0.166)
School or lower	-0.032	0.024	0.008	0.023	0.006	-0.065	0.059	0.032	-0.234*	0.214*	0.019	0.140
	(0.066)	(0.070)	(0.072)	(0.105)	(0.073)	(0.068)	(0.058)	(0.102)	(0.106)	(0.093)	(0.085)	(0.162)
Bachelor	-0.095	-0.077	0.172*	0.312**	-0.029	-0.038	0.067	0.100	-0.104	0.105	-0.002	0.079
	(0.062)	(0.063)	(0.067)	(0.107)	(0.068)	(0.064)	(0.054)	(0.098)	(0.099)	(0.084)	(0.077)	(0.151)
Conservative	0.024	-0.078	0.053	-0.007	0.085	-0.208***	0.122	0.071	-0.184	0.169	0.015	0.189
	(0.073)	(0.076)	(0.082)	(0.130)	(0.078)	(0.062)	(0.069)	(0.134)	(0.128)	(0.129)	(0.116)	(0.178)
Liberal	0.062	-0.071	0.009	-0.079	-0.027	-0.032	0.059	0.040	0.074	-0.039	-0.035	-0.062
	(0.046)	(0.049)	(0.053)	(0.087)	(0.054)	(0.053)	(0.044)	(0.077)	(0.094)	(0.078)	(0.073)	(0.149)
Constant	0.250**	0.436***	0.314***	0.934***	0.592***	0.448***	-0.040	0.350**	0.713***	0.135	0.152	0.385*
	(0.086)	(0.090)	(0.093)	(0.157)	(0.091)	(0.086)	(0.070)	(0.127)	(0.143)	(0.132)	(0.103)	(0.190)
N	419	419	419	419	423	423	423	423	148	148	148	148
Adj. R^2	0.054	0.049	0.123	0.118	0.072	0.029	0.079	0.066	0.057	0.047	0.103	0.053
F stat.	3.888	4.472	10.570	8.144	5.568	3.534	4.965	5.427	2.794	2.136	2.737	3.278

Results from ordinary least square (OLS) model (robust standard errors in parentheses). Dependent variable: Female- a binary variable which equals one for females and 0 otherwise; Age-an integer, indicating the age of the respondent; Working- a binary variable which equals one if the respondent is a full-time/part-time employer or self-employed; School or Lower - a binary variable which equals one if the respondent indicates at most a high school diploma as the highest level of education achieved and 0 otherwise; Bachelor- a binary variable which equals one if the respondent indicates bachelor's degree as the highest level of education she achieved and 0 otherwise; Post-graduate- a binary variable which equals one if the respondent indicates a master's or a doctoral degree as the highest level of education she achieved and 0 otherwise; Conservative- a binary variable which equals one if the respondent holds conservative political views and zero otherwise; Liberal- a binary variable which equals one if the respondent holds liberal political views and zero otherwise. Independent variables: LM1- a binary variable which equals one in LM1 treatment and zero otherwise; LM2- a binary variable which equals one in LM2 treatment and zero otherwise. Significance levels: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

CHAPTER 2

TRUST AND SUNK COSTS IN CHARITABLE GIVING

Charitable donations play a critical role in funding non-governmental organizations (NGOs) and public goods projects worldwide. These donations support various initiatives like education, healthcare, poverty alleviation, and environmental protection, and are essential for social and cultural development. However, effectively coordinating donations to prevent them from being spread too thinly across multiple projects presents a significant challenge for both donors and the NGOs. The paper Abraham et al. (2023): *"Coordinating Donations via an Intermediary: The Destructive Effect of a Sunk Overhead Cost"* examines whether donors' willingness to coordinate their contributions through an intermediary is influenced by the discretion granted to the intermediary and the overhead costs they incur.

Our study builds upon the experimental work of Corazzini et al. (2015) and Corazzini et al. (2020), which demonstrated the challenges of donor coordination in scenarios involving multiple public goods. They pointed out the threats of miscoordination, where donor contributions might fail to reach the necessary threshold, reducing the effectiveness of charitable efforts. Corazzini et al. (2020) found that imposing strict limitations on intermediary discretion could enhance coordination and improve outcomes. The present study builds on this by considering more realistic intermediary roles, where some discretion is allowed, and examining the impact of sunk overhead costs.

We have utilized a lab-on-web experiment to explore donor behavior in situations involving multiple identical threshold public goods. In the experiment, donors were given the option to route their contributions through an intermediary - another donor tasked with coordinating the group's donations. The findings suggest that donors were more likely to use intermediaries when their discretion over the donations was limited. However, this positive effect is diminished when the intermediary faces overhead costs, suggesting that such costs negatively affect donors' trust and willingness to coordinate through an intermediary.

Understanding the concept of overhead aversion is crucial for understanding donors' behavior in this context. Despite the sunk nature of these costs, which theoretically should not affect donors' decision-making, our experiment's results demonstrate a significant decrease in the coordination via the intermediary when overhead costs are introduced. These results are consistent with existing literature on donor behavior, which suggests that donors are often influenced by psychological biases and perceptions of trustworthiness rather than purely rational economic considerations (Mudita and Suk, 2024; Cagala et al., 2023; Hung et al., 2023).

The study provides critical insights into the interplay between funding restrictions and overhead costs. When intermediaries are bound by stricter destination rules – which require them to allocate a high percentage of the received funds to public goods – donor contributions and coordination efforts are more robust. However, the introduction of even minimal overhead costs significantly erodes these gains, suggesting a complex dynamic where the perceived fairness and effectiveness of intermediaries are called into question. This insight highlights the need for NGOs and similar entities to carefully consider both the structure of their fundraising efforts and the transparency of their cost structures to maintain donors' trust and maximize contributions.

The rest of this chapter is organized as follows. First, I summarize our experimental design and procedures; second, I present the main findings and then discuss the conclusions and implications of the results. All tables, figures, and highlighted results are presented as published in Abraham et al. (2023) with formatting adjustments when necessary.

2.1 EXPERIMENTAL DESIGN AND PROCEDURES

The objective of this study is to investigate how the presence of overhead costs and different levels of intermediary discretion affect donor behavior and the effectiveness of coordinated contributions; namely, we focused on i) the discretion rule of the intermediary in allocating donations and ii) the influence of sunk overhead costs on donor trust and coordination efficiency. To address these questions, we conducted a controlled lab-on-the-web experiment. The experiment used a threshold multiple public goods game where participants could allocate their resources directly to the public goods or delegate their contributions to an intermediary. Each round of the experiment consisted of two phases: a delegation phase, where donors decided how much

to transfer to the intermediary, and a contribution phase (see Figure 2.1 for the decision screen example including instructions for the participants), where the actual allocation to public goods occurred.

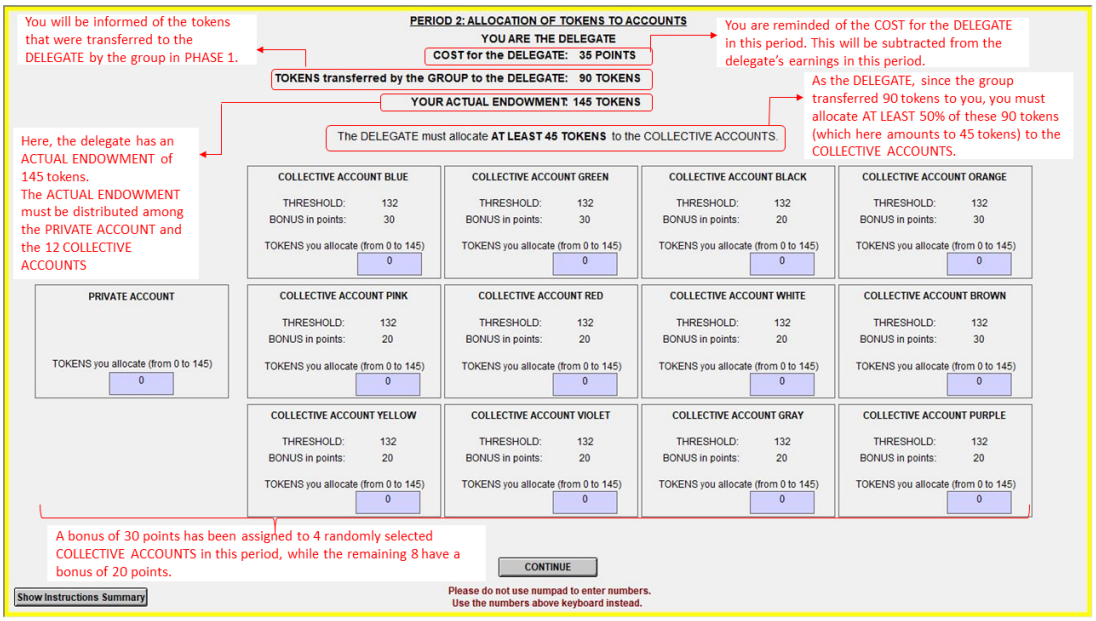


Figure 2.1: Instructions for $20Rule_{Cost}$ treatment - contribution phase

The experiment included six treatments using a 3x2 between-subjects design where we manipulated the level of restriction on the intermediary's discretion (parameter destination rule, 0%, 20%, and 80%) over the funds received and the presence or absence of overhead costs incurred by the intermediary regardless of whether any public good was successfully funded. You find the treatments overview in Table 2.1.

The Destination Rule (0%, 20% or 80%) represents the percentage of transfers received from the donors that the intermediary must allocate to the collective accounts. This means that the intermediary is required to allocate at least 20% (or 80%) of the transfers received from the donors to the collective accounts in the contribution phase or in the absence of a destination rule (i.e. the 0% destination rule), the intermediary is free to allocate any amount of the transfers received from the donors to her private account in the contribution phase.

Overhead Sunk Costs are incurred only by the intermediary. These costs could be 20, 35, or 50 points, and each value is equally likely and randomly selected. Participants in the cost treatments

were informed that these intermediary costs would be deducted from the intermediary's round earnings, regardless of the outcome of funding the 12 public goods.

Table 2.1: Treatments overview.

	Overhead sunk cost	
Destination rule	YES	NO
0%	$NoRule_{Cost}$	$NoRule_{NoCost}$
20%	$20Rule_{Cost}$	$20Rule_{NoCost}$
80%	$80Rule_{Cost}$	$80Rule_{NoCost}$

The experimental design was crafted to address two hypotheses concerning the level of discretion on the funds by the intermediary and the sunk overhead costs presence. The hypotheses were formulated as:

Hypothesis 1 (The effect of the size of the destination rule): *Relative to the baseline*[1] *where there are no restrictions on the intermediary's allocation decisions in the contribution phase:*

(a) *Transfers to the intermediary, contributions to the public goods, coordination over the public goods and overall profits are unaffected by the introduction of a 20% destination rule;*
(b) *Imposing an 80% destination rule increases transfers to the intermediary, contributions to the public goods, coordination over public goods and overall profits.*

Hypothesis 2 (The effect of the overhead costs): *For a given size of the destination rule, introducing an overhead sunk cost on the intermediary does not affect transfers by the group to the intermediary, contributions to the public goods, coordination over public goods or profits.*

The experiment was conducted in 2020 at Masaryk University Experimental Economics Laboratory with a total of 320 participants. Due to the COVID-19 pandemic, we used the "lab-on-the-web" procedure with z-Tree Unleashed (Duch et al., 2020) and instructions were delivered over Zoom. Participants completed 12 rounds of a threshold multiple public goods game. Each session lasted about 90 minutes, with an average payoff of around CZK 281.

[1] Treatment $NoRule_{NoCost}$.

2.2 MAIN RESULTS

The study finds that donors are more likely to coordinate their contributions via the intermediary when the intermediary is subject to a significant restriction on their discretion – specifically, when the intermediary is required to allocate 80% of the received funds to the public goods. This condition appears to mitigate the coordination problem typically observed in threshold public goods games, leading to higher overall contributions and an increased likelihood of public goods being successfully funded.

Figure 2.2: Transfers to the intermediary, overall contributions, coordination, and profits

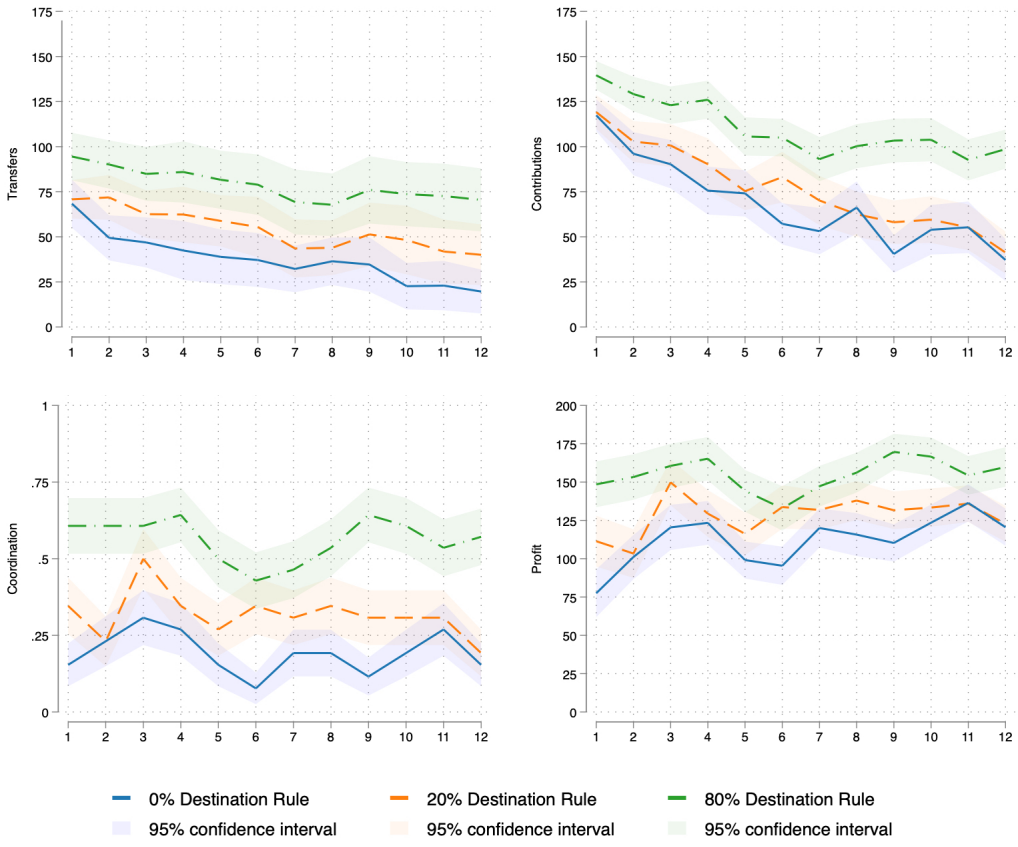
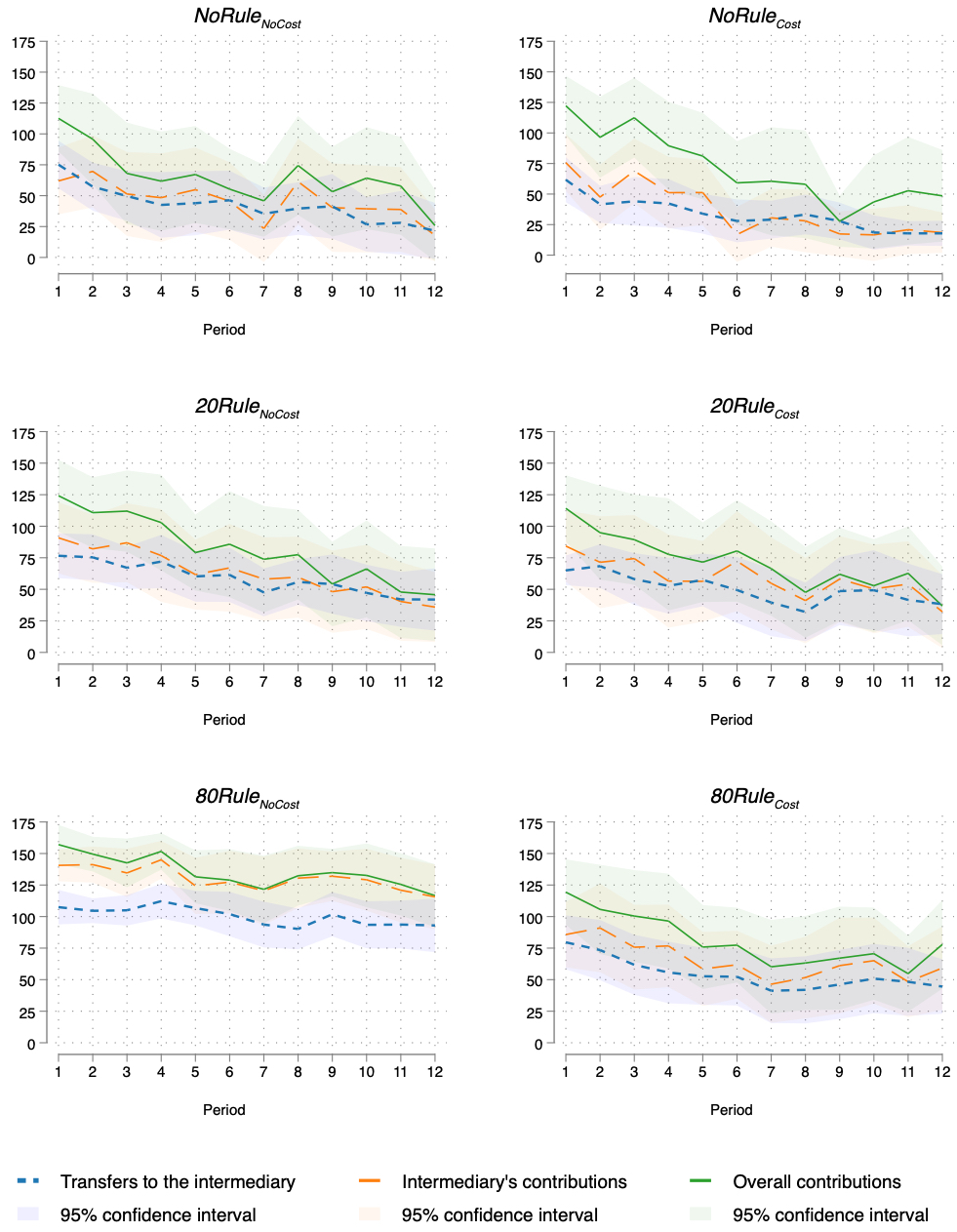


Figure 2.2 shows the average values of the main outcome measures. Transfer to the intermediary is consistently higher in the *80Rule* treatments compared to both the *NoRule* and *20Rule* treatments. This pattern holds true for the other three outcome variables as well, with the *80Rule* treatment also resulting in higher overall contributions by the group to the public goods, a greater proportion of successful coordination, and higher individual profits.

Figure 2.3: Transfers to the intermediary and composition of the contributions



Result 1 *Relative to the NoRule treatments, the 80Rule treatments significantly increase transfers to the intermediary, contributions to the public goods, coordination over public goods and overall profits. The 20Rule treatments are statistically indistinguishable from the NoRule treatments.*

However, the introduction of overhead costs significantly alters this dynamic. Even when these costs are sunk and unrelated to the intermediary's efficiency, their presence reduces the likelihood that donors will transfer their endowment (or it's part) to the intermediary. This reduction is attributed to a decrease in trust; donors might perceive the intermediary as less reliable when overhead costs are involved, even if these costs do not directly affect the allocation of funds. The negative impact of overhead costs is observed across all levels of intermediary discretion, suggesting that it is not the size of the costs but their existence that undermines donor coordination. We can observe this in Figure 2.3, which shows that transfers to the intermediary are higher in the $80\text{Rule}_{\text{NoCost}}$ treatment compared to the $80\text{Rule}_{\text{Cost}}$ treatment. Additionally, we found that contributions to public goods by donors are minimal in the $80\text{Rule}_{\text{NoCost}}$ treatment, indicating a heavy reliance on the intermediary to address the coordination problem of funding multiple public goods. Regression analysis presented in Table 2.2 suggests that any positive effect of the destination rule is undone by the presence of the overhead costs.

Result 2 *The overhead costs imposed on the intermediary significantly reduce transfers to the intermediary, contributions to the public goods, successful coordination and overall profits.*

Result 3 *The overhead costs imposed on the intermediary nullify the positive effects of the 80% destination rule on transfers to the intermediary, overall contributions, coordination, and profits.*

Interestingly, the 20% restriction on the intermediary's discretion did not produce a significant difference in donor behavior compared to the unrestricted condition. This finding highlights the importance of a sufficiently strict restriction to effectively coordinate donor behavior, as weaker restrictions do not seem to provide the necessary assurance to overcome the coordination problem.

In the $80Rule_{NoCost}$ treatment, despite the intermediary having some opportunity to expropriate donors' transfers, she is ex-ante in exactly the same position as the donors. The donors have little reason to believe she will expropriate *any* of their transfers if doing so means forgoing the

collective benefit from effectively funding a public good. Thus, in the absence of the overhead costs, donors may believe the rate at which their transfers are converted into contributions is actually even higher than 80%. As a result, starting right from the first round, the first-stage transfers from donors are high enough for the intermediary to be able to effectively fund one of the public goods. We compared transfers to the intermediary in the first round with and without costs under the 80% destination rule and found that the average transfer amount by group members to the intermediary in the first round was significantly lower in the $80\text{Rule}_{\text{Cost}}$ treatment compared to the 80Rule treatment. However, when we looked at the intermediary's behavior, we discovered that as long as she receives enough to unilaterally fund one of the public goods, there is no difference in the amount she contributes to the public goods in the $80\text{Rule}_{\text{Cost}}$ (36.10 tokens) and 80Rule treatments (39.81 tokens) (MWU-test $p > 0.200$).

Result 4 *Overhead costs reduce the effectiveness of a high 80% destination rule because they reduce donors' willingness to coordinate via the intermediary. However, as long as sufficient funds are transferred, intermediaries do not change expropriate more when they incur a sunk overhead cost.*

2.3 CONCLUSIONS

Our results add to previous studies showing that donors are sensitive to the "price" of giving and tend to avoid costs that are not directly related to a program, such as fundraising or administrative expenses. For example, Bowman (2006), Meer (2014), Gneezy et al. (2014), orPortillo and Stinn (2018) suggest that donors are more likely to contribute when they know their donations won't be used to cover overhead costs, as this increases trust in the charity. However, our findings indicate that distrust towards intermediaries due to overhead costs is often unnecessary; intermediaries behave consistently regardless of incurring overhead costs.

2.4 IMPLICATIONS

The study Abraham et al. (2023): *"Coordinating donations via an intermediary: The destructive effect of a sunk overhead cost"* contributes to the literature on charitable giving and the role of intermediaries in facilitating effective donations. Our findings highlight the critical role of trust in donation coordination, especially when overhead costs are involved. Although imposing strict restrictions on intermediary discretion can improve coordination and boost contributions, these benefits are considerably reduced when donors are aware of overhead costs, regardless of their size or relevance to the intermediary's decisions.

The result that an 80% restriction on intermediary discretion significantly enhances coordination aligns with previous findings that emphasize the importance of trust and perceived control in donor behavior (Eckel et al., 2017; Kessler et al., 2019; Costello and Malkoc, 2022). Our study, however, adds depth to this understanding by showing that even with limited discretion, intermediaries can effectively guide donor contributions, provided the restrictions are sufficient to smooth concerns over potential misallocation.

The inclusion of overhead costs represents a shift from previous models, which often assumed that these costs were minimal or adequately considered in donor utility functions. However, we argue that donors strongly dislike overhead costs, even when these costs do not directly impact the efficiency of fund allocation. This overhead aversion, which has been previously documented (e.g., Gneezy et al., 2014; Caviola et al., 2014), has a particularly negative impact in situations requiring coordinated giving.

Moreover, our study's findings align with literature on signaling and trust in charitable organizations. Previous studies, Bennett and Savani (2003), or Portillo and Stinn (2018), show that donors often rely on overhead ratios to assess charities' credibility despite evidence indicating that these ratios are unreliable indicators of overall organizational effectiveness. This study reinforces these concerns by demonstrating how the presence of overhead costs can hinder the donation coordination process, leading to a decrease in both total contributions and the likelihood of successfully funding public goods.

The theoretical implications of these findings challenge the conventional models of charitable

giving (see e.g. Andreoni and Payne, 2013), which frequently assume rational actors who incorporate all relevant information into their decision-making. The observed sensitivity to overhead costs suggests that donor trust is more uncertain than these models typically account for.

In summary, our experiment deepens the understanding of interplay between trust, overhead costs, and donor coordination in charitable giving. The introduction of overhead costs negates the benefits of imposing restrictions on intermediaries, reducing donors' willingness to contribute and hindering successful coordination. This negative impact is present even when overhead costs are low, indicating that their existence, rather than their size, diminishes the restrictions' effectiveness. Our findings, while limited by the constraints of the economic experiment methodology and external validity, might have implications for charitable organizations and policymakers. The results highlight the crucial importance of managing donor perceptions regarding overhead costs for charities. Even necessary overhead expenses must be communicated in a way that doesn't undermine trust in the organization, as the presence of these costs alone can discourage donors from fully engaging.

Table 2.2: Differences across treatments in transfers to the intermediary, overall contributions, coordination, and profits: parametric analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Transf. Del	Transf. Del	Cont	Cont	Profit	Profit	Coord	Coord
$20Rule_{NoCost}$	5.735	5.391*	4.127	2.657	8.471	6.413	0.106	0.106
	(3.881)	(3.215)	(4.665)	(3.352)	(14.689)	(12.906)	(0.389)	(0.389)
$80Rule_{NoCost}$	19.414***	15.575***	17.558***	8.645**	67.401***	53.997***	0.583***	0.584***
	(3.750)	(3.139)	(4.507)	(3.412)	(14.191)	(12.601)	(0.387)	(0.388)
$NoRule_{Cost}$	-2.73	-2.032	1.457	2.274	-9.978	-9.76	-0.068	-0.069
	(3.883)	(3.216)	(4.664)	(3.349)	(14.689)	(12.904)	(0.392)	(0.393)
$20Rule_{Cost}$	2.84	2.485	1.551	-0.149	13.885	8.428	0.127	0.127
	(3.882)	(3.216)	(4.665)	(3.353)	(14.689)	(12.907)	(0.426)	(0.426)
$80Rule_{Cost}$	4.000	3.777	3.894	3.304	3.949	0.808	0.077	0.077
	(3.883)	(3.216)	(4.664)	(3.348)	(14.689)	(12.904)	(0.432)	(0.432)
Trend		-0.818***		-1.102***		1.199***		-0.006
		(0.074)		(0.213)		(0.299)		(0.013)
$Coord_{(t-1)}$		8.046***		16.144***		16.921***		
		(0.776)		(1.841)		(3.141)		
Const.	14.009***	16.102***	16.295***	18.216***	116.949***	109.464***	[0.355]	[0.355]
	(2.745)	(2.324)	(3.299)	(2.726)	(10.387)	(9.331)		
ll	-11771.9	-10601.9	-19755.1	-18036.2	-21225	-19335.3	-528.426	-527.673
$Wald-\chi^2$	43.852	306.413	21.441	151.32	38.771	90.222	37.17	36.95
$p>\chi^2$	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.001
$Obs.$	2880	2640	3840	3520	3840	3520	960	960

Notes: Models (1) to (6) report coefficient estimates (standard errors in parentheses) from two-way linear random effects models accounting for both potential individual dependency over rounds and dependency within the group. Models (7) and (8) report marginal effects from Probit models. Trend is a linear time trend that starts from 0; $Coord_{(t-1)}$ is a dummy that takes a value of 1 if the subject's group reached the threshold for one of the public goods in the previous round. Results remain qualitatively unchanged when adding all the treatment interactions with $Coord_{(t-1)}$ and trend. Results are available upon request. Significance levels: * $p<0.100$, ** $p<0.050$, *** $p<0.010$.

CHAPTER 3

DECISION-MAKING UNDER HORMONAL FLUCTUATIONS

Understanding how physiological factors, particularly hormonal fluctuations, influence social preferences and decision-making is important for our understanding of human behavior. Economists, psychologists, social anthropologists or behavioral biologists have been interested in the impact of hormonal changes on decision-making, particularly the impact of the menstrual cycle. A growing body of literature has investigated the connection between the menstrual cycle and economic behavior to understand gender disparities in preferences. This interest arises from the fact that most significant life events occur between ages 15 and 50, which coincides with women's reproductive years (Croson and Gneezy, 2009). Studies have shown that different phases of the menstrual cycle can influence behaviors such as competitiveness (Buser, 2012b; Wozniak et al., 2014), social preferences (Buser, 2012a), loss aversion (Lazzaro et al., 2016), and competitive bidding (Chen et al., 2013; Schipper, 2014; Pearson and Schipper, 2013). However, many of these studies need a robust theoretical framework to explain why these hormonal changes might affect behavior. in contrast, psychology offers a more theoretically grounded explanation through the ovulatory shift hypothesis (OSH), which suggests behavioral changes across the menstrual cycle based on evolutionary theory which posits that female behavior may shift during ovulation to maximize reproductive success (Gangestad and Simpson, 2000; Jones et al., 2019; Gangestad and Thornhill, 2008; Pillsworth and Haselton, 2006; Larson et al., 2012).

The paper Fišar et al. (2023): *"Ovulatory shift, hormonal changes, and no effects on incentivized decision-making"* investigates whether the predictions of the OSH extend beyond mating behaviors to economic preferences, specifically risk preferences, rule violation, and exploratory behavior. We conducted a laboratory experiment with naturally cycling women, assessing their decisions during both ovulation and menstruation phases and incorporated biomedical technologies and instruments into the data collection (Smith, 2023). Despite the expectation that

hormonal fluctuations would impact economic behaviors, the results revealed no significant differences between the ovulatory and menstrual phases. This suggests that while the menstrual cycle may affect specific social behaviors, its influence on broader economic decision-making is limited.

As in the previous chapters, first, I summarize our experimental design and procedures; second, I show the main findings and then discuss the conclusions and implications of the results. All tables and figures are presented as published in Fišar et al. (2023) with formatting adjustments when necessary.

3.1 EXPERIMENTAL DESIGN AND PROCEDURES

The study seeks to determine whether the hypothesized behavioral shifts occur, particularly during ovulation (which is associated with higher levels of sex hormones like estradiol and testosterone). We designed and conducted a laboratory experiment with 124 naturally cycling women who took part in two experimental sessions and the control group of 47 male participants to account for potential learning effects between sessions. One session took place during ovulation and the other during menstruation. The study involved three behavioral tasks: the *Bomb Risk Elicitation Task* (Crosetto and Filippin, 2013) to assess risk preferences, a *rule-violation task* based on (Hruschka et al., 2014) to measure tendencies toward dishonest behavior, and a *foraging task* (Lenow et al., 2017) to evaluate exploratory versus exploitative decision-making. We also measure individual cognitive skills (Frederick, 2005) and state-trait anxiety (Spielberger et al., 1983). Furthermore, we collected saliva samples - to measure levels of estradiol and testosterone - and hair samples - to assess long-term cortisol levels.

Bomb Risk Elicitation Task (BRET) Participants interact with a 10x10 matrix, uncovering boxes sequentially to avoid a hidden bomb, and are rewarded based on risk-taking behavior, with risk-neutral, risk-averse, and risk-seeking individuals expected to open approximately 50, fewer than 50, and more than 50 boxes, respectively. The task offers analytical advantages over traditional multiple price-list approaches, such as that of Holt and Laury (2005) and avoids gender-math stereotyping biases in measuring risk aversion, as supported by literature findings (Crosetto and Filippin, 2016; Filippin and Crosetto, 2016). See Figure 3.1 for the decision screen.

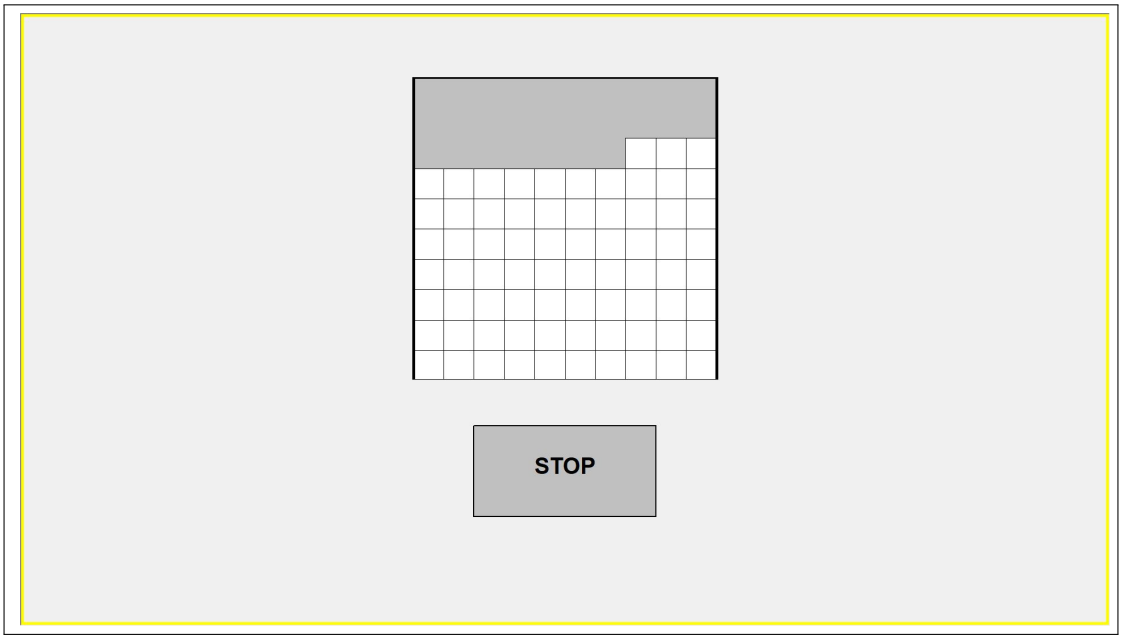


Figure 3.1: Bomb Risk Elicitation Task screenshot

Rule violation task Participants used a six-sided die with three sides colored white and three sides colored blue. Before rolling the die, they mentally choose a color. If the color they rolled matches their mental selection, they choose "option A" and earn a point. If the rolled color doesn't match their mental selection, they choose "option B" and receive no points. Since individual rule violations cannot be directly detected due to a lack of control over the dice roll, we analyze statistical probabilities of rule violation versus truth-telling based on repeated rolls (more than 30). We did not specify the exact number of rolls to the participants, but we kept a consistent count across subjects and sessions to avoid the anchoring effect. See Figure 3.2 for the decision screen.

Foraging task Participants made two types of decisions: (i) to continue harvesting apples from the same tree, thereby choosing to exploit resources, or (ii) to move to another tree in the virtual orchard, choosing to explore resources. Each tree has a stochastic depletion rate, making prolonged harvesting from the same tree increasingly less efficient. Conversely, exploring the orchard requires time, and constantly moving between trees would also reduce overall efficiency. See Figure 3.3 for the decision screen.

The experiment was conducted at the Masaryk University Experimental Economics Laboratory

Figure 3.2: Rule violation task screenshot

and the Laboratory of Experimental Economics (LEE) at the Prague University of Economics, across 157 sessions from November 2018 to June 2020. in total, 138 women and 58 men participated in the first session of the experiment, and 124 women and 47 men participated in both sessions. We required women to attend sessions only during ovulation or menstruation. Due to the collection of biological samples, we imposed strict criteria for recruitment and the organization of the sessions. Female research assistants were present in the laboratory for all-female sessions, and male assistants for all-male sessions as interactions with the opposite gender may affect behavior (Booth and Nolen, 2012; Aries, 1996; Haselton and Gildersleeve, 2011; Cigarini et al., 2020).

3.2 MAIN RESULTS

The results of our study suggest that there are no significant changes in behavior associated with the ovulatory shift across the three measured domains: risk-taking, rule violation, and exploratory behavior.

As you can see in Figure 3.4, we do not observe significant differences between menstruation and ovulation in BRET. This is contradictory to our expectations stemming from the ovulatory

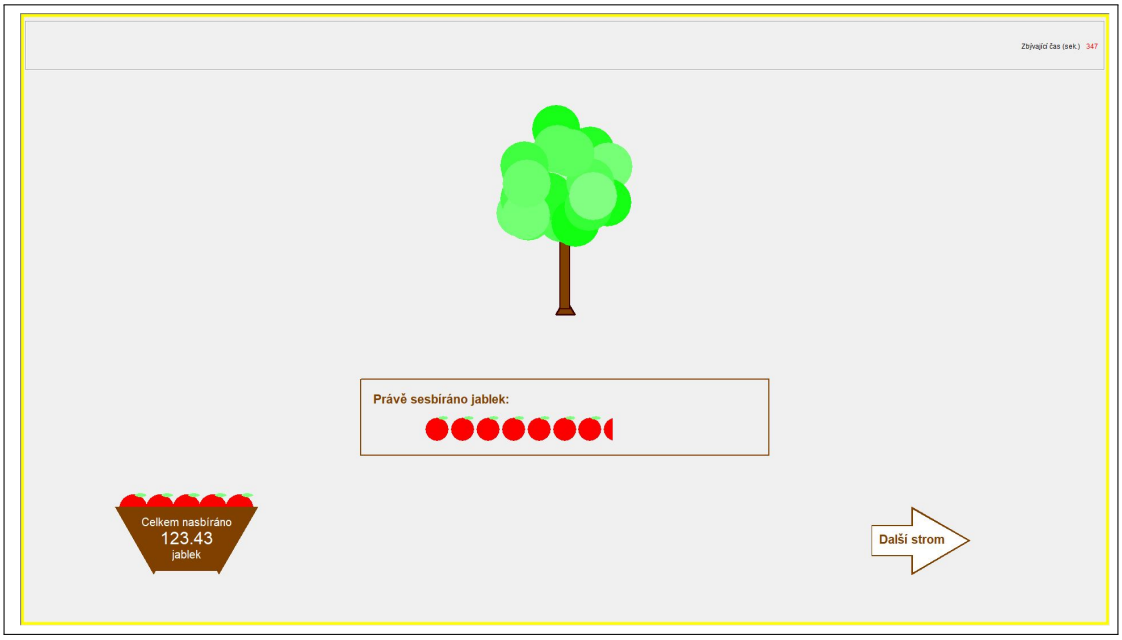
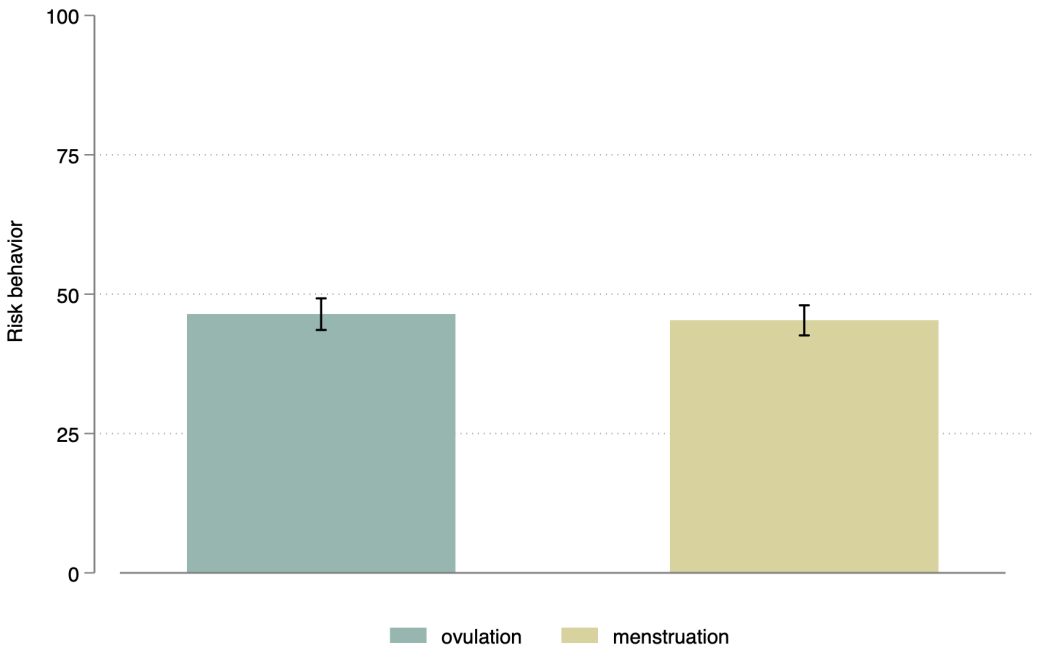


Figure 3.3: Foraging task screenshot

Figure 3.4: Risk-taking behavior



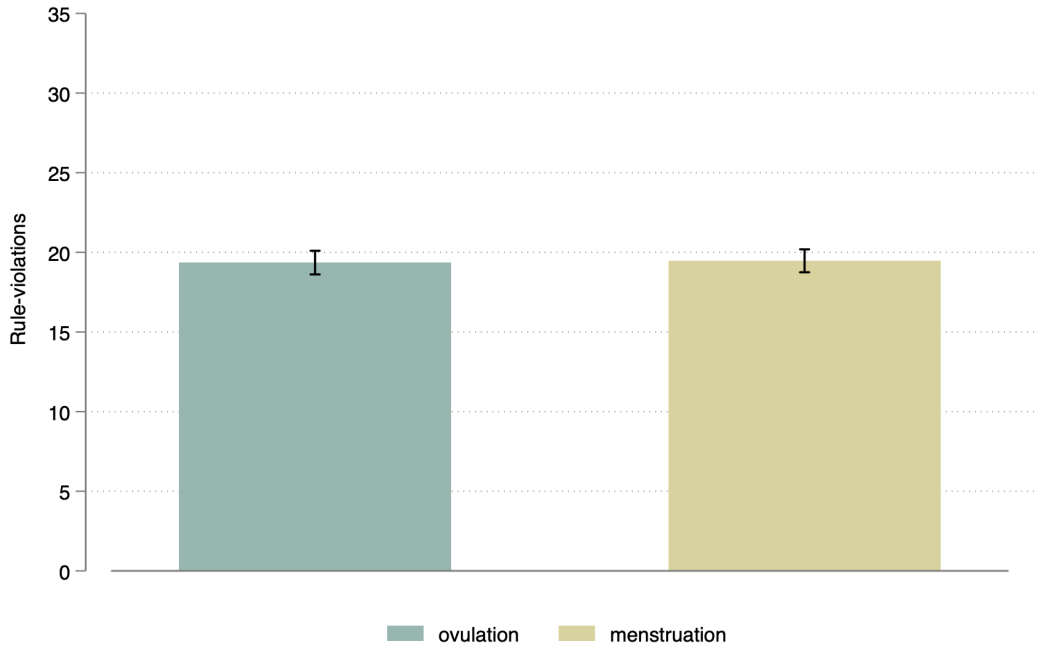
Note: the outcome variable is represented by the number of boxes opened by the subject out of a maximum of 100.

shift hypothesis, and we would expect females to engage in more risky behavior during ovulation rather than during the menstruation phase. This is further supported by regression models in Table 3.1.

Result 1 *There are no significant differences between menstruation and ovulation in risk attitudes of the female participants. Further, there is no difference between the female treatment group and the male control group.*

Similarly, the rule-violation task revealed no significant differences in dishonest behavior between the ovulation and menstruation phases. We would expect females to exhibit a higher tendency to over-report favorable outcomes for themselves during ovulation compared to menstruation. Again, the regression models also support this findings (Table 3.2).

Figure 3.5: Rule-violating behavior

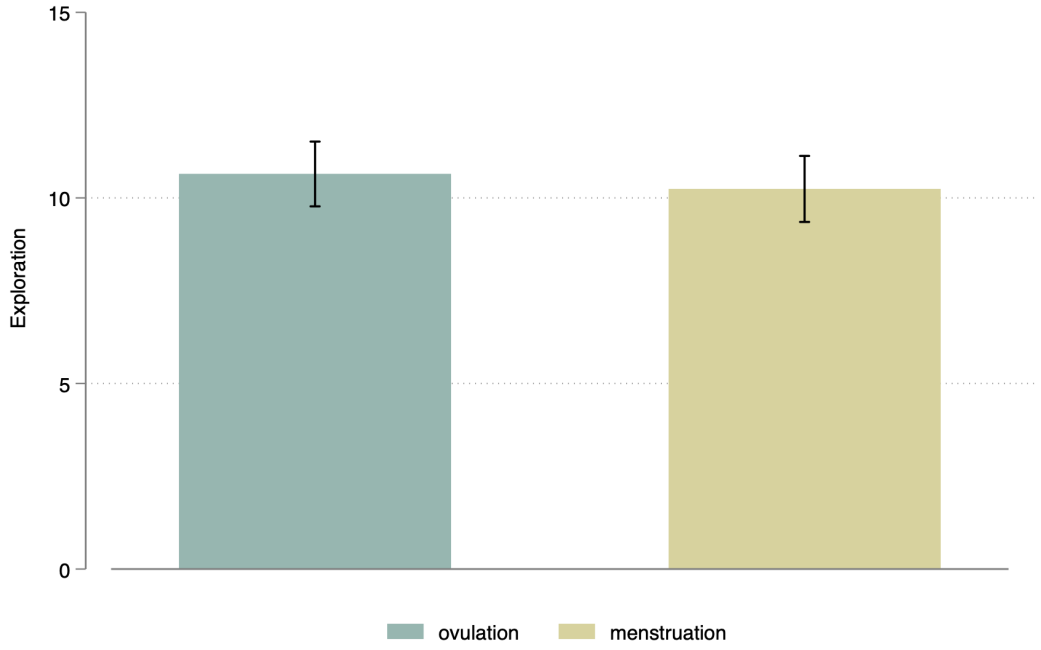


Note: the outcome variable represents the number of dice rolls that are favorable to the participant, out of a maximum of 32.

Result 2 *There is no significant difference between menstruation and ovulation in the rule-violating (cheating) behavior of the female participants. We observe a small gender effect, with females reporting about two tokens fewer than males.*

The exploratory behavior measured by the foraging task also showed no significant variation across the menstrual cycle phases. The exploratory attitudes were expected to be more pronounced during ovulation; however, Figure 3.6 and Table 3.3 show that this was not the case.

Figure 3.6: Exploratory behavior



Note: the outcome variable represents the number of virtual trees visited by the participant.

Result 3 *There are no significant differences between menstruation and ovulation in exploratory attitudes of the female participants. However, female participants tended to explore a little less than men.*

These null results suggest that the ovulatory shift does not have a noticeable effect on these economic behaviors, challenging the predictions made by the ovulatory shift hypothesis in this

context.

3.3 CONCLUSIONS

Our study employed a within-subjects design and utilized direct hormonal measurements to address several methodological concerns present in earlier research, such as small sample sizes, reliance on self-reported menstrual phases, and lack of control for hormonal variations, which we addressed in our design. The observed null effects support recent literature that suggests that the behavioral changes posited by the ovulatory shift hypothesis may not extend to decision-making contexts beyond mate selection. The previous findings of menstrual cycle effects on behavior might be attributable to methodological limitations or contextual factors rather than genuine biological effects. However, we also acknowledge certain limitations of our study. There was an inconsistency in the hormonal measures, where only a subset of women exhibited the expected increase in estradiol and testosterone during ovulation and we also acknowledge the low reliability of salivary estradiol for the identification of cycle phase (Arslan et al., 2023). Yet our study enhances the understanding of the interplay between hormonal fluctuations and economic decision-making, highlighting the need for caution in generalizing findings across different behavioral contexts and stressing the importance of methodological rigor in this field of research.

3.4 IMPLICATIONS

The ovulatory shift hypothesis, which proposes systematic behavioral changes across the menstrual cycle, has been a topic of interest in both psychology and economics for some time. Previous studies offered some support for this hypothesis, indicating that women might display increased risk-taking behaviors or altered social preferences during the ovulation phase (e.g., Pearson and Schipper, 2013; Eisenbruch and Roney, 2016); however, more recent research, including our study, has been questioning these earlier findings.

The null results reported in this study are consistent with a growing body of methodologically rigorous research that finds little to no evidence of significant behavioral changes across the menstrual cycle (e.g., Blake et al., 2022; Schleifenbaum et al., 2022). These studies suggest that

earlier findings of behavioral shifts may have been influenced by methodological limitations, such as small sample sizes, reliance on self-reported data, and inadequate control for confounding variables. The main contribution of our study is the intentional address of these issues and the provision of a more robust test of the ovulatory shift hypothesis in an economic context. In addition, our study also explored the dual-hormone hypothesis, which examines the impact of testosterone and cortisol interaction on behavior. We found little to no support for this hypothesis (in line with a recent meta-analysis by (Dekkers et al., 2019)) that only found tentative evidence for this theory. The inability to replicate these effects in a controlled laboratory setting raises concerns about the generalizability of findings from previous studies that reported interactions between testosterone and cortisol as predictors of risk-taking behavior.

Our findings contribute to the growing literature that hormonal fluctuations across the menstrual cycle may not have a robust or consistent effect on general decision-making behaviors. Therefore we suggest that economic models and theories may not have to consider menstrual cycle effects when predicting female behavior in terms of risk-taking, rule violation, or the exploration and exploitation of resources.

Table 3.1: Risk Behavior

Outcome:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
BRET	Pooled	Females	Females	Females	Females	Males	Males	Males
Female	1.2719							
	(2.2682)							
Female*Ovulation	0.6672							
	(1.5425)							
Ovulation		0.6439						
		(1.6664)						
Estradiol			0.0000	0.0000	0.0000	-0.0011	-0.0010	-0.0010
			(0.0001)	(0.0001)	(0.0001)	(0.0012)	(0.0009)	(0.0009)
Testosterone			-0.0018	-0.0010	-0.0006	0.0169*	0.0078	0.0088
			(0.0051)	(0.0050)	(0.0050)	(0.0074)	(0.0050)	(0.0048)
Cortisol			0.0369			-0.0260		
			(0.0470)			(0.0832)		
HairCortisol_1			-0.2995			0.0125		
			(0.2475)			(0.1487)		
Y1SCORE				-0.0740			-0.0570	
				(0.0936)			(0.1540)	
Y2SCORE					-0.0954			-0.4048*
					(0.1171)			(0.1758)
CONST.	47.6106***	48.3701***	49.8243***	51.3087***	52.9431***	52.9425***	49.6343***	64.3375***
	(3.3763)	(3.1609)	(4.3085)	(4.3956)	(5.8933)	(8.3530)	(9.3614)	(9.8989)
Controls	✓	✓	✓	✓	✓	✓	✓	✓
ll	-1388.6888	-1021.038	-1019.9091	-1020.7778	-1020.7561	-278.24431	-359.64865	-357.20622
$Wald-\chi^2$	28.31	19.68	22.07	20.12	20.23	14.21	16.26	21.97
$p>\chi^2$	0.0001	0.0014	0.0048	0.0053	0.0051	0.0765	0.0228	0.0026
Obs.	342	248	248	248	248	72	94	94

Notes: Estimates from panel linear mixed models with random effects accounting for potential intra-individual dependencies over sessions. Controls include the score in the CRT, the order of sessions, and the order of the game during a session. Standard errors are in parentheses. The outcome variable is the number of opened boxes and it empirically spans from 0 to 100. *** $p<0.001$, ** $p<0.01$, * $p<0.05$. The decrease in observations in Model (6) can be attributed to the constraint of collecting hair samples, particularly for subjects with hair length shorter than 3 cm, where hair cortisol measurements are not feasible.

Table 3.2: Rule-violations

Outcome:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CHEAT	Pooled	Females	Females	Females	Females	Males	Males	Males
Female	-2.0789**							
	(0.7874)							
Female*Ovulation	-0.0298							
	(0.3397)							
Ovulation		0.0166						
		(0.3332)						
Estradiol			0.0000	0.0000	0.0000	0.0000	0.0002	0.0001
			(0.0000)	(0.0000)	(0.0000)	(0.0004)	(0.0004)	(0.0004)
Testosterone			0.0006	0.0003	0.0005	-0.0041	-0.0044*	-0.0043*
			(0.0013)	(0.0013)	(0.0013)	(0.0031)	(0.0020)	(0.0020)
Cortisol			-0.0083			0.0521		
			(0.0120)			(0.0303)		
HairCortisol_1			0.0686			-0.0769		
			(0.0734)			(0.0856)		
Y1SCORE				-0.0185			0.0098	
				(0.0224)			(0.0596)	
Y2SCORE					-0.0405			-0.1154
					(0.0348)			(0.1010)
CONST.	20.8577***	18.2778***	17.9375***	18.7857***	19.8620***	21.9139***	21.0532***	26.2672***
	(1.0499)	(0.7324)	(1.1218)	(1.1057)	(1.6773)	(4.1344)	(3.5992)	(5.1813)
Controls	✓	✓	✓	✓	✓	✓	✓	✓
ll	-957.67849	-671.31039	-669.74711	-670.1639	-669.82621	-211.85555	-273.46791	-272.83971
$Wald-\chi^2$	21.06	16.69	20.16	19.28	20.03	8.24	9.27	10.55
$p>\chi^2$	0.0018	0.0051	0.0098	0.0074	0.0055	0.4106	0.2340	0.1596
Obs.	342	248	248	248	248	72	94	94
Obs.	342	248	248	248	248	72	94	94

Notes: Estimates from panel linear mixed models with random effects accounting for potential intra-individual dependencies over sessions. Controls include the score in the CRT, the order of sessions, and the order of the game during a session. Standard errors are in parentheses. The outcome variable is the number of tokens devoted to self and it empirically spans from 9 to 32. *** $p<0.001$, ** $p<0.01$, * $p<0.05$.

Table 3.3: Exploration

Outcome: Exploration (Exploitation)	(1) Pooled	(2) Females	(3) Females	(4) Females	(5) Females	(6) Males	(7) Males	(8) Males
Female	-1.7115*							
	(0.8016)							
Female*Ovulation	0.3305							
	(0.2940)							
Ovulation		0.3126						
		(0.3174)						
Estradiol			-0.0000	-0.0000	-0.0000	0.0001	0.0002	0.0002
			(0.0000)	(0.0000)	(0.0000)	(0.0003)	(0.0002)	(0.0002)
Testosterone			-0.0001	-0.0003	-0.0003	-0.0005	0.0010	0.0010
			(0.0015)	(0.0015)	(0.0015)	(0.0019)	(0.0013)	(0.0013)
Cortisol			-0.0159			0.0445*		
			(0.0131)			(0.0177)		
HairCortisol_1			0.0581			0.0379		
			(0.0925)			(0.0516)		
Y1SCORE				-0.0044			-0.0284	
				(0.0236)			(0.0376)	
Y2SCORE					-0.0214			-0.0025
					(0.0443)			(0.0659)
CONST.	13.3954***	11.5893***	12.2705***	12.1648***	12.9163***	12.8225***	13.1482***	12.2634***
	(1.0587)	(0.8857)	(1.3424)	(1.2597)	(2.0934)	(2.1630)	(2.1904)	(3.1925)
Controls	✓	✓	✓	✓	✓	✓	✓	✓
ll	-937.76846	-696.55732	-695.00358	-695.98701	-695.88714	- -175.03337	-230.38849	-230.67098
$Wald - \chi^2$	14.74	14.42	12.45	12.64	15.49	9.80	9.14	9.16
$p > \chi^2$	0.0224	0.0471	0.0715	0.0868	0.0814	0.0043	0.2003	0.2413
Obs.	342	248	248	248	248	72	94	94

Notes: Estimates from panel linear mixed models with random effects accounting for potential intra-individual dependencies over sessions. Controls include the score in the CRT, the order of sessions, and the order of the game during a session. Standard errors are in parentheses. The outcome variable empirically ranges between 1 and 29 virtual trees visited. *** p<0.001, ** p<0.01, * p<0.05.

CONCLUDING REMARKS

This habilitation thesis provides insight into social preferences and decision-making through a series of experimental studies. The research aims to deepen our understanding of the factors influencing individual and group economic behavior.

The first experimental study (Chapter 1) investigated the impact of framing on altruistic behavior within the Dictator Game framework under various loss-framing conditions. The study demonstrated that the way losses are presented significantly influences generosity. Specifically, when losses were shared, participants exhibited more prosocial behavior. These findings suggest that the perception of loss and its framing are essential in shaping our social preferences.

Using multiple public goods game in the second study (Chapter 2), we explored how trust in the intermediary and the existence of sunk overhead costs impact charitable giving. The findings indicate that donors are more likely to coordinate their contributions through intermediaries with limited discretion. However, even minimal overhead costs substantially reduce trust and the willingness to donate. In this study, we highlight the delicate balance between perceived efficiency and trustworthiness in charitable contexts.

The third experimental study (Chapter 3) examined the potential influence of hormonal fluctuations on economic decision-making. Contrary to previous research suggesting that physiological changes might affect decision-making, this study found no significant impact of hormonal shifts related to the menstrual cycle on risk-taking behavior, rule violations, or the exploration and exploitation of resources. These findings add to the discussion about the consistency of economic preferences and indicate that decision-making under uncertainty may be less influenced by physiological changes than previously thought.

Collectively, the studies presented in this thesis contribute to a more nuanced understanding of human behavior influenced by variety of factors. The implications of these findings extend beyond academic research in behavioral economics. They provide valuable insights—with some

methodological limitations—for stakeholders aiming to encourage cooperative behavior, build trust, or create effective interventions in various social and economic contexts. For instance, understanding how framing affects generosity can inform the development of more effective communication strategies in public policy and charitable campaigns. Similarly, insights into trust and overhead costs can guide the optimization of resource allocation and fundraising strategies.

In conclusion, this habilitation thesis demonstrates the value of experimental methods in uncovering the complexities of human behavior in economic contexts. Future research could expand on these findings by examining additional contextual factors and applying the experimental frameworks in different cultural and institutional settings to further enrich our understanding of economic behavior.

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APPENDIX

APPENDIX A: MIND THE FRAMING WHEN STUDYING SOCIAL PREFERENCES IN THE DOMAIN OF LOSSES

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APPENDIX B: COORDINATING DONATIONS VIA AN INTERMEDIARY: THE DESTRUCTIVE EFFECT OF A SUNK OVERHEAD COST

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APPENDIX C: OVULATORY SHIFT, HORMONAL CHANGES, AND NO EFFECTS ON INCENTIVIZED DECISION-MAKING

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