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From Individual Choices to the 4-Eyes-Principle: The Big Robber Game revisited among Financial Professionals and Students

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Abstract

While headline news frequently report cases of large-scale fraud, corruption, and other immoral behavior, laboratory experiments often show prosocial behavior in strategic games. To reconcile and explain these seemingly conflicting observations, Alós-Ferrer et al. (2022) introduced the *Big Robber Game*—an altered dictator game where one *robber* can take money from multiple *victims*. They reported low prosocial behavior among a pool of student subjects who behaved more prosocial in bilateral games than in the *Big Robber Game*. In our study, we employ the Big Robber Game within a 2x2 factorial design, engaging over 860 participants to examine the behaviors of financial professionals versus students. Moreover, inspired by the four-eyes principle, a common practice in the finance industry, we investigate decision-making both individually and in pairs. We find overall support for the results of Alós-Ferrer et al. (2022) and that finance professionals rob less than students. Accounting for a multitude of specifications, socio-demographic characteristics and individual preferences, we report that treatment differences disappear, indicating similar behavior across individuals, pairs, finance professionals, and students. Finally, in a series of non-pre-registered exploratory analyses, we show that *victims* expect finance professionals to rob significantly more than student *robbers*, implying that finance professionals are considered to be less pro-social than students' peers.

JEL: C91, C93, D91
Keywords: Selfishness, Social Preferences, Finance Professionals, Group decisions, Experimental Finance

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1 Introduction

It is widely recognized that the traditional assumption of the selfish "homo economicus," focused solely on maximizing income, frequently does not apply in bilateral games. With findings from dictator, trust, and ultimatum games, the assumption of invariable egoistic behavior has been clearly falsified (see, e.g., Forsythe et al., 1994; Dickhaut and McCabe, 1994; Engel, 2011; Güth and Kocher, 2014; Alós-Ferrer and Farolfi, 2019).

Building on these insights, Alós-Ferrer et al. (2022, p. 88) questioned whether and how the finding of prosocial behavior in strategic games can be brought in line with *"seemingly rampant economic selfishness suggested by many recent corporate scandals."* Prominent cases of such corporate scandals from the year 2000 onward are, for instance, the Enron scandal, the Madoff investment scandal, the Volkswagen emission scandal, the Wirecard accounting scandal, and the FTX scandal (see, e.g., Petrick and Scherer, 2003; U.S. Securities and Exchange Commission, 2008; Crête, 2016; Möllers, 2021; U.S. Attorney's Office, 2022).

While Alós-Ferrer et al. (2022) replicate students' expected prosocial behavior in classical bilateral games, they report low prosocial behavior in their newly invented altered dictator game with multiple *victims*, called the *Big Robber Game* (BRG). In this game, one player (i.e., the *robber*) can take a fraction of 16 other players' (i.e., *victims*') earnings without the possibility for punishment or deductions. The authors reported that over half of their subjects, all of which were students, decided to take the maximum fraction possible, which was set to be 50% of *victims*' earnings. They concluded that taking from many lowers moral barriers.

We build our design on their study and aim to narrow the following research gaps with a 2x2 factorial design. With respect to the motivation of explaining (financial) corporate scandals, we (i) expose finance professionals to the BRG. Referring to the widespread use of the *four-eyes-principle*, frequently implemented in companies, we investigate (ii) whether pair-wise decision-making leads to different outcomes compared to individual decision-making. Furthermore, we lift the limited choice space of Alós-Ferrer et al. (2022) and allow for *robbers* to take up to 100% of *victims*' earnings instead of only 50%. In addition, we run a conceptual replication of the original setting with exclusively student subjects, to allow for a clean comparison with the original findings from the BRG. Taken together, we replicate and extend the study of Alós-Ferrer et al. (2022) to explore how a finance professional background and institutional settings (individual vs. pair-wise decision) impact antisocial behavior.

Naturally, with respect to using finance professionals as subjects, studies on the behavior of finance professionals are of interest.[1] Most existing studies have indicated that more selfish people self-select into the financial industry, and that years in the industry do not influence the degree of selfishness. Holmén et al. (2023), for example, showed that finance professionals are more selfish compared to the general population, although this effect diminishes after controlling for socio-

[1] Personality traits (e.g., trustworthiness and dishonesty) of finance professionals in general are explored, for instance, in Cohn et al. (2014); Kirchler et al. (2018); Huber and Huber (2020).

economic characteristics. Similarly, Gill et al. (2023) reported that students with a high interest to work in the financial industry or with practical experience in the field return less in the trust and public goods game compared to other students. By analysing longitudinal German SOEP data, Deter and van Hoorn (2021) showed that finance professionals have stronger money preferences compared to the general population.

Consequently, we formulate our first research question:

RQ1: Do finance professionals decide differently compared to student subjects in the BRG?

Our second research question centers around the *four-eyes-principle*, widely used and enforced in the finance industry to prevent mistakes and fraud, and whether it impacts the behavior of subjects in the BRG. Studies on the dictator game involving multiple dictators generally reveal that groups tend to behave more selfishly and prioritize maximizing their own payoffs, leading to smaller donations to recipients (see, e.g., Luhan et al., 2009; Panchanathan et al., 2013; Chiang and Hsu, 2019). One exception is the study of Cason and Mui (1997), who found higher degrees of altruism in group decision-making compared to individuals' decisions. One potential explanation of the opposing finding of Cason and Mui (1997) addresses the form of communication between dictators (in-person versus anonymous). While in Cason and Mui (1997) groups were separated from recipients for discussing the decision face-to-face, dictators in Luhan et al. (2009) and Panchanathan et al. (2013), for example, could only communicate via a text-based chat, identical to our design in the *Big Robber Game*.

We, therefore, phrase our second research question:

RQ2: Does the *four-eyes-principle* (i.e., pair-wise decision-making via chat communication) influence the behavior of players in the BRG?

To answer our research questions, we implemented a 2x2 factorial design with the "type of subject" (either financial professional or student subject) and the "group size" of the *robber* (either individual or pair-wise decision) as treatment variables. During the experiment, we ran the BRG, the "Equality Equivalence Test" of Kerschbamer (2015), and a battery of survey questions in an online setting. In the BRG, each participant received a fixed initial windfall-endowment. Then, *robbers* decided which percentage (from 0 to 100%) to take (i.e., rob) from a pool of 16 *victims*' (other subjects) endowments. Additionally, we ran a conceptual replication of Alós-Ferrer et al. (2022). For the five treatments, we recruited 196 finance professionals from various EU countries and 682 student subjects from the University of Innsbruck.

First, the findings of our conceptual replication mainly supported the results of Alós-Ferrer et al. (2022). In particular, the majority of the student *robbers* [i.e., 68.3% of our sample compared to 56.3% in Alós-Ferrer et al. (2022)] opted for the most extreme choice or highest possible amount (i.e., 50% of *victims*' endowment). Further, we found no statistical difference in the robbing behavior between men and women. However, compared to Alós-Ferrer et al. (2022), we could not confirm that *extreme robbers* (i.e., those who opted for 50%) exhibit significantly shorter decision

times *non-extreme robbers*.

Second, concerning our 2x2 factorial design extension, We found suggestive evidence (significant at the 5% level) that students, when deciding alone, rob more than finance professionals (robbed share 69.0% vs. 64.1%), while all other meaningful treatment differences are insignificant. When pooling treatments across the group-size dimension, while keeping the subject-pool dimensions separated, this pattern holds; with a fraction of 68.9%, we provide suggestive evidence that students in general rob more than finance professionals do (65.4%). Importantly, as shown in Holmén et al. (2023), raw differences between subject pools have to be treated cautiously, as both groups differ across several socio-demographic dimensions, such as age and gender composition, as well as in their political orientation and distributional preferences. Thus, the observed subject pool differences between students and finance professionals might not be primarily driven by the fact that they are students and finance professionals. Therefore, we pre-registered multivariate regressions in a multiverse framework, controlling for researcher degrees of freedom, which we outline in the next section.

Third, by conducting a multiverse analysis following Simonsohn et al. (2020), controlling for various socio-economic variables and covariates, we found that all previously mentioned results of the raw differences (on a 5% level) disappeared. Thus, in most specifications, we found no significant differences between finance professionals and student subjects in the amount taken from the *victims* anymore, hinting at insignificant results across our treatment dimensions.

Finally, in a series of non-pre-registered exploratory analysis, we dug deeper into *victims*' and *robbers*' beliefs, also comparing them with the actually robbed amounts. (i) We did not find significant differences in the beliefs of robbed amounts between individual and pairwise decision-making, both for students and finance professionals acting as *robbers*, respectively. (ii) However, we reported that *victims* (i.e., student subjects) believe that student *robbers* rob significantly less than they actually do. This pattern also applies to *victims*' beliefs about the behavior of finance professionals in pairs. (iii) As a related finding, we also showed that *victims* believe that finance professionals will rob significantly more than student *robbers* will do, implying that finance professionals are (unjustifiably) considered more antisocial than students' peers.

In another non-pre-registered exploratory analysis, we investigated the association between personality types (Kerschbamer, 2015, *Equality Equivalence Test* by) and robbing behavior in the BRG. Compared to the selfish benchmark player, more pro-socially oriented *robbers*—across both subject pools—took less in the BRG.

This study makes the following contributions to the literature. First, we build on and extend the literature on finance professionals by showing that, for this particular task and research question, differences in antisocial behavior between professionals and standard student subjects are negligible.[2] Second, we add to the emerging literature on metascience and replication stud-

[2] See, for instance, Kirchler et al. (2018); Huber and Huber (2020); Weitzel et al. (2020) for studies with both subject pools, detecting various behavioral differences (see also Huber and König-Kersting, 2023, for a survey on studies analyzing finance professionals' behavior).

ies (e.g., Maniadis et al., 2014; Camerer et al., 2016, 2018). In particular, we innovate in our econometric approach by not relying on one analysis path for the main analysis, but we considered multiple analysis forks and thus hundreds of meaningful analysis paths. By following the multiverse analysis approach of Simonsohn et al. (2020), we provide a broader and robust picture of our insignificant results. We believe that this approach could be a promising path to pursue in the future, either for the main analysis of studies or at least for systematic robustness checks. Finally, regarding our exploratory finding of *victims* believing that finance professionals show less pro-social behavior than student subjects—even though these beliefs are not backed up by the experimental data in the BRG—, we add to a discussion on trust in finance professionals and the finance industry in general (see, for instance, a discussion in Holmén et al., 2023; Gill et al., 2023).

2 Study Design

Overview: We ran five treatments of the BRG in an online experiment with finance professionals and students (see Alós-Ferrer et al., 2022). The game participants were either *robbers* (neutrally labeled *Type I*) or *victims* (neutrally labeled *Type II*). While for *Type I* participants, students and financial professional subjects were sampled, for *Type II* participants, exclusively student subjects were sampled (as the available pool of finance professionals is more limited and the *robbers*' behavior is what we are mainly interested in). Importantly, robbers do not get information on the socio-economic background of *victims* and the subject pool they are sampled from.

In an experimental session, after a disclaimer, the participants played the BRG for one (treatment *ALÓS*— conceptual replication) or two rounds (all other treatments — 2x2 factorial design extension). After the main task and only in the extension, *Type I* (*robber*) participants completed the EET (see Kerschbamer, 2015; Holzmeister and Kerschbamer, 2019), while *Type II* (*victims*) participants immediately answered questions on their beliefs and demographics (both also collected from *robbers*). See Appendix B for screenshots of the experimental software.

BRG: At the beginning of the session, each participant received a windfall endowment of points, which was converted to a monetary payoff at the end of the experiment. Then, *robbers* decided separately which percentage amount they wanted to take (i.e., to rob) from a pool of 16 *victim* endowments. The possible choices available were presented in a table showing (i) the percentage amount that would be taken from the *victims*' earnings, (ii) the corresponding amount expressed in *points* for each *victim* (i.e., how much the *robber* would take from each *victim*), and (iii) the corresponding total amount in *points* for the *robber* (i.e., how much the *robber* would get on top of his/her own endowment).[3]

[3] Alós-Ferrer et al. (2022), in this regard, provided information on the total amount only in expected terms, since the players' endowment at the beginning of the *Big Robber Game* consisted of payoffs from previous games, which were determined at the very end of the experiment. We avoid this uncertainty by giving each player a fixed endowment at the beginning of the game, hence not relying on income generated through decisions in other tasks. Additionally, *robbers* also see the amount they take from each *victim* respectively.

To answer our research questions, we implemented the following settings. In the first treatment *ALÓS*, we replicated the setup of Alós-Ferrer et al. (2022) in a conceptual replication. We did this by running the original game with the exact same parameters: student subjects as *robbers* and *victims*, one *robber* making a decision over the endowments of 16 *victims*, and the available choices for *robbers* set to {0%, 10%, 33%, 50%}.

In our extension, we implemented four other settings as depicted in Table 1: Using a 2x2 factorial design with the type of subject serving as the first dimension (students or finance professionals) and the group size of the *robber(s)* being the second dimension (1 or 2; i.e., if the decision is made by individuals or pairs). The second treatment dimension was implemented in a within-subject design, where the order was randomized and pairs were matched by arrival. Additionally, the pairs were required to agree on one decision. To aid this process, the pairs were able to communicate through a text-based chat. The choice of the subjects on how much they wanted to take from the *victims* was our main variable of interest. Moreover, across all four settings, we modified the available choice range of *robbers* to {0%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 100%}.

		Group-size	
		Individual	Pair
Subject Pool	Students	*STUD_IND*	*STUD_PAIR*
	Professionals	*FINPROF_IND*	*FINPROF_PAIR*

Table 1: Design of the experiment. The table illustrates the 2x2 factorial design. In one dimension, we vary the participants' subject pool (students vs. finance professionals), while in the other, we change the size of the group that is confronted with the decision (individuals vs. pairs). The first is implemented as a between- and the latter as a within-subjects design.

Similar to Alós-Ferrer et al. (2022), we asked the subjects to indicate their beliefs about the behavior of *robbers*. For *robbers*, we elicited their belief about the average robbed share of *victims*' endowments in the particular group size treatment condition. We did this after the *robber* made the specific decision—i.e., after a *robber* made the individual (pair-wise) decision. Among *victims*, we collected their incentivized beliefs about the average robbed share in the specific subject pool *and* group size treatment condition. We did so after the game instructions were shared—i.e., after the *victim* saw the instructions, we asked about what the average robbed share is when *robbers* are students/finance professionals and take the decision individually/in pairs. Hence, for *victims*, we obtained four belief estimates. Additionally, we provided *victims* with the identical table showing available choices for *robbers* and descriptive statistics about the subject pools, including mean age, gender ratio, and distribution across working fields for finance professionals and across subjects of studies for students.

EET: For eliciting individual social preferences, we used the EET (Kerschbamer, 2015; Holzmeister and Kerschbamer, 2019). Following the parameterization used by Kerschbamer (2015) and the uncertain role protocol, players were again matched in groups of two. Both players in each group then had to make 10 incentivized binary choices over two payoff pairs in the domains of disadvantageous and advantageous inequalities (hence five choices in each domain), where one payoff pair gives both players equal income while the other is disadvantageous/advantageous for the player making the decision, depending on the domain. Here, our main variable of interest is the archetype of social preferences for each individual, which can be obtained through the switching point, where one moves from the equal income distribution to the unequal one in each domain. This will serve mainly as a control variable in our analysis. However, to avoid any spillover effects, we made sure that pairs are not the same as in the BRG. Also, whether the subjects made choices in the disadvantageous or advantageous domain first was randomized.

Survey: The subjects answered a short survey where we collected data about age, gender, confession, and political affiliation on 5 point Likert scales. For more detail, see Figure B21 in the Appendix.

Recruitment, Endowments, and Payoff: We recruited 874 subjects, 688 of which were students from the University of Innsbruck and 186 were finance professionals from several EU countries. Student subjects were recruited via HROOT (Bock et al., 2014), and finance professionals were recruited via our own financial professional subject pool (BEFORE.world) and via several professional institutions. Data collection for *robbers* ranged from from March to June 2023; *victims* were elicited afterwards, in October 2023.

To ensure consistency in the absolute size of stakes in the experimental tasks, we introduced an experimental currency called *points*. Based on previous experiments, the standard for payments to finance professionals is three to four times the hourly payment of student participants (see, for example, Cohn et al., 2014; Kirchler et al., 2018; Weitzel et al., 2020). Hence, we set the conversion rate for finance professionals to 1 point = 0.75 EUR, whereas the conversion rate of student subjects was set to 1 point = 0.25 EUR. There was no show-up fee on top of the payoffs from the experimental tasks.

Regarding the BRG, we set the initial endowment of each subject (i.e., *Type I* and *Type II* participants) to 25 points, meaning that *robbers* were able to take up to 400 points from 16 *victims*, hence yielding a possible total payoff of 425. For our conceptual replication, *victims* received what was left from their endowment after the decision of the *robber*. Regarding our extension, however, *victims* served twice the passive role, once for the decision of students and once for the decision of finance professionals.[4] This was not disclosed to *robbers*, who only knew

[4] In the original design by Alós-Ferrer et al. (2022), the authors collected one *victim* for each *robber*, respectively. However, since *victims* in the *Big Robber Game* only have a passive role and there is no interaction between *robbers* and *victims*, we considered it unnecessary for our extension to elicit for each *robber* one *victim* separately. Hence,

that each *victim* subject received the same endowment for participating as they did. In the EET, the decisions involved payoffs ranging from a minimum of 7 points to a maximum of 13 points.

With respect to payments to *Type I* participants, one out of 16 finishers of the experiment received a payoff.[5] One part of this payoff resulted from either the individual or pair-wise decision (random draw) in the BRG, while the other part resulted from all the other experimental tasks. For the BRG, only the randomly drawn decision (individual or pair-wise) was implemented and, therefore, reduced the endowments of 16 random *victims*.[6] Additionally, a *robber* selected to receive the payoff got 50 points for each estimate that was in the range of +/- 5pp (percentage points) of the true average in the estimation task.[7] Finally, a random process was used to select one of the 20 pair-wise choices made in the EET. Concerning *Type II* participants, they received the endowment from the BRG (potentially reduced by an implemented decision of a selected *robber*) and an additional payoff of 4 points, based on their performance in the estimation task, following the same logic as already stated for the *robbers*.[8]

The median time for *robbers* to complete the experiment was 9.4 min, and, if being selected for payment, student robbers got, on average, 67.95 EUR (maximum: 109.50 EUR), while finance professionals received 245.25 EUR on average (maximum: 401.50 EUR). Because we ran the experiments online, payoffs were calculated and transferred separately after data collection. To ensure anonymity, we strictly separated payoff calculation—done by us—and the transaction of the final payoffs—done by a third party.

3 Results

3.1 Overview

Table 2 shows details on the two samples of our extension (sample descriptives for victims are shown in Table A1 in Appendix A). It is evident that the two samples differ strongly in several demographic aspects. For instance, we found strong differences in gender composition, as approximately 83% of all finance professionals were men; the corresponding number for our student sample was 36%. This is not surprising, as the fields we target (e.g., fund management, trading, and private banking) are, as the industry itself, male-dominated (e.g., Kirchler et al., 2018; Weitzel et al., 2020). Also, in terms of age [two-sample t-test, $t(280.8) = 22.47$, $P < 0.001$], political orientation [two-sample t-test, $t(406) = 7.48$, $P < 0.001$] and regarding social preferences,

and also to achieve a sufficient sample size for the counterparty beliefs about *robbers*' behavior in the *Big Robber Game*, we decided that, for our extension, *victims* serve their role twice.

[5] More specifically, for every sequence of 16 finishers, every first finisher was selected to receive a payoff. *Robbers* not selected did not receive any payoff.

[6] In case the pair-wise decision is drawn in this stage, only the player who was drawn to receive the payouts from the experimental tasks received the payout.

[7] We define the true average as the mean percentage amount taken by the corresponding subject pool in the respective task once data collection was completed.

[8] As *Type II* participants made four estimates instead of only two, we defined the true average as the mean percentage amount taken by the corresponding subject pool in the respective group domain, resulting in the mean of every quadrant in Table 1.

Students (N = 222)					Finance Professionals (N = 186)					
	Mean	SD	Min	Max		Mean	SD	Min	Max	
Age	22.98	5.07	18	81	Age	39.60	8.96	18	61	P < 0.001
Gender					**Gender**					P < 0.001
Male	0.36		0	1	Male	0.83		0	1	
Female	0.64		0	1	Female	0.17		0	1	
Diverse	0.00		0	1						
Field of Study					**Field**					
Economic and Social	0.51		0	1	Portfolio Management	0.37		0	1	
Natural Sciences	0.18		0	1	Sales	0.43		0	1	
Humanities and Cultural	0.18		0	1	Risk Management	0.06		0	1	
Other	0.13		0	1	Other	0.14		0	1	
Confession					**Confession**					P < 0.05
Roman Catholic	0.55		0	1	Roman Catholic	0.56		0	1	
Islamic	0.05		0	1	Islamic	0.02		0	1	
Without	0.31		0	1	Without	0.30		0	1	
Other	0.09		0	1	Other	0.12		0	1	
Political affiliation	2.55	0.88	1	5	Political affiliation	3.15	0.75	1	5	P < 0.001
EET Archetype					**EET Archetype**					P < 0.001
Selfish	0.45		0	1	Selfish	0.31		0	1	
Maximin	0.22		0	1	Maximin	0.20		0	1	
Inequality Averse	0.17		0	1	Inequality Averse	0.13		0	1	
Altruistic	0.05		0	1	Altruistic	0.14		0	1	
Other	0.11		0	1	Other	0.22		0	1	

Table 2: Sample descriptives. This table shows sample descriptives across each subject pool alongside statistical test results testing for significant differences. Finance professionals are significantly older (two sample t-test, $t(281) = 22.47$, $P < 0.001$), have a higher share of males (χ^2 test, $\chi^2(2) = 90.61$, $P < 0.001$), and position themselves more right on the political affiliation scale (two-sample t-test, $t(406) = 7.48$, $P < 0.001$). Regarding subjects' confession, there is no significant difference between student and financial professional subjects [χ^2 test, $\chi^2(5) = 11.46$, $P < 0.05$ (suggestive evidence)]. In terms of the archetype in the EET, there are significant differences between student and financial professional subjects (χ^2 test, $\chi^2(8) = 28.70$, $P < 0.001$), with student subjects showing a higher share of individuals categorized as "selfish."

measured via the EET [χ^2 test, $\chi^2(8) = 28.70$, $P < 0.001$], differences across pools emerged. We pre-registered multiverse analyses, in which we controlled for the demographic differences across subject pools. The raw differences between the two pools—i.e., not controlling for demographic differences— however, were interesting as well, as they showed general differences in the behavior of both groups. We will focus on these aspects in the upcoming paragraphs and sections.

We follow Benjamin et al. (2018) and apply the terms "suggestive evidence" and "statistical significance" to the findings with p-values below 5% and 0.5%, respectively, throughout the paper. To maintain consistency with the original study, we take the 5% level as main cut-off for comparing the conceptual replication with the original and for defining a threshold p-value for the multiverse analysis outlined below.

Conceptual replication of Alós-Ferrer et al. (2022).

Result 1. *The conceptual replication shows results that are almost entirely in line with those of the original study.*

In a first non-pregistered analysis, we outline our result 1. In particular, we replicate almost all findings with the only exception that more extreme *robbers* do not show shorter decision times for our sample. Figure 1 depicts choice frequencies of the original study (Panel A) and the conceptual replication (Panel B). We find that the distributions of choices of *robbers* do not differ across both settings [χ^2 test, $\chi^2(3) = 6.7201$, $P = 0.081$]. For the sake of brevity, we relegate all other analyses, testing for differences between our control treatment and the one of Alós-Ferrer et al. (2022), to Appendix C.

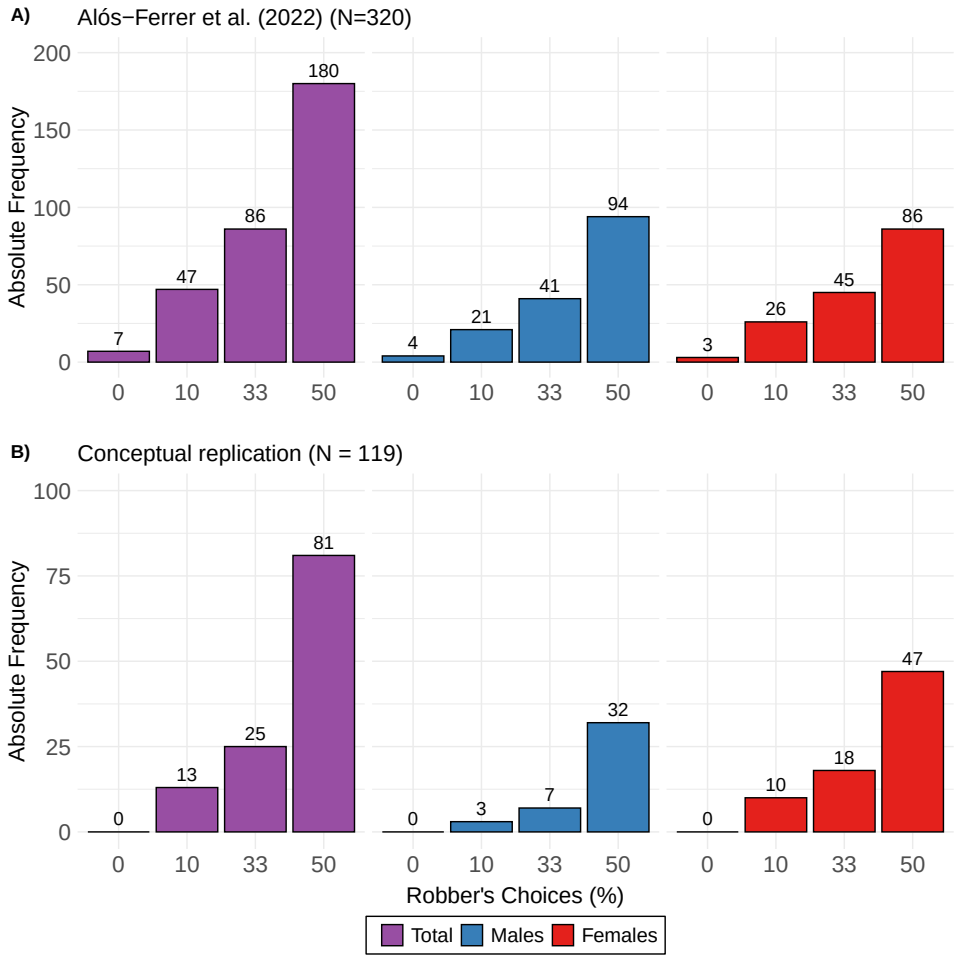

Figure 1: Choice frequencies of the original study and the conceptual replication. Panel A shows the choices among *robbers* in the paper of Alós-Ferrer et al. (2022) and Panel B shows our conceptual replication. The numbers of males and female in Panel B do not add up to 119 as 2 participants declared to be of diverse gender. In the experiment, *robbers* could take either 0%, 10%, 33%, or 50% from the earnings from 16 randomly selected *victims*. The distributions of choices do not differ between the two studies [χ^2 test, $\chi^2(3) = 6.7201$, $P = 0.081$].

Result 2. *Students in Treatment $STUD\_IND$ rob significantly more than finance professionals.* Figure 2 outlines the average amounts taken (robbed) in each treatment (top), across subject pools (bottom left) and for group size (bottom right), including test statistics for non-parametric Mann-Whitney-Wilcoxon (MWW) tests for independent samples and Wilcoxon signed-ranks (WSR) tests for paired samples. As indicated, when looking at the raw treatment differences, we find suggestive evidence that students in Treatment $STUD\_IND$ rob more than finance professionals, while all other meaningful treatment differences are insignificant.

When pooling treatments across the group-size dimension, while keeping the subject-pool dimensions separate, the pattern of $STUD\_IND$ holds and, with 68.9%, we provide suggestive evidence that students in general rob more than finance professionals do (65.4%). Again, all differences between individual and pair-wise decisions, testing for the *four-eyes-principle*, are insignificant. This is remarkable, given the high prominence and perceived importance of the

four-eyes-principle in real-world decision-making in the finance industry and beyond.

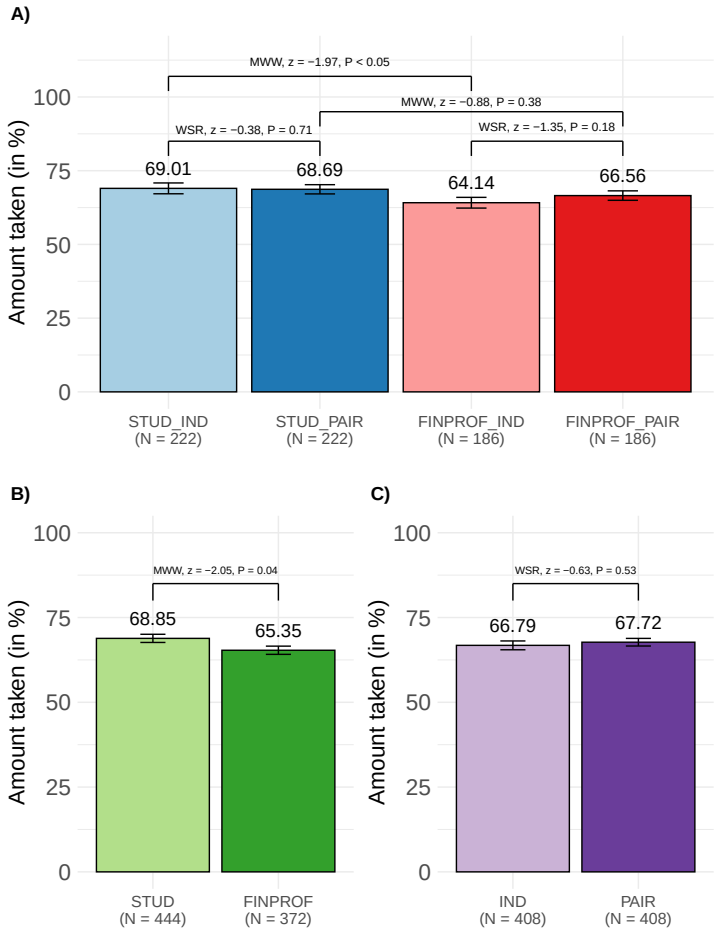

Figure 2: Average amount robbed. This figure shows the average amount *robbers* take from 16 randomly selected *victims* and results from non-parametric tests (MWW = Mann-Whitney-Wilcoxon tests for unpaired samples; WSR = Wilcoxon-Signed-Rank tests for paired samples). Error bars indicate standard errors of the mean (SEM). Panel A depicts the average of our 2x2 treatment design in every treatment cell. When making the decision alone, students take significantly more than finance professionals (MWW, z = -1.97, P < 0.05). Panel B shows the average pooled across subject pools. Including both, individual and pair-wise decision-making, students take significantly more than finance professionals (MWW, z = -2.05, P = 0.04). Panel C shows the average pooled across the decision-mode, i.e., individual vs. pair-wise decision-making.

However, as already indicated, raw differences between subject pools have to be treated cautiously, as the two pools differ across several socio-demographic dimensions, such as age and gender composition (see Table 2), as well as in their education and political orientation. Thus, the observed subject pool differences between students and finance professionals might not be primarily driven by the fact that they are students and finance professionals. The differences in socio-demographic dimensions, political attitudes and distributional preferences might pick up some or all of the behavioral differences outlined above. Therefore, we pre-registered multivariate regressions in a multiverse framework, controlling for researcher degrees of freedom, which we outline in the next section.

3.2 Multiverse Analysis

We run pre-registered specifications using the following general regression framework, applying to all specifications in the multiverse:

$$Y_i = \beta_0 + \beta_1 FP_i + \beta_2 PW_i + \sum_{i=1}^{N} \gamma_i X_i + \epsilon_i, \tag{1}$$

where Y_i is our dependent variable and represents the choice subject i made in the BRG. FP_i and PW_i are dummy variables indicating whether subject i is a finance professional and if the decision was made in a pair. X_i is a vector of control variables and ϵ_i captures the residuals. We cluster our standard errors on the pair-level in the BRG to adjust the errors for intra-group correlations. To answer our two research questions, we analyse the effects β_1 and β_2 and conduct joint inferences, respectively.

Moreover, we conduct multiverse analyses for the interaction effect of both dimension/treatment variables in forks where the interaction effect is included in the analysis, yielding the following framework:

$$Y_i = \beta_0 + \beta_1 FP_i + \beta_2 PW_i + \beta_3 FP_i PW_i + \sum_{i=1}^{N} \gamma_i X_i + \epsilon_i, \tag{2}$$

where β_3 is our coefficient in focus. Again, standard errors are clustered on pair level in the BRG.

In our multiverse analysis approach, we follow the specification curve analysis of Simonsohn et al. (2020). Here, all reasonable and meaningful specifications are reported on the same data to rule out any results that are only due to a certain regression specification, which examines the robustness of results to varying analytical pathways. Table 3 summarizes the data analytical decisions/forks we propose, resulting in 960 different analysis paths.

Our first decision node centers around the type of regression model. Based on the literature on dictator games (e.g Engel, 2011; Doñate-Buendía et al., 2022), we consider an unconditional OLS regression, a (two-limit) Tobit regression and a hurdle model, consisting of a logit regression on the decision to rob and a truncated OLS regression on the decision of actual *robbers* to be applicable.[9]

Second, we consider the implementation of control variables to be another important decision node. Due to the structure of the BRG,[10], we include a battery of standard control variables (i.e., gender, age, political affiliation, and confession) typically used in games of similar type (e.g., Engel, 2011; Doñate-Buendía et al., 2022). We include the archetype elicited in the EET as an additional fork.

Third, it is also common practice to drop observations that might be considered as outliers or

[9] In the case of the hurdle model, we only consider the truncated OLS to be relevant since the dependent variable in the logit model is binary (i.e., whether to rob any amount in the first place or not), unlike the dependent variables in the other models, which we consider to be continuous (i.e., how much one robs).

[10] For example, one-shot game, no real effort task for endowments and no focus on which group of participants are *victims*.

noise. Mimicking a standard procedure, we focus on the time needed to complete the active choice task. Arguably, researchers can use any arbitrary cutoff value; therefore, we remove the top and bottom 1%, 2.5%, 5%, and 10% of participants based on their page times in the BRG and EET.

Finally, one straightforward fork is the detection of whether pair-wise decision-making differs across subject pools by using an interaction of both treatment variables. We include this as a separate decision node, also because of power considerations.

Decision	**Specification**
(1) Type of regression model	OLS, Tobit, truncated OLS conditioned on taking more than zero
(2) Control variables (age, gender, political affiliation, religion, archetype of EET)	Include all of them or none, step-wise inclusion
(3) Drop observations	none, remove top and bottom 1%, 2.5%, 5%, 10% w.r.t. time completing active tasks[11]
(4) Interaction treatment variables $FP \times PW$	Include or not

Table 3: Data analytical decisions with specifications

Result 3. *No differences in robbing behavior between student subjects and finance professionals exist after controlling for socio-economic variables.*

Figure 3 shows the results with the treatment dummy $FINPROF$ as the variable of interest, depicted through distributions of p-values across the multiverse specifications. Only 14 out of 960 specifications exhibit a negative $FINPROF$ coefficient at the 5% level. Note that all 14 significant specifications at this level rely on the inclusion of the interaction effect $FINPROF \times PAIR$ (the exact specifications yielding a significant $FINPROF$ coefficient are depicted in Table A2 in Appendix A), which essentially causes the interpretation of the $FINPROF$ coefficient to change, i.e., it captures only the difference between students and professional robbers making the decision alone, compared to an average effect of being a finance professional when the interaction effect is not included. However, also given that only 14 out of 480 specifications including the interaction term yield suggestive evidence, we conclude that after controlling for socio-economic variables there is no suggestive evidence of a difference between student and finance professional *robbers* in the BRG.

Result 4. *No differences in robbing behavior between individual and pair decisions exist (before and) after controlling for socio-economic variables.*

Figure 4 shows the results with the treatment dummy $PAIR$ as the variable of interest, depicted by distributions of p-values across the multiverse specifications. Again, we find a clear indication of insignificant results, as none of the 960 specifications exhibits a significant $PAIR$ coefficient at

[11] Tasks only containing disclaimer information or instructions for upcoming tasks are not considered for this.

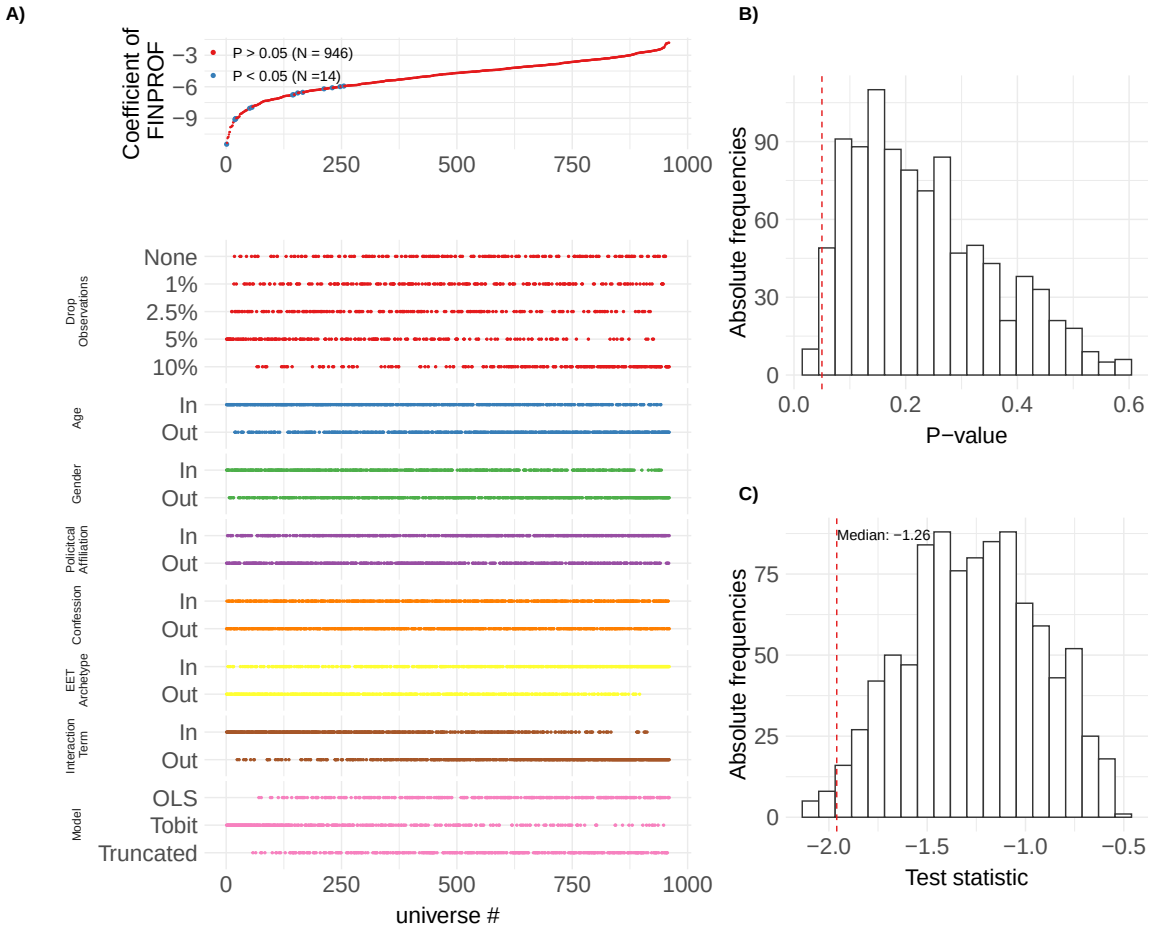

Figure 3: Specification curve analysis for *FINPROF*. This figure illustrates the results of the specification curve analysis for the dummy *FINPROF* as the variable of interest, taking on 1 if a subject is a finance professional and 0 otherwise. At the top of Panel A, the distribution of coefficients is shown with significance indicator color coded (red = P ≥ 0.05 and non-significant; blue = P < 0.05 and significant). Only 14 out of 960 specifications yield significant coefficients for being a finance professional. Below, indicators for specifications within the forks are shown. The specifications, which yield significant coefficients, include the interaction between both variables of interest. In Panel B, the distribution of P-values is depicted with the red vertical and dashed line located at the significance threshold of P = 0.05. In Panel C, the distribution of test statistics (i.e., t-statistic for OLS and Tobit regressions, z-statistic for truncated regression) is shown. The red vertical and dashed line is located at test-statistic of -1.96, indicating significance. The overall median test statistic across all universe is -1.23.

the 5% level.

Result 5. *No difference in the differences between single and pair decisions across subject pools exist.*

Figure A1 in the Appendix shows results with the interaction term of *FINPROF* × *PAIR* of Equation 2. None out of the 480 specifications shows a significant coefficient for the interaction; that is, there is no significant difference in the effect of deciding in pairs between students and finance professionals.

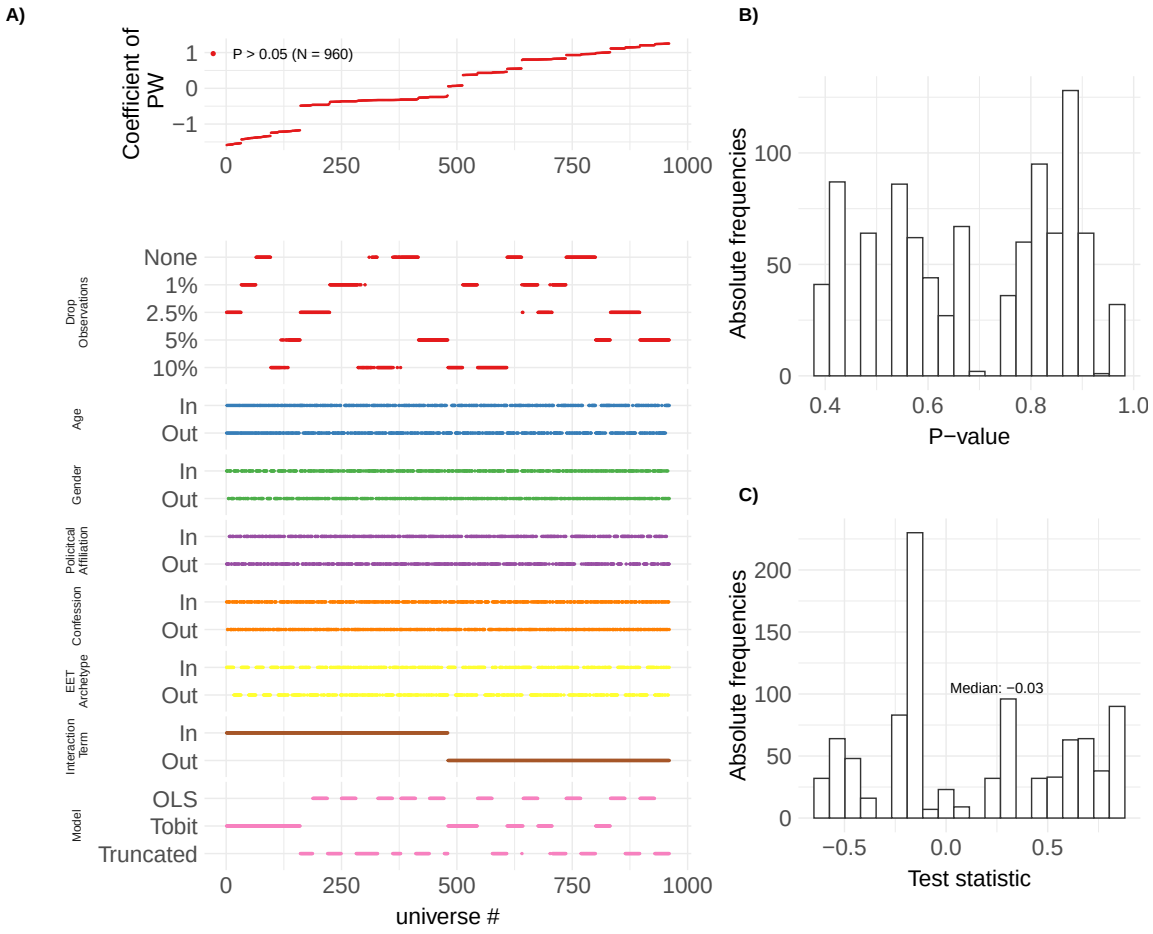

Figure 4: Specification curve analysis for *PAIR*. This figure illustrates the results of the specification curve analysis for the dummy *PAIR* as the variable of interest, taking on 1 if the decision is agreed on in a pair or is done alone. At the top of Panel A, the distribution of coefficients is shown with significance indicator color coded (red = P $\geq$ 0.05 and non-significant). None out of the 960 specifications yield significant coefficients for making the decision in a pair. Below, indicators for specifications within the forks are shown. In Panel B, the distribution of P-values is depicted. In Panel C, the distribution of test statistics (i.e., t-statistic for OLS and Tobit regressions, z-statistic for truncated regression) is shown. The overall median test statistic across all universe is 0.13.

3.3 Exploratory Analyses

Exploratory Result 1. *Victims believe that finance professionals rob significantly more than students.*

Figure 5 shows boxplots of beliefs about *robbers*' behavior in the BRG across all treatment cells (i.e., left boxplots for the belief of *victims*, and right boxplots for the belief of *robbers*, respectively). Additionally, the behavior shown by *robbers* is depicted by the intermediate boxplot (in grey) within each triad of boxplots per treatment (i.e., it is located between victims' and robbers' beliefs, respectively). We find that *victims* expect finance professionals to rob significantly more than student subjects (IND: WSR, z = -4.17, P < 0.005; PAIR: WSR, z = -3.14, P < 0.005). This finding suggests that student subjects—in their roles as *victims*—believe that financial professionals acting as robbers will show more antisocial behavior than student subjects acting as robbers, which is not backed up by the experimental data in the BRG.

Exploratory Result 2. *Robbers and victims underestimate actual robbing behavior among students, and robbing behavior in pairs among professionals.*

As also outlined in Figure 5, victims significantly underestimate student *robbers*' single ($STUD\_IND$: MWW, z = -5.26, P < 0.005) and pair-wise ($STUD\_PAIR$: MWW, z = -5.37, P < 0.005) robbing behavior, as well as the amount robbed by finance professionals, in pairs [$FINPROF\_PAIR$: MWW, z = -2.60, P = 0.009 (suggestive evidence)]. Likewise, robbers also underestimate the amount robbed in these treatments ($STUD\_IND$: WSR, z = 3.33, P < 0.005; $STUD\_PAIR$: WSR, z = 4.32, P < 0.005; $FINPROF\_PAIR$: WSR, z = 4.79, P < 0.005). However, both *victims* and finance professional *robbers* are quite successful in estimating the amount robbed in $FINPROF\_IND$ (*victims*: MWW, z = 0.54, P = 0.592, *robbers*: WSR, z = 1.70, P = 0.088). One notable difference between the estimates of both groups in the $FINPROF$ treatments is that they believe in a smaller amount to be robbed for single vs. pair-wise decision-making [*victims*: WSR, z = 2.78, P = 0.005; *robbers*: WSR, z = 1.99, P = 0.046 (both suggestive evidence)], which is interestingly not the case in the $STUD$ treatments (*victims*: WSR, z = 0.90, P = 0.369; *robbers*: WSR, z = 1.87, P = 0.061). One potential explanation for it could be that victims believe that the $four\text{-}eyes\text{-}principle$ indeed leads to higher levels of prosociality in a professional environment. Similarly, finance professionals being in such an environment while participating in the study may also think that the $four\text{-}eyes\text{-}principle$ is associated with more generosity.

Exploratory Result 3. *Altruistic, inequality averse, and kick-down personality types rob less than selfish types.*

Figure 6 displays the distribution of P-values associated with coefficients for personality archetypes elicited in the EET task (Kerschbamer, 2015) over 480 analysis specifications in the multiverse. The reference category for the EET archeytpe is "selfish." In each sub-figure, the red vertical line

indicates the 5% significance threshold and the color of the bars depicts the sign of the coefficient wrt to the base category "selfish" (orange = negative, blue = positive). We find that *robbers* with the archetypes "altruistic," "inequality averse," and "kick-down" take significantly less in the BRG than *robbers* of archetype "selfish" do. Additionally, some specifications also yield significant and negative coefficients for the archetype "kiss-up."

These findings suggest that, not surprisingly, certain personality types explain behavior in the BRG. With respect to the selfish benchmark player, more pro-socially oriented *robbers*—across both subject pools—take less in the BRG at the expense of the *victims*.

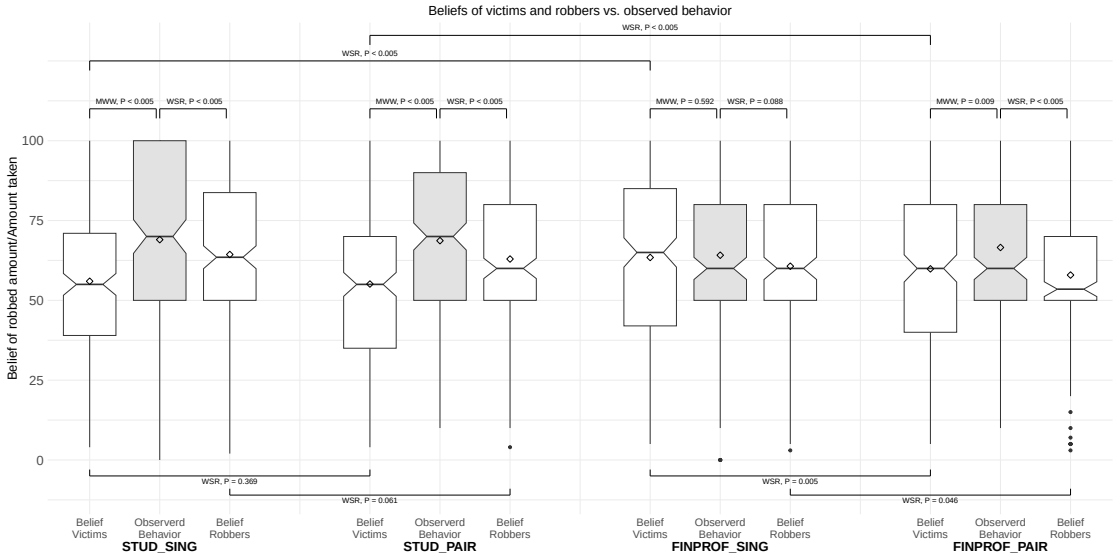

Figure 5: Beliefs. This figure shows beliefs about the behavior of *robbers* (mid boxplots in grey) in the BRG across *victims* (left boxplots) and *robbers* (right boxplots) in all treatment cells, respectively. The diamonds within the boxplots mark the mean. Additionally, non -parametric tests are included (MWW = Mann-Whitney-Wilcoxon tests for unpaired samples; WSR = Wilcoxon-Singed-Rank tests for paired samples). The two tests on top compare differences in the beliefs of *victims* regarding the subject pools—*victims* believe that finance professionals rob significantly more than students (IND: WSR, z = -4.170, P < 0.005; PAIR: WSR, z = -3.141, P < 0.005). The tests above the boxplots compare the beliefs of *victims* and *robbers* against actual behavior shown in the corresponding treatment cell—*robbers* and *victims* significantly underestimate robbing behavior for the treatments $STUD\_IND$ (*victims*: MWW, z = -5.260, P < 0.005; *robbers*: WSR, z = 3.332, P < 0.005), $STUD\_PAIR$ (*victims*: MWW, z = -5.369, P < 0.005; *robbers*: WSR, z = 4.318, P < 0.005), and $FINPROF\_PAIR$ (*victims*: MWW, z = -2.604, P = 0.009 (suggestive evidence); *robbers*: WSR, z = 4.791, P < 0.005). The tests below the boxplots compare differences in *victims*' and *robbers*' beliefs across group sizes—there is suggestive evidence that *victims* believe that pair of professional robbers rob less than single professional robbers [WSR, z = 2.783, P = 0.005 (suggestive evidence)]. The same applies for professional robbers as they lower their estimates about the amount being robbed for pairs [WSR, z = 1.991, P = 0.046 (suggestive evidence)].

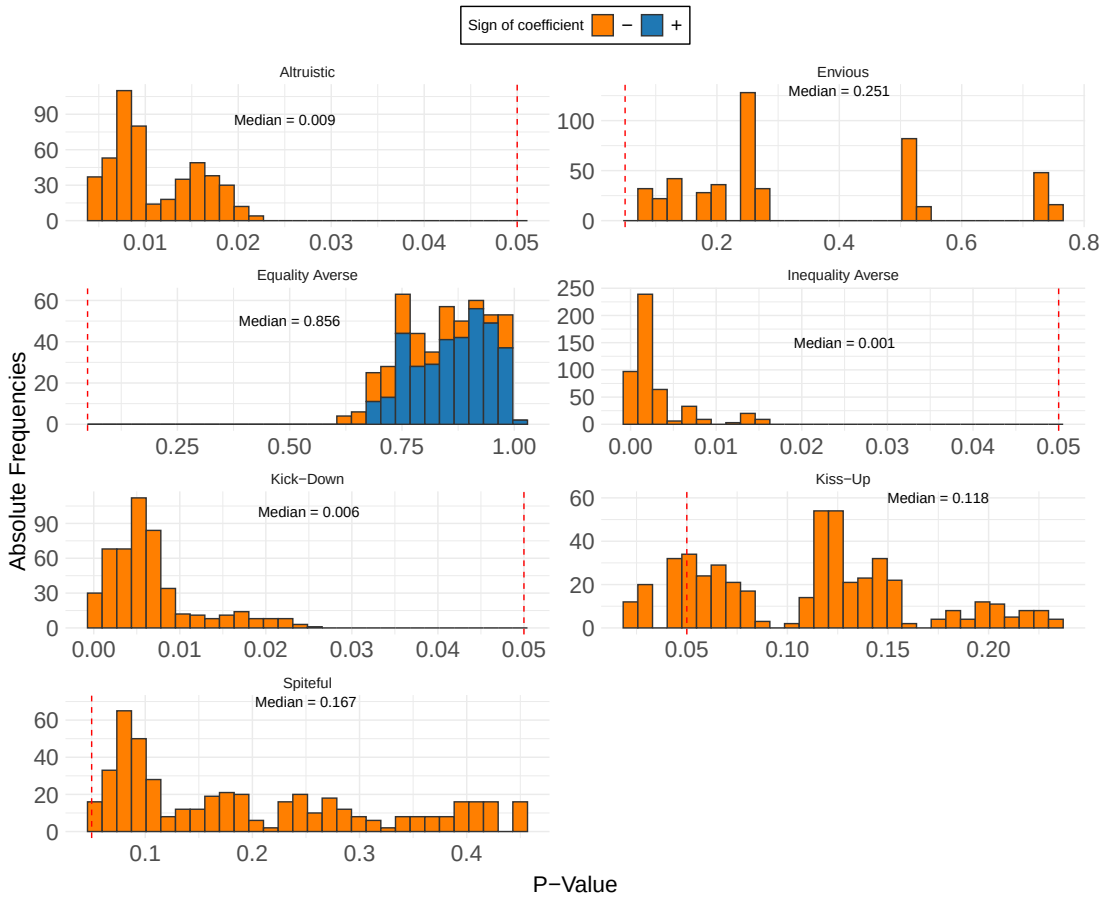

Figure 6: Distribution of p-values for EET archetypes in the multiverse. This figure shows the distribution of P-values associated with coefficients for archetypes elicited in the EET task over 480 analysis specifications. The reference category for the EET archeytpe is "selfish". In each figure, the red vertical line indicates the 5% significance threshold, while the color of the bars shows the sign of the coefficient (orange = negative, blue = positive). Compared to *robbers* of archetype "selfish," *robbers* with the archetypes of "altruistic," "inequality averse," and "kick-down" take significantly less in the BRG. Additionally, some specifications also yield significant and negative coefficients for the archetype "kiss-up."

4 Discussion and Conclusion

In this paper, we took up the idea of Alós-Ferrer et al. (2022) to analyze why the findings of observed prosocial behavior in strategic games—dictator games and ultimatum games—are seemingly not in line with recent corporate scandals that attest to enormous greed and selfishness among those robbing millions or billions from multiple *victims* on purpose. We, therefore, ran a conceptual replication of the so-called *Big Robber Game*, an altered dictator game where one *robber* can take money from multiple *victims*. We were then interested in additional treatment variations, investigating the role of finance professionals versus student subjects and analyzing robbing decisions individually or in pairs in a 2x2 factorial design.

Our results support the findings of Alós-Ferrer et al. (2022), and corroborate the robustness and reliability of the BRG, as it produces consistent and clear results across different subject pools and in individual and pair-wise decisions. Regarding our 2x2 factorial design, we found suggestive evidence that students as individual decision makers robbed more from *victims* than finance professionals did. We emphasized that this findings only applies to the raw differences across subject pools, before controlling for socio-demographic variables. When controlling for socio-economic and other covariates in our multiverse analysis approach, all significant results of the raw differences (on a 5% level) disappeared.

Next, in a series of non pre-registered exploratory analyses, we explored *victims*' and *robbers*' beliefs about how much *robbers*' would rob. (i) *Victims* believed that student *robbers* would rob significantly less than they actually did. The same pattern applied for the beliefs regarding finance professionals' behavior in pairs. (ii) We showed that *victims* believed finance professionals would rob significantly more than student *robbers* would, which was in contrast with the actual robbing behavior. (iii) Ultimately, we analyzed the impact of personality types accorting to the EET (Kerschbamer, 2015) on robbing behavior: compared to the selfish benchmark player, more pro-socially oriented *robbers* across both subject pools took less in the BRG on the expense of the *victims*.

Our study, of course, has several limitations. First, the findings from our artificial laboratory (online) environment might not extrapolate to real-world scandals. While this external validity aspect is, in general, difficult to address with laboratory studies, we can still conclude that finance professionals take less or, after controlling for socio-economic variables, the same amount of money from *victims* compared to student subjects. However, with our study, we can only make statements on these subject pool differences for moderate amounts of money. With respect to the exploratory finding that *victims* believe finance professionals to show less pro-social behavior than student subjects, we add to the discussion on trust in finance professionals and the finance industry in general (see, for instance, related data and a discussion in Holmén et al., 2023).

Second, this experimental setting might particularly be sensitive to the size of monetary stakes involved in robbing decisions. Thus, stake size might play a major role and it is unclear whether substantially higher stakes could change behavior asymmetrically across subject pools and across

individual vs. pair-wise decisions.

Our findings offer the following implications. First, given our monetary stakes and the particular design of the task, it seems that taking moderate amounts of money from anonymous individuals is not per se a "personality trait" or "typical" behavior of finance professionals. According to our multiverse approach, the differences between finance professionals and the general population can actually be explained by the variation in participants' socioeconomic characteristics, political attitudes, and distributional preferences. Thus, our results indicate that finance professionals' and students' antisocial behavior in the *Big Robber Game* does not differ when individual preferences and characteristics are controlled for. Second, this study also demonstrates the need for running experimental studies on industry-relevant research questions also with the corresponding actors from the real world. Even though we mainly report non-significant results, it is an interesting finding that, probably contrary to general perception, finance professionals do not rob more than student participants do in our setting. This move towards artefactual field experiments (Harrison and List, 2004) is important, as for some industry-specific research questions, professionals differ substantially from student behavior (e.g., Kirchler et al., 2018; Weitzel et al., 2020)—see also a survey on the behavior of finance professionals and deviations from "standard" subjects or general population subjects (Huber and König-Kersting, 2023).

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Appendix

A Additional Figures and Tables

	Mean	SD	Min	Max
Age	22.39	3.05	18	35
Gender				
Male	0.44		0	1
Female	0.55		0	1
Diverse	0.00		0	1
Field of Study				
Economic and Social	0.56		0	1
Natural Sciences	0.18		0	1
Humanities	0.15		0	1
Other	0.11		0	1
Confession				
Roman Catholic	0.53		0	1
Islamic	0.05		0	1
Without	0.28		0	1
Other	0.14		0	1
Political affiliation	2.63	0.85	1	5

Table A1: Sample descriptive victims expansion (N = 219). This table shows sample characterstics of the passive players (i.e., victims) in our expansion of the *Big Robber Game*. Age is subjects' age when participating in the study. Gender describes subjects's gender. Field of study is subjects' current study program, and confession is subjects' religious beliefs. Political affiliation is subjects' political affilation on a 5-point scale ranging from 1 (left) to 5 (right), with a midpoint at 3 (centre).

Drop Observations	Age	Gender	Pol. affiliation	Confession	EET	Interaction	Model
Top and bottom 2.5%	No	No	No	No	No	Yes	OLS
Top and bottom 2.5%	No	No	No	No	No	Yes	Tobit
Top and bottom 2.5%	No	No	No	No	No	Yes	Truncated
Top and bottom 2.5%	No	No	No	Yes	No	Yes	OLS
Top and bottom 2.5%	No	No	No	Yes	No	Yes	Tobit
Top and bottom 2.5%	No	No	No	Yes	No	Yes	Truncated
Top and bottom 2.5%	No	Yes	No	No	No	Yes	OLS
Top and bottom 2.5%	No	Yes	No	No	No	Yes	Tobit
Top and bottom 2.5%	No	Yes	No	No	No	Yes	Truncated
Top and bottom 2.5%	No	Yes	No	Yes	No	Yes	OLS
Top and bottom 2.5%	No	Yes	No	Yes	No	Yes	Tobit
Top and bottom 2.5%	No	Yes	No	Yes	No	Yes	Truncated
Top and bottom 5%	No	Yes	No	No	No	Yes	Tobit
Top and bottom 5%	Yes	Yes	No	No	No	Yes	Tobit

Table A2: Specifications yielding suggestive evidence for the coefficient $FINPROF$. This table depicts the exact specifications which yield a significant coefficient for being a financial professional $FINPROF$. The coefficient for $FINPROF$ is significant at the 5% level (suggestive evidence) when the top and bottom 2.5% or 5% of observations regarding time needed to complete active tasks (i.e., without disclaimer information or instruction to upcoming tasks) are dropped, the variables political affiliation and the eet archetype are not included in the battery of control variables, and when the interaction between $FINPROF \times PAIR$ is included in the model.

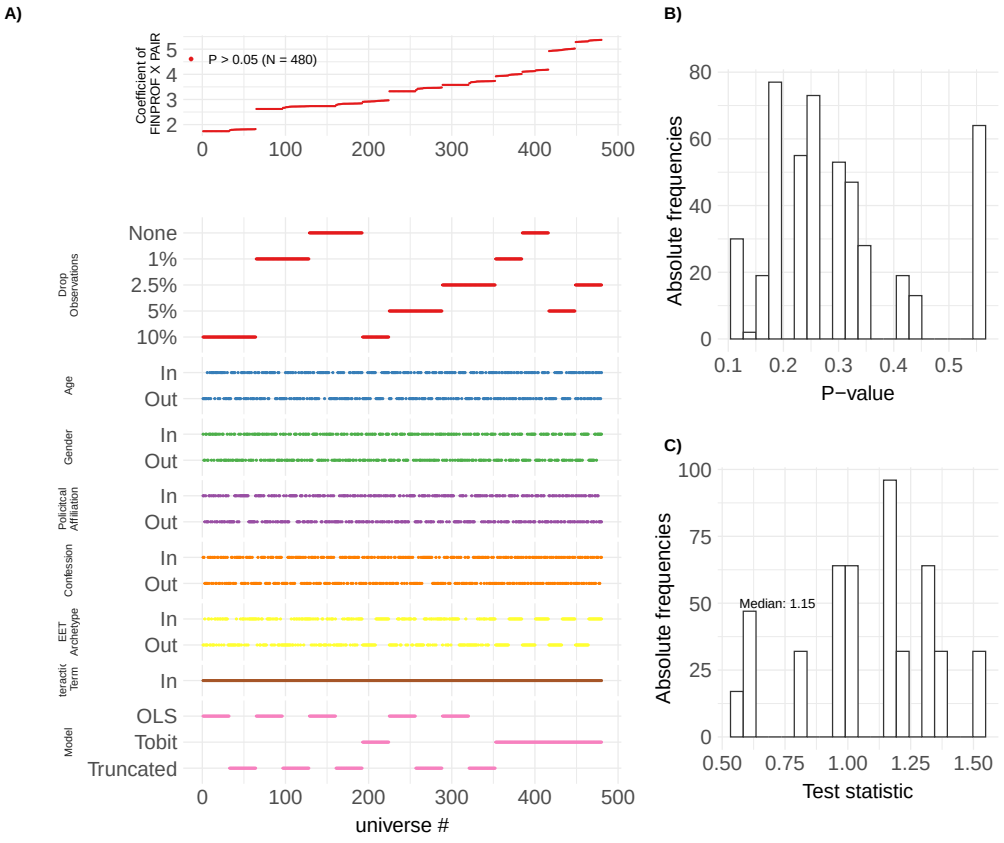

Figure A1: Specification curve Analysis for *FINPROF* × *PAIR*. This figure illustrates the results of the specification curve analysis for the interaction between the dummies *FINPROF* and *PAIR*, i.e., comparing students' individual decision and professionals' decisions in teams. On top of A) the distribution of coefficients is shown with significance indicator color coded (red = P ≥ 0.05 and non significant). None out of 580 specifications yield significant coefficients for making the decision in a pair of financial professionals. Below indicators for specifications within the forks are shown. In Panel B) the distribution of P-values is depicted. In C) the distribution of test statistics (i.e., t-statistic for OLS and Tobit regressions, z-statistic for truncated regression) is shown. The overall median test statistic across all universe is 1.01.

B Experimental Software

In this section, screenshots of the main parts of our experiment, separate for the conceptual replication and the 2x2 treatment design, are presented. Additionally, the post experimental survey is presented at the end. The full experimental software is available at https://osf.io/t5rcv/. Figures B2–B6 show the experimental instructions for our conceptual replication of Alós-Ferrer et al. (2022). Figures B7–B20 show the experimental instructions for our extension. Figure B21 shows one instance of the post experimental survey.

B.1 Conceptual replication – *Type II* participants (*victims*)

Task 1 - Instructions

Task 1

Now comes the experimental task of the study. In this task, there are two types of participants: Type I and Type II participants. **You are Type II.** At the beginning, each participant gets an endowment of 25 points for their participation in the experimental task.

Each Type I participant has to make one decision: Decision A. At the end of the experiment, one of 16 Type I participants gets randomly chosen and his/her decision will get implemented.

In Decision A, each Type I participant has to decide which share he/she would like to receive from 16 randomly selected Type II participants on top of his/her own earnings. In case the decision is the one implemented at the end of the experiment, the earnings of the Type II participants will be reduced by the corresponding amount and the Type I participant will get the total amount on top of his/her own earnings.

Available choices for Type I participants:

Choice	Total amount in points	Amount in points per Type II participant
50%	200.00 points	12.50 points
33%	132.00 points	8.25 points
10%	40.00 points	2.50 points
0%	0.00 points	0.00 points

Next

Figure B2: Instructions for our conceptual replication. *Type II* participants (*victims*). *Type II* participants do not make any active decisions. Therefore, they only receive these instructions, which are immediately followed up by the post experimental survey (see Figure B21).

B.2 Conceptual replication – *Type I* participants (*robbers*)

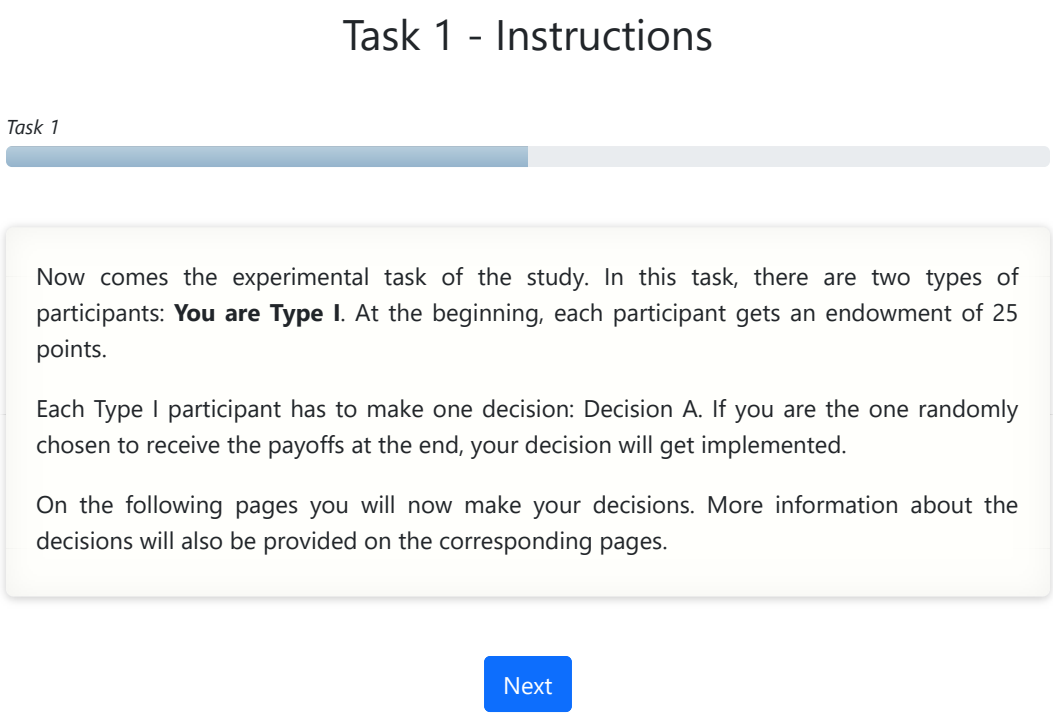

Figure B3: Instructions for our conceptual replication. *Type I* participants (*robbers*) – Part 1. See Figure B4 for part 2.

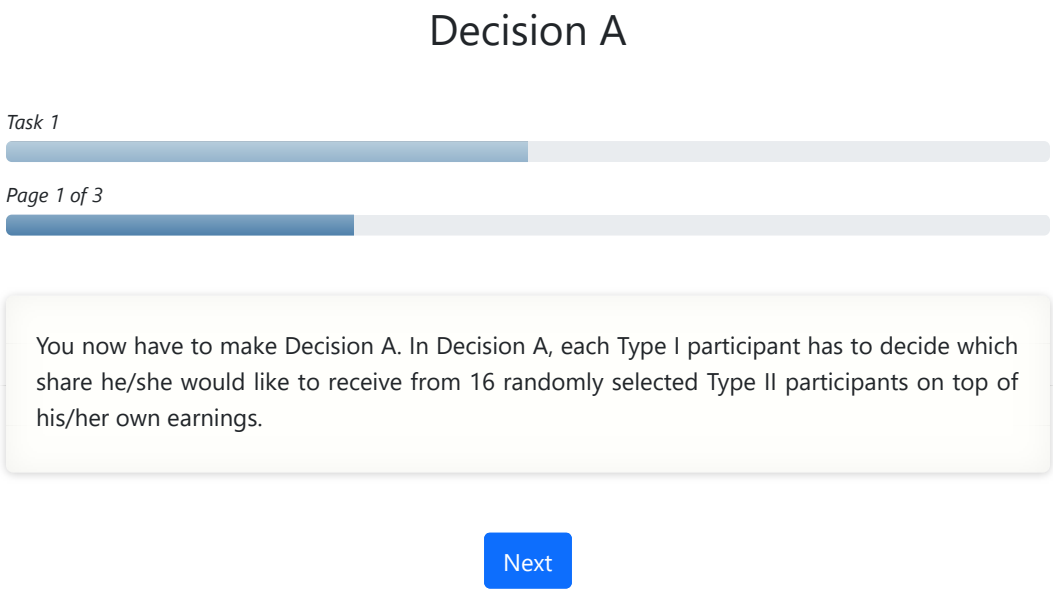

Figure B4: Instructions for our conceptual replication. *Type I* participants (*robbers*) – Part 2. See Figure B5 for part 3.

Decision A

Task 1

Page 2 of 3

You now have to decide which share you would like to receive from 16 Type II participants. In case this decision is the one implemented at the end of the experiment, the earnings of the Type II participants will be reduced by the corresponding amount and you will get the total amount on top of your earnings.

Type II participants

Choice	Total amount in points	Amount in points per Type II participant
○ 50%	200.00 points	12.50 points
○ 33%	132.00 points	8.25 points
○ 10%	40.00 points	2.50 points
○ 0%	0.00 points	0.00 points

By clicking 'Calculate sum', you can see your earnings as well as the earnings of the chosen Type II participants if this decision gets implemented.

Calculate sum

In case this decision gets implemented, your earnings out of this part of the experiment are **-** **points** and the earnings of the chosen Type II participants are **-** **points** each.

Next

Figure B5: Instructions including the main decision task for our conceptual replication. *Type I* participants (*robbers*) – Part 3. See Figure B6 for part 4.

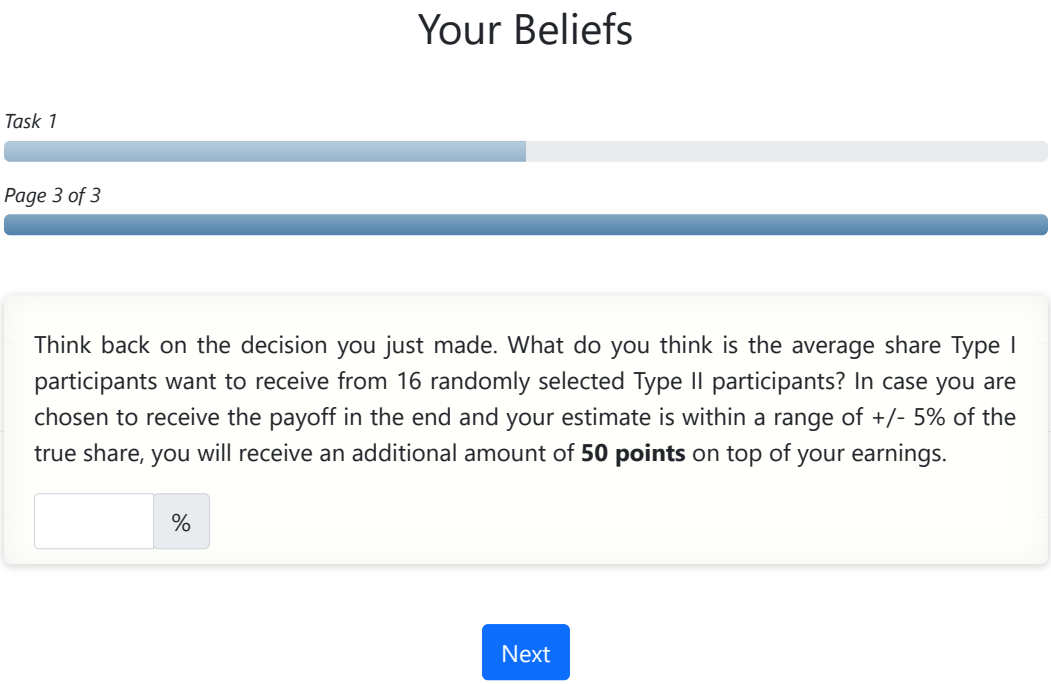

Figure B6: Additional belief estimation task for our conceptual replication. *Type I* participants (*robbers*) – Part 4. After this, *Type I* participants proceed to the post experimental survey (see Figure B21).

B.3 2x2 Extension – *Type II* participants (*victims*)

Figures B7–B20 show the experimental instructions for our extension.

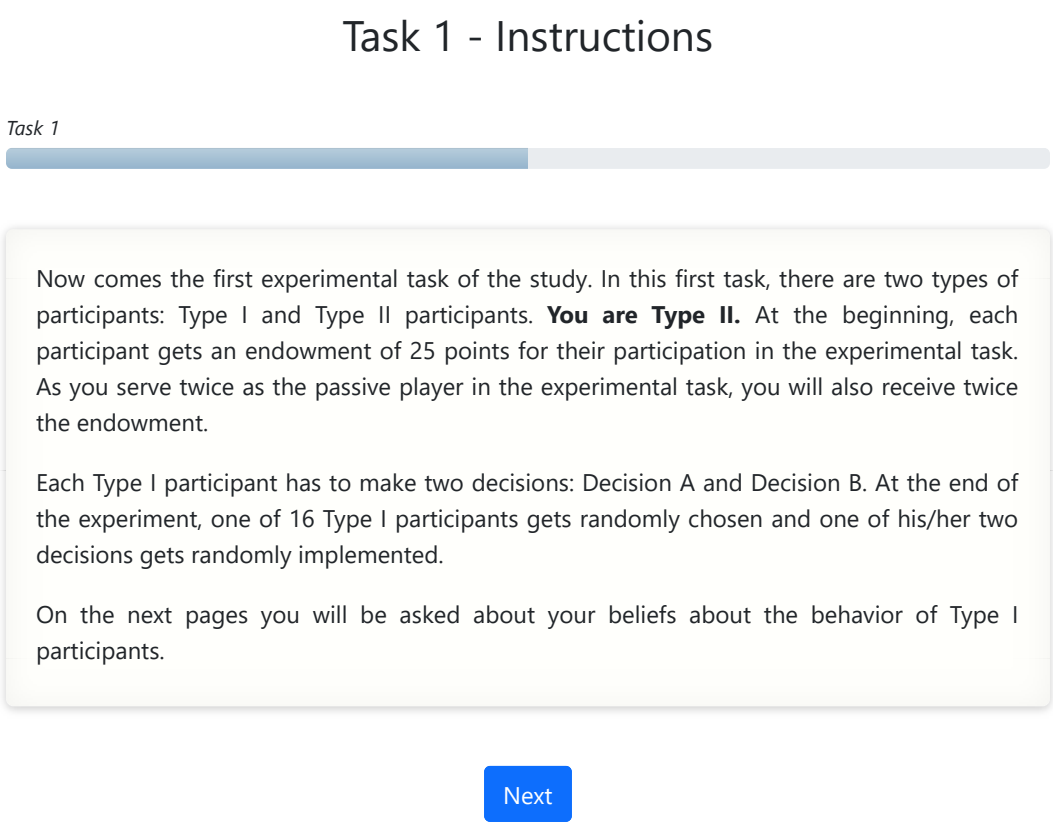

Figure B7: Instructions for our extension. *Type II* participants (*victims*) – Part 1. See Figure B8 for part 2.

Your Beliefs

Part 1 of 2

In Decision A, each Type I participant has to decide which share he/she would like to receive from 16 randomly selected Type II participants on top of his/her own earnings. In case the decision is the one implemented at the end of the experiment, the earnings of the Type II participants will be reduced by the corresponding amount and the Type I participant will get the total amount on top of his/her own earnings.

The Type I participant can choose out of the following options:

Type II participants

Available choices for Type I participants:

Choice	Total amount in points	Amount in points per Type II participant
100%	400.00 points	25.00 points
90%	360.00 points	22.50 points
80%	320.00 points	20.00 points
70%	280.00 points	17.50 points
60%	240.00 points	15.00 points
50%	200.00 points	12.50 points
40%	160.00 points	10.00 points
30%	120.00 points	7.50 points
20%	80.00 points	5.00 points
10%	40.00 points	2.50 points
0%	0.00 points	0.00 points

Figure B8: Instructions and illustration of the main individual player decision task for our extension. *Type II* participants (*victims*) – Part 2. See Figure B9 for part 3.

What do you think?

What do you think is the average share Type I participants want to receive from 16 randomly selected Type II participants in case the Type I participants are **financial professionals**? For guidance you can see some characteristics about a pool of **financial professionals** below. When your estimate is within a range of +/- 5% of the true share, you will receive an additional amount of **3.125 points** on top of your earnings.

%

Characteristics about financial professionals	
Mean age:	40 years
Gender ratio:	Male: 83% Female: 17%
Distribution across working fields:	Sales: 43% Asset/Portfolio Management: 37% Risk Management: 7% Treasury: 5% Compliance and customer support: 5% Trading: 3%

Next

Figure B9: Instructions and belief estimation task regarding the main individual player decision task for our extension. *Type II* participants (*victims*) – Part 3. See Figure B10 for part 4. In this figure financial professionals are explicitly mentioned. Participants were also faced with the exact same question, however, with respect to students instead of financial professionals.

Your Beliefs

Part 1 of 2

In Decision B, each Type I participant is paired together with another (anonymous) Type I participant. Together they have to agree on which share they would like to receive from 16 randomly selected Type II participants. (In order to proceed, both have to pick the same choice. For communication they can use a chat box and both of them can see which choice the other Type I participant logs in.

In case the decision is the one implemented at the end of the experiment, the earnings of the Type II participants will be reduced by the corresponding amount and the Type I participant who is chosen will get the total amount on top of his/her own earnings.

Type I participants can choose out of the following options. In the right column both can see what the other player picks.

Type II participants

Available choices for Type I participants:

Choice	Total amount in points	Amount in points per Type II participant	Signature
100%	400.00 points	25.00 points	
90%	360.00 points	22.50 points	
80%	320.00 points	20.00 points	
70%	280.00 points	17.50 points	
60%	240.00 points	15.00 points	
50%	200.00 points	12.50 points	
40%	160.00 points	10.00 points	
30%	120.00 points	7.50 points	
20%	80.00 points	5.00 points	
10%	40.00 points	2.50 points	
0%	0.00 points	0.00 points	

Figure B10: Instructions and illustration of the main pair-wise decision task for our extension. *Type II* participants (*victims*) – Part 4. See Figure B11 for part 5.

What do you think?

What do you think is the average share the pairs of Type I participants agree on to receive from 16 randomly selected Type II participants in case the Type I participants are **financial professionals**? For guidance you can see some characteristics about a pool of **financial professionals** below. When your estimate is within a range of +/- 5% of the true share, you will receive an additional amount of **3.125 points** on top of your earnings.

%

Characteristics about financial professionals	
Mean age:	40 years
Gender ratio:	Male: 83% Female: 17%
Distribution across working fields:	Sales: 43% Asset/Portfolio Management: 37% Risk Management: 7% Treasury: 5% Compliance and customer support: 5% Trading: 3%

Next

Figure B11: Instructions and belief estimation task regarding the main pair-wise decision task for our extension. *Type II* participants (*victims*) – Part 5. In this figure financial professionals are explicitly mentioned. Participants were also faced with the exact same question, however, with respect to students instead of financial professionals. After this, *Type II* participants proceed to the post experimental survey (see Figure B21).

B.4 Extension – *Type I* participants (*robbers*)

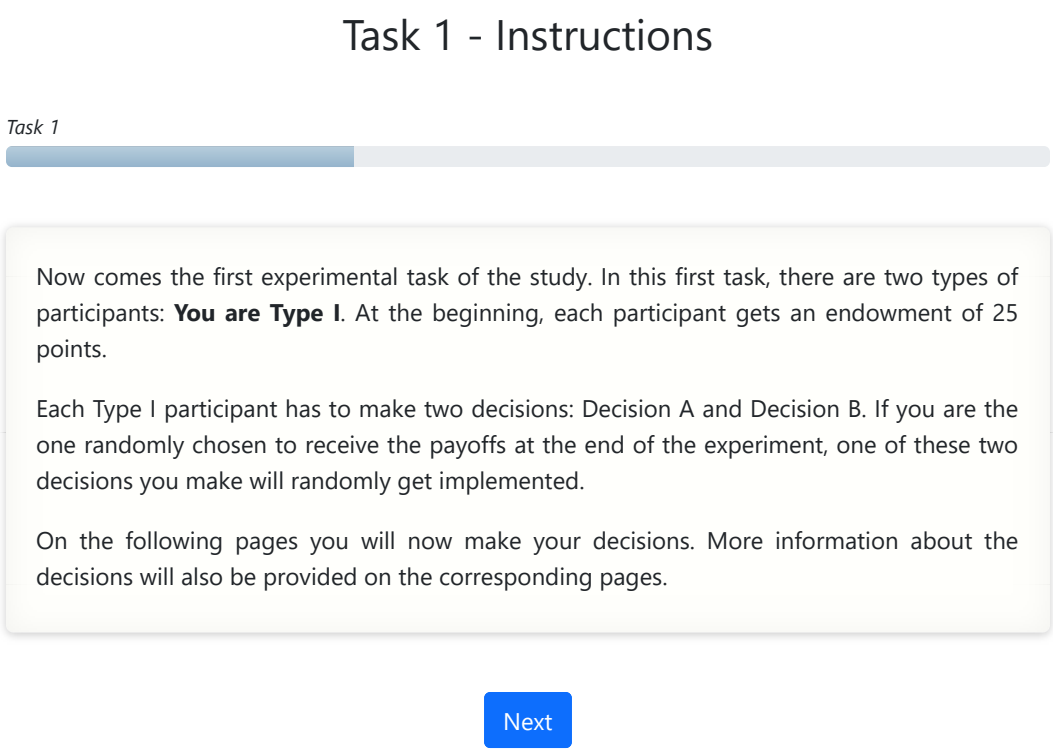

Figure B12: Instructions for our extension. *Type I* participants (*robbers*) – Part 1. See Figure B13 for part 2.

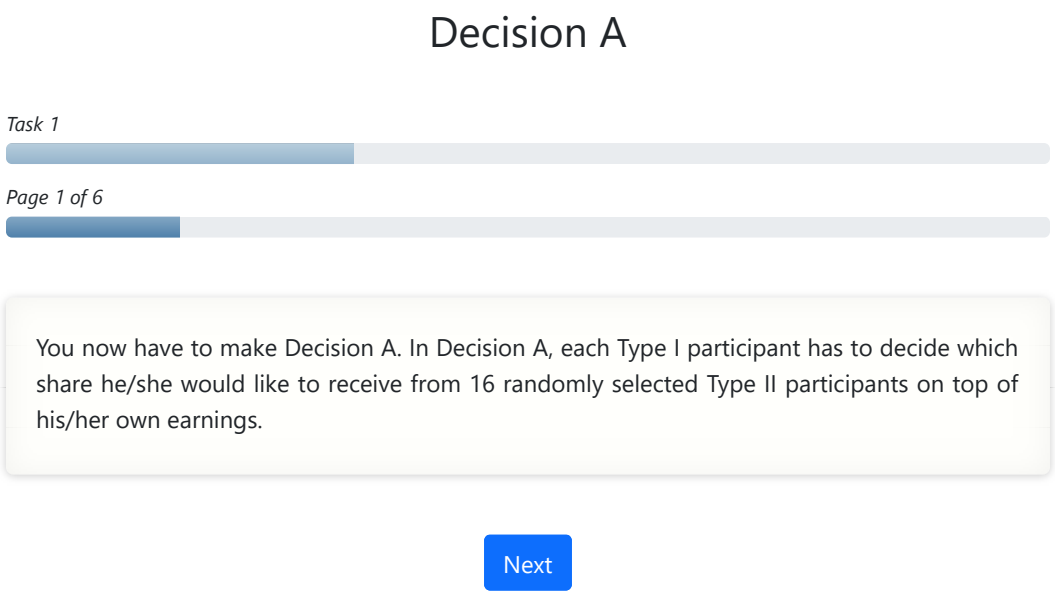

Figure B13: Instructions for our extension. *Type I* participants (*robbers*) – Part 2. See Figure B14 for part 3.

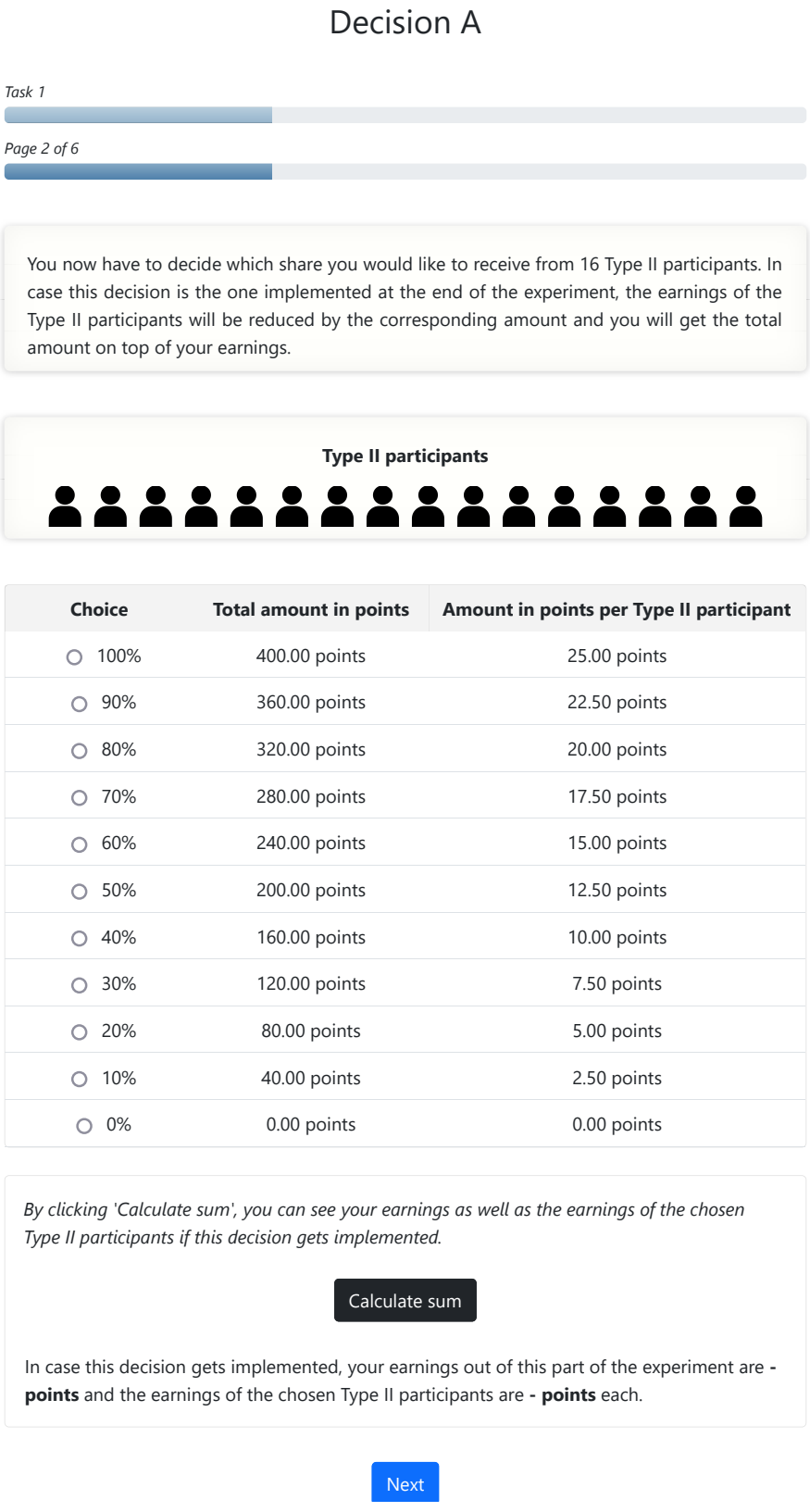

Figure B14: Instructions including the main individual player decision task for our extension. *Type I* participants (*robbers*) – Part 3. See Figure B15 for part 4.

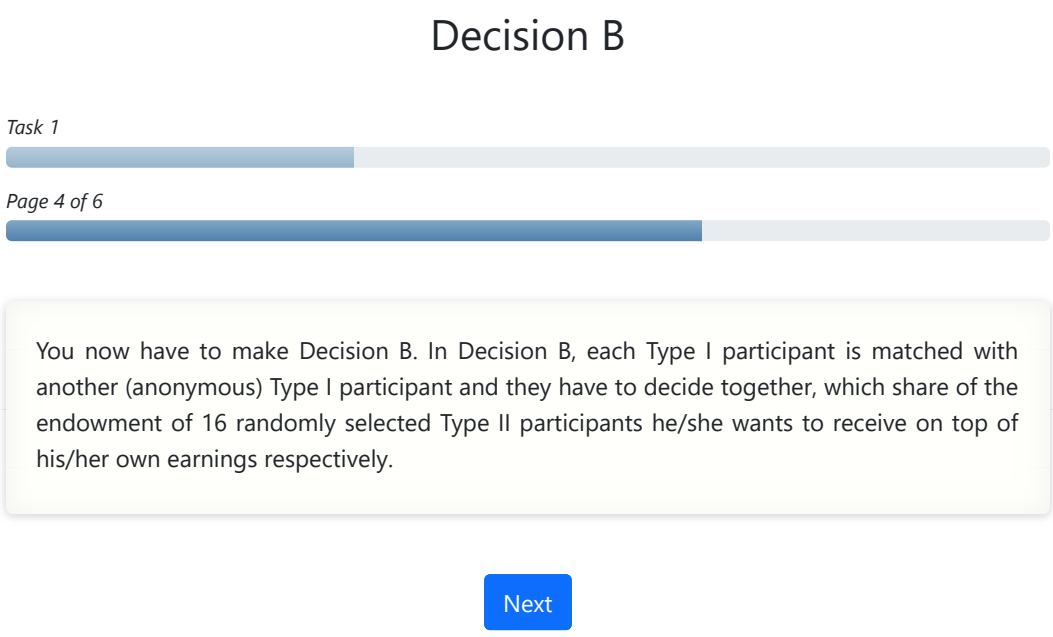

Figure B15: Instructions for our extension. *Type I* participants (*robbers*) – Part 4. See Figure B16 for part 5.

Decision B

Task 1

Page 5 of 6

You are now paired with another Type I participant. Together you have to decide which share each of you would like to receive from 16 randomly selected Type II participants. In order to continue, both of you have to click on the same choice and press on the next button respectively (If your choices differ, both of you will not be able to continue in the experiment). Please use the chat below to communicate with your team partner. Enter your message in the chat box below and press "return" to send the message. Additionally, you can see which choice your partner ticks in the right column.

In case this decision is the one implemented at the end of the experiment, you will get the total amount on top of your earnings and the earnings of the Type II participants will be reduced by the corresponding amount.

Type II participants

Choice	Total amount in points	Amount in points per Type II participant	Signature
◉ 100%	400.00 points	25.00 points	Me
○ 90%	360.00 points	22.50 points	
○ 80%	320.00 points	20.00 points	Other
○ 70%	280.00 points	17.50 points	
○ 60%	240.00 points	15.00 points	
○ 50%	200.00 points	12.50 points	
○ 40%	160.00 points	10.00 points	
○ 30%	120.00 points	7.50 points	
○ 20%	80.00 points	5.00 points	
○ 10%	40.00 points	2.50 points	
○ 0%	0.00 points	0.00 points	

Figure B16: Instructions including the main pair-wise decision task for our extension. *Type I* participants (*robbers*) – Part 5a. See Figure B17 for part 5b.

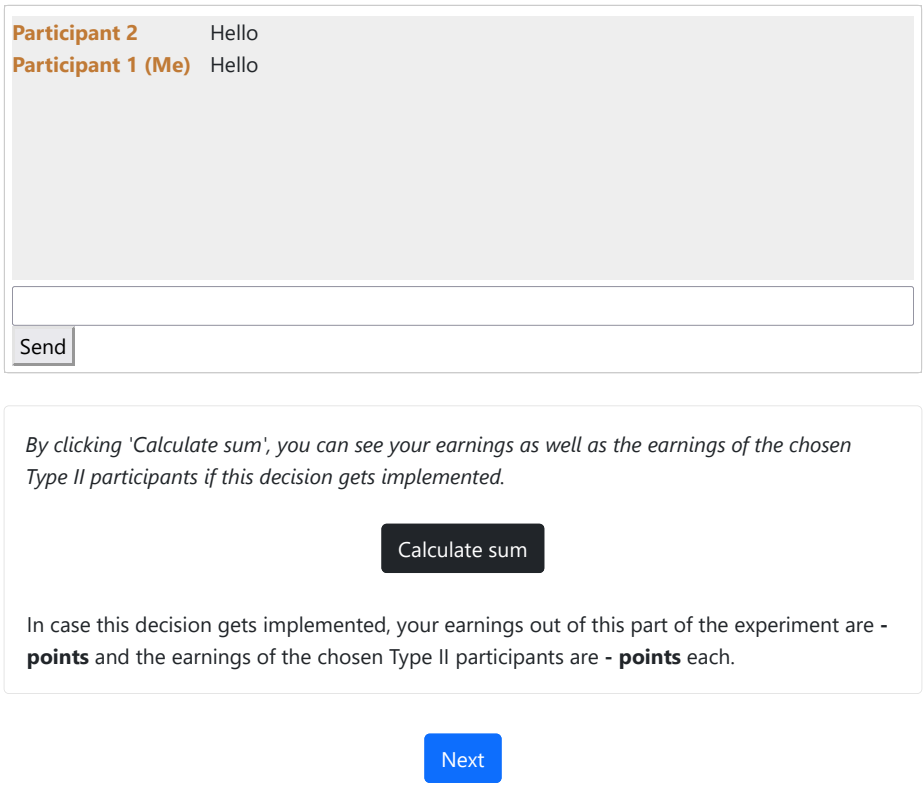

Figure B17: Additional parts, including text-based chat with example messages, from the main pair-wise decision task for our extension. *Type I* participants (*robbers*) – Part 5b. See Figure B18 for part 6.

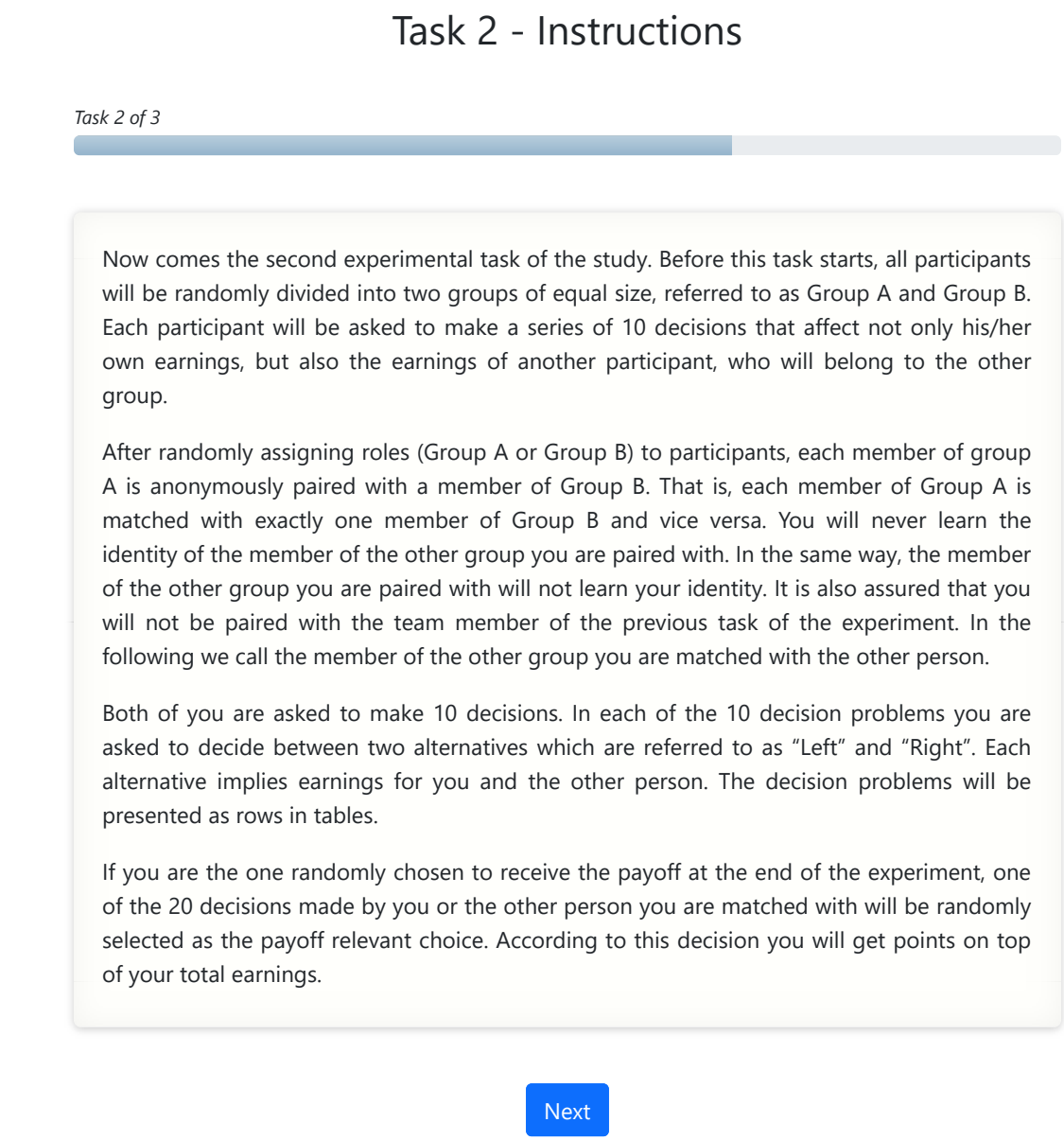

Figure B18: Instructions for our extension. *Type I* participants (*robbers*) – Part 6. See Figure B19 for part 7.

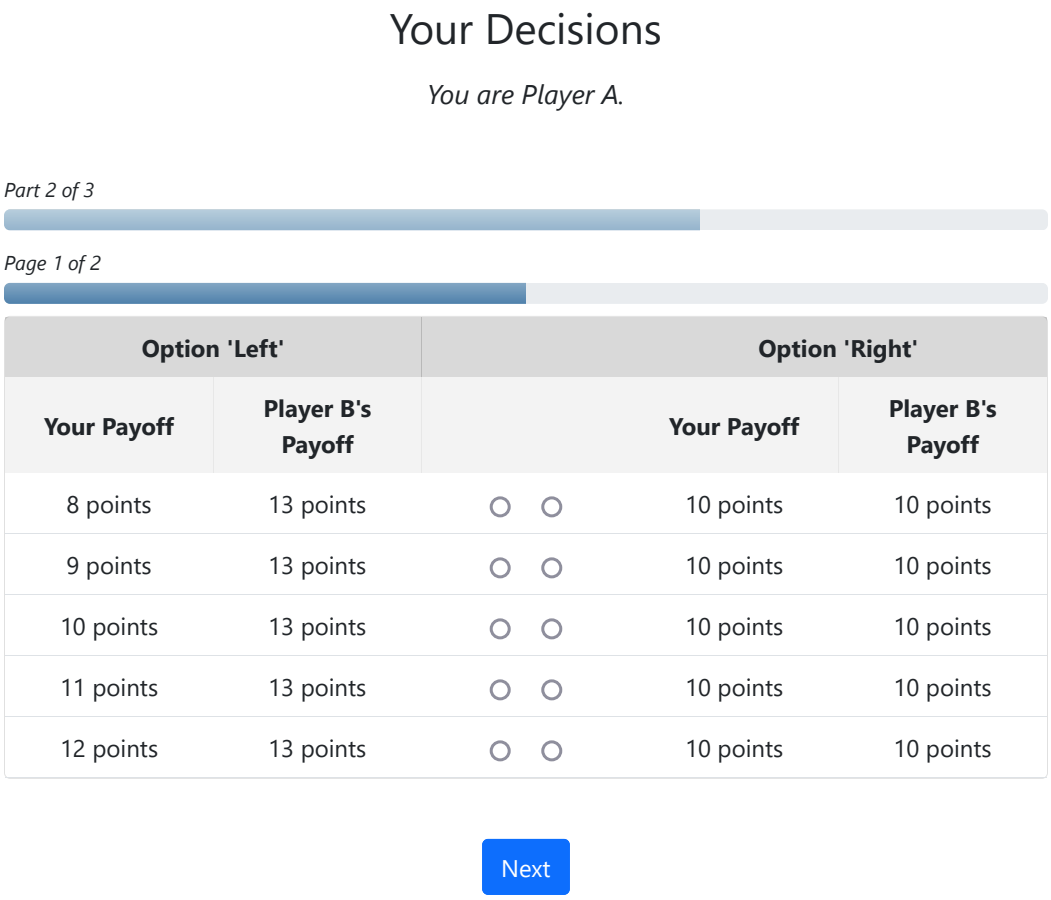

Figure B19: Illustration of the first step in the secondary decision task (EET). *Type I* participants (*robbers*) – Part 7. See Figure B20 for part 8.

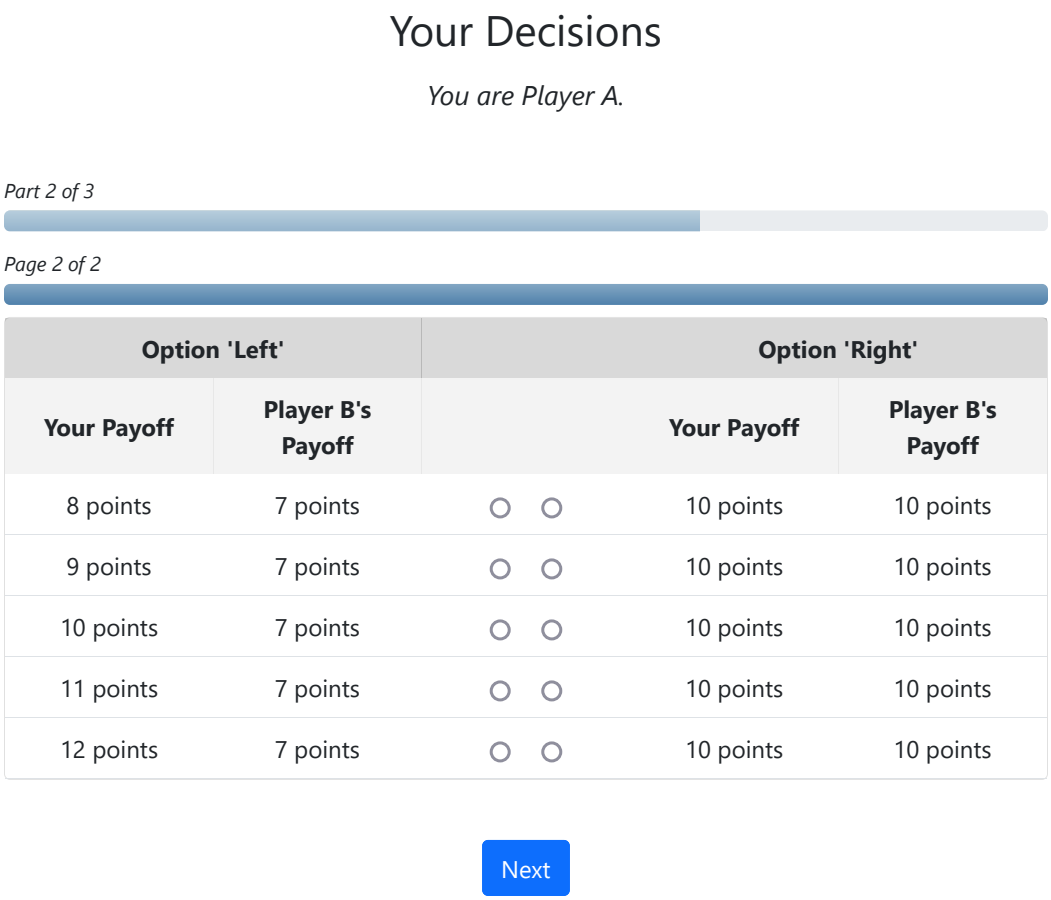

Figure B20: Illustration of the second and last step in the secondary decision task (EET). *Type I* participants (*robbers*) – Part 8. After this, *Type II* participants proceed to the post experimental survey (see Figure B21).

B.5 Post experimental survey

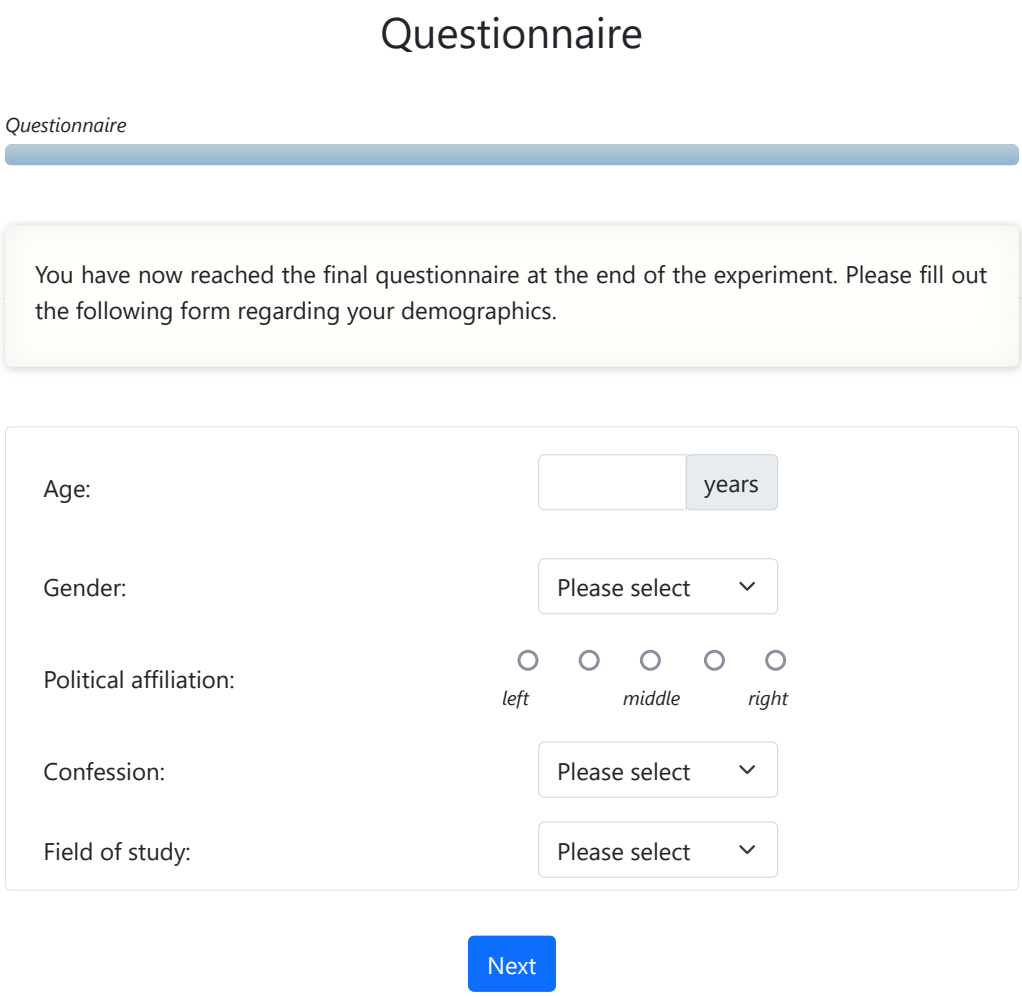

Figure B21: Post experimental survey. this instance of the post experimental survey shows what was presented to all student participants after the experiment. All fields were required to be filled in. For age, input values are limited between and including 18 and 120. For gender, the options "female", "male", and "diverse" were available. For political affiliation, a 5-point Likert-Scale was used, labelled as "left" and "right" for the extreme values and "middle" for the center value. For confession, a list of options with "Roman Catholic", "Orthodox", "Muslim", "Protestant", "Other", and "Without" was offered. For the last survey question, conditional on the subject pool, we asked about either the field of study for students, or the area of work for financial professionals. For students, the available choices were "Humanities and Cultural Sciences", "Engineering Sciences", "Natural Sciences", "Law", "Social and Economic Sciences", "Theology", and "Interdisciplinary Study Programmes". For financial professionals, we provided the options "Trading", "Asset/Portfolio Management", "Risk Management", "Sales", "Treasury", and "Compliance and customer support".

C Results Conceptual replication

This section of the appendix contains supplementary material (i.e., Tables and Figures) for the conceptual replication. Whenever we refer to Alós-Ferrer et al. (2022), we reproduced the results using the data they provided in their replication package, which is downloadable under the following link: https://osf.io/q7n2C/.

	Alós-Ferrer et al. (2022)					Conceptual replication				
	N	Mean	SD	Min	Max	N	Mean	SD	Min	Max
Age	320	23.47	4.07	18	50	119	23.78	3.74	18	38
Gender										
Male	320	0.50		0	1	119	0.35		0	1
Female	320	0.50		0	1	119	0.63		0	1
Diverse						119	0.02		0	1
Field of Study										
Economics and Social Sciences	320	0.46		0	1	119	0.44		0	1
Natural Sciences						119	0.24		0	1
Humanities and Cultural Sciences						119	0.19		0	1
Other						119	0.13		0	1
Confession										
Roman Catholic						119	0.54		0	1
Islamic						119	0.06		0	1
Without						119	0.33		0	1
Other						119	0.07		0	1
Political affiliation						119	2.54	0.82	1	5

Table C3: Sample descriptives *robbers*. This table compares sample characteristics from *robbers* of the original study of Alós-Ferrer et al. (2022) and of our sample regarding age, gender, field of study, confession and political affiliation. Age is subjects' age when participating in the study. Gender describes subjects' gender; in Alós-Ferrer et al. (2022) they asked whether a subject is female or not. Field of study is subjects' current study program; in Alós-Ferrer et al. (2022) *Economics and Social Sciences* only includes economics. Confession is subjects' confession and it is not elicited in the paper of Alós-Ferrer et al. (2022). Political affiliation is subjects' political affiliation on a 5-point scale ranging from 1 (left) to 5 (right), with a midpoint at 3 (centre).

	Alós-Ferrer et al. (2022)					Conceptual replication				
	N	Mean	SD	Min	Max	N	Mean	SD	Min	Max
Age	320	22.87	4.22	17	62	128	23.62	4.30	18	55
Gender										
Male	320	0.46		0	1	128	0.67		0	1
Female	320	0.54		0	1	128	033		0	1
Field of Study										
Economics and Social Sciences	320	0.45		0	1	128	0.46		0	1
Natural Sciences						128	0.28		0	1
Humanities and Cultural Sciences						128	0.12		0	1
Other						128	0.14		0	1
Confession										
Roman Catholic						128	0.56		0	1
Islamic						128	0.03		0	1
Without						128	0.24		0	1
Other						128	0.17		0	1
Political affiliation						128	2.58	0.78	1	5

Table C4: Sample descriptives *victims*. This table compares sample characteristics from *victims* of the original study of Alós-Ferrer et al. (2022) and of our sample regarding age, gender, field of study, confession and political affiliation. Age is subjects' age when participating in the study. Gender describes subjects' gender; in Alós-Ferrer et al. (2022) they asked whether a subject is female or not. Field of study is subjects' current study program; in Alós-Ferrer et al. (2022) *Economics and Social Sciences* only includes economics. Confession is subjects' confession and it is not elicited in the paper of Alós-Ferrer et al. (2022). Political affiliation is subjects' political affiliation on a 5-point scale ranging from 1 (left) to 5 (right), with a midpoint at 3 (centre).

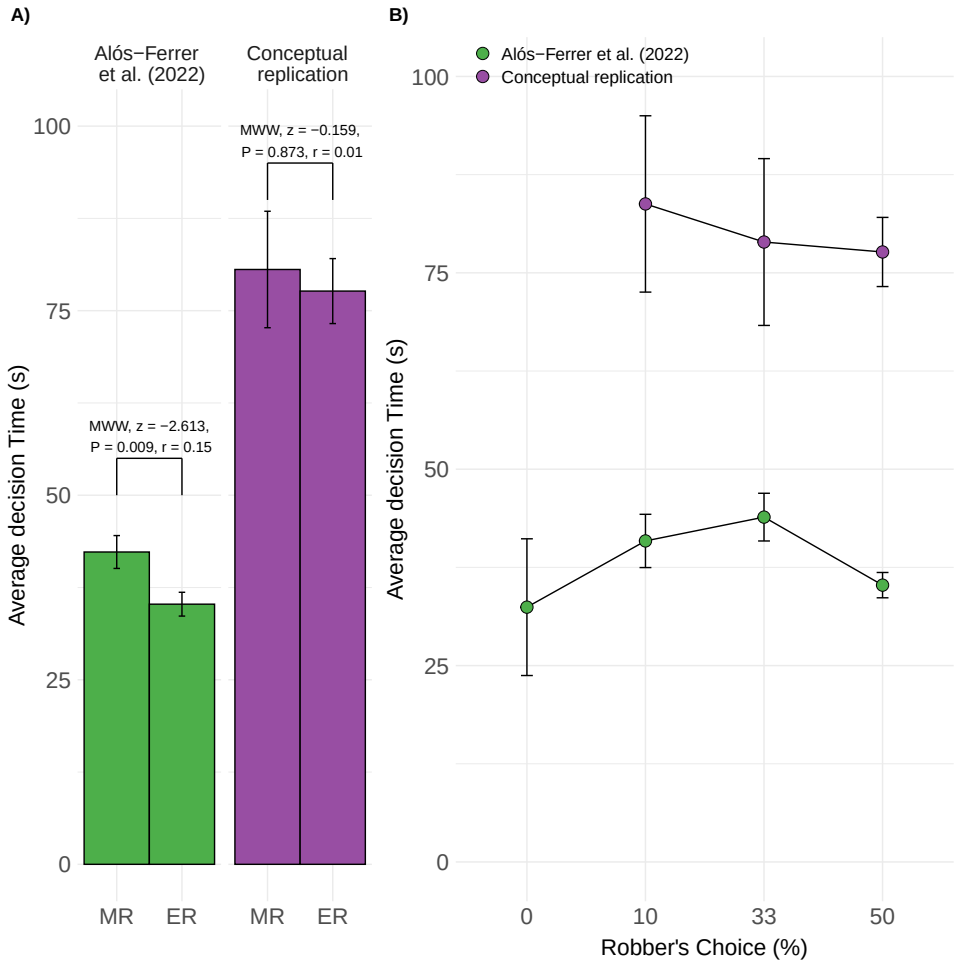

Figure C22: Decision times between *robbers* and studies. This figures shows the average decision times of *robbers*. In Panel A) the average decision time with SEMs (Standard error of the means) as errorbars between moderate *robbers* (MR) and extreme *robbers* (ER) are shown. An extreme *robber* is defined as a *robber* who opts for the highest possible amount to take 50%, whereas the moderate *robbers* are subjects who are not classified as being extreme. ERs decide significantly faster in the original of Alós-Ferrer et al. (2022)(MWW (Mann-Whitney-Wilcoxon test), N = 320, z = -2.613, P = 0.009, effect size r = 0.15), which is not the case for our replication (MWW test, N = 119, z = -0.159, P = 0.873, effect size r = 0.01). In panel B) the average decision times across choices are shown.

Result	Alós-Ferrer et al. (2022)	Conceptual replication	replicated
No diff. men and women	χ^2 test, $\chi^2(3) = 1.216$, $P = 0.749$	χ^2 test, $\chi^2(3) = 2.335$, $P = 0.311$	✓
Extreme *robbers* shorter decision times	MWW , z = -2.613, $P = 0.009$, r = 0.15	MWW, z = -0.159, $P = 0.873$, r = 0.01	
No diff. econ and non-econ	χ^2 test, $\chi^2(3) = 4.431$, $P = 0.219$	χ^2 test, $\chi^2(2) = 3.713$, $P = 0.156$	✓
% of ERs no diff. econ and non-econ	TEP, z = -1.427, $P = 0.153$, mean difference 7.94%, 95% CI[-0.029, 0.188]	TEP, z = -1.825, $P = 0.068$, mean difference 15.73%, 95% CI[-0.006, 0.321]	✓

Table C5: Conceptual replication results. This table shows the replication attempts in replicating the results found in Alós-Ferrer et al. (2022). We only do replication attempts where data is comparable, i.e., all tests where ex-post and ex-ante treatment in the original are compared are not replicated. Comparing the distributions of choices between students with and without a major in economics involves also social sciences for our replication. MWW denotes Mann-Whitney-Wilcoxon tests, and TEP stands for Test of Equal Proportions (the assumptions for normal approximation are satisfied).

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Sebastian Bachler, Armando Holzknecht, Jürgen Huber, Michael Kirchler

From Individual Choices to the 4-Eyes-Principle: The Big Robber Game revisited among Financial Professionals and Students

Abstract
While headline news frequently report cases of large-scale fraud, corruption, and other immoral behavior, laboratory experiments often show prosocial behavior in strategic games. To reconcile and explain these seemingly conflicting observations, Alós-Ferrer et al. (2022) introduced the Big Robber Game — an altered dictator game where one robber can take money from multiple victims. They reported low prosocial behavior among a pool of student subjects who behaved more prosocial in bilateral games than in the Big Robber Game. In our study, we employ the Big Robber Game within a 2x2 factorial design, engaging over 860 participants to examine the behaviors of financial professionals versus students. Moreover, inspired by the four-eyes principle, a common practice in the finance industry, we investigate decision-making both individually and in pairs. We find overall support for the results of Alós-Ferrer et al. (2022) and that finance professionals rob less than students. Accounting for a multitude of specifications, socio-demographic characteristics and individual preferences, we report that treatment differences disappear, indicating similar behavior across individuals, pairs, finance professionals, and students. Finally, in a series of non-pre-registered exploratory analyses, we show that victims expect finance professionals to rob significantly more than student robbers, implying that finance professionals are considered to be less pro-social than students' peers.

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