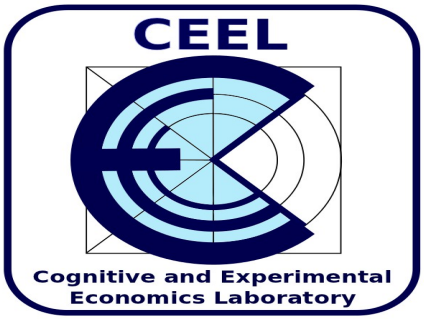

Matteo Ploner and Viola Saredi

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Cognitive and Experimental Economics Laboratory

Via Inama, 5 38100 Trento, Italy

http://www-ceel.economia.unitn.it
tel. +39.461.282313

Taking Over Control: An Experimental Analysis of Delegation Avoidance in Risky Choices

Matteo Ploner
DEM-CEEL, University of Trento

Viola Saredi
DSSS-CEEL, University of Trento

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Abstract

We experimentally investigate delegation in risky choices, in a principal-agent framework. Agents are asked to build a portfolio for their principals by selecting among prospects that are presented either in a conventional descriptive way or are experienced via exploration (i.e., clicking paradigm). Principals are given the opportunity to take over control and build their own portfolio by paying a fee. We find that portfolios built by principals are more efficient in terms of mean-variance ratio and more ambitious in terms of expected returns than those built by the delegated agents. The higher quality of principal's portfolios is associated to higher effort exerted in the experience framework by principals than by agents. Principals anticipate differences in portfolio's performance, but pay a control fee that is generally excessive and negatively impacts on final earnings.

Keywords: Description-Experience Gap; delegated decision-making; control premium; risk taking; experiment
JEL-classification: C91, D81, D83

1 Introduction

Individuals are often asked to make choices, the consequences of which are barely predictable, but which nonetheless have important implications for others. Choices of this kind do not always imply a direct link between the outcomes of the delegated choice and the economic returns of the delegated agent. As an example, parents choose patterns of education for their children, doctors choose medical treatments on behalf of their patients, and bank financial advisors define the composition of their clients' portfolios.

Traditionally, economic research on risky choices focused on choices with direct consequences for the decision-maker. Only recently has attention shifted to choices in which an agent chooses on behalf of a principal. Pollmann et al. (2014) and Chakravarty et al. (2011) find that individuals exhibit less risk aversion when choosing for an anonymous stranger than for themselves. Andersson et al. (2014) argue that such a higher risk propensity when choosing for others may be prompted by a decrease in loss aversion.On the other hand, Eriksen and Kvaløy (2009) and Kvaløy et al. (2014) find that people are more risk averse when dealing with other people's money.

In our research, we adopt the perspective of the aforementioned studies in which delegated agents build portfolios for others without a direct economic stake in the decision. However, previous studies consider only the point of view of the delegated agent and compare decision-making for oneself and for others only in terms of risk propensity. Generally, no assessment of the efficiency of the decision in terms of the trade-off between risk and returns is made. To the best of our knowledge, our paper is the first to explore in a non-loaded setting whether principals perceive delegation as efficient, and whether they are actually willing to delegate.[1]

Identifying principal-agent mismatches in the extent of risk-taking is indeed fundamental: this is true for any kind of choice ranging from medical to financial decision-making. In fact, Arora and McHorney (2000) and Levinson et al. (2005) study people's preferences for delegation and participation in medical decisions, and find that patients' demographic variables are among the main determinants of delegation. However, the authors do not take into account how

[1]The closest analysis to ours is the questionnaire and laboratory study by Botti and Iyengar (2004). Participants evaluate two different sets of imaginary dishes: one consisting of four sumptuous entrées, and one of four revolting dishes. They observe that, in the case of more attractive entrées, choosers (i.e. those selecting a dish for themselves) show a higher anticipated satisfaction than non-choosers (i.e. those asked to imagine to eat a dish chosen by someone else) do. On the contrary, in the case of less attractive entrées, choosers' anticipated satisfaction is lower that non-choosers'.

the doctors' source of knowledge might affect patients' willingness to delegate: in this respect, doctors' previous training can be perceived as more relevant than experience.Furthermore, perceived trustworthiness, employee's skills and service quality are named among the main determinants of customer satisfaction for banking. From the viewpoint of delegated agents, it is crucial to identify efficient solutions that meet the needs of their clients, so as to avoid losing delegation relationships.[2]

The present experimental research investigates the agency problem that characterizes most delegated decisions: in a context where incentives are not aligned and source of knowledge might be different, we consider both the agent's behavior, in terms of risk-taking and decision quality, and the principal's expectations about the delegation. The experiment allows us to study conflicts in agency by providing a better insight into real world decision-making (Koritzky and Yechiam, 2010): for the first time, it combines the research line on delegated agents, and the comparison between *description-based*[3] and *experience-based*[4] tasks, which present relevant similarities with decisional settings that people encounter in the real world.[5] The aim of the paper is twofold: on the one hand, we verify whether the way in which the decision-maker collects information (description vs. experience) affects the outcome of the decision process and a principal's willingness to delegate; on the other hand, we test whether choices differ systematically according to whether they have direct consequences for oneself or for someone else (self vs. other).

In many instances, people facing a decisional problem may rely both on their knowledge from previous training and on their experience. Benjamin and Budescu (2015) investigate how the learning mode affects adivice giving and taking: they compare advice from individuals who learn in either a Description

[2] According to the Global Consumer Banking Survey conducted by Ernst and Young in 2014, principals need to be satisfied and to perceive their managers as trustworthy and supportive. In Italy, UK and Turkey, the main reason why clients decide to close their bank accounts is the bad experience with services. Similarly the 2015 Accenture Global Consumer Pulse Research reports that 27% of bank customers subscribed to a new service, and the proportion of consumers willing to buy less from their current providers is increasing.

[3] This approach is based on prospects explicit and full description (in terms of outcomes and associated probabilities), and it is the most commonly used for problems involving monetary gambles (in Prospect Theory, for instance).

[4] This approach (Barron and Erev, 2003; Hertwig et al., 2004; Rakow and Newell, 2010) is characterized by repeated decisions on monetary gambles, and lack of objective prior information on outcome distributions. Decision-makers have to rely on the information they collect during the iterated trials (experience simulation by means of the clicking task).

[5] To name just a few examples: vaccinations recommendations (Hertwig et al., 2004), daily decisions to use safety devices (Yechiam et al., 2006; Erev, 2007), evaluation of innovation (Rakow and Miler, 2009), and reaction to possible disasters (Yechiam et al., 2005; Weber, 2006).

or Experience condition, and find that advice from description is, in general, preferred by the decision-makers.[6] According to the risk/uncertainty taxonomy by Knight (1921),[7] both description- and experience-based choices can ultimately be considered as decision-making under risk: even if probabilities are not explicit, they are still measurable (Hau et al., 2010). Risky decisions from experience occupy a middle ground (Rakow and Newell, 2010). Initially, the probability distribution is not known, but it can be determined through sampling. In this context, the degree of experience is defined by the size of the experienced sample: despite practical difficulties in computations, if people decrease the degree of uncertainty sufficiently, they can determine a priori probabilities with precision.[8]

We present a detailed exploration of the principal-agent relationship in the context of delegated risk-taking that captures important components of everyday decisions, such as costly acquisition and collating of payoff information (Rakow and Newell, 2010). If no specific assumption about agents' qualification and trustworthiness is made, principals' expectations can play a fundamental role: the lack of confidence and trust in agents' commitment may hamper the emergence of potentially fruitful delegation relationships

In the experiment, principals are asked to build a portfolio of prospects for themselves (*Self*) and, simultaneously, agents are asked to build a portfolio for their principals (*Other*), choosing from the same set of lotteries. Prospects are either presented to participants in a conventional way, as distribution of probabilities over outcomes (*Description*), or are experienced by participants via the clicking paradigm (*Experience*). Agents have no stake in the choice they make on behalf of their principals, as they earn a fixed amount irrespective of their actual decisions. Under the canonical assumption of selfish maximization, choices of the agents are expected to be quite erratic. Agents have no pecuniary incentive to implement a coherent choice plan and this would reflect in mindless choices, especially when the choice process is cognitively more demanding (i.e., *Experience*). However, previous evidence about delegated risky decisions (see the review above) and the documented existence of widespread other-regarding preferences (e.g., Camerer, 2013) suggest that concerns for principals' welfare would encourage agents to make choices that, at the very least, do not explicitly

[6] In both Description and Experience, people choose between two (risky) options. However, in descriptive settings, people usually overweight rare outcomes, while in experiential settings, people underweight them (Gonzalez and Dutt, 2011; Hertwig et al., 2004; Weber et al., 2004; Hertwig and Erev, 2009).

[7] Knight (1921) introduces a continuum of types of uncertainty/probability, characterized by different *degrees of uncertainty*: risky situations where probabilities are defined precisely are opposed to situations where only estimation can form one's beliefs.

[8] Some studies explore the relationship between the size of the Description-Experience Gap and the sample size (Hau et al., 2008, 2010; Ungemach et al., 2009).

harm the principal.

Within this setting, we analyze the effort of principals and agents in reducing the degree of uncertainty of prospects and the efficiency of portfolios in terms of mean/variance.[9] Furthermore, we allow principals to retain full control over the portfolio composition and we measure their willingness to pay to avoid delegation. More precisely, our research is structured around the following research questions:

- Does the risk content of portfolios change across experimental conditions that differ in roles (Principal/Agent) and information acquiring process (Experience/Description)?
- Does the efficiency of portfolios change across experimental conditions that differ in roles and information acquiring process?
- Do principals exert more effort in reducing uncertainty than agents?
- How do principals' expectations and attitudes affect the willingness to delegate? What drives principal's desire to take over control?

We find that subjects deciding for others tend to make inefficient decisions: portfolios built by principals are more ambitious in terms of mean/variance and at the same time are more efficient. Principals adapt their effort to the complexity of the task more than agents. The lack of effort of agents and the inferior quality of portfolio delivered is anticipated by the principals who pay (excessively) large fees to retain control over their earnings.

The rest of the paper is organized as follows. Section 2 contains the methodology (experimental design, task, and procedure). Results are presented and discussed in Section 3; Section 4 concludes. Experimental instructions and the supplementary analysis are relegated to the Appendix.

2 Methodology

We observe how principals and agents build a risky portfolio, under different decisional settings (*Description vs. Experience*), and we measure principals' willingness to pay in order not to delegate by means of a random price mechanism (Becker et al., 1964).

[9] To define the efficiency of a portfolio we refer to a mean/variance dominance criterion. A portfolio is more efficient than another if for a given expected return it has a lower variance or, alternatively, if for a given variance it delivers higher expected returns.

2.1 Experimental Task

Subjects can play either in the role of principal (*Self* decision-making) or in the role of agent (*Other* decision-making). At the start of the experiment, each participant is informed about his role and is randomly and anonymously coupled with another participant.

Principals are asked to build a portfolio for themselves, while agents are asked to perform the same task for their principals. Before choices are implemented, every principal states his willingness to pay to retain his portfolio, instead of replacing it with the one built by their agent, in the meantime (see Figure 3).[10] Subjects build portfolios by selecting risky options from three multiple price lists (MPLs).[11] Each list involves 10 decisions between a Leftward and a Rightward prospect, with the former being safer than the latter. The general structure of each prospect is $P = [L, p; H, 1-p]$ with $0 < L < H$ and $p > 0$. Expected values do not vary across lists, while probability distributions range from $p = 0.5$ gambles (less risky and very easy to understand), to $p = 0.7$, and finally to $p = 0.9$ gambles (characterized by higher degree of risk and by rare events).[12] Participants in both roles are asked to build two 30-prospect portfolios labeled A and B. Prospects in portfolio B are characterized by larger differences in the standard deviations of the Leftward and Rightward prospects. In the following, we adopt the letter of the portfolio and the probability p as labels to identify blocks of 10 prospects. As an example, $A.5$ uniquely identifies prospects of portfolio A that assign probability 50% to the lowest outcome. Tables C.1 and C.2 in the Appendix contain a detailed description of the prospects.

The aforementioned task is common to all the experimental treatments: the manipulation refers to the way in which prospects are presented. Under *Description*, the typical decisional screen (Figure 1) shows only two gambles and includes all the relevant information, so that participants knowing both outcomes and probability distributions can compare the two prospects.

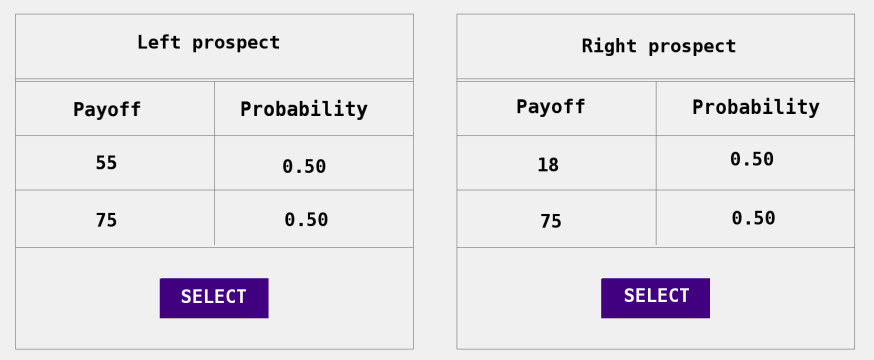
Under *Experience* (Figure 2), subjects can collect information on each couple

[10] Bids are collected via a standard BDM procedure: bids must lie between 0 and 1000 ECU, to be deducted from principals earnings. The BDM screen can be found in Appendix A.

[11] The choice structure of the present experiment can be considered as a version of the multiple price list (MPL) format. The only difference is represented by the fact that our participants do not go through a sequence of three prospect list screens. Instead, they are displayed a screen for each couple of prospects they are sequentially asked to evaluate. This was necessary for the implementation of the treatments involving experience. Nevertheless, couples are always presented in the same order.

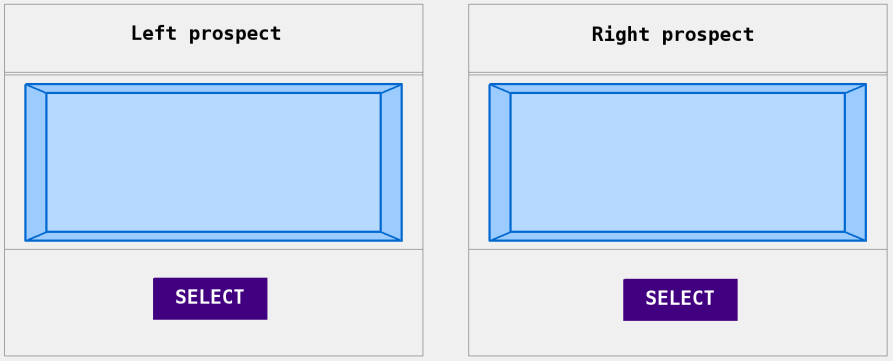
[12] The presence of rare events (i.e. events associated to small probabilities) is relevant for the investigation of the Description-Experience gap in the context of self-other decision-making: as a matter of fact, it predicts an overweighting of rare events in case of description, i.e. a higher degree of risk-taking (Tversky and Kahneman, 1992), and an underweighting of rare events in case of experience, i.e. a lower degree of risk-taking (Hertwig et al., 2004).

Figure 1: Typical Decisional Screen - Description



of prospects and select the one that they prefer. The well-established clicking paradigm is adopted(Barron and Erev, 2003; Hertwig et al., 2004).

Figure 2: Typical Decisional Screen - Experience



Each prospect is represented by a button: by clicking on it, participants sample an outcome from the underlying distribution, with replacement. They can sample in whatever order and as many many times as they like. When confident enough to evaluate the prospects, they select the one from which the actual payoff will be drawn. By means of this paradigm, we can firstly investigate the role of experience on subjects' decisions. Secondly, and more interestingly, we can introduce an agency problem of the type studied in the literature on self-other decision-making. The clicking paradigm can be interpreted as a task that requires effort in reducing the degree of uncertainty when making decisions. Hence, on the one hand, we can verify whether including this task in a principal's decisional problem affects their willingness to pay in order not to delegate. On the other hand, we can observe how much the principal and the agent are actually

interested in reducing uncertainty. Therefore, the treatments are motivated by our interest in understanding not only how agent's behavior is affected by the risk exposure of a (passive) principal, but also how principal's expectations and behavior affect delegation.

2.2 Experimental Design and Session Structure

The experiment is based on a 2×2 factorial design. On the one hand, we manipulate the way in which the principal receives information on prospects to build his own portfolio, since he can either receive a full description of prospects or discover these, by experiencing the lotteries. On the other hand, we experimentally manipulate the way in which the agent receives information about prospects when building their principal's portfolios.

As shown in Table 1, we combine these two factors to obtain four experimental treatments:

EE - Both the principal and the agent decide under experience;

DD - Both the principal and the agent decide under description;

DE - The principal decides under description, while the agent decides under experience;

ED - The principal decides under experience, while the agent decides under description.

Table 1: Treatments

		Agent	
		Description	*Experience*
Principal	*Description*	DD	DE
	Experience	ED	EE

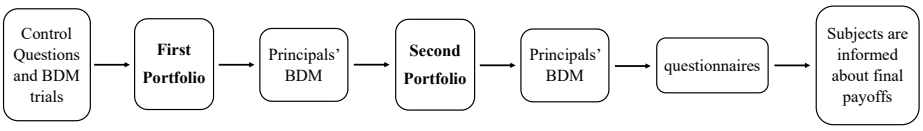
Specifically, the role and mode of information collection are experimentally manipulated in a within-subjects fashion. Indeed, Figure 3 shows that each session consists of two distinct yet identical parts for the structure, but not for the specific prospects:[13] if a participant decides under Description in the first part, then he decides under Experience in the second part, and vice versa. Therefore, EE is paired with DD, and DE with ED, by always controlling for order effects in the experimental sessions. Because of this, two different sets

[13] A more extensive and detailed description of the task can be found in Section 2.1

of prospects are implemented (A and B): in the first part of the experiment, subjects build a portfolio from one set; in the second part, they build a second portfolio from the other set (see Table C.1 and Table C.2).

Every session includes two questionnaires measuring subjects' locus of control and risk attitudes, and a questionnaire for demographics.[14] Questionnaires are administered at the end of the session, before subjects are made aware of their final payoff. The first questionnaire consists of eight questions from the Levenson's IPC (Internal, Powerful Others, and Chance) scale[15] (Levenson, 1972), while the second is composed of seven questions from the 30-item version of the DOSPERT (Domain-Specific Risk-Taking) scale (Blais and Weber, 2006).[16]

Figure 3: Overview of the experimental structure



Each session ends with feedback about participants' final payoffs. A principal's payoff is determined as the sum of the payoffs he gets in the two parts of the experiment. In each of them, the payoffs depend first on the BDM procedure (Becker et al., 1964): if the principal's bid (i.e. the willingness to pay in order not to delegate) is higher than the randomly generated number, then the principal keeps the portfolio previously built. According to the BDM procedure, the principals pay a fee equal to the randomly drawn number. If the bid is lower, then their payoff (at least for that part) is determined by the portfolio built by their agent. At the end of the session, all selected prospects are played out and the principal is paid according to the outcomes of the gambles. The agent's payoff is fixed: it does not depend on the decisions made on behalf of their principal and it is line with the usual average payment that subjects receive in our laboratory.

[14] An English version of the questionnaires is in Appendix A.

[15] This scale of internal control products a measure of individual belief in chance as separate from belief in powerful others: it allows to determine to which extent subjects believe that events in their life directly depend on their own actions. Therefore, such a scale is relevant for the present experimental study, since we observe subjects' willingness to 'control' decisions on risky events affecting their earnings, we build a sample questionnaire consisting of five questions on chance and three questions on internal control.

[16] This psychometric scale allows us to introduce an additional control for participants' risk taking in specific domains. Given the focus of our research, the sample questionnaire consists of four financial and three social questions on work situations. Questions regarding ethical, health/safety, or recreational issues have been neglected.

2.3 Participants and Procedure

The experiment was run at CEEL (Cognitive and Experimental Economics Laboratory) of the University of Trento (Trento, Italy), and participants were recruited among undergraduate students or recent graduates (of the same university), who previously subscribed to CEEL's database. The experiment was programmed and conducted using z-Tree (Fischbacher, 2007). Overall, we conducted eight sessions.

In total, 156 participants took part in the experiment: 78 subjects (43 males, and 35 females) in both treatment EE and DD, while the remaining 78 subjects (40 males and 38 females) in ED and DE. The average age was 22.10 (s.d. = 2.565). Most of the participants (72%) were students of Economics, 4% of Law, 5% of Engineering, 5% of Humanities, 9% of Social Sciences, 2.5% of Mathematics and Hard Sciences, and 2.5% had recently graduated. None of the participants was informed about the purpose of the experiment and subjects were allowed to participate only once.

Upon their arrival in the laboratory, participants were randomly assigned to a computer, and asked to sit in cubicles. They were provided with the instructions of the entire experiment and were informed that the experiment was composed of two independent parts. Subjects were given time to read the instructions individually. Then, instructions were read aloud by one of the experimenters. Before the experiment started, participants answered a few questions about the experimental rules, and were given the opportunity of playing three trial BDMs, which did not affect final payoffs. This was intended to check participants' comprehension, both of the experimental instructions and of the bidding mechanism.

In both the software and the instructions we employed non-loaded terminology, such as "Participant 1" (for principals), "Participant 2" (for agents), and "prospect". This is intended to rule out any context-related effect, and make our results more generalizable and valid in a variety of frameworks involving delegated risk-taking.

Each session lasted about 50 minutes. As for the payoffs, Participants 1 received 3 Euros as a show-up fee, plus a sum that varied according to their decisions (or, as appropriate, according to the decisions of their agent). In the end, this sum was converted into Euro and rounded up or down to the nearest ten euro-cent (1000 ECU = 2 Euros). On average, these participants earned 14 Euros (with a maximum of 16.90 Euros, and a minimum of 9.70 Euros, show-up fee included). Participants 2 earned a fixed amount of 13 Euros (show-up fee included).

3 Results

Experimental data are presented in two steps. First (in Sections 3.1-3.3), we present a statistical descriptive analysis of participants' portfolios: we compare subjects' choices across treatments and roles. Also, we consider the level of effort expended by both principals and agents in the process of information gathering, as well as principal's desire for control. Second (in Section 3.4), we present a regression analysis.

3.1 Analysis of Risk and Efficiency in Decisions

Figure 4 reports participants' portfolio decisions, keeping distinct both the role and the information process. Each panel reports the frequency of choice for the Rightward prospect in each of the 10-prospect Multiple Price Lists (see Tables C.1 and C.2 in the Appendix for more details). The dashed line shows the choice pattern of a risk-neutral decision maker.

The distribution of agents' decisions in each MPL is systematically flatter and more stable. Compared to principals, agents choose fewer "ambitious" Rightward prospects beyond the risk-neutrality switching point and are more likely to choose dominated prospects before this. In this respect, an analysis of individual frequencies of Rightward prospects selected in Prospect # 1 (where the Leftward prospect always stochastically dominates the Rightward prospect) shows interesting differences. Agents choose more frequently the dominated Rightward prospect than principals, both in Experience (WRT, $p - value < 0.001$) and in Description (WRT, $p-value < 0.001$).[17] Overall, compared to description, experience seems to lead to a more frequent selection of dominated prospects (Table 2). This is especially true for agents (WST, $p - value = 0.005$), while only a marginally significant difference emerges for principals (WST, $p-value = 0.078$).

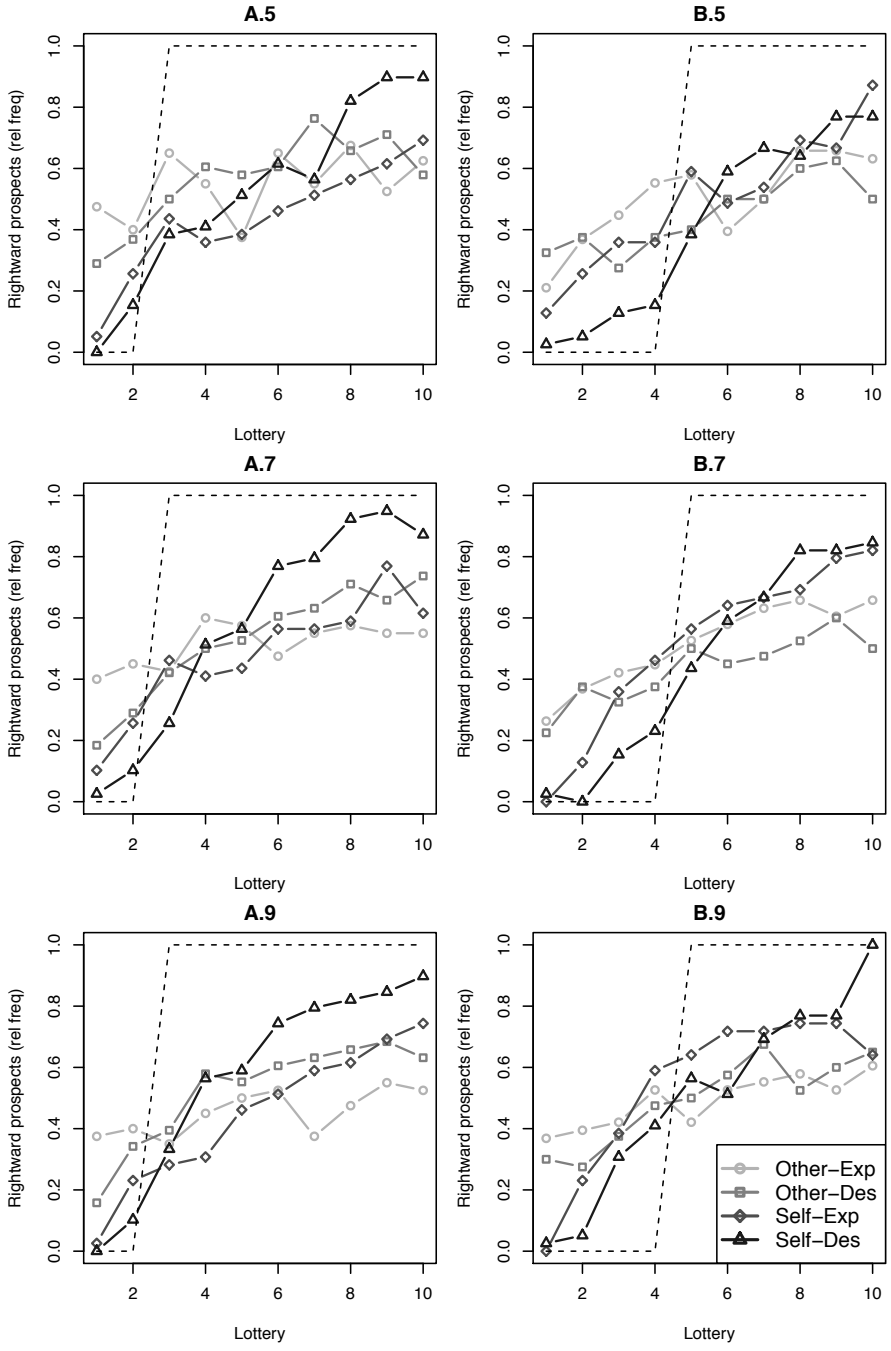
Table 2: Relative frequency of dominated choices - Prospect # 1

	Other	Self
Description	0.248	0.017
Experience	0.350	0.051

Result 1a - *Agents tend to make systematically more dominated choices than principals. Agents perform significantly worse under Experience than under Description.*

[17] All tests are two-sided, if not specified. WRT stands for Wilcoxon Rank Sum Test, while WST stands for Wilcoxon Signed Rank Test.

Figure 4: Prospect Choice



Building on this evidence, we perform a more detailed analysis of risky choices, measuring both the expected return (μ_{PF}) and the standard deviation

(σ_{PF})[18] of every 10-prospect portfolio in a MPL.[19]

A summary of average expected portfolio returns and standard deviations across 10-prospect MPL portfolios is reported in Table 3.[20] Principals tend to build more ambitious portfolios (higher return μ and degree of risk σ) under Description than under Experience: this is more evident in Set A (WST on μ: $p-value < 0.001$; WST on σ: $p-value < 0.001$) than in Set B. In contrast, no clear tendency emerges for agents' portfolios: in Set A, they are slightly more ambitious under Description than under Experience (WST on μ: $p-value = 0.064$; WST on σ: $p-value = 0.202$), while the opposite is observed in Set B, yet not systematically.

Table 3: Portfolios' Average Expected Returns and Standard Deviations

	Other-Des	Other-Exp	Self-Des	Self-Exp
		A		
μ	78.973 (9.454)	76.162 (8.467)	83.385 (5.788)	78.652 (7.028)
σ	24.015 (14.27)	22.049 (12.535)	28.87 (12.102)	24.567 (12.769)
		B		
μ	93.824 (8.995)	94.483 (8.019)	99.514 (5.213)	97.906 (6.000)
σ	24.892 (13.767)	24.535 (14.759)	30.188 (13.019)	28.413 (12.976)

Notes: For every set, role and mode of information acquisition, we compute the portfolio's average expected returns (μ) and standard deviations (σ). Corresponding standard deviations are in parentheses.

The identification of these measures (μ and σ) also allows to draw a comparison among portfolios according to the mean-variance efficiency criterion.[21] In our analysis we consider separately each of the 10-prospect sub-portfolios, as exemplified in Figure 5.[22] Beside confirming that principals' portfolios are characterized by higher returns and risk, especially under Description, the analysis shows that these are also closer to the efficiency frontier (gray line) of observed non-dominated choices.

Table 4 reports the overall frequency of dominated and non-dominated choices

[18] The portfolio's expected return $\mu_{P_i} = \sum_{i=1}^{30} w_{P_i}\mu_{P_i}$ is defined as the weighted average of expected returns of every prospect P_i selected from the three MPLs. The portfolio's standard deviation $\sigma_{P_i} = \sqrt{\sum_{i=1}^{30} w_{P_i}^2 \sigma_{P_i}^2}$ is determined as the square root of the weighted average of variances of every prospect P_i (since the covariance across prospects is assumed to be null, the component $\sum_{P_i}\sum_{P_j \neq P_i} w_{P_i} w_{P_j} \sigma_{P_i}\sigma_{P_j}\rho_{P_i P_j}$ is omitted).

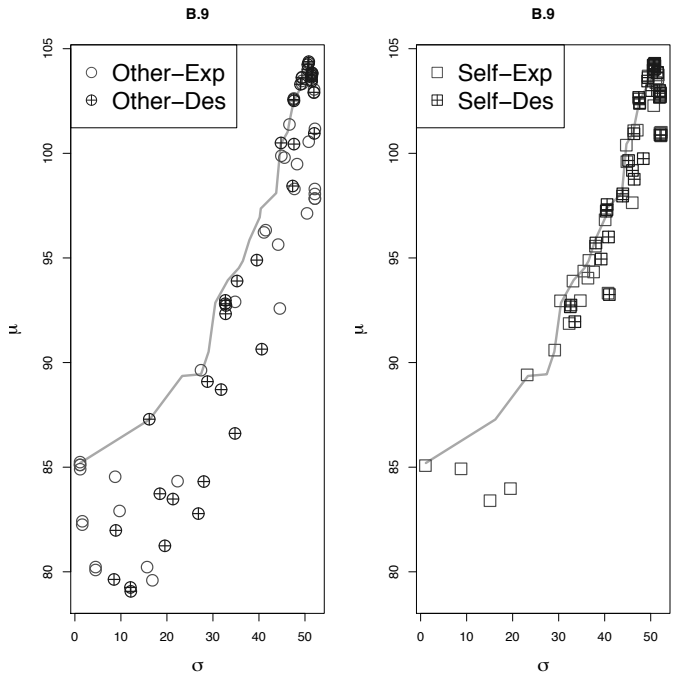
[19] We focus on portfolio choices at the MPL level instead of focusing on 30-prospect portfolios A and B, to account for the nature of the experimental task: participants were choosing in a MPL without knowing the nature of prospects in the following MPL. Because of this they could not develop a global portfolio strategy.

[20] The same analysis for each MPL can be found in Appendix B (Table B.1).

[21] Every portfolio $\hat{PF}$ is non-dominated by another portfolio PF either when $\sigma_{\hat{PF}} < \sigma_{PF}$ or when $\sigma_{\hat{PF}} \geq \sigma_{PF}$ and $\mu_{\hat{PF}} \geq \mu_{PF}$.

[22] A complete graphical representation of all MPLs can be found in Appendix B (Figure B.1).

Figure 5: Portfolios in the mean/variance space - MPL B.9



in all 10-prospect sub-portfolios.[23] It is evident that experience leads to a lower degree of efficiency[24]: irrespective of the role, the proportion of dominated portfolios is significantly higher under Experience than under Description (WST on principals: $p - value < 0.001$; WST on agents: $p - value < 0.001$).[25] Nevertheless, it emerges, at the same time, that the proportion of dominated portfolios is systematically higher for agents than for principals (WRT under Description: $p - value < 0.001$; WRT under Experience: $p - value < 0.001$). Principals are generally able to build an efficient portfolio under Description, while seem to face some difficulties in doing so under Experience. In contrast, the majority of agents' portfolios is not efficient even under Description, where the prospect evaluation process is assumed to be simpler. The degree of inefficiency is dramatically high under Experience.

Result 1b - *Principals choosing under Description build more ambitious and efficient portfolios. The majority of portfolios built by agents are not efficient.*

[23] Table B.2 in the Appendix reports on the frequency of dominated/non-dominated choices in each of the 10-prospect sub-portfolios.

[24] Also in this case, a more detailed analysis can be found in Appendix B (Table B.2)

[25] All tests are performed on averages at the individual level to preserve statistical independence.

Table 4: Overall Portfolio Efficiency

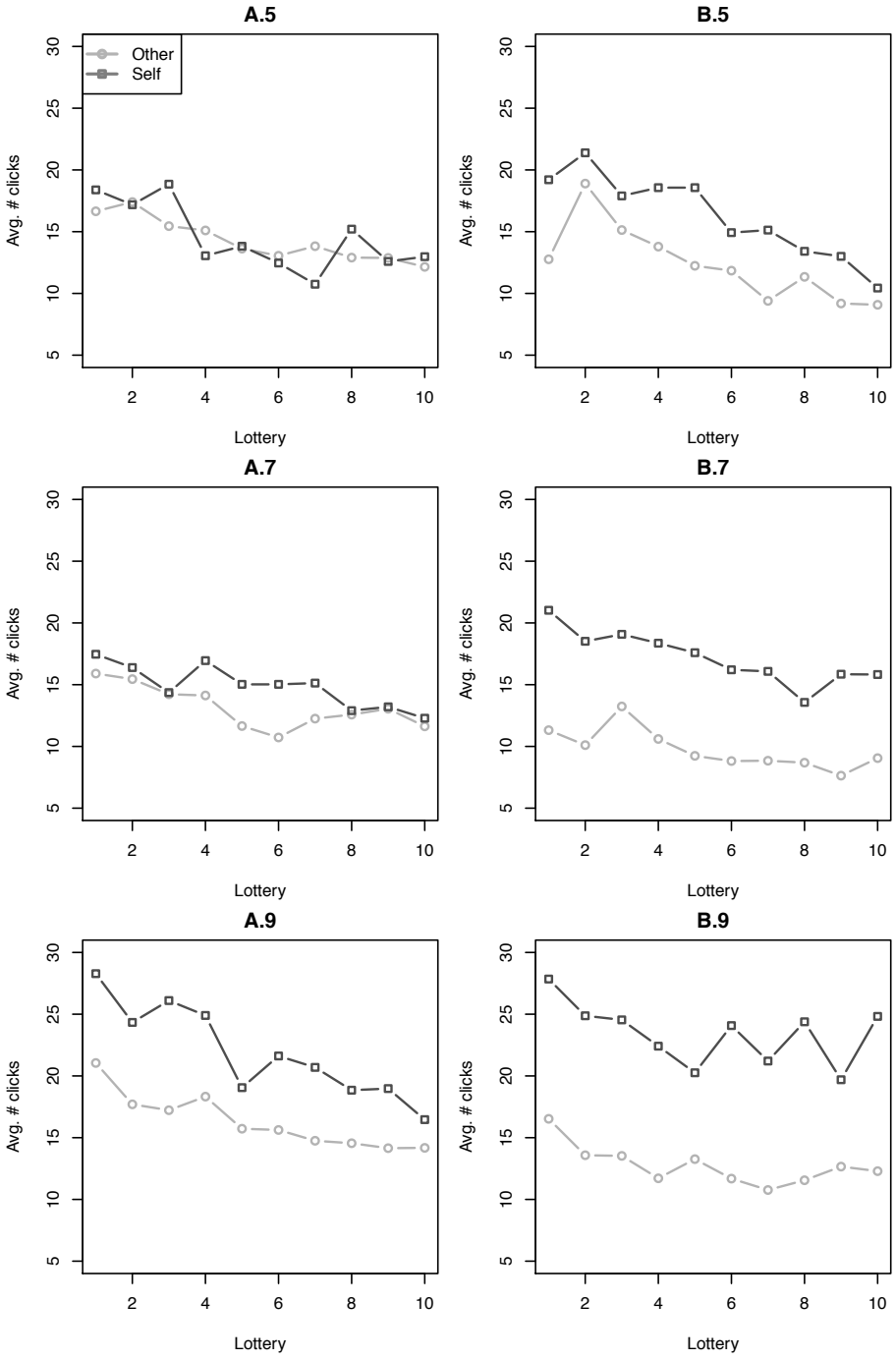
%	Dominated Portfolios	Non-Dominated Portfolios
Other-Des	**55.1**	44.9
Other-Exp	**73.5**	26.5
Self-Des	31.2	**68.8**
Self-Exp	**52.6**	47.4

3.2 The Portfolio Building Process: Effort Analysis

The clicking task can be intended to mimic the effort that a decision-maker exerts to perform an informed prospect selection. Figure 6 provides us with a visual analysis of both principals and agents' average effort in reducing the degree of uncertainty across MPLs.

Agents invest significantly less in exploring lotteries than principals do (WRT on list B.5: $p - value = 0.035$; WRT on list B.7: $p - value < 0.001$; WRT on list B.9: $p - value < 0.001$; WRT on list A.9: $p - value = 0.037$). Specifically, the higher the degree of heterogeneity in the probability distribution, the more the difference becomes evident. Indeed, the average level of effort exerted by agents is quite stable and similar across MPLs. In contrast, principals' effort gradually increases when moving from the first to the third MPL of the same set (see Figure B.2 in Appendix B), i.e. when inferring the right underlying probability distribution becomes more complex because of the presence of rare events ($p = .9$). Furthermore, the difference in effort is stronger in Set B than in Set A, with the former displaying larger differences in the standard deviation of the Rightward and Leftward prospects than the latter. When pooling data irrespective of the set and the probability associated to the lowest outcome, Agents click on average 6.6 times for each choice, while Principals click 9 times, on average. A test on individual-level data shows that the overall difference in clicking between the two types is highly significant (WRT, p-value< 0.001)

Figure 6: Clicking Process - Effort Task



Result 2 - *Principals exert higher effort than agents do. The difference in effort is significantly larger for the set with higher variance and for prospects*

characterized by rare events.

3.3 Investment in Delegation Avoidance

Now we consider principals' willingness to pay (WTP) to avoid delegation, which, as shown by Table 5, is generally very high.

In general, principals prefer to make decisions on their own. One possible explanation is that they correctly predict the degree of risk and inefficiency characterizing agents' portfolios. Accordingly, they are willing to pay a substantial fee, which decreases their potential earnings, in the end. This is true both when the information process is asymmetric (Treatment DE and ED) and when it is symmetric (Treatment EE and DD), even if Table 5 shows the willingness to avoid delegation is lower in this case.

Table 5: WTP to avoid delegation

Treatment	Mean	St. Dev.
EE	444.10	260.39
DD	503.33	231.49
DE	615.89	225.34
ED	517.17	231.25

Principals' WTP reveals a strong distaste for the Experience condition relative to the Description condition. At an aggregate level, principals' willingness to pay in DE is higher than in EE (WRT: p-value = 0.0014) and in DD (WRT: p-value = 0.0096). This allows us to rule out the notion that principals prefer to keep their portfolios only because they have exerted a positive and substantial effort in gathering information to reduce uncertainty. Principals do not feel too confident in making decisions under Experience, and thus they are less willing to pay in order to retain their portfolios. Since they cannot rely on objective distributions but on evaluations, they are more ready to incur the risk embedded in agents' portfolios. For the same reason, their desire to take over control increases when agents face the Experience condition. As a result of the combination of these two effects, principals' willingness to pay is systematically higher in treatment DE than in ED (WRT: p-value = 0.0089).

Result 3 - *Principals reveal the strongest desire to take over control when they decide under Description and agents decide under Experience. The desire to take over control is at its minimum level when both decide under Experience.*

With respect to Result 3, it is interesting to note that the lowest proportion of inefficient portfolios is actually identified among principals' portfolios built

under Description, while the highest proportion of inefficient portfolios among those built by agents is identified under Experience (see Table 4). This means that the highest principals' willingness to pay is found in the treatment where the efficiency difference between principals and agents' portfolios is maximized. As a matter of fact, since they are not explicitly incentivized, agents do not feel like collecting information, when no full description is provided: the quality of their decisions is quite low, even if they know that, by default, their portfolios will determine principals' payoffs. Nevertheless, it is also worth noting that principals seem to overinvest in delegation avoidance, overall. A comparative analysis of portfolios' expected returns shows that in every treatment but ED principals might get higher expected earnings from their own portfolios.[26] However, irrespective of the treatment and the lottery group, principals would systematically earn more by delegating rather than paying the premium they choose (WRT: p-value < 0.01).

3.4 Regression Analysis

Table 6 reports on a regression analysis concerning the determinants of participants' behavior. Four different dependent variables are considered and, accordingly, four different estimates reported: *Model (1)* takes as its dependent variable the expected returns of the 10-prospect subportfolios (MPLs); *Model (2)* focuses on determinants of non-dominated sub-portfolios; *Model (3)* focuses on clicking effort; *Model (4)* analyzes determinants of principals' BDM bids. In *Model (1)*, *Model (3)*, and *Model (4)* estimates are obtained via a Linear Mixed Model (LMM). In *Model (2)* a Generalized Linear Mixed Model (GLMM) Logit is adopted, given the dichotomous nature of the dependent variable.

Among explanatory variables, $Portfolio\ St.\ Dev.$ controls for the risk of each sub-portfolio. The first treatment dummy variable is $Self$: it is equal to 1 when the portfolio is built by a principal, otherwise it is 0. The other treatment dummy is *Experience*: it is equal to 1 if the portfolio is built under Experience, and equal to 0 if built under Description. The effect of the interaction between these two variables is estimated by introducing the term $Self\&Experience$.

The dummy $Set\ B$ takes value 1 when the list from which lotteries are selected belongs to Set B, instead of Set A. Dummy variables $Prob$ 0.7 and $Prob$ 0.9 take into account the probability distribution of the ten prospects in-

[26] For the sake of completeness, we introduce a distinction among lottery sets, and we always observe a significant difference in Set B (WRT on DD: p-value$<$ 0.05; WRT on EE: p-value$<$ 0.1; WRT on DE: p-value$<$ 0.05). As for Set A, principals' portfolios ensure higher expected returns only when the principal decides under Description (WRT on DD: p-value$<$ 0.1; WRT on DE: p-value$<$ 0.001)

cluded in a portfolio (either 0.70/0.30 or 0.90/0.10). In Model (3) the variable *Rightward Prospect* is equal to 1 for clicks on the riskier button, and to 0 for clicks on the safer button; the dummy $EV+$ takes value 1 when the expected return of the clicked prospect is higher than that of the alternative. In Model (4), *Agent Des* and *Principal Des* capture choices in which the Agent and the Principal are in the Description condition, respectively. The dummy variable *Non Dominated* takes value 1 in case of an efficient portfolio and 0 in case of a dominated one.

Model (1) confirms that principals extract significantly higher returns, yet at a higher risk, from their portfolios than agents do: in fact, both the dummy variable *Self*, and the variable *Portfolio St. Dev.* are highly significant. The interaction term *Self&Experience* confirms that the negative impact of experience on returns is stronger for principals than for agents. *Model (2)* shows that principals are more likely to choose non-dominated prospects, and that, in general, the Experience condition and the *Set B* variable both lead towards a greater degree of inefficiency. *Model (3)* confirms that principals explore more than agents. Riskier prospects seem to induce more search, which, however, decreases for prospects with larger EV relative to the alternative. Finally, *Model (4)* shows that principals are ready to pay a higher payoff premium when they are in the Description condition than when they are in the Experience condition, but they do not discriminate between conditions faced by their agents.

Table 6: Regression analysis

	Portfolio Return (1)	ND Portfolio (2)	Searching Effort (3)	Control Premium (4)
Portfolio Return				0.503 (3.899)
Portfolio St. Dev.	0.535 (0.013)***			−3.299 (4.342)
Non Dominated				−8.568 (18.576)
Set B	15.999 (0.206)***	−0.830 (0.153)***	−0.630 (0.675)	−16.827 (76.575)
Self	2.357 (0.487)***	1.257 (0.279)***	2.445 (0.674)***	
Experience	−0.447 (0.289)	−1.077 (0.222)***		
Prob 0.7	−1.864 (0.258)***	0.290 (0.184)	−0.302 (0.170)$^{\circ}$	
Prob 0.9	−10.332 (0.359)***	0.000 (0.184)	2.127 (0.170)***	
Self&Experience	−1.098 (0.409)**	−0.054 (0.305)		
Rightward Prospect			2.221 (0.139)***	
EV+			−1.749 (0.156)***	
Principal Des				78.870 (35.065)*
Agent Des				−26.040 (30.993)
Constant	69.367 (0.432)***	0.062 (0.234)	6.391 (0.604)***	508.551 (306.106)$^{\circ}$
Observations	936	936	9360	156
Num. groups: ID	156	156	156	78
Fitting model	*LMM*	*GLMM(Logit)*	*LMM*	*LMM*

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\circ}p < 0.1$

In the Appendix (see Table B.3), we report the outcomes of a regression analysis which replicates the analysis of Table 6, but adds several further control

variables for idiosyncratic features of the participants.[27] Specifically, we control for gender, enrollment in the economics program (a dummy variable *Economics* that takes value 1 when the participant is a student of economics), locus of control (*Levenson* variable), and risk attitude (*Dospert* variable). In terms of main explanatory variables, the analysis corroborates results reported above. In terms of the impact of the control variables, it is interesting to observe that those with higher scores in the Levenson test are more likely to choose a dominated portfolio and that females pay higher fees to retain control over their portfolio composition.

4 Conclusions

We show that the mode of information acquisition produces a systematic effect not only on choice performance but also on the emergence of delegation itself. Overall, participants exhibit a worse performance under Experience than under Description: they face a more complex decisional situation in which their direct willingness to gather and collate information affects the underlying degree of uncertainty.

A novel result of our research concerns agents' and principals' decision quality. The great majority of subjects deciding on behalf of someone else make dominated decisions: especially when information sampling is required, agents select prospects ensuring an inefficient combination of risk and expected returns. Since their final payoff is not linked to their decisions, agents seem unwilling to exert effort in acquiring information on prospects' probability distributions. This might be one of the causes of agents' poor performance as compared to that of principals, under Experience.[28] Nevertheless, a performance discrepancy also emerges under Description, where sampling errors can play no role at all: the quality of agents' decision-making improves when they are provided with full information, though it still falls short of that exhibited by principals faced with full information. In fact, irrespective of the process of information acquisition, principals make more ambitious and efficient decisions, even if, to a certain extent, the experience framework affects negatively also their performance. Our study mimics ubiquitous real-world situations in which the decisions of the agent have consequences for another individual but not for the agent themselves: this is not only the case of financial decisions, but also of medical decisions, for instance.

[27] Because of a technical issue at the end of one experimental session, some participants' answers to the final questionnaire have not been properly recorded. Therefore, one of the sessions with treatments DD and EE has not been included in the regression analysis.

[28] Only principals sample more than what observed in other studies involving decision from experience for binary lotteries (see Hau et al. (2010)).

Understanding how to optimally design incentives in delegated risky choices goes beyond the scope of our study, but may represent an interesting venue for future research.

A further result concerns the effect of experience on principals' confidence in delegation: principals tend to show a preference for the decisional setting that involves prospects' full description. The control premium is highly positive: it is larger when agents learn from experience, and it is orthogonal to the main characteristics of principals' portfolios (expected returns, standard deviations, and dominance).[29] This confirms the relevance of agents' process of information acquisition: agents learning in a more uncertain environment are less likely to be trusted with delegation. Therefore, besides the inefficiency issue, which might be addressed by means of monetary incentives, agents need to understand how to attract customers. They may decrease principals' unwillingness to delegate, leveraging on their own reliability: they can make decisions based on solid knowledge, not on vague evaluations. In this framework, experience as a learning mode can help improve agents' reliability, when combined with a valid training: in fact, customers or patients' delegation decision may also depend on information such as the place where the agent has graduated or previously worked. Future research might focus on the effect of combining the two sources of knowledge.

Missed delegation relationships are detrimental both to agents and to principals, who overestimate the difference between their own performance and that of agents. In our study, principals' portfolios tend to ensure higher expected returns, but, at the same time, principals are willing to pay an excessive control premium to enact their decisions and avoid delegation: despite agents' inefficiency, they could earn more by delegating than by paying to retain control over their outcomes.

[29] This result is in line with a questionnaire study by Botti and Iyengar (2004): they report that, when facing a decisional problem, people prefer making their own decisions, instead of having their decisions either dictated by someone else or determined by a random device.

References

Andersson, O., Holm, H. J., Tyran, J.-R., and Wengström, E. (2014). Deciding for others reduces loss aversion. *Management Science*, 62(1):29–36.

Arora, N. K. and McHorney, C. A. (2000). Patient preferences for medical decision making: who really wants to participate? *Medical care*, 38(3):335–341.

Barron, G. and Erev, I. (2003). Small feedback-based decisions and their limited correspondence to description-based decisions. *Journal of Behavioral Decision Making*, 16(3):215–233.

Becker, G. M., DeGroot, M. H., and Marschak, J. (1964). Measuring utility by a single-response sequential method. *Behavioral science*, 9(3):226–232.

Benjamin, D. and Budescu, D. V. (2015). Advice from experience: Communicating incomplete information incompletely. *Journal of Behavioral Decision Making*, 28(1):36–49.

Blais, A.-R. and Weber, E. U. (2006). A domain-specific risk-taking (dospert) scale for adult populations. *Judgment and Decision Making*, 1(1).

Botti, S. and Iyengar, S. S. (2004). The psychological pleasure and pain of choosing: when people prefer choosing at the cost of subsequent outcome satisfaction. *Journal of personality and social psychology*, 87(3):312.

Camerer, C. F. (2013). Experimental, cultural, and neural evidence of deliberate prosociality. *Trends in Cognitive Sciences*, 17(3):106 – 108.

Chakravarty, S., Harrison, G. W., Haruvy, E. E., and Rutström, E. E. (2011). Are you risk averse over other people's money? *Southern Economic Journal*, 77(4):901–913.

Erev, I. (2007). On the weighting of rare events and the economics of small decisions. In *Developments on Experimental Economics*, pages 59–73. Springer.

Eriksen, K. W. and Kvaløy, O. (2009). Myopic investment management*. *Review of Finance*, page rfp019.

Fischbacher, U. (2007). z-tree: Zurich toolbox for ready-made economic experiments. *Experimental economics*, 10(2):171–178.

Gonzalez, C. and Dutt, V. (2011). Instance-based learning: Integrating sampling and repeated decisions from experience. *Psychological review*, 118(4):523.

Hau, R., Pleskac, T. J., and Hertwig, R. (2010). Decisions from experience and statistical probabilities: Why they trigger different choices than a priori probabilities. *Journal of Behavioral Decision Making*, 23(1):48–68.

Hau, R., Pleskac, T. J., Kiefer, J., and Hertwig, R. (2008). The description–experience gap in risky choice: The role of sample size and experienced probabilities. *Journal of Behavioral Decision Making*, 21(5):493–518.

Hertwig, R., Barron, Greg, W., U, E., and Erev, I. (2004). Decisions from experience and the effect of rare events in risky choice. *Psychological science*, 15(8):534–539.

Hertwig, R. and Erev, I. (2009). The description–experience gap in risky choice. *Trends in cognitive sciences*, 13(12):517–523.

Knight, F. H. (1921). Risk, uncertainty and profit. *New York: Hart, Schaffner and Marx*.

Koritzky, G. and Yechiam, E. (2010). On the robustness of description and experience based decision tasks to social desirability. *Journal of Behavioral Decision Making*, 23(1):83–99.

Kvaløy, O., Eriksen, K., and Luzuriaga, M. (2014). Risk-taking with other peoples money. Technical report, University of Stavanger.

Levenson, H. (1972). Distinctions within the concept of internal-external control: Development of a new scale. In *Proceedings of the Annual Convention of the American Psychological Association*. American Psychological Association.

Levinson, W., Kao, A., Kuby, A., and Thisted, R. A. (2005). Not all patients want to participate in decision making. *Journal of general internal medicine*, 20(6):531–535.

Pollmann, M. M., Potters, J., and Trautmann, S. T. (2014). Risk taking by agents: The role of ex-ante and ex-post accountability. *Economics Letters*, 123(3):387–390.

Rakow, T. and Miler, K. (2009). Doomed to repeat the successes of the past: History is best forgotten for repeated choices with nonstationary payoffs. *Memory & cognition*, 37(7):985–1000.

Rakow, T. and Newell, B. R. (2010). Degrees of uncertainty: An overview and framework for future research on experience-based choice. *Journal of Behavioral Decision Making*, 23(1):1–14.

Tversky, A. and Kahneman, D. (1992). Advances in prospect theory: Cumulative representation of uncertainty. *Journal of Risk and uncertainty*, 5(4):297–323.

Ungemach, C., Chater, N., and Stewart, N. (2009). Are probabilities overweighted or underweighted when rare outcomes are experienced (rarely)? *Psychological Science*, 20(4):473–479.

Weber, E. U. (2006). Experience-based and description-based perceptions of long-term risk: Why global warming does not scare us (yet). *Climatic Change*, 77(1-2):103–120.

Weber, E. U., Shafir, S., and Blais, A.-R. (2004). Predicting risk sensitivity in humans and lower animals: risk as variance or coefficient of variation. *Psychological review*, 111(2):430.

Yechiam, E., Barron, G., and Erev, I. (2005). The role of personal experience in contributing to different patterns of response to rare terrorist attacks. *Journal of Conflict Resolution*, 49(3):430–439.

Yechiam, E., Erev, I., and Barron, G. (2006). The effect of experience on using a safety device. *Safety science*, 44(6):515–522.

A Appendix - Experimental Instructions

This is a translated version (originally in Italian) of the instructions used for the experimental sessions. Instructions change according to the treatment. This will be indicated in the text. As for the within-subject manipulation: Treatment DD (either first or second part) has been paired with Treatment EE (either first or second part); Treatment DE (either first or second part) has been paired with Treatment ED (either first or second part).

GENERAL INSTRUCTIONS

Welcome,

Thank you for coming. You are going to take part in an experiment on economic decisions. For arriving on time, you will receive 3 Euros at the end of the experiment.
Following you will be given instructions for the experiment. Please, read them carefully. May you have any doubt, raise your hand and a member of the experimental staff will come to answer your question.
During the experiment, you are not allowed to talk to other participants. If you disturb your colleagues or use the computer for activities not strictly related to the experiment, you will be excluded from the experiment and any reward. You can trust that what happens during the experiment is in line with the following instructions.

The experiment consists of two independent parts.
You will be randomly assigned a role (either *Participant 1* or *Participant 2*), that will remain unchanged during the entire experimental session (including both the first and the second part). If you are a Participant 1, you will be asked to make decisions for you, i.e. decisions that will affect only your own payoff. On the contrary, if you a Participant 2, you will be asked to make decisions for another participant, i.e. decisions that will affect only the payoff of this participant and not your own payoff.
Every Participant 1 will be randomly assigned to one of the Participants 2, so that to each Participant 2 corresponds one (and only one) Participant 1.

Both the first and the second part of the experiment consists of two sequential decisional phases for those playing the role of Participant 1, while they consist of only one phase for those with the role of Participant 2.
In the end, you all will be asked to answer a brief questionnaire, and you will be informed of your final payoff, which is determined as the sum of the payoffs you get during the first and the second part of the experiment.

Following, you will find the experimental instructions. You will be given five minutes to read them. Instructions will be then read aloud by a staff member; you will be asked to answer few simple questions on instructions comprehension.

During the experiment, ECU (Experimental Currency Units) will be used to express your earnings. At the end of the experimental session, the ECU you will have earned are converted in Euros (and rounded to the nearest ten euro-cent) in order to determine your real payoff (1000 ECU = 2 Euros).

INSTRUCTIONS: FIRST PART

At the beginning of this part of the experiment, you will be informed of your role.

`Treatment DD`

Participant 1

- *First Decisional Phase*: You will be asked to make 30 decisions that will affect your payoff. These decisions are divided into three subsets: therefore, each of them consists of 10 decisions. You will (sequentially) go through 30 couples of prospects, and you will have to choose the prospect you prefer (between Left Prospect and Right Prospect) for each of the 30 couples. In general, a prospect offers an outcome T with probability p and an outcome B with probability *1-p*. The value of T and B can vary for every prospect. Outcomes are in ECU.

  Following, you can find an example of a couple of prospects (Figure 3.4). For each couple, click on the SELECT button corresponding to the prospect you prefer.

Figure A.1: Participant 1 Decisional Task - First Part - Example

In the meanwhile, your Participant 2 will decide on the same prospects. Therefore, you both will be asked to make 30 decisions on the same list

of prospects. However, Participant 1's decisions will affect only his own payoff, while Participant 2's decisions will affect the payoff of the corresponding Participant 1.

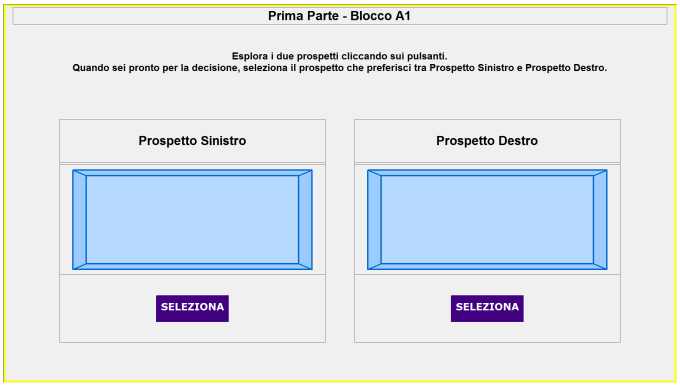
`Treatment EE`

Participant 1

- *First Decisional Phase*: You will be asked to make 30 decisions that will affect your payoff. These decisions are divided into three subsets: therefore, each of them consists of 10 decisions. You will (sequentially) go through 30 couples of prospects, and you will have to choose the prospect you prefer (between Left Prospect and Right Prospect) for each of the 30 couples. In general, a prospect offers an outcome T with probability p and an outcome B with probability *1-p*. The value of T and B can vary for every prospect. All outcomes are in ECU.

  Consider that, in the beginning, you will not receive any information about the prospects. However, you will have the opportunity to collect the information you might need to make your decisions. For this reason, every prospect will be represented by a button: therefore, for each of the 30 decisions, two buttons (one for the Left Prospect and one for the Right Prospect) will appear on your screen. Every time you click on one of them, you will be immediately informed about the payoff you would have received by choosing the corresponding prospect (according to the outcome and probability distributions associated to that specific prospect). You can continue to click until you feel confident enough to choose. At this point, click on the SELECT button corresponding to the prospect you prefer. Following, you can find an example of a couple of prospects (Figure 3.5).

Figure A.2: Participant 1 Decisional Task - First Part - Example



In the meanwhile, your Participant 2 will decide on the same prospects (presented as buttons). Therefore, you both will be asked to make 30

decisions on the same list of prospects. However, Participant 1's decisions will affect only his own payoff, while Participant 2's decisions will affect the payoff of the corresponding Participant 1.

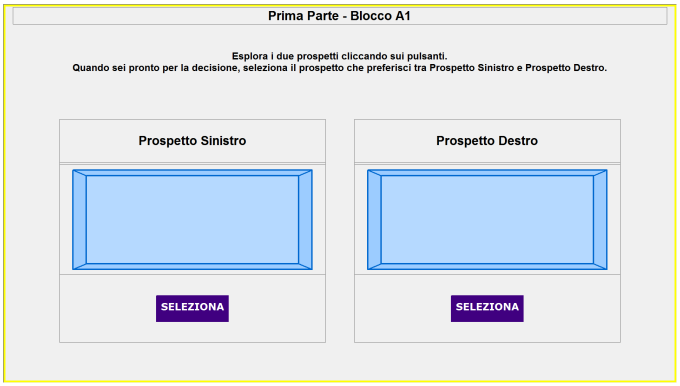
`Treatment ED`

Participant 1

- *First Decisional Phase*: You will be asked to make 30 decisions that will affect your payoff. These decisions are divided into three subsets: therefore, each of them consists of 10 decisions. You will (sequentially) go through 30 couples of prospects, and you will have to choose the prospect you prefer (between Left Prospect and Right Prospect) for each of the 30 couples. In general, a prospect offers an outcome T with probability p and an outcome B with probability *1-p*. The value of T and B can vary for every prospect. All outcomes are in ECU.

  Consider that, you will receive no prior information. You will have the opportunity to collect the information you might need to make your decisions. Every prospect is represented by a button: for each of the 30 decisions, two buttons (one for the Left Prospect and one for the Right Prospect) will appear on your screen. Every time you click on one of them, you will be immediately informed about the payoff you would have received by choosing the corresponding prospect (according to the outcome and probability distributions associated to that specific prospect). You can continue to click until you feel confident enough. At this point, click on the SELECT button corresponding to the prospect you prefer. Following, you can find an example of a couple of prospects (Figure 3.6).

Figure A.3: Participant 1 Decisional Task - First Part - Example



In the meanwhile, your Participant 2 will decide on the same prospects (yet presented with a full description of outcomes and probability distributions). Therefore, you both will be asked to make 30 decisions on the

same list of prospects. However, Participant 1's decisions will affect only his own payoff, while Participant 2's decisions will affect the payoff of the corresponding Participant 1.

`Treatment DE`

Participant 1

- *First Decisional Phase*: You will be asked to make 30 decisions that will affect your payoff. These decisions are divided into three subsets: therefore, each of them consists of 10 decisions. You will (sequentially) go through 30 couples of prospects, and you will have to choose the prospect you prefer (between Left Prospect and Right Prospect) for each of the 30 couples. In general, a prospect offers an outcome T with probability p and an outcome B with probability *1-p*. The value of T and B can vary for every prospect. All outcomes are in ECU.

  Following, you can find an example of a couple of prospects (Figure 3.7). For each couple, click on the button SELECT corresponding to the prospect you prefer.

Figure A.4: Participant 1 Decisional Task - First Part - Example

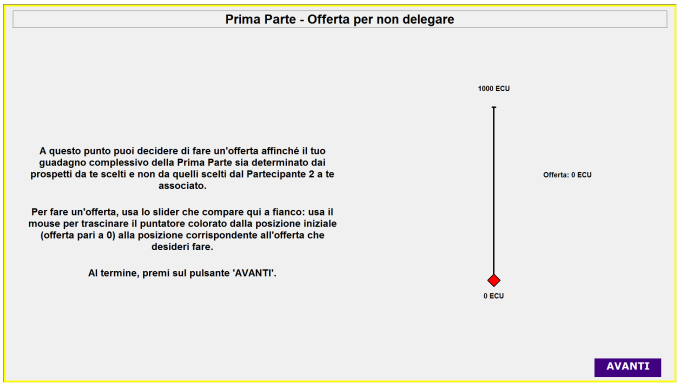
In the meanwhile, your Participant 2 will decide on the same prospects (yet presented as buttons). Therefore, you both will be asked to make 30 decisions on the same list of prospects. However, Participant 1's decisions will affect only his own payoff, while Participant 2's decisions will affect the payoff of the corresponding Participant 1.

`Common to all Treatments`

Participant 1

- *Second Decisional Phase*: You will be asked to send a bid, so that your payoff (relative to the first part of the experiment) is determined by your choices, and not by those of the Participant 2 (you have been assigned to). The minimum bid you can send is equal to 0 ECU, while the maximum bid is equal to 1000 ECU. In order to state your bid, you can use a slider: drag the pointer in correspondence of the sum of ECU you are willing to pay (Figure 3.8).

Figure A.5: Bid Mechanism - Example



In order to determine whether your bid is such that your payoff depends only on your decisions, the following procedure will be adopted. A number between 0 and 1000 is randomly generated by the computer so that every number can be drawn with the same probability.

- *If the randomly generated number is lower than or equal to your bid*, your bid is accepted. Your payoff (for this first part of the experiment) will be determined by playing the prospects you have previously chosen, minus the randomly generated number.
- *If the randomly generated number is higher than your bid*, your bid is rejected. Your payoff (for this first part of the experiment) will be determined by playing the prospects the Participant 2 you have been assigned to has previously chosen.

Consider that the higher is your bid, the higher is the probability that your bid is accepted, and, thus, that it's you determining your payoff. However, a too high bid might make you pay more than your willingness (if the randomly generated number is larger than your willingness to pay, but, at the same time, lower than your 'too high' bid). On the contrary, the lower is your bid, the higher is the probability that your bid is rejected, and, thus, that the Participant 2 determines your payoff. For all these reasons, the bid you are asked to send is the one representing your actual

willingness to pay.

In any case, for a better comprehension of such a mechanism, the experiment will start with a simulation phase: you will have the opportunity of sending three independent (trial) bids that will not affect your final payoff.

At this point, the first part of the experiment ends. You will be informed of your payoff at the end of the experiment: if your bis is accepted, then your earnings will be determined as the sum of the payoffs of the prospects you have chosen; on the contrary, if your bid is rejected, your earnings will be determined as the sum of the payoffs of the prospects your Participant 2 has chosen.

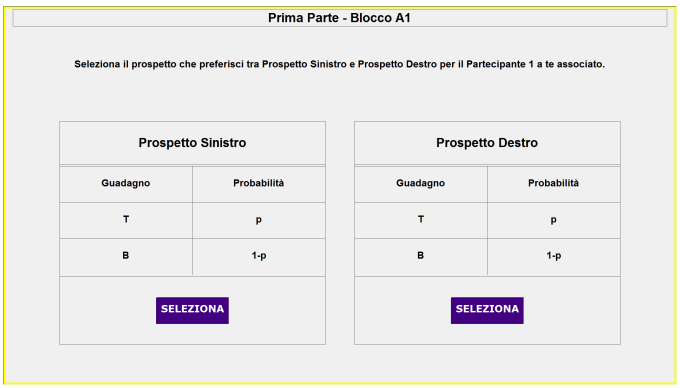
Participant 2

The first part of the experiment consists of a single decisional phase, which is contemporary to Participant 1's first decisional phase. You will be asked to evaluate 30 couples of prospects (the same of Participant 1), and, for each couple (Left Prospect and Right Prospect), to choose a prospect for the Participant 1 you have been assigned to in the beginning.

`Treatment DD`

Following, you can find an example of a couple of prospects (Figure 3.9). For each couple, click on the SELECT button corresponding to the prospect you prefer for the Participant 1.

Figure A.6: Participant 2 Decisional Task - First Part - Example



`Treatment EE`

You will not receive any prior information. Every prospect will be represented by a button: for each decisions, two buttons (one for the Left Prospect and one

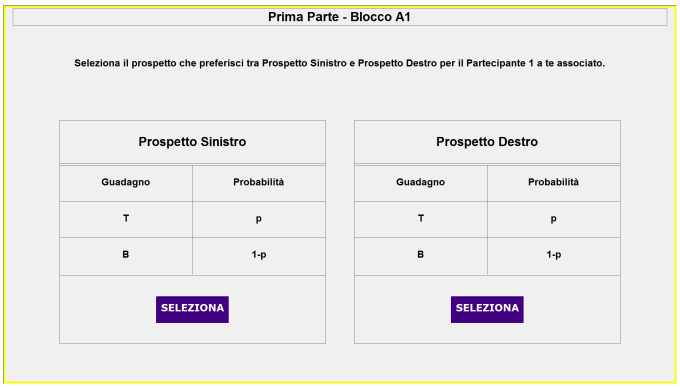
for the Right Prospect) will appear on your screen. Every time you click on one of them, you will be immediately informed about the payoff your Participant 1 would receive with that prospect. You can click until you feel confident enough to choose. At this point, click on the SELECT button corresponding to the prospect you prefer for the Participant 1. Following, you can find an example of a couple of prospects (Figure 3.10).

Figure A.7: Participant 2 Decisional Task - First Part - Example

`Treatment ED`

Consider that decisions will be presented in a different way with respect to Participant 1's first decisional phase. Specifically, prospects are fully described in terms of probability and outcomes. You will not have to 'explore' the prospects in order to choose. Following, you can find an example of a couple of prospects (Figure 3.11).

Figure A.8: Participant 2 Decisional Task - First Part - Example



`Treatment DE`

Consider that decisions will be presented in a different way with respect to Participant 1's first decisional phase. Specifically, you will not receive any information about the prospects (probability p and outcomes T and B). Every prospect will be represented by a button: for each of the 30 decisions, two buttons (one for the Left Prospect and one for the Right Prospect) will appear on your screen. Every time you click on one of them, you will be immediately informed about the payoff your Participant 1 would have received if you had chosen the corresponding prospect (according to the outcome and probability distributions associated to that specific prospect). You can continue to click until you feel confident enough to choose. At this point, click on the SELECT button corresponding to the prospect you prefer for the Participant 1. Following, you can find an example of a couple of prospects (Figure 3.12).

Figure A.9: Participant 2 Decisional Task - First Part - Example

`Common to all Treatments`

Once you have made all the 30 decisions, the first part of the experiment is concluded.

You will be informed of your payoff (relative to this first part) at the end of the experiment. However, your payoff is fixed, and it is not affected by the decisions you make for the Participant 1. Your choices can influence only his payoff.

INSTRUCTIONS: SECOND PART

In this second part of the experiment you will have the same role as in the first part. Furthermore, also the decisional phases will remain unchanged: there will be two phases (the 30 decisions for himself and the bid) for the Participant 1, and one phase (the 30 decisions for the corresponding Participant 1) for the Participant 2.

`Treatment DD`

The only difference concerns Participant 1's first decisional phase and Participant 2's decisional phase: in both cases, it will be asked to make 30 decisions, again in terms of sequential choices through 30 couples of prospects (different from those of the first part). However, such decisional problems will be presented in a different way. More precisely, during the first part of experiment, it was asked to collect the information necessary to decide; on the contrary, during this second part, prospects are fully described (both in terms of probability p and outcomes T and B). Therefore, all the relevant information about the Left Prospect and the Right Prospect is available from the beginning.

- If you have the role of **Participant 1**, you can find an example of a couple of prospects in Figure 3.13. For each couple, click on the SELECT button corresponding to the prospect you prefer.

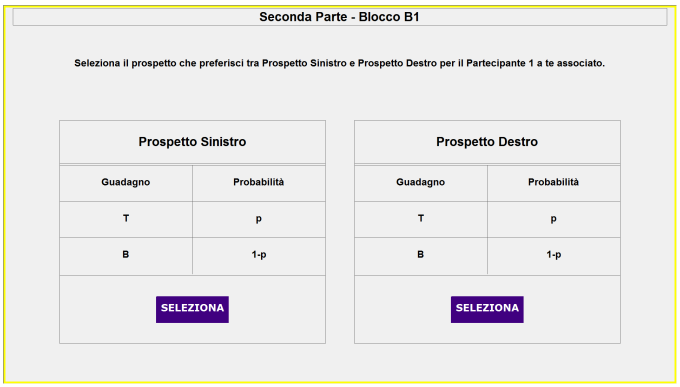
Figure A.10: Participant 1 Decisional Task - Second Part - Example

After your 30 decisions, your first decisional phase is concluded. Then, you will move to the second phase, i.e. the one giving you the opportunity to send a bid to decide whose decisions will determine your payoff. Like in the first part, if your bid is accepted, your earnings will be defined as the sum of the payoffs of the prospects you have previously selected; on the contrary, if you bid is rejected, your earnings will be determined by the Participant 2 you have been associated to.

- If you have the role of **Participant 2**, you can find an example of a couple of prospects in Figure 3.14. For each couple, click on the SELECT button corresponding to the prospect you prefer or the Participant 1.

  After your 30 decisions, your decisional phase is concluded. Like in the first part, your payoff is fixed, and it does not depend on your decisions.

Figure A.11: Participant 2 Decisional Task - Second Part - Example



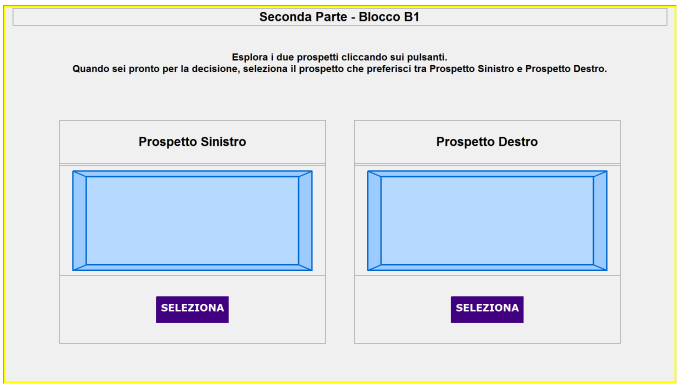
`Treatment EE`

The only difference concerns Participant 1's first decisional phase and Participant 2's decisional phase: in both cases, it will be asked to make 30 decisions, again in terms of sequential choices through 30 couples of prospects (different from those of the first part). However, such decisional problems will be presented in a different way. More precisely, during the first part of the experiment, prospects were fully described (in terms of probability p an outcomes T and B): the relevant information is available from the beginning. On the contrary, in this second part of the experiment, you will have no prior information on the prospects; however, you will have the opportunity to collected the information necessary to decide. For this reason, each prospect will be represented by a button: for every decision, two buttons (one for the Left Prospect and one for the Right Prospect) will appear on your screen. Every time you click on one of them, you will be immediately informed about the payoff you would receive by choosing the corresponding prospect (according to the outcome and probability distributions associated to that specific prospect). You can continue to click until you feel confident enough to choose.

- If you have the role of **Participant 1**, you can find an example of a couple of prospects in Figure 3.15. For each couple, click on the SELECT button corresponding to the prospect you prefer.

  After your 30 decisions, your first decisional phase is concluded. Then, you will move to the second phase, i.e. the one giving you the opportunity to send a bid to decide whose decisions will determine your payoff. Like in the first part, if your bid is accepted, your earnings will be defined as the sum of the payoffs of the prospects you have previously selected; on the

Figure A.12: Participant 1 Decisional Task - Second Part - Example



contrary, if you bid is rejected, your earnings will be determined by the Participant 2 you have been associated to.

- If you have the role of **Participant 2**, you can find an example of a couple of prospects in Figure 3.16. Like in the case of the Participant 1, prospects are represented by buttons. Every time you click on one of them, you will be immediately informed about the payoff your Participant 1 would have received if you had chosen the corresponding prospect (according to the outcome and probability distributions associated to that specific prospect). You can continue to click until you feel confident enough to choose. For each couple, click on the SELECT button corresponding to the prospect you prefer or the Participant 1.

Figure A.13: Participant 2 Decisional Task - Second Part - Example

After your 30 decisions, your decisional phase is concluded. Like in the first part, your payoff is fixed, and it does not depend on your decisions.

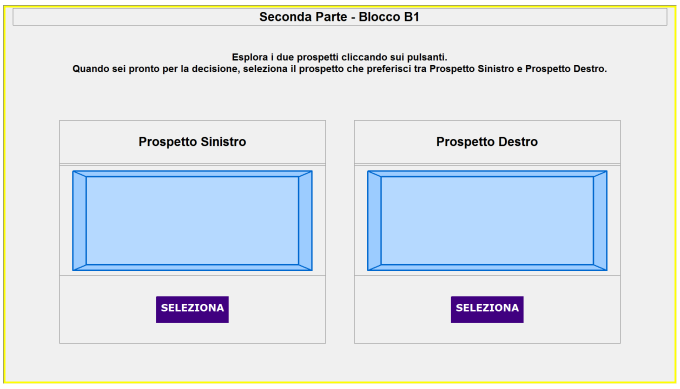
`Treatment ED`

The only difference concerns Participant 1's first decisional phase and Participant 2's decisional phase: in both cases, it will be asked to make 30 decisions, again in terms of sequential choices through 30 couples of prospects (different from those of the first part). However, such decisional problems will be presented in a different way.

- If you have the role of **Participant 1**, during the first part of the experiment, your prospects were fully described (in terms of probability p an outcomes T and B): the relevant information was available from the beginning. On the contrary, in this second part of the experiment, you will have no prior information on the prospects; however, you will have the opportunity to collect the information necessary to decide. For this reason, each prospect will be represented by a button: for every decision, two buttons (one for the Left Prospect and one for the Right Prospect) will appear on your screen. Every time you click on one of them, you will be immediately informed about the payoff you would receive by choosing the corresponding prospect (according to the outcome and probability distributions associated to that specific prospect). You can continue to click until you feel confident enough to choose.

  You can find an example of a couple of prospects in Figure 3.17. For each couple, click on the SELECT button corresponding to the prospect you prefer.

Figure A.14: Participant 1 Decisional Task - Second Part - Example



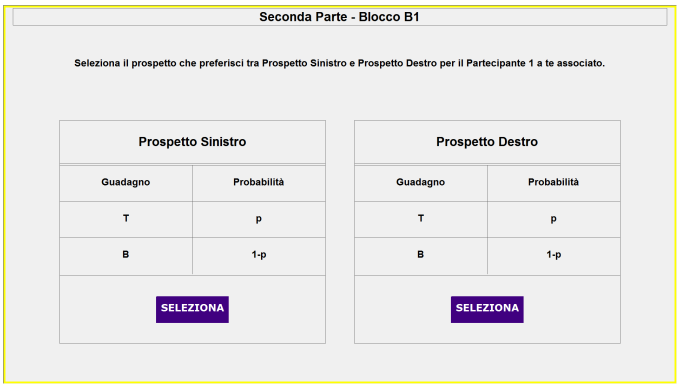
After your 30 decisions, your first decisional phase is concluded. Then, you will move to the second phase, i.e. the one giving you the opportunity to send a bid to decide whose decisions will determine your payoff. Like in the first part, if your bid is accepted, your earnings will be defined as the sum of the payoffs of the prospects you have previously selected; on the

contrary, if you bid is rejected, your earnings will be determined by the Participant 2 you have been associated to.

- If you have the role of **Participant 2**, during the first part of the experiment, no prior information on the prospects was available; in this second part, on the contrary, prospects will be fully described (in terms of probability p and outcomes T and B). Therefore, all the relevant information about the Left Prospect and the Right Prospect is available from the beginning.

  You can find an example of a couple of prospects in Figure 3.16. For each couple, click on the SELECT button corresponding to the prospect you prefer or the Participant 1.

Figure A.15: Participant 2 Decisional Task - Second Part - Example



After your 30 decisions, your decisional phase is concluded. Like in the first part, your payoff is fixed, and it does not depend on your decisions.

`Treatment DE`

The only difference concerns Participant 1's first decisional phase and Participant 2's decisional phase: in both cases, it will be asked to make 30 decisions, again in terms of sequential choices through 30 couples of prospects (different from those of the first part). However, such decisional problems will be presented in a different way.

- If you have the role of **Participant 1**, during the first part of the experiment, no prior information on the prospects was available; in this second part, on the contrary, prospects will be fully described (in terms of probability p and outcomes T and B). Therefore, all the relevant information about the Left Prospect and the Right Prospect is available from the beginning.

You can find an example of a couple of prospects in Figure 3.19. For each couple, click on the SELECT button corresponding to the prospect you prefer.

Figure A.16: Participant 1 Decisional Task - Second Part - Example

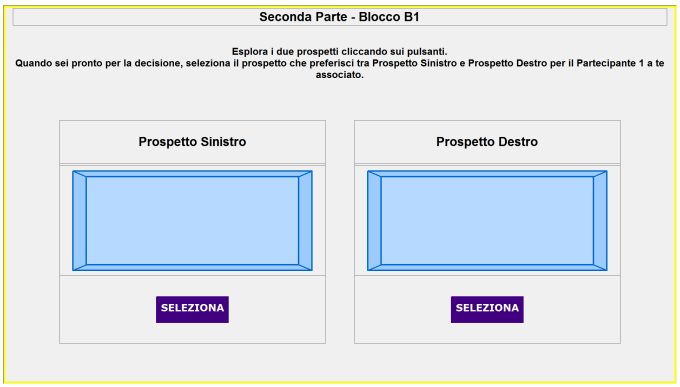
After your 30 decisions, your first decisional phase is concluded. Then, you will move to the second phase, i.e. the one giving you the opportunity to send a bid to decide whose decisions will determine your payoff. Like in the first part, if your bid is accepted, your earnings will be defined as the sum of the payoffs of the prospects you have previously selected; on the contrary, if you bid is rejected, your earnings will be determined by the Participant 2 you have been associated to.

- If you have the role of **Participant 2**, during the first part of the experiment, the prospects were fully described (in terms of probability p an outcomes T and B): the relevant information was available from the beginning. On the contrary, in this second part of the experiment, you will have no prior information on the prospects; however, you will have the opportunity to collect the information necessary to decide. For this reason, each prospect will be represented by a button: for every decision, two buttons (one for the Left Prospect and one for the Right Prospect) will appear on your screen. Every time you click on one of them, you will be immediately informed about the payoff your Participant 1 would receive if you choose the corresponding prospect (according to the outcome and probability distributions associated to that specific prospect). You can continue to click until you feel confident enough to choose for the Participant 1.

  You can find an example of a couple of prospects in Figure 3.20. For each couple, click on the SELECT button corresponding to the prospect you prefer or the Participant 1.

  After your 30 decisions, your decisional phase is concluded. Like in the

Figure A.17: Participant 2 Decisional Task - Second Part - Example



first part, your payoff is fixed, and it does not depend on your decisions.

(This is an English translation of the questionnaires participants answered to at the end of the experiment.)

Levenson's Scale

We kindly ask you to answer the following questionnaire truthfully.
We ask you to indicate how much you agree with each of the following statements by using a scale of 6 values that goes from "I strongly disagree" to "I strongly agree".

1. To a great extent my life is controlled by accidental happenings.
2. When I make plans, I am almost certain to make them work.
3. Often there is no chance of protecting my personal interests from bad luck happenings.
4. When I get what I want, it's usually because I'm lucky.
5. I have often found that what is going to happen will happen.
6. It's not always wise for me to plan too far ahead because many things turn out to be a matter of good or bad fortune.
7. When I get what I want, it's usually because I worked hard for it.
8. My life is determined by my own actions.

Dospert

We kindly ask you to answer the following questionnaire truthfully. For each of the following statements, please indicate the likelihood that you would engage in the described activity or behavior if you were to find yourself in that situation. Provide a rating from Extremely Unlikely to Extremely Likely, using the following scale: 1 = "Extremely unlikely", 2 = "Moderately unlikely", 3 ="Somewhat unlikely", 4 = "Not sure", 5 ="Somewhat likely", 6 = "Moderately likely", 7 ="Extremely likely".

1. Admitting that your tastes are different from those of a friend.
2. Betting a day's income at the horse races.
3. Investing 5% of your annual income in a very speculative stock.
4. Betting a day's income on the outcome of a sporting event.
5. Investing 10% of your annual income in a new business venture.
6. Choosing a career that you truly enjoy over a more secure one.
7. Speaking your mind about an unpopular issue in a meeting at work.

Demographics and Other Information

Please, fill in the following fields.

- Date of Birth:
- Gender:
- Field of Studies:
- Number of experiment in which you have taken part:

B Appendix - Supplementary Analysis

Table B.1: MPLs' Expected Returns and Standard Deviations

mean (sd)	Agent-Des	Agent-Exp	Principal-Des	Principal-Exp
			A.5	
μ	78.605 (9.441)	76.965 (7.841)	82.737 (5.786)	77.983 (7.019)
σ	16.909 (6.639)	16.722 (5.205)	19.146 (4.17)	16.393 (5.17)
			A.7	
μ	79.542 (9.377)	76.239 (9.241)	84.038 (5.290)	78.639 (6.612)
σ	21.085 (9.402)	19.2 (8.67)	25.14 (5.037)	21.321 (6.211)
			A.9	
μ	78.773 (9.767)	75.282 (8.391)	83.379 (6.320)	79.335 (7.540)
σ	34.050 (18.037)	30.223 (16.470)	42.324 (10.354)	35.986 (14.805)
			B.5	
μ	93.323 (9.128)	94.763 (7.533)	98.303 (6.207)	97.533 (5.798)
σ	16.551 (6.239)	17.855 (6.086)	18.777 (4.953)	19.347 (5.063)
			B.7	
μ	93.291 (8.961)	995.184 (8.203)	99.875 (5.254)	98.835 (6.069)
σ	20.269 (8.304)	22.337 (9.033)	25.424 (5.849)	24.924 (7.484)
			B.9	
μ	94.858 (9.033)	93.502 (8.414)	100.365 (3.800)	97.351 (6.174)
σ	37.855 (14.312)	33.414 (20.369)	46.361 (5.767)	40.969 (13.180)

Notes: For every MPL, the average of both portfolios' expected returns (μ) and standard deviations (σ) is computed according to role (principal vs. agent) and information gathering condition (description vs. experience). Corresponding standard deviations are in parentheses.

Figure B.1: Portfolios in mean/variance space

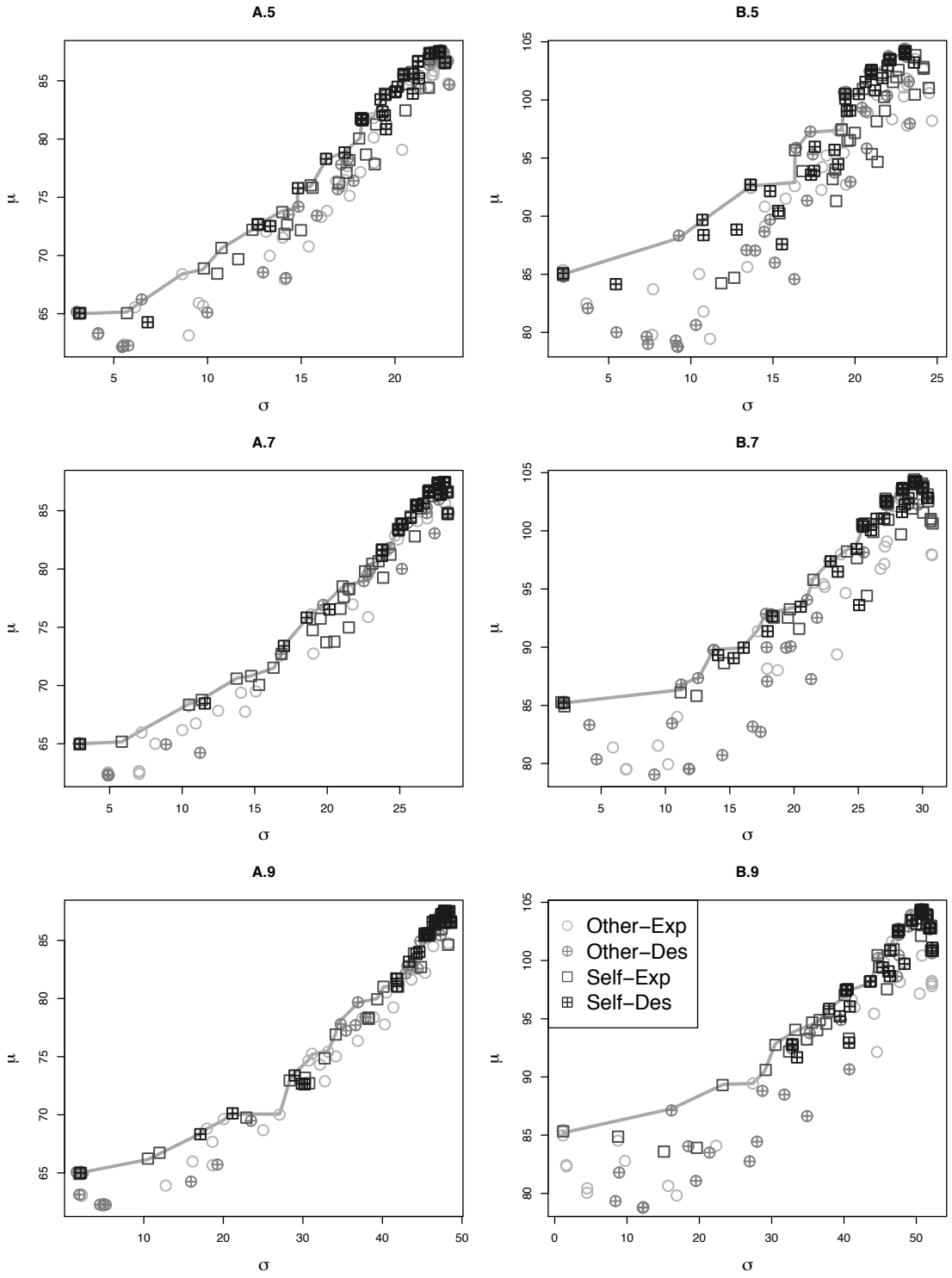


Table B.2: Proportion of Dominance - MPL

%	Dominated Portfolios	Non-Dominated Portfolios
	A.5	
Agent-Des	**57.89**	42.11
Agent-Exp	**77.50**	22.50
Principal-Des	23.08	**76.92**
Principal-Exp	43.59	**56.41**
	A.7	
Agent-Des	34.21	**65.79**
Agent-Exp	**72.50**	27.50
Principal-Des	17.95	**82.05**
Principal-Exp	46.15	**53.85**
	A.9	
Agent-Des	44.74	**55.26**
Agent-Exp	**70.00**	30.00
Principal-Des	20.51	**79.49**
Principal-Exp	38.46	**61.54**
	B.5	
Agent-Des	**60.0**	40.0
Agent-Exp	**73.7**	26.3
Principal-Des	41.0	**59.0**
Principal-Exp	**61.5**	38.5
	B.7	
Agent-Des	**57.5**	42.5
Agent-Exp	**73.7**	26.3
Principal-Des	35.9	**64.1**
Principal-Exp	**59.0**	41.0
	B.9	
Agent-Des	**75.0**	25.0
Agent-Exp	**73.7**	26.3
Principal-Des	48.7	**51.3**
Principal-Exp	**66.7**	33.3

Figure B.2: Average Clicking - Principal vs. Agent

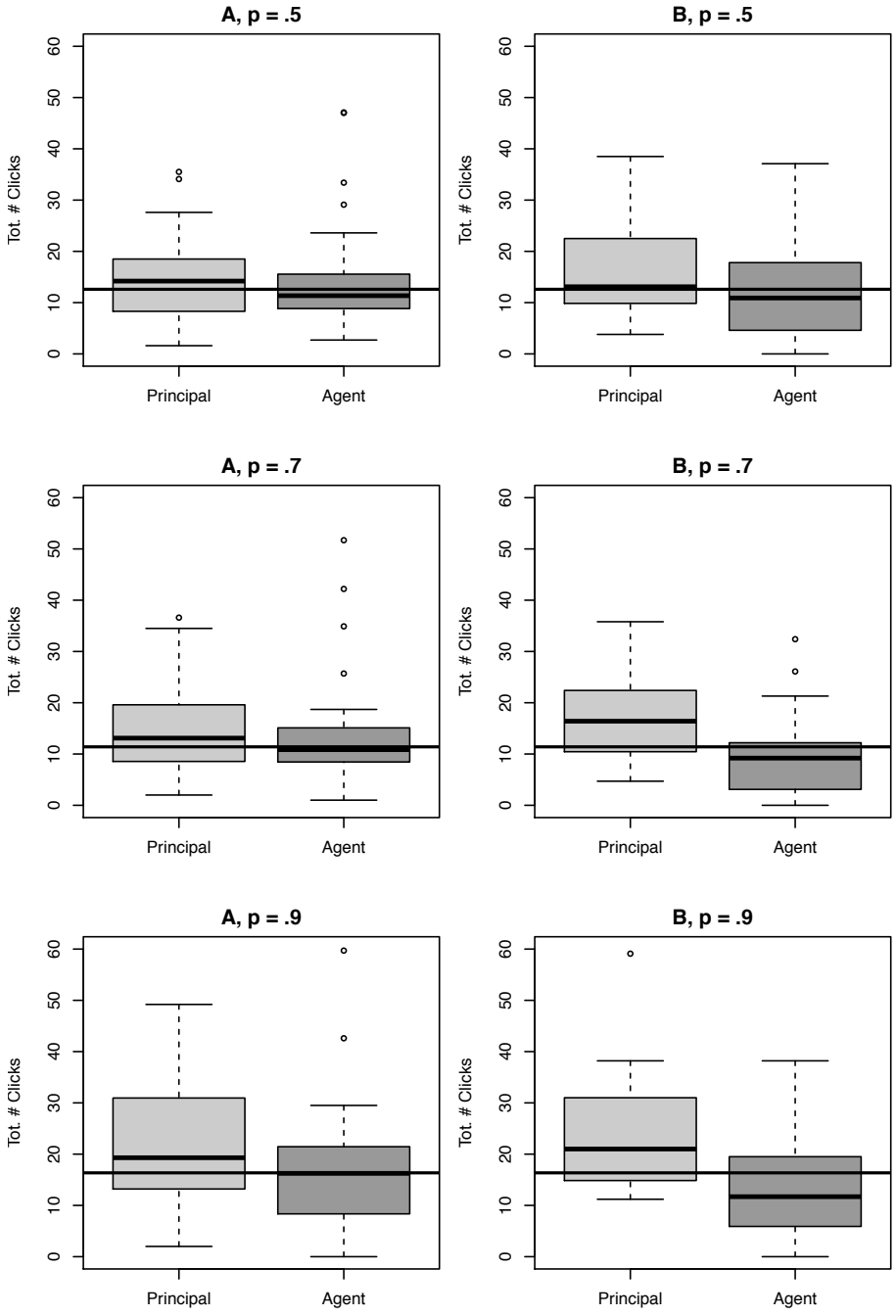


Table B.3: Regression analysis with controls

	Portfolio Return	ND Portfolio	Searching Effort	Control Premium
Portfolio Return				0.202 (4.221)
Portfolio St. Dev.	0.526 (0.014)***			1.256 (4.941)
Non Dominated				−4.726 (19.260)
Set B	16.065 (0.224)***	−0.752 (0.163)***	−1.336 (0.729)$^{\circ}$	−6.451 (19.294)
Self	1.989 (0.524)***	1.044 (0.299)***	2.409 (0.737)**	
Experience	−0.688 (0.313)*	−1.128 (0.236)***		
Prob 0.7	−1.847 (0.277)***	0.318 (0.196)	−0.267 (0.184)	
Prob 0.9	−10.207 (0.378)***	0.066 (0.196)	2.146 (0.184)***	
Self & Experience	−0.753 (0.442)$^{\circ}$	−0.078 (0.327)		
Rightward Prospect			2.263 (0.150)***	
EV+			−1.739 (0.166)***	
Principal Des				80.404 (36.198)*
Agent Des				−20.027 (31.369)
Levenson	−0.721 (0.524)	−0.701 (0.286)*	−0.033 (0.821)	92.859 (55.634)$^{\cdot}$
Dospert	−0.007 (0.262)	−0.046 (0.141)	−0.040 (0.412)	8.547 (27.350)
Female	−0.711 (0.489)	−0.126 (0.262)	−1.463 (0.773)$^{\circ}$	147.941 (55.612)**
Econ	−0.052 (0.496)	0.089 (0.265)	1.167 (0.777)	−42.437 (58.492)
Constant	72.876 (2.159)***	2.897 (1.169)*	7.092 (3.366)*	100.285 (395.725)
Observations	816	816	8160	136
Num. groups: ID	136	136	136	68
Fitting model	LMM	$GLMM(Logit)$	LMM	LMM

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\cdot}p < 0.1$

C Appendix - Prospects

Table C.1: Prospect Set A

		Leftward				Rightward			
	List	H	L	EV	SD	H	L	EV	SD
1	A.5	55	75	65	10	18	75	46.5	28.5
2	A.5	55	75	65	10	18	95	56.5	38.5
3	A.5	55	75	65	10	18	115	66.5	48.5
4	A.5	55	75	65	10	18	125	71.5	53.5
5	A.5	55	75	65	10	18	135	76.5	58.5
6	A.5	55	75	65	10	18	145	81.5	63.5
7	A.5	55	75	65	10	18	155	86.5	68.5
8	A.5	55	75	65	10	18	180	99	81
9	A.5	55	75	65	10	18	225	121.5	103.5
10	A.5	55	75	65	10	18	265	141.5	123.5
11	A.7	59	79	65	9.2	33	79	46.8	21.1
12	A.7	59	79	65	9.2	33	111	56.4	35.7
13	A.7	59	79	65	9.2	33	145	66.6	51.3
14	A.7	59	79	65	9.2	33	161	71.4	58.7
15	A.7	59	79	65	9.2	33	178	76.5	66.4
16	A.7	59	79	65	9.2	33	195	81.6	74.2
17	A.7	59	79	65	9.2	33	211	86.4	81.6
18	A.7	59	79	65	9.2	33	253	99	100.8
19	A.7	59	79	65	9.2	33	328	121.5	135.2
20	A.7	59	79	65	9.2	33	395	141.6	165.9
21	A.9	63	83	65	6	42	83	46.1	12.3
22	A.9	63	83	65	6	42	187	56.5	43.5
23	A.9	63	83	65	6	42	287	66.5	73.5
24	A.9	63	83	65	6	42	337	71.5	88.5
25	A.9	63	83	65	6	42	387	76.5	103.5
26	A.9	63	83	65	6	42	437	81.5	118.5
27	A.9	63	83	65	6	42	487	86.5	133.5
28	A.9	63	83	65	6	42	612	99	171
29	A.9	63	83	65	6	42	837	121.5	238.5
30	A.9	63	83	65	6	42	1037	141.5	298.5

Table C.2: Prospect Set B

		Leftward				Rightward			
	List	H	L	EV	SD	H	L	EV	SD
1	B.5	78	92	85	7	26	86	56	30
2	B.5	78	92	85	7	26	106	66	40
3	B.5	78	92	85	7	26	126	76	50
4	B.5	78	92	85	7	26	136	81	55
5	B.5	78	92	85	7	26	156	91	65
6	B.5	78	92	85	7	26	166	96	70
7	B.5	78	92	85	7	26	186	106	80
8	B.5	78	92	85	7	26	206	116	90
9	B.5	78	92	85	7	26	236	131	105
10	B.5	78	92	85	7	26	296	161	135
11	B.7	81	95	85.2	6.4	42	89	56.1	21.5
12	B.7	81	95	85.2	6.4	42	122	66	36.7
13	B.7	81	95	85.2	6.4	42	155	75.9	51.8
14	B.7	81	95	85.2	6.4	42	172	81	59.6
15	B.7	81	95	85.2	6.4	42	205	90.9	74.7
16	B.7	81	95	85.2	6.4	42	222	96	82.5
17	B.7	81	95	85.2	6.4	42	255	105.9	97.6
18	B.7	81	95	85.2	6.4	42	289	116.1	113.2
19	B.7	81	95	85.2	6.4	42	339	131.1	136.1
20	B.7	81	95	85.2	6.4	42	439	161.1	181.9
21	B.9	84	96	85.2	3.6	52	92	56	12
22	B.9	84	96	85.2	3.6	52	192	66	42
23	B.9	84	96	85.2	3.6	52	292	76	72
24	B.9	84	96	85.2	3.6	52	342	81	87
25	B.9	84	96	85.2	3.6	52	442	91	117
26	B.9	84	96	85.2	3.6	52	492	96	132
27	B.9	84	96	85.2	3.6	52	592	106	162
28	B.9	84	96	85.2	3.6	52	692	116	192
29	B.9	84	96	85.2	3.6	52	842	131	237
30	B.9	84	96	85.2	3.6	52	1142	161	327