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Social Preferences under Risk: the Role of Social Distance*

Natalia Montinari[†], Michela Rancan[‡]

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Abstract

In many different contexts individuals take decisions on the behalf of others. However, little is known about how this circumstance affects the decision making process and influences the ultimate individuals' choices. In this paper, we focus on the context of investment decisions and study if (and how) lottery-type investment decisions made on behalf of another person differ i) compared to decisions which do not affect anyone else, and ii) depending on the social distance between who makes the decision and who is affected by it. Our results shows that social distance (i.e., whether the person affected by one's decision is an unknown stranger or a friend) is an important determinant when people decide on the behalf of others. Individuals are heterogeneous in their individual investment strategies but, on average, when deciding on behalf of a friend rather than only for themselves or a stranger, their behavior is closer to expected value maximization, exhibiting less risk taking. We interpret these findings as evidence of other regarding preferences affecting the decision making process in lottery-type decisions when the social distance is shortened.

JEL classification: A13, C91, D64, D81

Keywords: Risk seeking, Other Regarding Preferences, Social Distance, Friends, Lottery-type investment

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1 Introduction

Individuals take decisions affecting themselves as well as others, like spouse, children, colleagues, employees, shareholders, customers, patients, and voters. Despite the fact that these situations are extremely common in everyday life, still a little is known about how feeling responsible for another person affects the individuals' decision making (see e.g. Sutter, 2009; Bolton and Ockenfels, 2010; Pahlke et al., 2012a).

The aim of this paper is to study how risk taking varies when investment decisions refer to a lottery-type project (i.e.an investment project with negative expected value), and are made on behalf of another person under different levels of social distance compared to the case when decisions do not affect anyone else. In this analysis we will focus on two elements: the relevance of other regarding preferences and the effect of social distance. Concerning the first element, by definition, the presence of someone else may affect the decision maker only if he takes into account other's outcome or feels responsible for others' gains and losses. The other element playing an important role is the social distance between the decision maker and the person affected by the investment choice. For example, a situation characterized by high social distance is the one of a mutual fund manager investing clients' money (Bergstresser et al., 2009). Usually, this situation is completely anonymous in the sense that the fund manager does not know the identity of the investors. On the contrary, in other situations the social distance is lower, financial and investment advisors develop a personal relationship with clients, and face-to-face contact exists even between pension fund managers and clients (Del Guercio and Tkac, 2002). Many other similar cases can be listed and a number of intermediate cases exist in real word.[1]

The common element of the situations mentioned is that a decision maker makes an investment choice on behalf of another person. What varies –despite some institutional details– is the social distance between the two agents and, in particular, the possibility of receiving feedbacks about the investment choices directly from the clients.

In this paper, we choose to focus on lottery type investment based on the evidence that, in some circumstances, people exhibit risk seeking behaviors,

[1] At one extreme, there are CEOs working for large companies, who meet the shareholders just at the annual general meeting; at the other extreme, there are managers of small and medium companies, who are much closer to the controlling shareholders (Claessens et al., 2000). Middle managers, being at the intermediate level of the hierarchy, have social contacts with their subordinates and, at the same time, affect their colleagues by implementing the organization's strategic objectives with their decisions (Wooldridge and Floyd, 1990).

such as investing in projects with negative expected value, like lotteries, which seems inconsistent with expected utility maximization. This phenomenon is not limited to commercial gambling;[2] recent studies document that individual gambling preferences also influence investment decisions and corporate decision making. Individual investors overinvest in lottery-type stocks (i.e., stocks with higher volatility and large positive skewness (Kumar, 2009; Kumar et al., 2011), and initial public offerings (IPOs) with high expected skewness (Green and Hwang, 2012). Institutional investors exhibit a substantially heterogeneous risk-taking profile (Kosowski et al., 2006; Balduzzi and Reuter, 2012), mutual fund managers change the portfolio's risk conditional upon past performance (Chevalier and Ellison, 1997), a number of funds have very risky strategies or hold concentrated portfolios (Kosowski et al., 2006), and some of them overweight lottery-type stocks (Kumar, 2009; Kumar et al., 2011). In the same vein, gambling attitudes of CEOs influence mergers (Graham et al., 2011) and takeovers (Schneider and Spalt, 2013), while personal risk attitude affects corporate policies (Cronqvist et al., 2012; Cain and McKeon, 2012). Moreover, Graham et al. (2011) find that CEOs differ in their risk attitude with respect to lay population being substantially less risk averse.

Our aim is therefore to investigate whether, in those circumstances, where individuals seem to act in discordance with expected utility maximization, the fact that others are affected by their choice may work as a device to induce individuals to make better investments -in expected terms.

With this aim in mind, we designed an experiment to study how social distance affects an investment choice where a decision maker (active participant) chooses the level of investment in a lottery-type project, which has consequences both for himself and another person (passive participant). We vary the social distance between the two participants by changing the identity of the person for whom the active participant decides using two polar cases. In our within subjects design, each active participant decides only once for himself (herself) and twice on behalf of someone else: in one treatment the risky decision is made on behalf of an anonymous stranger, while in the other treatment it is made on behalf of a friend who comes to the laboratory together with the decision maker. While a decision for an anonymous stranger represents a situation characterized by high social distance without the possibility of any feedback, a decision on behalf of a friend is characterized by low social distance and, most likely, will

[2] It has been documented that individuals spend a consistent amount of money to play lotteries (Kearney, 2005; Clotfelter and Cook, 1990).

be rediscussed after the experimental session. For a decision maker to decide on behalf of a friend rather than an anonymous stranger also implies a different level of knowledge of the risk propensity of the passive participants, which again captures well the two extreme situations we want to study. In addition, we study the determinants of decision making on behalf of others in two contexts which differ in the frequency of the feedback about the outcome of the investment, to assess the effect of myopic loss aversion.

We report three main results. First, we find that when deciding on behalf of others, despite all else being equal, individuals make different choices than when they decide only for themselves. These choices made on behalf of others seem affected by altruistic considerations which are modulated by the social distance between the decision maker and the participant affected by the outcome of the investment. Second, we document heterogeneous investment strategies in different decision contexts but, on average, find that when deciding on behalf of someone else, individuals' investment decisions are more in line with the expected value maximization, i.e., individuals decide to invest less and, less frequently, in a lottery yielding negative expected value compared to the case in which they only invest for themselves or for an anonymous stranger. However, beliefs seem important, and for male participants, in particular, the identity of the passive participant is still a significant explanatory variable, suggesting that in those circumstances the decision making process is not a mere cognitive process. But the feeling of responsibility for the lottery outcomes may also play an important role. Our third result shows that myopic loss aversion is confirmed when individuals decide both on behalf of a stranger and, to a lesser extent, a friend. At the same time, by considering different environments in terms of riskiness of the lottery and feedback about the outcome of the investment, we find that myopic loss averse behavior by the decision maker does not eliminate the role of altruism and social distance, which seem important determinants independent of the specificities of the context.

Our framework offers a novel view of those situations in which people invest in a lottery-type project on behalf of others. We find that deciding on behalf of others drives people to behave more consistently with expected value maximization. Thus someone else deciding for us may prevent or, at least, mitigate gambling behavior and the suboptimal associated outcomes. At first sight, this may seem in contrast with the evidence of mutual fund managers and CEOs making gambling financial decisions as well as with the common view that excessively risky positions by some executives in the financial industry, which contributed to the recent financial crisis. However, our results highlight the importance of i) the identity of the person affected by the outcome of the investment and ii) his risk attitude and the emotional proximity to the decision maker.

The remainder of the paper is organized as follows. Section 2 discusses the relevant literature and, Section 3 explains the experimental design. Section 4 proposes a simple framework incorporating other-regarding preferences and social distance in the investment decision and formulates our research hypothesis. Section 5 and 6 presents the experimental procedure and the main results. Section 7 concludes.

2 Related Literature

In this section we discuss our experiment with respect to two main streams of literature. The first stream studies risk seeking behavior on behalf of others (and in particular situations involving responsibility), the second refers to the relevance of social distance. With respect to the first stream, our main contribution relates to the focus on investment choices yielding negative expected value, while other papers focus on lotteries yielding positive expected value (with few exceptions, as Pahlke et al., 2012a). With respect to the second stream, the novelty of our study consists in varying the social distance between the decision maker and the passive participant, while other papers study decisions on behalf of others under a given level of social distance.

Situations involving responsibility identify cases in which the decision maker decides for others as well as herself. In distributional games characterized by the absence of any risk (typically dictator, ultimatum, and public good games), previous studies show that people care about others' payoffs exhibiting other regarding preferences (Fehr and Schmidt, 1999; Charness and Rabin, 2002; Andreoni, 1990). However, it is less clear if (and how) other regarding preferences affect decision making in risky environments. The existing theoretical models do not provide any prediction about how people behave when taking a risk on behalf of others in lottery-type investment (i.e., investment yielding negative expected value). Recently, a growing number of studies have investigated decision making in a risky context on behalf of others. Bolton and Ockenfels (2010) in a dictator game with risky options show that individuals tend to be more risk averse when the outcomes of the risky decision affect both themselves and the recipient. Using a similar setting, Brock et al. (2013) find that both ex ante and ex post fairness motives are important. However, most of the papers (see also Chakravarty et al., 2011; Sutter, 2009) focus on choices with positive expected value. An interesting exception is Pahlke et al. (2012a), who study decisions on behalf of others under different domains (gain, loss, or mixed domain), finding that this varies the risk attitude of the decision maker.[3] We choose to focus our investigation on a project yielding negative expected value motivated by the attempt to reproduce a situation in which people take decisions on behalf of someone over lottery investment decisions, as it is the case in many real life situations.

To our knowledge, this paper is the first study to assess the role of social distance in the context of lottery-type investment. Making risky decisions in many contexts, people often have to make decisions that affect themselves as well as others, like colleagues, employees, customers, shareholders, spouses and children. All these circumstances differ substantially in the level of social distance between the decision maker and the person affected by the choice. Social distance can be defined as the degree of similarity, closeness, or "emotional proximity" between individuals involved in a certain situation (Charness and Gneezy, 2008). In the lab this concept has been operationalized in several ways: i) based on participants' demographic similarities, e.g. race, nationality, (Glaeser et al., 2000) and other individual characteristics (Frey and Bohnet, 1999; Charness et al., 2007); ii) creating artificial (minimal) groups as defined by Tajfel and Katok (1970) as in Ball and Eckel (1998); or iii) reducing anonymity as in Hoffman et al. (1996). For example, full names were revealed in Holm (2000) and Fershtman and Gneezy (2001) to signal gender and ethnicity. Impersonal communication was introduced by Frohlich and Oppenheimer (1998), while Frey and Bohnet (1999) and Rankin (2006) used face-to-face interaction. Irrespectively from how social distance is defined and measured, in all these studies the underling hypothesis is that people act more favorably toward those with a higher degree of social kinship. Therefore, decreasing social distance should increase the strength of other regarding preferences in the decision making process. Indeed, these studies document a positive and significant correlation between the reduction of social distance and the frequency of non-selfish decisions.

[3]Other aspects investigated relating to decision making for others, which we take into account, are gender stereotypes (e.g., females being more risk averse than males as passive participants Daruvala, 2007) and beliefs about others' risk preferences (Chakravarty et al., 2011).

3 Experimental design

The two key features of our experimental design are: the investment decision (Section 3.1) and the treatments implemented (Section 3.2).

3.1 The investment decision

We design our lottery-type investment task by introducing a small variation to the task used in Gneezy and Potters (1997) and Charness and Gneezy (2010) such that our lottery has a negative expected value. Each participant is given 100 ECUs as endowment and asked to choose the portion of this amount (between 0 and 100) that she wishes to invest in a lottery-type project. The ECUs not invested together with the ECUs gained form the earnings obtained from a given investment decision. Our experiment has three parts. In each part, participants are confronted with an identical sequence of 12 independent investment decisions, presented in four blocks of three identical lotteries each.[4] In particular, as shown in Table 1, in each experimental part investment decisions from 1 to 6 (i.e., block 1 and block 2) correspond to lottery A. Lottery A identifies a project that is successful with 0.33 probability, returning 2.5 times the amount invested, while it fails with a complementary probability of 0.67, returning 0. Investment decisions from 7 to 12 (i.e., block 3 and block 4) correspond to lottery B. Lottery B is successful with 0.25 probability, returning 1.8 times the amount invested, while it fails with a complementary probability of 0.75, returning half of the amount invested.

It can be noted that the two lotteries give the same (negative) expected value, but differ both in their variance ($Var(A) > Var(B)$) and in the fact that money invested can be totally or partially lost in case of the project's failure. Therefore, a decision maker who adopts the expected value criterion for his decision (e.g., maximizes a utility function simply based on expected value) would never invest any amount in any of the two lotteries.

3.2 The treatments: social distance and feedback

Our experimental design varies two main factors: the social distance and the feedback frequency regarding the outcome of the investment. The social distance is varied within subjects and, therefore, within a session subjects experience dif-

[4] Subjects are informed that the three decisions contained in each block are identical. More details can be found in the Instructions reproduced in English in Appendix A.

ferent levels of social distance (one in each of the three experimental parts). The feedbacks frequency is varied between subjects and, therefore, within a session participants always face the same type of feedback for all three parts. Table 2 summarizes our treatments.

Social distance. Following Charness and Gneezy (2008), we define social distance as "emotional proximity." To investigate the impact of social distance we base our analysis on three treatments within subjects, each implemented in one of the three parts of our experiment. In part 1, identified as own treatment (OT), each participant decides only for herself and her decisions have no consequences for anyone else. The OT constitutes our baseline to measure individual propensity to risk taking in the environment we consider. At the beginning of part 2, subjects are divided in to active and passive participants (we will also identify the active participants as decision makers). The active participants make investment decisions on behalf of one passive participant. The same role (active or passive) is retained in part 3. Moving from part 2 to part 3, we manipulate social distance by varying the identity of the passive participant. Specifically in part 2, identified as stranger treatment (ST), the active participant is asked to make her investment decisions on behalf of an anonymous passive participant. In part 3, identified as friend treatment (FT), the active participant is asked to make her investment choices on behalf of the friend who came with her to the lab. Both in ST and FT, we perfectly align the incentives of active and passive participants. This means that the investment decisions of active participant determine the same identical payoff for herself and the passive participant.[5] In this way, we rule out by design any concerns for inequality of the experimental earnings between active and passive participants and, in general, any other form of other regarding preferences based on the relative comparison of experimental payoffs. We consider this as a conservative choice in terms of design. However, we think this constitutes a better compromise in order to study –in a laboratory

[5]Specifically, the decision situation for the active participant was described as follows: "*Now we are about to start the first (second/third/fourth) block of investment decisions. Each block contains 3 investment decisions. In each period of a block, you will face the same project and you have to make your investment decision for the passive participant.*" Then, on the decision screen the active participant was required to do the following: "*Please indicate how many ECUs of the PASSIVE participant you want to invest in Project 1. The ECUs that you dont invest will be accumulated in the total balance of the PASSIVE participant.*" Finally, in the instruction the following was specified: "*If this part, i.e., part 2, is selected, then: 1) the passive participant matched with you will earn the sum of the earnings obtained as a consequence of your investment choices in each of the 12 periods of part 2. 2) You will earn the same amount of ECUs he earns.*" See the Appendix for more details.

experiment– the effect of other regarding preferences as well as social distance in risky environments, compared to other studies in the literature assigning a fixed payment to the active participants (Daruvala, 2007; Eriksen and Kvaloy, 2010).

Feedback frequency. We implement two variations in the feedback frequency between subjects, as in Gneezy and Potters (1997) and Charness and Gneezy (2010). In the frequent feedback treatment (FFT) in each of the twelve investment periods, each subject first decides how many of the 100 ECUs to invest in the lottery-type project. Then she receives feedback about the success/failure of the project in that period, and after that another investment period starts until the twelfth investment period is completed. In the infrequent feedback treatment (IFT), each subject is informed about the success/failure of the project after a block of three periods, and she then makes an investment decision for a block of three periods at a time. Therefore, in the IFT each subject, at the beginning of each block of investment decisions, has to decide how much of her endowment to invest in the project for the three subsequent periods, and these investment decisions are restricted to being equal within each block. By varying the feedback frequency, we measure how myopic loss aversion (MLA) influences investment decisions. An individual is said to be loss averse if she is more aware of losses than gains of equal amount (Kahneman and Tversky, 1979). When an individual evaluates the lottery outcomes at a high frequency, he experiences a greater dissatisfaction with a negative outcome compared to the case of low frequency evaluation (Thaler, 1985). The combination of loss aversion and mental accounting gives rise to myopic loss aversion, specifically people's propensity to invest less in the FFT than in IFT.

Payments. Since we are interested in studying if (and how) the decision environment interacts with individuals' other regarding preferences and social distance, subjects are informed that only the investment decisions made in one of the three experimental parts will be randomly selected as relevant for the determination of the experimental earnings. Within each part, however, all twelve decisions are considered in calculating the payoff of that part, and the earnings cumulated in each investment period are shown to the active participant in each part. At the end of the twelve investment periods, both in ST and FT, the passive participants are also informed about the investment decisions made by the active participant with whom they are matched as well as about the success/failure of the project in each round.

4 Theoretical framework and hypotheses

In this section we provide a formal representation of the investment decision faced by our participants and state our research hypotheses.
We model the investment decision of an individual under condition of uncertainty in the spirit of Pratt (1964) and Arrow (1970). Consider an individual i who holds an initial wealth $w > 0$ and decides to invest in a lottery-type project an amount $q \in [0, 1]$. The amount not invested in the lottery-type project and held in a safe account is $w - q$.

The individual faces the following maximization problem:

$$V = \max_q u(q \int g(\rho)d\rho) + u(w - q) \tag{1}$$
$$\text{s.t.} 0 \leq q \leq 1$$

V is the indirect utility function and $g(\rho)$ denotes the density function of ρ, being the return of the project. The constraint implies that agents cannot borrow money and have to invest a positive amount (or 0). Given a twice differentiable utility function $u(.)$, the Arrow-Pratt measure of absolute risk aversion is defined as $r_i = -u''/u'$.
We generalize the model to consider cases in which individual i decides on behalf of another individual, j. We define γ_i, which captures concerns for others' payoffs,[6] and depends on the social distance, $d_{ij} \in [0, \infty)$, between individuals i and j. In particular, if $d_{ij} = 0$, as for example in OT, individual i's decision does not affect anyone else and the problem reduces to equation 1. If $d_{ij} > 0$, concerns for others' payoffs and social distance may affect the invested amount q. Formally, this can be summarized as follows:

$$V = \begin{cases} \max_q u\left(q \int g(\rho)d\rho\right) + u(w - q), & \text{if } \mathrm{d}_{ij} = 0 \\ \max_q u\left(q\left(1 + \gamma_i \frac{1}{d_{ij}}\right) \int g(\rho)d\rho\right) + u(w - q), & \text{otherwise} \end{cases} \tag{2}$$

This simple formulation has significant implications. The solution, q^*, for

[6] Regarding the heterogeneity of preferences see Fehr and Schmidt (1999).

a decision maker is to choose the amount to be invested in the risky asset depending on the existing situation. While in all circumstances q^* depends on the individual risk attitude, the optimal solution varies in the weight attached to others' payoffs and in the social distance when the decision maker decides on behalf of someone else.

Based on this formulation, we derive and test three main hypotheses related to how average investment decisions are made on behalf of others compared to a situation where $d_{ij} = 0$: i) the role of other regarding preferences and social distance; ii) the heterogeneity of individual strategies of investment; and iii) the feedback frequency and relevance of MLA.

Our first hypothesis refers to how other regarding preferences (ORP) and social distance (SD) affect the decision of the active participants.

HYPOTHESIS 1.

1.a Other Regarding Preferences: $q_{OT} \neq q_{ST}$ & $q_{OT} \neq q_{FT}$.

Investment decisions made by active participants on behalf of a stranger (ST) or a friend (FT) differ with respect to investment decisions that do not have consequences for others (OT).

1.b Social Distance: $q_{ST} \neq q_{FT}$.

Investment decisions made by active participants on behalf of a stranger (ST) and a friend (FT) differ from each other.

Differently than in OT, in ST and FT the ORPs and SD may affect the active participants' decision. Thus, if ORPs do not affect the active participants' investment decisions, we should expect that, on average, the investment decisions made by the active participants in OT, ST, and FT are not different from each other. On the contrary, we interpret any difference between the investment decisions made in ST and FT (compared to the investment decisions made in OT), as evidence of the relevance of ORPs (Hypothesis 1.a) and, specifically, altruism. Given the risk sharing payment scheme we adopted in ST and FT, we can exclude by design the relevance of any model of ORP based on the relative comparison of payoffs as, for example, in Fehr and Schmidt (1999) since our active participants do not face any trade-off between own and other's payoff. The decisions of the active participants in our environment are compatible with models where participants' payoff depends on their own monetary payoff and

–as an externality– the payoff of their opponents (see Becker, 1974; Andreoni, 1990; Rotemberg, 1994). In presence of ORP, it does not only matter whether someone else is affected by own investment decisions, but the social distance, d_{ij}, between the active and the passive participants may also play a role. In particular, in situations characterized by low social distance, other regarding concerns should have a stronger weight in the individual' investment decisions (e.g., in FT) compared to situations characterized by high social distance (e.g. ST). Therefore, if social distance does not affect individuals' investment decisions, then we should not observe any difference when comparing decisions in ST and FT. On the contrary, we interpret any difference in these decisions as evidence of the role of social distance, (Hypothesis 1.b).

Our second hypothesis focuses on individual investment strategies to investigate how altruism affects the decision making process.

HYPOTHESIS 2.
2.a Individual Investment Strategies. When deciding on behalf of others, individuals adopt heterogeneous investment strategies.

2.b Individual Consistency. Individuals consistently change their investment decisions when deciding on behalf of a stranger and a friend.

The way in which altruism affects the decision making process is not a priori obvious and, in particular, we believe it may depend on two factors: 1) the active participants' beliefs about the risk attitude of the passive participant; and 2) the expected emotions associated to a feeling of responsibility in case of investment failure. If the first factor dominates, being the passive participant's payoff expressed in expected terms, the active participant might either increase his investment (if he believes that the passive participant is more willing to take a risk than he is) or decrease the amount invested to secure a certain amount of money for the other participant (if he thinks that the passive participant is less willing to take a risk than he is). If the second factor dominates,[7] we should observe lower investment in parts ST and FT compared to OT since the

[7]Expected emotions are taken into account in decision making through a cognitive process (Loewenstein et al., 2001).

active participant is more afraid of losing the other's money. For this reason we investigate, at an individual level, patterns of increase/decrease in the invested amount across treatments (henceforth investment strategy) depending on the SD and test for the consistency of the adopted strategy across treatments. Thus, while in case we observe an increase in the investment we can interpret it as driven by the active participant's beliefs about the risk attitude of the passive participants. In case we observe a decrease in the investment from OT to ST/FT, both the beliefs about the other's risk attitude and the feeling of responsibility may explain the change in the active participant's investment decision. Controlling for the beliefs of the active participants about the risk profile of the passive participant in each part, we are able to assess the relative effect of these two explanations. Moreover, we gain further insights into the decision making process by studying the consistency of the investment strategy across the different experimental parts.

The third hypothesis is based on the feedback frequency treatments and tests the presence of MLA in lottery-type investment as well as its interaction with ORP and SD.

HYPOTHESIS 3.

3.a Feedback frequency. $\gamma_{iFFT} \simeq \gamma_{iIFT}$ and $d_{ijFFT} \simeq d_{ijIFT}$
ORP and SD affect the decision making process when decisions are made on behalf of a stranger (ST) or a friend (FT) both in the frequent feedback treatment (FFT) and in the infrequent feedback treatment(IFT).

3.b Myopic Loss Aversion. $q_{FFT-S} < q_{IFT-S}$ and $q_{FFT-F} < q_{IFT-F}$
Amounts invested by active participants on behalf of a stranger (ST), or a friend (FT), are lower in the frequent feedback environment (FFT) than in the infrequent feedback environment (IFT).

The feedback frequency of in any risky situation affects the decision making process. While in the frequent treatment the investment decisions may depend greatly on the lottery outputs, wins and losses play a less important role when the feedback is infrequent. On top of that, in case individuals evaluate losses more negatively, as documented extensively in the literature, they will invest a lower amount in the FFT, which, given the negative expected value of the

lottery, may lead to a decrease of suboptimal outcomes. In presence of another person affected by the outcome of the investment, however, it is not obvious whether ORP and SD play a role in both feedback contexts and, if so, to which extent (Hypothesis 3.a).
In addition, the frequency treatments allow us to study whether MLA -individuals investing less in the FFT than in IFT- is relevant when an active participant decides on behalf of a passive participant (hypothesis 3b). It might be that the presence of someone else helps the active participants to view the decision more in line with expected value maximization (which, in this case, implies that MLA is amplified, i.e., that decision makers invest less, and less often). Differently, it might be that this behavioral bias is persistent in part 2 and part 3 or even emphasized in case the decision maker considers the investment even more attractive because he is deciding for someone else.

5 Procedures and summary statistics

The experiment was programmed in z-Tree Fischbacher (2007) and conducted at the experimental laboratory of the Max Planck Institute of Economics Jena (Germany) between April and August 2013. The participants were undergraduate students from the Friedrich Schiller University Jena; they were recruited using the ORSEE software Greiner (2004) and invited to come to the lab with a friend of the same gender. The name, surname, and e-mail address of the friend had to be communicated via email to the experimenters at least 24 hours before the scheduled sessions in order to verify that s/he had not participated in another session of the same experiment before. Upon entering the laboratory, subjects were randomly assigned to visually isolated computer terminals. Participants were informed that the experiment had three parts and that they would receive instructions for the second (third) part once the first (second) part was completed. Our matching protocol is such that, once part 2 starts, each friend of the couple knows that everyone has the same probability to be assigned the role of active and passive participant. Once roles are assigned in part 2, they are then retained in both parts 2 and 3, but subjects are informed about the content of each part (and about their role not changing from part 2 to part 3) only when part 2 is concluded (see the Instructions in the Appendix A for details). The two frequent and infrequent feedback treatments were run in a between-subject design, i.e., each subject participated in only one of two treatments. We ran twelve sessions per treatment, six entirely composed of females and six entirely composed of males. Each session involved from 14 to 30 participants, as shown in Table 3. Sessions lasted about 80 minutes.

Average earnings of the experiment were 16 euros including 2.5 euros for showing up. Table 3 contains summary statistics about the variables elicited in the postexperimental questionnaire.

6 Results

We present our experimental results in three steps, each corresponding to a separate section focusing on the behavior of active participants. Section 6.1 reports information about the average investment and the average number of safe choices made by the active participants depending on social distance. In Section 6.2, we focus on the individual strategies of investment depending on the social distance. Finally, in Section 6.3 we focus on the effect of feedback frequency on the investment decision.

6.1 Investment decisions: the role of Other Regarding Preferences and Social Distance

In this section we examine the investment decisions of the active participants, considering both the mean of invested ECUs and the average number of safe choices depending on whether the investment decision is made on behalf of another person or not and also depending on the social distance between the decision maker and the passive participant. We define the variable safe choice as a dummy equal to 1 if the active participant does not invest any ECUs in the lottery-type project and 0 if he invests a positive amount. Our findings are summarized in Result 1:

RESULT 1

Result 1.a *Investment decisions made on behalf of a stranger (ST) do not differ with respect to investment choices with no consequences for others (OT). Investment decisions made on behalf of a friend (FT) differ with respect to investment decisions with no consequences on others (OT).*

Result 1.b *Differences in investment behavior vary with the level of social distance* d_{ij} *between the decision maker and the passive participant. When the so-*

cial distance is shortened (i.e., investment decisions affect a friend rather than a stranger), active participants, on average, behave more in line with expected value maximization, exhibiting less risk seeking.

Support for Result 1 comes from Figure 1 and Table 4. In Figure 1 we plot the mean of the invested ECUs (panel a) and the average proportion of safe choices (panel b) depending on the social distance. When active participants decide only for themselves (OT), they invest, on average, 29.76 ECUs. When deciding on behalf of a stranger (ST), they slightly decrease the average amount invested to 28.75 ECUs. Differently, when deciding on behalf of a friend (FT), they invest, on average, 24.37 ECUs. According to a set of Wilcoxon signed-rank tests,[8] we find no significant differences between OT and ST (z=1.276, p=0.2018) but we do find a significant treatment effect between OT and FT (z=3.702, p=0.0002).
This picture is confirmed when looking at the average proportion of safe choices. Comparing the mean of the individuals' proportion of safe choices, we find that in OT the safe choice is made, on average, 26.84% of the time, but in ST and FT it is made, on average, 28.54% and 40.00% of the time, respectively (see panel b in Figure 1 and Table 4). According to a set of Wilcoxon signed-rank tests, statistically significant differences are confirmed only when the passive participant is a friend but not a stranger (OT vs ST: z=1.555, p=0.1200; OT vs FT: z=4.533, p = 0.0000).
To study the effect of social distance on investment decisions, we compare ST and FT: we find that both the average investment and the average proportion of safe choices are lower in FT than in ST (Wilcoxon signed-rank tests: invested ECUs ST vs FT, z=3.814, p=0.0001; average number of safe choices: ST vs FT: z=4.910, p=0.0000). This may be explained with a more important role played by altruism in the decision process when social distance is reduced. We investigate this issue further in the next section to better understand the effects of altruism in this context.

6.2 The determinants of decisions made on behalf of others

To test for the determinants of altruism in the decision making process when someone else is affected by the decisions, a closer look at individual behavior seems warranted. While result 1 is based on average behavior, we explore,

[8] Unless not differently specified, all tests reported are two-sided.

in this section, the relevance of participants' heterogeneity in choosing q in OT, ST, and FT. In order to address this issue, we define three individuals' investment *strategies* across the three parts of our experiment by looking at the average amount of ECUs invested in each possible pairwise comparison of our OT, ST, and FT. In particular, strategy $\bar{q}_{OT} < \bar{q}_{FT}$ ($\bar{q}_{OT} > \bar{q}_{FT}$) indicates that the active participants' average investment in OT is lower (higher) than the average investment in FT, implying that the presence of the friend affects the investment decision, pushing it in the direction of taking more (less) risk. Strategy $\bar{q}_{OT} = \bar{q}_{FT}$ reveals no differences between the average investment made by the active participants in OT and FT. Similar strategies can be identified by comparing the investment decisions in OT to ST and, to study the effect of social distance, by comparing ST and FT.

RESULT 2

Result 2.a *Individuals adopt heterogeneous investment strategies when deciding on behalf of others.*

Result 2.b *Individuals exhibit consistency in the choice of strategies across treatments. Gender differences and beliefs about the other's risk attitude explain the investment decisions across treatments.*

Support for this result comes from Tables 5 and 6 which show the percentage of participants choosing each strategy and the percentage of participants which is consistent across treatments. Consider Table 5. When comparing OT and ST, 49% of active participants invest less ($\bar{q}_{OT} > \bar{q}_{ST}$), 36% invest more ($\bar{q}_{OT} < \bar{q}_{ST}$), the remaining 15% do not change their investment. When comparing OT and FT, 59% of active participants invest less ($\bar{q}_{OT} > \bar{q}_{FT}$), only 28% invest more ($\bar{q}_{OT} < \bar{q}_{FT}$), while the remaining 13% do not change their investment. Similar results are obtained comparing ST and FT: 55% of active participants invest less ($\bar{q}_{ST} > \bar{q}_{FT}$), 28% invest more ($\bar{q}_{ST} < \bar{q}_{FT}$), while the remaining 17% do not change their investment. Thus Table 5 confirms our hypothesis: when deciding on behalf of others, individuals adopt different strategies and the relative majority reduces investment compared to the situation in which the investment decision has no consequences for others.

Inspection of Table 5 also reveals the existence of gender differences in the choice of investment strategies. When deciding on the behalf of others (both an anonymous stranger or a friend), the proportion of females choosing to reduce their investment is significantly higher than the one of males (two sample test of proportions: OT vs ST 54% vs 42%, z=1.35, p=.09; OT vs FT 66% vs 49%, z=1.94, p=.03; ST vs FT 65% vs 44%, z=2.33, p=.01). On the contrary, in all treatments a significantly higher proportion of males do not change their average investment compared to females: (two sample test of proportions: OT vs ST 20% vs 10%, z=1.58, p=.06; OT vs FT 22% vs 6%, z=2.67, p=.00; ST vs FT 29% vs 7%, z=3.19, p=.00). No significant gender differences are observed when we consider the increase in investments (two sample test of proportions: OT vs ST m:37% vs f:35%, z=.23, p=.82; OT vs FT m:29% vs f:28%, z=.11, p=.91; ST vs FT m:27% vs f:28%, z=.10, p=.92).

Having documented the existence of differences in the investment strategies *within* each treatments, it will be informative for us to investigate whether individuals show consistency in the strategy decisions *across* treatments and, if so, which factors account for it. To this end, we look at two different levels of consistency: in panel A of Table 6, we look at the percentage of individuals who increase (decrease/ do not change) their investment in ST and FT compared to OT (without imposing any relationship between investment choices in ST and FT). We identify this first level as *weak* consistency. In panel B of Table 6, we look at the percentage of individuals who progressively increase (decrease/ do not change) their investment passing from OT to ST and then to FT as the social distance decreases. We identify this second level as *strong* consistency. When considering *weak* consistency, it can be noted how, overall, about 77% ($N = 98/127$) of participants show a consistent investment strategy. In particular, the 57.14% ($N = 56/98$) of participants who make weakly consistent decisions reduces their investment both in ST and FT compared to OT, while 28.57% ($N = 28/98$) of consistent decisions are made by participants who increase their investment when deciding on behalf of others rather than only for themselves. Finally, 14.29% ($N = 14/98$) of participants do not change their average investment due to the fact that they are deciding on the behalf of another person. If we defines four types of participants, one for each of the investment strategies indicated in Panel A of Table 6 plus a residual type for participants who are not weakly consistent, both a Pearson χ^2 and a Fisher's exact tests reject the null hypotheses that types are equally distributed across gender, (p=0.034 and p=0.033, respectively). No other factors seem to explain the distribution of individual investment strategies.

When considering *strong* consistency we impose the additional condition that the average investment should decrease (increase) depending on social distance. Overall, 50.39% ($N = 64/127$) of participants can be classified using this cri-

terion. Panel B of Table 6 gives the same picture of Panel A: the 59.38% ($N = 38/64$) of participants classified as strongly consistent reduce progressively their investment as social distance decreases (i.e., $\bar{q}_{OT} > \bar{q}_{ST} > \bar{q}_{FT}$). The 18.75% ($N = 12/64$) of participants progressively increase their investment as social distance decreases (i.e. $\bar{q}_{OT} < \bar{q}_{ST} < \bar{q}_{FT}$). If, in addition to the case of strong consistency, we define four types of participants, one for each of the investment strategies indicated in panel B of Table 6 plus a residual type for participants who are not weakly consistent, both a Pearson χ^2 and a Fisher's exact test reject the null hypothesis that types are equally distributed across males and females, (p=0.031 and p=0.030, respectively).
For both classifications, it can be noted that females are more likely than males to reduce their investment when deciding on behalf of another person. In the same situations, males are more likely than females either to increase or not to change their investment when deciding on behalf of another person.

The analysis at individual level highlights that a certain number of participants take more risk in ST or FT than in OT. Altruistic behavior toward a passive participant may be the result of the willingness to do what the passive participant would have done. To gain more insight on this, we formally investigate the role of beliefs about the risk attitude of the passive participants. In our questionnaire we elicit individuals' beliefs about an anonymous stranger's SOEP and friend's SOEP.[9] In Table 7 we present the main results. Estimates are from Tobit regressions,[10] with robust standard errors adjusted for clustering at the individual level. In all specifications, the dependent variable is the amount of ECUs invested by active participants. We control for the feedback frequency and the blocks of periods. In columns 1 and 2, we pool together observations of the three parts and add a dummy variable each for part 2 and part 3. We control for gender (equals 1 if the active participant is a male) and the player's risk attitude, as measured with the SOEP. Also, we define a dummy variable which equals 1 if a individual adopts a weakly (strongly) consistent strategy and zero otherwise. The frequency treatment variable is negative and statistically significant (see next section). Coefficients of the dummy variables identifying part 2 and part 3 are negative but statistically significant only when the decision is

[9] We use a general risk question of the German Socio-Economic Panel (SOEP) which requests that participants give an assessment of their own general willingness to take risks on a 0-10 scale. Participants were then asked to indicate an anonymous stranger's and their friends' general willingness to take risks.

[10] We choose a Tobit model since our dependent variable is censored.

made on behalf of a friend, confirming previous results. The strategy variables are statistically significant both when we consider weak consistency (column 1) and strong consistency (column 2). The significantly positive coefficient of the SOEP variable indicates that the individual risk attitude has predictive power for the invested amount. We then study in detail investment decisions in part 2 and 3. In columns 3 and 4, we add as control the beliefs about a passive participant's SOEP (beliefs about an anonymous stranger's SOEP when the decision concerns part 2 and beliefs about a friend's SOEP when the decision concerns part 3). Given that the decision maker's SOEP correlates with beliefs about the anonymous stranger's and the friend's SOEP, we control for individual risk attitude, including the average amount invested in part 1. We are thus able to obtain clean evidence on the role of beliefs. We run separate regressions by gender. The results show that both for females and males the investment decisions in part 1 are important to explain those in parts 2 and 3. However, the importance of beliefs differ across genders: while for female participants beliefs about a passive participant's risk attitude do not predict the invested amount, males seem to rely much more on beliefs in their investment decisions. Importantly, in both regressions the coefficient of the friend dummy is negative and statistically significant, confirming our conjecture that social distance plays an important role when decision are made for others.

6.3 The frequency treatment: Other Regarding Preferences, Social Distance and Myopic Loss Aversion

Our experimental design allows us to investigate whether both the observed data patterns in section are verified in different contexts and MLA is present also when investment decisions are made on behalf of others. Our findings are summarized in Result 3.

RESULT 3

Result 3.a *ORP and SD play a role both in FFT and IFT.*

Result 3.b *Amounts invested by active participants on behalf of a stranger or a friend are lower in the frequent feedback environment rather than in the infrequent feedback environment. This is verified, to a lesser extent, when active participants decide on behalf of a friend.*

Support for Result 3 comes from Table 4. First, we separately consider the frequent and infrequent treatment across the experimental parts. In FFT active participants invest, on average, 25.31, 23.33, and 21.02 ECUs in part 1, part 2, and part 3, respectively. A set of Wilcoxon signed-rank tests indicates that a significant treatment effect exists between FFT-O and FFT-F (z=2.328, p=0.0199) and between FFT-S and FFT-F (z=2.598, p=0.0094).

The average amounts invested in the infrequent treatment are 34.43, 34.40, and 27.88 ECUs in part 1, part 2, and part 3, respectively. Statistically significant differences across treatments are confirmed when comparing IFT-O with IFT-F (z=2.951, p=0.0032) and IFT-S with IFT-F (z=2.793, p=0.0052). Thus differences in the average invested amount are larger across the experimental parts in the infrequent treatment, and the role of altruism and social distance is only slightly attenuated in the frequent treatment.[11] Data on the mean of individuals' proportion of safe choices suggest the same pattern.

Second, in part 1 we confirm a pattern consistent with MLA since the invested amount is lower in the frequent treatment than the invested amount in the infrequent treatment.[12] Similarly, this is verified when the decision maker makes a decision on behalf of others. Specifically, in part 2 the difference is statistically significant according to a Mann-Whitney test (z=2.763, p=0.0057). Looking at the average percentage of safe choices, a similar pattern is confirmed (FFT-S=41%, IFT-S=15%; Mann-Whitney tests, z=3.5527, p=0.0004). Whereas the difference regarding safe choices is statistically significant (FFT-S=49%, IFT-S=29%; z=2.1339, p=0.0328), the difference in the average amount invested is not significant (z=1.539, p=0.1238) when decisions are made on behalf of a friend. One may view the lower effect of the frequency feedback treatment as evidence of a moderate effect of the MLA when the decision is made on behalf of a friend. However, this result has to be interpreted with caution. The decision maker in part 3 reduces the investment in the lottery-type project already in the infrequent treatment. Thus altruism and social distance seem to prevail over the influence of MLA on risk taking.

7 Discussion and Conclusion

In everyday life individuals take decision on the behalf of others. This happens in many different contexts which differ in the social distance between the decision

[11] These results are verified also by separately considering the investment decisions in Lottery A and Lottery B across the experimental parts.

[12] Interestingly, frequent feedback induces a behavior more closely related to profit maximization. In contrast, Haisley et al. (2008) document the existence of a reverse myopic effect for lottery tickets with very small probability of a large gain.

maker and the person affected by the decision: parents take decisions which affect their children; politicians affects the citizens' life, physicians decisions are crucial for their patients, managers' decisions affect both the workers in the organizations an the shareholders, etc. Although there is a large literature in economics that analyzes individual risk taking, there has been less emphasis on this behavior in the context of social preferences and lottery-type project. In addition, despite decision making on behalf of others is very common, little is known about how the presence of others affect the individual behavior.

In this paper, we attempt to bridge this gap by studying in lab risky decisions when, not only the decision maker, but also other people are involved. Our first key evidence is that people do not behave in the same way when deciding only for themselves compared to when they decide on behalf of someone else and, specifically, they take less risk. This suggests that the decision maker, when motivated by altruistic reasoning, is concerned about others' payoffs. Yet altruism seems to operate through different mechanisms. When deciding for others, people perceive the responsibility for the outcomes of the lottery, in particular the negative ones. This effect seems stronger for female individuals, who adopt a more conservative strategy when investing on behalf of others, independent of the identity of the passive participant. Instead, male individuals seem to rely slightly more on beliefs about friends' risk attitude. Thus, in such circumstances both emotional and cognitive aspects seem to enter into the decision making process (as in Andersson et al., 2013). This evidence is also consistent with previous works finding that females are more averse to losses than males (Schmidt and Traub, 2002). Most importantly, when deciding for others, the decision maker facing a lottery with negative expected value behaves more like a rational maximizer agent avoiding non-profitable risk. Similarly to our results, Sutter (2009) and Chakravarty et al. (2011) find that when deciding on behalf of others, individuals are willing to take more risk in an investment yielding positive expected value. Thus, it seems that, deciding on the behalf of others induces individuals to behave more in line with expected payoff maximization.[13] In contrast, Andersson et al. (2013) find no difference in the gain domain; when losses are possible, they find an increase in risk taking when decisions are made on behalf of others. While Eriksen and Kvaloy (2010) show that a decision maker facing a lottery with positive expected value does not behave in an optimal way in the sense that he is more risk averse investing others' money even

[13]Similarly, in Albrecht et al. (2011) individuals are more patient when making intertemporal decisions for another person.

though it would pay off. Thus these studies show mixed findings; however, they are not directly comparable since they may be affected by differences in the choice domain (see Pahlke et al., 2012a), in the tasks used for the elicitation of risk preferences, and in the payoff of the decision maker.

Our second key evidence is that the reduction of the amount invested is larger when a friend, rather than a stranger, is affected by the decision. While ignored by previous literature, our finding highlights that social distance is an important category in the choices affecting others. We acknowledge the fact that our variation of social distance implements two extreme scenarios; however, we think this was the best way to reproduce, in a laboratory environment, extremely different situations such as those faced by customers in financial markets. The idea of deciding for a person one has never met and will never meet is completely different from making decisions for a person one had the opportunity to meet and will surely meet again and repeatedly. The first types of relationships are characterized by high social distance and, in our opinion, are well captured by decisions made for an anonymous stranger in the lab: the average characteristics of this person are known, but s/he has no possibility to send feedback and rediscuss the outcomes of the investment made on his/her behalf. The second types of relationships are characterized by low social distance where the investor has the opportunity to meet the financial advisor to talk about her/his risk preferences. Similarly, it is likely that the customer can discuss the outcome of the investment with the decision maker, and the relationship between them will become personal. We think that this second situation is approximated reasonably well in FT: the decision maker knows the friend's risk attitude and, similarly, he will discuss with her/him his investment choices once the experimental session is concluded. Our aim has been to capture more than the mere effect of feedback by the passive participant as implemented in Pahlke et al. (2012b). Rather, we tried to implement two different decision situations as we think that the two situations we want to capture do not simply differ in the possibility of receiving feedback or not but rather in a different level of emotional proximity, that is, a different level of social distance, as defined by Charness and Gneezy (2008).

In light of the emergence of a high level of anonymity in many real world situations, our framework calls for a reconsideration of non monetary motives also in those contexts. Our findings are relevant for contract design when tasks concern risk choices on behalf of others. Another implication of this work is

that the proximity of the relationship is a factor which deserves to be taken into account since it may induce a difference in the level of risk seeking behavior.
Overall, this paper provides a novel framework regarding the decision making process under risk when others are involved. Further studies are required to generalize our findings about other regarding concerns and social distance to other contexts (i.e., lottery with positive expected value). Important avenues for future research are to explore systematically whether behavioral biases are attenuated or exacerbated in those circumstances.

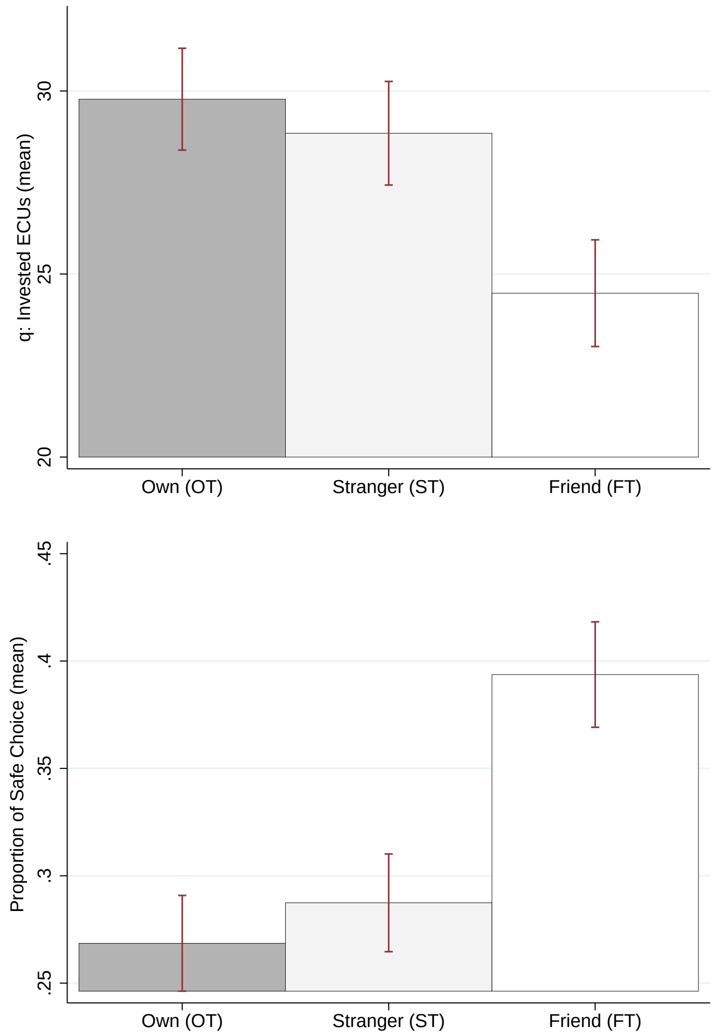

Figure 1: Top panels display the mean of invested ECUs; bottom panels display the proportion of times a safe choice is made.

Table 1: Lotteries

	Success		Failure		Expected Value
	Earnings	Probability	Earnings	Probability	for full investment
Lottery A	$2.5q$	.33	$-1q$	.67	82.5
Lottery B	$1.8q$	.25	$0.5q$	.75	82.5

Table 2: Treatments: Social Distance and Frequency Feedback

	Social Distance	Frequent Feedback	Infrequent Feedback
Part 1: Own (OT)	No social distance	FFT-O	IFT-O
Part 2: Stranger(ST)	High social distance	FFT-S	IFT-S
Part 3: Friend (FT)	Low social distance	FFT-F	IFT-F

Table 3: Participants and Treatments

	Frequent Feedback	Infrequent Feedback	Total
Session	6	6	12
Participants	130	124	254
Active Participants	65	62	127
% of Male	47.69	45.16	46.46
Active Participants' SOEP	4.88	4.68	4.78
Active Participants' beliefs about the stranger's SOEP	4.52	4.58	4.55
Active Participants' beliefs about the friend's SOEP	4.80	4.84	4.82

Table 4: Average amount of ECUs invested and percentage of safe choices in each treatment (St. Dev. in parenthesis)

Panel A: Average amount of ECUs invested			
	Own	Stranger	Friend
Overall	25.31	23.33	21.02
Frequent Feedback	(19.85)	(20.29)	(19.84)
Lottery A	26.82	24.05	24.87
	(22.16)	(20.05)	(22.85)
Lottery B	23.80	23.03	17.68
	(23.08)	(25.69)	(22.34)
Overall	34.43	34.40	27.88
Infrequent Feedback	(21.44)	(22.30)	(22.97)
Lottery A	35.56	37.62	30.94
	(22.75)	(22.98)	(26.36)
Lottery B	33.29	31.18	24.72
	(24.93)	(24.94)	(25.71)
Total	29.76	28.84	24.48
	(21.06)	(21.92)	(21.63)

Panel B: Average Percentage of Safe Choices			
	Own	Stranger	Friend
Overall	0.35	0.41	0.49
Frequent Feedback	(0.36)	(0.38)	(0.37)
Lottery A	0.28	0.39	0.42
	(0.38)	(0.38)	(0.42)
Lottery B	0.42	0.44	0.56
	(0.40)	(0.43)	(0.41)
Overall	0.18	0.15	0.29
Infrequent Feedback	(0.34)	(0.30)	(0.40)
Lottery A	0.16	0.11	0.24
	(0.36)	(0.29)	(0.41)
Lottery B	0.20	0.19	0.34
	(0.37)	(0.34)	(0.44)
Total (Frequent and	0.27	0.28	0.40
Infrequent Feedback	(0.36)	(0.37)	(0.40)

Table 5: Individual Investment Strategies and Social Distance

Panel A: Own vs Stranger (OT vs ST)			
	% $\bar{q}_{OT} > \bar{q}_{ST}$	% $\bar{q}_{OT} < \bar{q}_{ST}$	% $\bar{q}_{OT} = \bar{q}_{ST}$
Male	42.37	37.29	20.34
	N=25	N=22	N=12
Female	54.41	35.29	10.29
	N=37	N=24	N=7
Total	48.82	36.22	14.96
	N=62	N=46	N=19

Panel B: Own vs Friend (OT vs FT)			
	% $\bar{q}_{OT} > \bar{q}_{FT}$	% $\bar{q}_{OT} < \bar{q}_{FT}$	% $\bar{q}_{OT} = \bar{q}_{FT}$
Male	49.15	28.81	22.03
	N=29	N=17	N=13
Female	66.17	27.94	5.88
	N=46	N=18	N=4
Total	58.27	28.35	13.39
	N=74	N=36	N=17

Panel C: Stranger vs Friend (ST vs FT)			
	% $\bar{q}_{ST} > \bar{q}_{FT}$	% $\bar{q}_{ST} < \bar{q}_{FT}$	% $\bar{q}_{ST} = \bar{q}_{FT}$
Male	44.07	27.12	28.81
	N=26	N=16	N=17
Female	64.71	27.94	7.35
	N=45	N=18	N=5
Total	55.12	27.56	17.32
	N=70	N=35	N=22

Table 6: Individual Consistency and Investment Strategies

	Panel A: *weak* consistency			
	% ($\bar{q}_{OT} > \bar{q}_{ST}$ and $\bar{q}_{OT} > \bar{q}_{FT}$)	% ($\bar{q}_{OT} < \bar{q}_{ST}$ and $\bar{q}_{OT} < \bar{q}_{FT}$)	% ($\bar{q}_{OT} = \bar{q}_{ST}$ and $\bar{q}_{OT} = \bar{q}_{FT}$)	Overall Consistent
Male	38.98	25.42	18.64	83.05
	N=23	N=15	N=11	N=49/59
Female	48.53	19.12	4.41	72.06
	N=33	N=13	N=3	N=49/68
Total	44.09	22.05	11.02	77.16
	N=56	N=28	N=14	N=98/127

	Panel B: *strong* consistency			
	% ($\bar{q}_{OT} > \bar{q}_{ST} > \bar{q}_{FT}$)	% ($\bar{q}_{OT} < \bar{q}_{ST} < \bar{q}_{FT}$)	% ($\bar{q}_{OT} = \bar{q}_{ST} = \bar{q}_{FT}$)	Overall Consistent
Male	22.03	11.86	18.64	52.54
	N=13	N=7	N=11	N=31/59
Female	36.76	7.35	4.41	48.53
	N=25	N=5	N=3	N=33/68
Total	29.92	9.45	11.02	50.39
	N=38	N=12	N=14	N=64/127

Table 7: Invested ECUs in the Lottery-Type Project Active Participants

	(1)	(2)	(3)	(4)
Method: Tobit model				
Frequent feedbacks	-14.86**	-14.46**	-5.581	-9.198
	(-2.98)	(-2.82)	(-1.24)	(-0.97)
Block 2	2.747	2.776	-0.463	4.936
	(1.57)	(1.58)	(-0.17)	(1.22)
Block 3	-6.035**	-6.028**	-10.99**	-2.416
	(-2.56)	(-2.55)	(-3.27)	(-0.54)
Block 4	-6.333**	-6.293**	-12.28***	-3.136
	(-2.54)	(-2.52)	(-3.50)	(-0.64)
Stranger (part 2)	-1.526	-1.512		
	(-0.78)	(-0.77)		
Friend (part 3)	-9.401***	-9.485***	-9.028***	-8.519**
	(-3.41)	(-3.40)	(-3.63)	(-2.27)
Gender	-3.753	-4.700		
	(-0.72)	(-0.92)		
SOEP	2.951**	2.849**		
	(2.54)	(2.43)		
Weak consistent type	-11.34*			
	(-1.85)			
Strong consistent type		-9.488*		
		(-1.82)		
$\overline{q}_{OT}$			1.054***	1.096***
			(8.14)	(5.93)
Beliefs SOEP			0.338	4.235**
			(0.37)	(2.08)
Constant	29.82***	26.51***	-1.896	-28.72**
	(3.78)	(3.66)	(-0.29)	(-2.08)
N	4571	4571	1632	1416
Log likelihood	-16347.0	-16347.5	-5785.7	-4369.6
Part	1,2 and 3	1,2 and 3	2 and 3	2 and 3
Gender	F and M	F and M	F	M

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.001$

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Appendix A

In this section, we report the instructions for our two treatments. We report, in parentheses, the text which is specific for the *Frequent Feedback treatment* (FFT) and *Infrequent Feedback treatment* (FFT) respectively. The post-experimental questionnaire is available upon request.

Instructions

Welcome! You are about to participate in an experiment funded by the Max Planck Institute of Economics. Please switch off your mobile and remain quiet. It is strictly forbidden to talk to the other participants. Whenever you have a question, please raise your hand and one of the experimenters will come to your aid. You will receive 2.50 Euros for showing up on time. Besides this, you can earn more. The show-up fee and any additional amounts of money you may earn will be paid to you in cash at the end of the experiment. Payments are carried out privately, i.e., the others will not see your earnings. During the experiment we shall speak of ECUs (Experimental Currency Unit) rather than Euros. The conversion rate between them is 1 ECUs = 1 euro cent. The experiment consists of three parts. The instructions for the first part follow on the next page. The instructions for the second part will be distributed after all participants have completed the first part. The instructions for the third part will be distributed after all participants have completed the second part. All instructions are identical for all participants and we read them aloud such that you can verify this.

Detailed Instruction for Part 1

The experiment consists of 12 successive periods. The decisions will be organized in 4 blocks, and within each block, you will face the same identical decision 3 times. In each period you will receive 100 ECUs. You are asked to choose the portion of this amount (between 0 and 100 ECUs, inclusive) that you wish to invest in a risky project. The rest of the ECUs (those you don't invest) will be accumulated in your total balance.

The Risky Project.

In any particular period, there is a certain probability that the project will fail and a complementary chance that it will succeed. In each period you will be informed about:

1) of the probability of success and failure of the project,
2) the amount that you obtain in case of failure and in case of success.

In the box below you see two examples of risky project.

Example 1.

With a 40% chance the investment in the risky project will be successful, while with a 60% chance it will fail. If it is successful, you receive 2.5 times the amount invested. If the investment is unsuccessful, you lose the amount invested.

- If you invest 100 ECUs in the risky project,
  - if the investment is successful you will earn 250 ECUs,
  - if the investment fails, you will earn 0 ECU.
- If you invest 50 ECUs in the risky project,
  - if the investment is successful, you will earn 125 ECUs from the project + the 50 ECUs that you did not invest, for a total of 175 ECUs;
  - if the investment fails, you will earn 0 from the project + the 50 ECUs that you did not invest, for a total of 50 ECUs.

Example 2.

With a 50% chance the investment in the risky project will be successful, while with a 50% chance it will fail. If it is successful, you receive 1.5 times the amount invested. If the investment is unsuccessful, you will only earn 0.5 (i.e. half) of the amount invested.

- If you invest 100 ECUs in the risky project,
  - if the investment is successful you will earn 150 ECUs,
  - if the investment fails, you will earn half of what you invested, i.e 50 ECUs.
- If you invest 5 ECUs in the risky project,
  - if the investment is successful, you will earn 750 ECUs from the project + the 50 ECUs that you did not invest, for a total of 125 ECUs;

- if the investment fails, you will earn 25 ECUs from the project + the 50 ECUs that you did not invest, for a total of 75 ECUs.

How Do We Determine if the Risky Project Succeeds?
The success of the project depends on a random drawing made by the computer. In each consecutive period the computer will make a random and independent throw, and the outcome in a given period is the same for all participants.

Feedback about the investment in the Risky Project.
[FFT: At the beginning of every period, after the project is presented, you choose the amount you wish to allocate to the risky project in that period. You then learn the outcome for that period (recall that you start with 100ECUs in each period). Next, you would make an investment decision for the next period].
[IFT: At the beginning of period 1, after the projects are presented, you choose the amount you wish to allocate to the risky project for each block, i.e. for the next 3 periods (periods 1, 2, and 3). So, it means that you have to decide on your investment 4 in blocks of 3 periods each. Within each block the projects are identical, i.e. they have the same probabilities to be successful or not and the same amounts associated to success/failure. So, you choose to invest X ECUS in the project in period 1, X ECUS will also be invested in the project in periods 2 and 3. When period 3 is over you will get to see the outcome of the first three periods. Then period 4 starts and again you have to decide on how much to invest in the project for the next block of three periods (periods 4, 5 and 6). You will then see the outcome for the preceding periods (periods 4, 5 and 6). The same procedure applies for periods 7, 8 and 9 and for the last block of periods 10, 11 and 12. Note that the computer implements the random draw in each period, but that you decide on X ECUS for three consecutive periods.**]**

Final Payments
At the end of the entire experiment, one of the three parts of the experiment will be selected to be relevant for your final earnings. If this part, which is part 1, is selected, then your total earnings for the experiment are the sum of the earnings in each of the 12 periods. The amount of ECUs you accumulated will be converted in Euros, summed to the show up fee and paid in cash.

Detailed Instruction for Part 2

In part 2, only half of the participants have to take a decision, we will identify these participant as active participants.
You will learn on your screen whether you will be randomly assigned to be an active or passive participant. All participants have the same probability of being assigned to be active or passive.

<u>If you are an ACTIVE participant</u>
You will face the same task as in Part 1 of the experiment.
The only difference in part 2 is that your decision will affect the earnings of another anonymous participant in this room (one of the passive participant). For all the 12 periods you will be paired to the same passive participant.
However, it will be not possible for you to know the identity of the passive participant for whom you have been deciding. Similarly, it will not be possible for him to know the identity of who took the decision which affects him. **Note that, this participant is NOT the friend who came with you today.**
Final Payments
At the end of the entire experiment, one of the three parts of the experiment will be selected to be relevant for your final earnings. If this part, i.e. part 2, is selected, then:
1) the passive participants matched with you will earn the sum of the earnings obtained as a consequence of you investment choices in each of the 12 periods of part 2.
2) you will earn the same amount of ECUs he earns.

The amount of ECUs accumulated will be converted in Euros, summed to the show up fee and paid in cash.

<u>If you are a PASSIVE participant</u>
While we are waiting the other participant to take his decision, we will ask you to answer some questions.

Final Payments
At the end of the entire experiment, one of the three parts of the experiment will be selected to be relevant for your final earnings. If this part, i.e. part 2, is selected, then:

1) you will earn the sum of the earnings obtained as a consequence of the investment choices made by the active participant in each of the 12 periods of part 2.
2) The active participant will earn the same amount of ECUs you earn.

The amount of ECUs accumulated will be converted in Euros, summed to the show up fee and paid in cash.

Detailed Instruction for Part 3

In part 3, as in part 2, only half of the participants have to take a decision. In particular, if you were assigned to be an active participant in part 2, then, you will be active also in part 3. Similarly, if you were selected to be a passive participant in part 2, then you have to wait until all the active participants have made their choices.

<u>If you are an ACTIVE participant</u>
You will face the same task as in Part 1 of the experiment.
The only difference in part 2 is that your decision will affect the earnings of the friend who came with you at the lab today. For all the 15 periods you will be paired to the same participant, your friend.
Final Payments
At the end of the entire experiment, one of the three parts of the experiment will be selected to be relevant for your final earnings. If this part, i.e. part 3, is selected, then:

1) your friend will earn the sum of the earnings obtained as a consequence of you investment choices in each of the 12 periods of part 2.
2) you will earn the same amount of ECUs he earns.

The amount of ECUs accumulated will be converted in Euros, summed to the show up fee and paid in cash.

<u>If you are a PASSIVE participant</u>
While we are waiting the other participant to take his decision, we will ask you to answer some questions.
Final Payments
At the end of the entire experiment, one of the three parts of the experiment will be selected to be relevant for your final earnings. If this part, i.e. part 3, is selected, then:

1) you will earn the sum of the earnings obtained as a consequence of the investment choices made by your friend in each of the 12 periods of part 2.
2) Your friend will earn the same amount of ECUs you earn.

The amount of ECUs accumulated will be converted in Euros, summed to the show up fee and paid in cash.