Incentive schemes in the financial industry

An experimental approach

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Abstract

The most recent financial crisis highlighted several fragilities of financial markets. According to several observers, a relevant source of instability could be identified in the incentive schemes of the financial professionals. Yet, it is not clear whether the higher risk is due to the structure of the incentive scheme in itself or whether it emerges as strategic pricing by asset managers in order to deal with a more generalized market competition.

In the light of the ongoing debate on the role of the incentive schemes in the financial industry, the main goal of this thesis is to emphasize that market interventions should be implemented by involving in the decision-making process both investors and managers and not only the latter.

In this Doctoral thesis, to disentangle and control some possible effects deriving from the delegated portfolio management context, the experimental methodology is implemented. Managers and investors are allowed to interact: we investigate to what extent this interaction affect general results. In Chapter 1 of this Doctoral Thesis the context and the related literature will be provided with a focus on the ongoing debates and on the answers provided by the experimental literature. In Chapter 2 we manipulate the contract design by allowing investors under endowment legitimacy (or not) to decide the incentive scheme while managers have no bargaining power. In Chapter 3 instead, we investigate to what extent a market setting characterized by competition between managers and disclosure of others' practices affect the market fees' combination. Differently than in the experiment in Chapter 2, here both players are involved in the decision-making process: managers are asked to propose fees combinations while investors choose the fee combination they want to pay.

JEL classification: C90, C91, C92, D4, G02, G4, G11.
Keywords: Laboratory Experiment; Behavioral Economics; Experimental Finance; Delegated Portfolio Management; Decision Making for Others; Endowment Legitimacy; Incentives; Portfolio Composition; Contract design; Conflict of Interests; Competition and Disclosure

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TABLE OF CONTENTS

List of Tables

Table **Page**

List of Figures

INTRODUCTION

Trading activity is one of the most well known activities in financial markets. The increasing reliance of investors on mutual funds has raised concerns about competition in the financial industry. Additionally, it was accentuated also the importance of traders' compensation schemes, since according to (part of) the existing literature, the existing contracts (bonus payments and option-like contracts) are among drivers of the observed undue risk taking in the financial industry.

There is a mix evidence on the causality and on the link between incentive schemes and market dynamics. Despite the rich literature, it is not clear whether "the problem" is the structure of the compensation scheme, the rules according to which agents operate in the market, or, the market structure itself. Thus, the role and the implications of the applied contracts remain a question to be deepen. A further confirmation of this need comes from the market: in 2016, professionally managed assets in the U.S. were 9511 (40.3% increase with respect to 1997),[1] which amount to 16.34 trillion U.S. dollars and accounts for 47% of the worldwide distribution of mutual funds and ETF assets (Europe accounts for other 35%).[2] Given the size of the portfolio management industry, given the possible spillovers to (overall) economy and the relevance that incentive structures assume in this context, it becomes crucial to better investigate the commonly used (in the industry) contracts in order to check whether and how can they be improved.

The ultimate goal of this work is to emphasize that probably the usual applied contracts are not "wrong" in the structure but, probably, there is the need to change the methodology according to which these contracts are designed. Given that managers are delegated to the portfolio management on the behalf of the investors, it is important to consider the interests of both players when the contract is designed.

The aim of this doctoral thesis is to mimic as much as possible real-world (financial) settings and to experimentally investigate some features of the delegated portfolio management. Despite the rich literature on the experimental asset markets, some

[1] Hereafter, "*with respect to*" will be abbreviated as *wrt*.

[2] www.statista.com

fundamental features are still missing from the analysis. The first feature (and gap we aim to bridge) concerns the fact that traders invest someone else's money and not their own. Thus, to investigate players' behavior under endowment legitimacy condition becomes a necessity. Another key aspect in the delegated portfolio management concerns the fact that portfolio managers decide on behalf of other people. Thus, in order to understand how financial markets behave, it is crucial to consider both managers and investors and investigate to what extent this interaction affects the general results.

More specifically, in the just presented context, we investigate through the experimental method the currently faced contracts in the financial industry by introducing some new features. Both experimental studies (here presented) are about a situation in which portfolio managers are delegated to (actively) manage other people's wealth, but, differently than the usual considered experimental settings, our investors are not fictitious, but real persons and they are in the lab. Another feature of the two experiments consist in the fact that portfolio managers have no wealth on their own to invest, and they will be paid a portion of the profits they make. As in the actual markets, the cost of the bad performance of the investments is "suffered" by the investors and not by the agents.

This work is structured as follows. In Chapter 1, the description of the context with a brief literature will be provided. The focus is on the incentives schemes in the experimental literature on financial markets, with a short link to other related contexts. The aim of this chapter is to position our studies in the existing literature and provide the reader a general description on how experimental literature have answered to the some questions concerning the payment of portfolio managers.

The first experimental study will be presented in Chapter 2. This study is a joint work with Flavio Bazzana and Matteo Ploner. As a means to investigate investors' willingness to pay managers for the portfolio management, within an experimental asset market setting we investigate how do investors behave when they have the bargaining power while managers do not. The investors are asked to decide under asset legitimacy condition (legitimized by real effort) as opposed to house money condition, the performance fee to be assigned to their managers. As a consequence, we investigate whether managers recognize this endowment legitimacy (of the investors) and whether and to what extent it affects their behavior in the experimental asset markets in terms of price deviation (wrt the EV of the assets) and in terms of volumes of transactions. In the mentioned settings, investors are allowed to decide also the initial portfolio composition: although it is not binding for the managers, we investigate to what extent managers consider

this initial composition and whether the allocate performance fee plays a relevant role as literature suggests. To control whether managers are influenced by the decisions being taken by investors, we run an additional treatment in which managers trade with house money on behalf of fictitious investors. We find that endowment legitimacy is not perceived as important: it does not significantly affect neither investors' nor the managers' behavior. What will have a significant effect in the market sessions is the (presence of) fictitious investor: managers trade lower volumes but to higher prices. We find also a puzzling *anchoring effect* toward initial suggested portfolio composition in the first and the last played rounds, while in the intermediate periods this anchoring "disappear". This effect is more evident in the presence of investors. For what concerns the ongoing debate on the incentive scheme, we find that investors allocate (significantly) lower performance fees than usually applied ones: independently of the endowment legitimacy, the median allocated (by investors) performance fee is around 10% of the profits. Furthermore, our results suggest that the allocated performance fees do not significantly affect the observed portfolio deviations.

The second study (Chapter 3) is a joint work with Juergen Huber and Matteo Ploner: experiments have been conducted both at the University of Innsbruck (Austria) and Trento (Italy). The experiment considers an investment game in which managers and investors can bargain over both the fixed (management) and performance fees: managers propose a fee combination while investors decide whether and which fees combination they are willing to pay. The design considers two treatments: *Competition* between managers (in attracting investors' endowments) and *Disclosure* of other competitors' practices. The aim of the study is to understand the fees combinations on which managers and investors agree, and how does the (agreed) incentive schemes affect portfolio composition and market participation. We find that *Disclosure* about others' practices does not heavily affect the observed dynamics. What will have a significant effect is the competition between managers: not only *Competition* increases market participation, but even more importantly, it lowers the proposed and paid fees. More in general, we find that within this setting, *Competition* benefits both managers and investors.

The doctoral thesis concludes with some general considerations and policy implications of these studies. In the Appendix they will be provided additional material and instructions of the two experiments.

CHAPTER 1

THE CONTEXT AND THE RELATED LITERATURE

"What we know about the global financial crisis is that
we don't know very much."
Paul Samuelson

It is commonly accepted opinion that the most recent financial crisis was the worst (global) economic crisis since the Great Depression of the 1930s (Kindleberger and Aliber; 2011). Because of the negative spillovers to real world economy, to study and to find the responsible factors in order to avoid other events like the 2008 economic crisis became the commitment of academics, politicians and regulators. The point of consensus between these actors is that one of the main drivers of the financial crisis should be identified with the excessive risk taking within the financial industry and with the weaknesses and failures of financial markets' regulation (Bebchuk and Spamann; 2009; D'Arista and Griffith-Jones; 2008; Kirkpatrick; 2009).

According to various academics, one of the main reasons of this increased volatility (an excessive risk taking which brings to instability) in the financial industry has to be identified with the bonus payment and option-like compensation schemes of the financial professionals.[1] Nevertheless, it is not clear whether the higher risk is due to the structure of the incentive scheme or it emerges as strategic pricing by asset managers in order to deal with market competition (Golec and Starks; 2004; Drago et al.; 2010).

[1] See among others Rajan (2006); Chen et al. (2006); Bebchuk and Spamann (2009); Robin et al. (2012)

According to some authors the undue risk taking is is related to the fact that nowadays compared to the past, there is a more general competitiveness in (all) the markets, financial markets included (Rajan; 2006). Because of this (more) generalized competitiveness, on one hand, the optimal contracts (to be applied for own managers) for the banks are bonus contracts: compared to fixed wages, bonus remuneration payments are more closely linked with the returns on investments (Thanassoulis; 2012). Thus, within the financial markets managers are incentivized to take more risk because their compensation is affected by investment returns: the higher the risk, the higher the possible return and thus, the higher the possible payment for the manager (Rajan; 2006).

On the other hand, the fact that the portfolio management is usually delegated to a professionals implies the existence of the agency relationship between the investor (principal) and the portfolio manager (agent). As in any agency problem, the portfolio delegation is characterized by an asymmetric information between the two players (the agent is better informed than the principal), which in turn creates a problem of moral hazard (Allen; 2001): the player who decides is not the same player who bears the cost of the risk. In order to solve this problem, the proposed solution is to align the interests of the agent and those of the principal, and, one more time, the performance-based incentives have been found to be the optimal solution (Kritzman; 1987; Cuoco and Kaniel; 2011).

In the view of Gennaioli et al. (2015), professional managers can be seen as "money doctors" who provide a service to investors who don't want to make risky investments by themselves because of the little financial knowledge and because "*they are too nervous . . . to make risky investments on their own*". In the view of Stracca (2006) instead, investors delegate the portfolio management to professionals because of the high transaction costs or because of some frictions which makes inconvenient (or even impossible) for investors to manage the portfolio by themselves. Independently of the reason why investors delegate the portfolio management to professionals, because of the importance of the financial industry for the (overall) economy, continuing to do research on the delegated portfolio management contract assumes a high importance.

In the delegated portfolio management there is space for economies of scale on managers' side: the manager can spread the cost of information gathering among many investors (Stracca; 2006; Hackethal et al.; 2012). Combined with better investment practices, the delegated portfolio management may create the possibility for investors to improve portfolio performance by delegating the financial decisions.[2] Consistent with

[2]In this thesis we focus only on the active management of the portfolio.

this interpretation, there is evidence that professionally managed accounts are more diversified and slightly more profitable than those of independently run (Shapira and Venezia; 2001).[3] According to the authors, the results is due to the fact that biases like *disposition effect* (selling winning stocks earlier than losing ones) affect professionals to a lower extent than individual investors.

1.1 Delegated portfolio management and the agency theory

The agency theory may help to answer some of the questions deriving from investor-manager relationship, but not all of them. There are some dissimilarities between delegated portfolio management problem and the usual agency context, which means that (also) the faced challenges differ. As Stracca (2006) points out, differently than in the agency context, the problem in the delegated portfolio management is related to the information gathering by the agent and the subsequent action, rather than a problem of (agent's) performance in itself. A further difference wrt the agency problem consists in the fact that the agent may decide how to behave once he observed the signal, which means that the agent can control (and influence) both the return and the variance of the investment determining the outcome (his performance), while in the usual agency problem the agent cannot act on both variables simultaneously. These dissimilarities make the challenge of the alignment of players' interests even more difficult.

In addition to the already presented distinction between delegated portfolio management and the agency problem, we can add others. Differently than in the agency context in which the principal has a bargaining power in defining the contract such that he can make a "take-it-or-leave-it" offer to the agent, in the delegated portfolio management usually is the opposite: the investor (principal) usually accepts the contracts defined by the company or by the agent to whom he entrusts the wealth to be invested. Furthermore, the incentives of the managers, are not always aligned with those of the investors, and this misalignment may result in distortions (in terms of asset prices or risk taking) in the financial markets (Rajan; 2006). From a regulatory perspective, this consideration brings back to one of the main reasons why the regulatory attempts have failed to achieve the aim. According to Bebchuk and Spamann (2009) the problem relies on the formulation of the rules: given the misalignment of the interests of the two players, the regulatory

[3] Results are based on an empirical analysis of investment transactions of a (randomly chosen) large sample of clients of one of the largest bank in Israel in 1994.

interventions should consider the interests of investors and those of portfolio managers separately rather than jointly (aligned).

From a theoretical perspective, (especially) due to the fact that the agent can control the effort to be exerted and he can also influence the risk, the design of incentive compatible contracts becomes even more challenging. As a result, the (theoretical) literature does not agree on the optimal contract, and, furthermore, the existing negative results are more than the constructive ones (Stracca; 2006). Additionally, from a industry perspective, it looks like the practice favours compensation schemes which include a low fixed (management) fee plus a performance-based component. The former covers the day-by-day costs of investing, and usually is a fixed cost in percentage on commitment to the fund. The latter "*is a compensation plan under which the level of compensation to a portfolio manager varies according to investment results rather than solely according to the amount of assets under management*" (Modigliani and Pogue; 1975). The norm in the market seems to be 2% management fee plus 20% performance fee (Agranov et al.; 2014).

1.2 Answers provided by experimental literature

The incentive scheme is a reward structure which ensures that management compensation is a function of the investment performance relative to a benchmark. From a theoretical perspective, Huddart (1999) have found that performance fees are the solution to reduce distortions in the portfolio choice. In a two-period model of investment management, when asset fees are a fraction of assets under management, because of the competition between advisers, reputation motivates the adviser to choose an extreme portfolio in the first period as a mean to appear to be informed (a superior information they actually do not have) and signal a good performance. By introducing performance fees, this reputation effect is reduced. Nevertheless, the evidence on performance fees is mixed: according to may authors these fees are too high and they bring also to market inefficiencies.

1.2.1 Performance based contracts

When managers are remunerated as a function of funds under management, their incentives look like tournament incentives. In the presence of the "beat-the-market" incentive scheme as an example of a tournament contract, prices significantly diverge from the

intrinsic value of the assets (James and Isaac; 2000).[4] This observed market inefficiency is a matter of the structure of the incentive scheme: compared to the baseline contract in which the repeated experience brings to the convergence toward the intrinsic value of the asset, the repeated experience with asset markets under tournament contracts brings to the opposite results. By reducing the proportion of traders being paid with a tournament contract to approximatively half of the market participants, the impact of tournaments on mispricing is much weaker (Isaac and James; 2003).

Furthermore, there is evidence that bonus contracts affects the severity of the bubble depending on the frequency adopted for their payment (Robin et al.; 2012). By comparing a no-bonus contract to short-term and long-term bonus contracts, evidence suggests that long-term contract induce a lower price deviation (w.r.t. fundamentals) and smaller bubble amplitude than markets with short-term bonus or no-bonus contracts. Authors argue that the observed behavior is (probably) due to a different reference point: in the long-term contracts (from the beginning) the focus is on the fundamental value of the asset while in the short-term contracts prices are more salient.

A point of consensus between authors investigating bonus payment and option-like contracts is that these contracts increase risk taking (Kleinlercher et al.; 2014; Holmen et al.; 2014; Hedesström et al.; 2015). But this is only a part of the story. Paul et al. (2015) argue that when subjects can trade more than one type of risky asset at the same time, tournament incentives do not distort prices more than absolute-performance based incentives do.[5] Furthermore, due to the convexity of option-like incentives, trading at higher prices and taking more risk increases traders' expected payouts, which makes this behavior rational from the point of view of the manager being incentivized with this type of contract (Holmen et al.; 2014). Although rational from a trader perspective, overvalued assets produce negative consequences for other market participants: not only investors who delegate their portfolio to these managers (with convex incentives) face a linear incentive structure and therefore bear the losses of overvalued assets, but the overvalued asset affect also the efficiency of the markets since the value of the asset is no more reflecting the discounted future cash-flows.

Contracts with bonuses have been found to affect also portfolio diversification: when

[4]The divergence from the EV of the asset is a violation of the efficient market hypothesis by (Fama; 1970) according to which, market price incorporate all the relevant information.

[5]Authors measure price distortion through the size and duration of mispricing/bubbles. Compared to the baseline, authors implement 4 treatments: Carrot, Stick, GilCarrot and GilStick. The first two incentive schemes paid for good (carrot) or bad performance (stick) wrt the average trader, with the Stick including a zero payment in case of underperformance. The other two contracts (GilCarrot and GilStick) were paid according to rank-order tournament, where the rank determined the payoff.)

the bonus contract was providing more benefits to invest in one of the two available options (incorporating different levels of risk), diversification decreases (Hedesström et al.; 2015). Further, when the uncertainty on bonus outcome is salient diversification increases, while it decreases when the outcome uncertainty is made salient and participants are informed that a majority of others have chosen their same preferred option. The proposed explanation by the authors is that a decrease in bonus whose uncertainty is salient does not influence the strength of preference for an option, while the higher total bonus payout does.

1.2.2 Regulatory interventions: caps on gains and shared losses

To contribute to financial stability and reduce distortions in the financial markets, a number of reforms have been proposed and various studies testing policy implications have been conducted. The most discussed actions, on the one hand, regard incentive schemes with caps on gains and, on the other hand, the introduction of some degree of liability (limited or total) between the manager and the investor when the former realizes a loss (which now affects only the investor).

Bonus caps have already been implemented in the European Union (directive 2013/36/EU), and it affects not only E.U. employees, but also some U.S. employees of financial institutions that are in the E.U. and to E.U.-based employees of financial institutions, independently of where the institutions are headquartered. With the restrictions on the payment of the bonuses the EU Commission aims to discourage unnecessary risk taking. However, based on their results, Baghestanian et al. (2017) argue that caps on gains are not very effective at containing market instability, while by forcing managers to share losses with investors lower observed asset price bubbles.

The two mentioned actions imply a conflict of interests between the two players. In the case of the *limited liability*, the conflict arises because of the difference on how players value the asset: while the two players share the gains, only investors suffer (all) the losses, which makes them value the asset lower than traders do. On contrary, the capped bonuses are generated by a different source of the conflict of interest because, it is no more a matter of how the two players value the asset but it is about how much the two players are paid: the potential gains of the trader decrease while those of the investor increase (Baghestanian et al.; 2017).

The introduction of the *caps*, from a theoretical perspective, can negatively affect the banker's effort and the efficiency of the contract (Dittrich and Städter; 2015). Furthermore, caps or penalties influence the risk taking and create price distortions in the

markets. In an experimental design in which manager could decide whether invest in a low or high risk market, Kleinlercher et al. (2014) investigate the effect of the bonus, cap, linear and penalty incentive schemes on asset prices and portfolio composition. Results clearly demonstrate that applied incentive schemes matter and have a huge impact on market's behavior: they affect both prices of the concluded transactions and the portfolio composition. In markets in which managers are incentivized according to different contracts, those incentivized with bonus incentives exhibit higher prices and a significantly riskier investment behavior than those incentivized with penalty incentives: the latter exhibit the lowest prices and (for what concerns portfolio composition) predominantly go out of the high-risk asset by holding cash. Finally, authors find that the portfolio composition is strongly affected by the incentive scheme and it brings to different assets' pricing.

The effect of the two suggested actions has been studied also by Baghestanian et al. (2017): in an experimental setting in which investors can entrust their money to traders, authors have investigated how these compensation schemes affect liquidity provision and asset prices. Results of the study provide (significant) evidence that, not only traders take more risks when they are not liable for losses, but also investor behave differently in presence of the different contracts: liquidity provision is higher in the presence of a cap and/or limited liability, while it is lowest when traders are liable (total liability) for losses. Furthermore, the fact that investors provide more liquidity when traders are not liable for losses might imply that not only traders but also investors may want to ride the bubble as well.

The competition to get investors' endowments (and the right to invest others' money) is a characteristic which distinguishes these markets from others (Agranov et al.; 2014). Given that managers' contracts are a function of the performance of the investment, this means also that the contracts faced by managers makes them sensible to the risk. In this perspective, the undue risk taking becomes a feature of the interaction between the mentioned competition and the faced (option-like) contract and it leads, both in theory and in the laboratory experiment, to an inefficient equilibrium outcome. To reduce this undue risk taking, authors check the effectiveness of different policy interventions in a laboratory portfolio management context. More specifically, the implemented treatments are: the *transparency* treatment (a competitive environment in which managers are forced to announce the investment strategy), a *risk sharing* treatment (implying full liability between managers and investors) and a *cap on watermark* treatment (capping the strike price or promised return). Among these policy interventions, authors find that

although transparency treatment is the one providing the most effective intervention, none of them reduces risk to theoretically predicted levels.

1.2.3 Non monetary incentives

In the usual principal agent context, although the effort is unobservable, (from a theoretical perspective) the relative performance of the manager (compared to others) is a good indicator of the performance without imposing excessive risk on the agents (Sappington; 1991). Contrary, in the delegated portfolio management, it is more difficult to find a good measure of manager's performance. For example, the just mentioned measure for managers' performance within the financial context produce the opposite results not only because there are monetary incentives for outperforming the others, but also because non monetary incentives influence traders' behavior. In fact, according to Diamond and Rajan (2009) one of the sources of the undue risk taking (which lead then to the financial crisis) consists in the fact that the performance of the top management (in the industry) is (partially) evaluated on the earnings they generate compared to their peers.

There is extensive evidence that apart form monetary incentives, in the financial industry also non monetary incentives play a relevant role. In fact, providing periodic performance information for the best or the worst performer in an experimental market influences market prices and boom duration (Schoenberg and Haruvy; 2012). Furthermore, depending on the way the relative information is presented may lead to different results: emphasising the upward relative comparison (Leader) lead to higher risk-taking and to worse outcomes, while, the down-ward comparison (which implicitly shows the "damage" of the excessive risk-taking) brings to a better portfolio diversification (Baghestanian et al.; 2015). According to Schoenberg and Haruvy (2012), although non-monetary incentivized, the only information about relative position in the market (Leader or Laggard) in itself is sufficient to alter both the markets prices and the risk-taking. Also Eriksen and Kvaløy (2016) support this theory and show that by removing the feedback about leader's decisions (in each round), risk taking (as defined by the setting) decreases. Furthermore, there is evidence on a strong relationship between rank relative performance and risk-taking: under-performers show a strong preference for positively skewed assets (more risky strategies) while over-performers invest disproportionally in the negatively skewed assets (Dijk et al.; 2014).

Thus, traders are influenced by their perceived performance relative to others even if there are no monetary tournament incentives, meaning that this is a social and not a monetary effect. More in general, in the financial industry there is a strong culture

of relative performance and social competition (Kirchler et al.; 2017). Although with no direct monetary consequences, rankings between financial professionals increase risk-taking (especially for under-performers) because of the desire for positive self-image.

Conclusions

Different contexts have different particularities which imply also different challenges. Because of presented differences, although answers provided by agency problem sometimes are generalizable to the delegated portfolio management, in order to answer to questions arising from the specific delegated portfolio relationship, we have to look to characteristics of this contract in itself and provide tailored answers for this type of relationship.

Because of the (further) difficulty to disentangle some possible effects, the methodology which helps in this case are laboratory experiments: the experimental method allows the experimenter to control, isolate, and examine specific issues of interest. A common critique to laboratory experiments conducted with participants being students is that they may not be representative of behavior in naturally occurring environments. However, there is evidence from other contexts that students are an appropriate subject pool for the study of social behavior (Exadaktylos et al.; 2013). In the specific context of experimental asset markets the evidence is mixed and it is also context dependent. There is evidence that price bubbles occur both with professionals and students subjects (Smith et al.; 1988). However, there is evidence not only on similarities between the two subject pools, but also on difference between them. In fact, it has been found that professionals exhibit behavior consistent with myopic loss aversion more than students (acting as traders) do, and that professional managers' risk taking is affected by ranking while students' risk taking does not (Haigh and List; 2005; Kirchler et al.; 2017). Furthermore, in an option pricing experiment, Abbink and Rockenbach (2006) have found that in their setting professional traders do not perform better than students do. Despite the evidence on differences between participants being students and professionals, our experiments are exploratory studies with the aim to provide a benchmark which could be later integrated with field experiments before implementing a regulatory intervention.

CHAPTER 2

MY MONEY, YOUR DECISIONS... WOULD YOU CARE?

with Flavio Bazzana, University of Trento (Italy)
and Matteo Ploner, University of Trento (Italy)

Abstract:

In an experimental asset market setting in which participants may act both as investors or as portfolio managers, we investigate the role played by the endowment legitimacy. We question whether and to what extent it affects the investors' allocated performance fee as a compensation for portfolio management or the initial portfolio riskiness they suggest and whether managers recognize investors' endowment legitimacy. We find that, if investors had the power to decide the applied fees in the financial industry the fees should be lower than usually applied ones. Neither managers are affected by endowment legitimacy: prices and volumes of transactions do not differ significantly compared to the *house-money* condition. What will really make the difference is the absence of the investors: managers have a more speculative behavior in that case. We find also an anchoring effect: independently of the treatment, managers anchor to the initial suggested portfolio composition at the beginning and once the final round is approaching, while it looks like they forget about it in the intermediate periods.

JEL classification: C91, G02, G11, G12.
Keywords: experimental asset markets, endowment legitimacy, performance fee allocation, portfolio composition.

2.1 Introduction

In a usual principal-agent problem, the incentives schemes designed by the principal do not necessarily coincide with those expected by the agent. The observed misalignment of the interests of the two players holds also in the delegated portfolio management, which shares some features with the general principal-agent context although with some (significant) dissimilarities, as already described in Chapter 1. In the financial markets specifically, investors usually accept fees applied by the managers or by companies to whom they entrust the own endowment with no possibility to bargain. We find this absence of bargaining power (usually) also in the experimental studies in which, differently than in the field, who defines the contract is the experimenter. Since the investor is the one who will experience (more) the eventual gain/loss in case of good/bad performance of the portfolio manager, it seems important to study his willingness to pay the manager and the possible impact of an incentive scheme being defined by the investor on managers' behavior.[1] Furthermore, according to the last report on the investment choices of Italian households, among main reasons to not demand a professional advice, the second most chosen option was the cost of the advice, considered by the Italian investors to be high (Linciano et al.; 2016).

There is, thus, evidence on the fact that investors think they are paying too much, but there is no evidence on how much they are willing to pay. To bridge this gap we design (and implement) an experimental asset market setting in which participants act as portfolio managers or as investors, and, within this setting we investigate investors' willingness to pay. To the best of our knowledge, this is the first study investigating managers' behavior in experimental asset markets when contracts are designed by the investors. Furthermore, we depart from the literature in which participants acting as portfolio managers invest for fictitious investors, since in our experiment (except for one condition) both managers and investors are in the experimental laboratory.

There is an extensive literature on experimental asset markets, but a common feature of these studies is the use of *"house money"*, called also *windfall money*: the experimenter endows participants with the initial asset, but no effort is required in order to get it. Handing out money to the subjects is a way to ensure that participants do not suffer any net monetary losses. The other side of the story is that participants' behavior could

[1] In case of bad performance of the manager, the investor will experience not only the loss but also the cost of the portfolio management, while the manager will lose only the performance fee. Thus, the two losses differ in magnitude.

be modified as a result of the *house-money effect*,[2], understood as people's tendency to increase risk seeking in the presence of a prior gain (Cárdenas et al.; 2014). Studying the effect of earned endowments as opposed to house money is important not only because of the evidence on windfall gains (house money) being spent more readily than other type of assets (Arkes et al.; 1994), but also because of the external validity of lab experiments: if our aim is to mimic settings outside the lab, we have to take into account that almost all incomes are earned rather than obtained as windfalls (Carlsson et al.; 2009). Despite its importance, there are few studies investigating the behavior of experimental asset markets under earned money condition. Moreover, in these studies the earned money condition is implemented to deal with financial bubbles and find whether the endowment legitimacy may reduce bubbles' occurrence or their duration.[3]

In order to fill the mentioned gaps, we extend the two markets (Low and High risk) design by Kleinlercher et al. (2014) by allowing the investor-manager interaction under the Earned Money (EM thereafter) as opposed to the House Money (HM thereafter) condition. As a further control for the effect of the relationship between managers and investors and possible effects on markets' behavior, we run also sessions in which managers are endowed with windfall money and invest on the behalf of a fictitious investor (HM_NOInv thereafter). Thus, on one hand we investigate whether and to what extent endowment legitimacy play a role in this context, and on the other hand, how the presence of real versus fictitious investors affect market behavior. In the light of the increasing digitalisation of the investment service (UNCTAD; 2017), the latter comparison assumes a high importance. Compared to the traditional investment service, the digital service makes the relationship between portfolio manager/financial advisor and investors weaker: the setting with fictitious investors mimics the weak relationship between the two players. To the best of our knowledge, this is the first study addressing the question on whether and to what extent the investors' presence in the lab matters. The possible effect of this interaction will be studied in terms of market prices and volumes of traded assets, in terms of portfolio composition and portfolio deviation from initial (suggested) portfolio riskiness.

[2]This behavioral pattern has been introduced in the finance context by Thaler and Johnson (1990) and gets its name from the casino phrase "playing with the house's money": players refer to money they won from the casino as house money (the casino is known as "the house"). According to Thaler (1999), "house money" is an example of mental accounting: often gamblers who have won some money early in the evening put that money into a different pocket from their "own money". This mental separation of money in separate "accounts" leads investors to view these profits as disposable, and act as if they are bidding with casino's money, and not with own money.

[3]See e.g. Corgnet et al. (2015); Paul et al. (2015); Ang et al. (2010).

This chapter is structured as follows. In section 2.2 a literature review is provided. Based on the related literature we will position our study by specifying the experimental design (section 2.3) and related research questions to be investigated (section 2.4). Results of the experimental study, conclusions and possible implications will then conclude the chapter. Instructions of the experiment and additional materials will be provided in the Appendix A.

2.2 Literature review

Depending on the context, the evidence of the effect of windfall money on subject behavior in the lab is mixed. In the specific context of experimental double-auction asset markets based on the design by Smith et al. (1988), when participants are required to exert effort in order to earn the initial endowment, Corgnet et al. (2015) find that market bubbles are similar in magnitude regardless of whether subjects trade with earned or endowed money, although there are some differences in transaction volumes. Paul et al. (2015) then conclude that issues of asset legitimacy are not salient for this type of asset markets: bubbles/mispricing occurred with the same frequency and had a similar length/duration in both earned and house money (free money) markets.[4] However, we are not interested in the presence of a bubble or whether the endowment legitimacy may mitigate its occurrence, but we are interested on players' behavior in itself, and, to the best of our knowledge there are no studies investigating these issues.

Another feature of the study is the fact that own decisions will impact on other's welfare. By analysing the experimental literature on decision-making on others' behalf when own decisions affect others' welfare, no univocal answer emerges on whether deciding for others involves a higher (risky shift) or lower level of risk taking (caution shift) than for themselves. In fact, from lottery context, mixed evidence on the assumed degree of risk aversion is observed: there are studies in which participants are less risk-averse when choosing for others than for themselves (Chakravarty et al.; 2011), and other studies in which the opposite is true (Reynolds et al.; 2011; Montinari and Rancan;

[4]The two studies implement the same market structure designed by Smith et al. (1988) and this makes the two studies comparable. The difference between the two studies relies on the way the authors implement the earned money condition. Participants to the study by Corgnet et al. (2015) were asked to download papers and contribute to the development of a database and the payment was fixed independently of the exerted effort. Paul et al. (2015) instead use a GMAT-based quiz and explicitly map the effort to earnings in order to allocate participants to one of two markets on the basis of their relative performance in the quiz: the market for the better performers is characterised by higher (expected) earnings than the other.

2013). There is also evidence that people exhibit less loss-aversion when deciding for others (Mengarelli et al.; 2014), and that subjects who make choices for themselves take less risk than those deciding for others when losses loom. These findings are consistent with the interpretation of loss aversion as a bias in decision making driven by emotions that are reduced when deciding for others (Andersson et al.; 2014).

Consistent with this interpretation, from a psychological perspective, there is evidence that people attach different weights when their decisions affect only themselves compared to when it affects someone else's wealth. Based on Constructual Level Theory (i.e. psychological distance), Lu et al. (2013) have shown that this difference is due to the fact that people attach different weights to *desirability* and *feasibility* when deciding for themselves or for others. More precisely, in decision-making processes, individuals deciding for others tend to focus more on *desirability* (prominent attributes), while the focus is on *feasibility* (both important and less important attributes) when deciding for themselves.

A further support is provided by Beisswanger et al. (2003) who argue that differences in decision making for oneself compared to decision making on other's behalf are higher the higher the emotional involvement of the participants. From a neurological point of view, taking inter-temporal decisions for oneself compared to deciding for others, implies the activation of areas of the brain which have to deal with emotions and reward-related because of the preference for immediate reward, areas which are less activated when deciding for others (Albrecht et al.; 2010).

According to some authors, the observed "cautious risk shift" can be explained by the *"responsibility alleviation principle"*: agents feel responsible for other's wealth and they behave in a more pro-social manner which translates also in a more conservative risk-taking (Charness; 2000; Charness and Jackson; 2009). By introducing the justification requirement rather than comparing decisions under responsibility to individual decisions, Pahlke et al. (2012) find the *"accountability principle"* to be an effective mechanism in reducing loss-aversion bias.[5] In fact, there is evidence from investment game context that agents deciding for the principal make less risk averse investment decisions compared to those who invest for themselves (Pollmann et al.; 2014).[6] However, the risk

[5] In this study, after the experiment agents could be asked by their principal to explain the reasons behind the made decisions.

[6] In this study, in a between-subjects design authors run 4 different treatments: a treatment (OWN) in which subjects invest for their own account, the second (OTHER) in which agents invested the endowment of another passive player (principal) but the principal could not influence or reward the decision of the agent. In the other two treatments, REWARD BEFORE and REWARD AFTER, the agent makes an investment decision which is then communicated to the principal, and the latter can reward the agent on

taken on other's behalf differs according to the way the experimenter manipulates the "accountability": if agents have to explain their choices to the principal, agents become more risk-neutral (since loss-aversion will be difficult to be explained), while in the case in which accountability is reward-based, the agent behaves more closely according to preferences of the principal. More than an alternative theory, the two theories could be seen as complementary: as Pahlke et al. (2012) point out, *"some form of accountability is generally present in real-world decisions under responsibility"*.

In the specific context of the experimental asset markets, when participants acting as portfolio managers are asked to invest for themselves compared to when they are deciding on behalf of a group of clients or both for them and for the clients, managers invest significantly less for others than for themselves (Füllbrunn and Luhan; 2015). Although this result supports the "responsibility alleviation principle", this "cautious shift" effect is driven by those with low levels of risk-aversion. In fact, if individuals are highly risk averse, authors find risk-shifting. More in general, it looks like managers asked to decide on behalf of others invest the same amount they believe their investors would invest for themselves. Although this study seems to find support for the responsibility alleviation principle, authors find also that managers consider own interests as being higher than those of their clients. Thus, also in the experimental asset market the evidence on decision-making on others' behalf is mixed.

2.3 Method

In the just presented context, the aim of this study is to experimentally investigate how do investors and manager behave when the bargaining-power to decide the applied incentive scheme is fully in the hands of the investors. To reach our goal, we design an experimental asset markets setting in which investors entrust their gained/windfall money to portfolio managers who have no own endowment to invest, and thus, they can only invest on investors' (real person or fictitious) behalf. As a compensation for the asset management, managers are paid a 2% management fee plus a share of the profit - defined as the difference between the final and the initial value of the portfolio whose percentage is decided by the investor.

The experiment consists of different parts: the sequence of the events in shown in Fig. 2.1. For the first two parts of the experiment, participants are randomly matched and "work" in groups of two: one participant acts as investor and the other one as portfolio

the basis of his investment before or after knowing the outcome of the risky asset.

manager. The group composition remains the same throughout the experiment. Participants' payment for the first two parts is the result on the effort they exert individually and on the decisions they make. Throughout the experiment participants use the experimental currency ECU, and the final payoff is converted in Euro according to the conversion rule: *500 ECU = 1 Euro*.

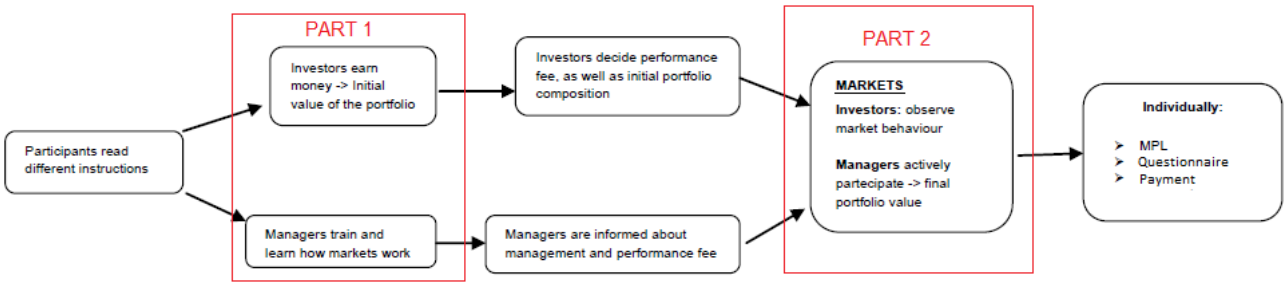


Figure 2.1: The experimental structure

In the first part of the experiment, participants acting as investors and those acting as portfolio managers are asked to perform different tasks. More precisely, participants acting as investors in the EM condition are asked to exert a real effort task in order to earn their initial endowment: the task consists in counting and writing in the designated space the exact number of ones present in a 10×10 table.[7] The earning task lasted 5 minutes (preceded by an additional minute for training): for every correctly counted table, investors get 200 ECU and zero otherwise. The amount of ECU investors obtain defines the initial value of the portfolio and it is needed as reference point in order to determine whether the manager is entitled to receive the performance fee or not.

During the first part of the experiment, participants acting as portfolio managers get acquainted with markets' functioning. Before the training periods start, participants become familiar wit the training screen. After the tutorial, managers experience two training periods in which they are endowed with a fictitious portfolio: the performance in these rounds has no impact on the final payment. At the end of the training part, participants familiarize also with the process determining the final value of the portfolio.

Before the main trading periods begin, participants enter an intermediate stage. In this stage investors are informed about the initial value of their (earned or not) portfolio.

[7] Differently than in the study by Corgnet et al. (2015) in which participants get the same endowment independently of the exerted effort, our aim is to have a performance-based endowment with an initial value proportional to the exerted effort. Our approach is similar to the one implemented by Paul et al. (2015), although with a different task: we implement a real effort task requiring basic knowledge (counting) and not specific knowledge (needed for the GMAT test) as Paul et al. (2015) do. In this way we do not introduce any potential bias nor favour none of the participants in obtaining a higher initial value of the portfolio.

Investors are asked to decide the initial portfolio composition and the share of profits to be allocated to their manager: the investor can choose anything between no performance fee at all or, at the other extreme, assign 100% of profits.[8] Once the training part is finished, also portfolio managers enter this intermediate stage: they are informed about the initial value and composition of their portfolio, about the corresponding amount in ECU for the management fee and the percentage of profits (the performance fee) the investor decided to allocate.

In the second part of the experiment only portfolio managers participate actively, while investors are passive actors: investors observe the behavior of the markets, with no information about manager's performance by the end of the experiment. The only information investors have is the chronological order of the closed deals in the respective markets. The final value of the portfolio of each pair depends (mostly) on managers' performance in this second part: the lower is the number of stocks they have at the end of the experiment, the lower is the impact of the random process which determines the final payback price the experimenter will pay for their stocks in the respective markets.[9]

The experiment continues then individually: every participant, independently of the previously assigned role, faces the Multiple Price List (MPL), a task which allows to measure their degree of risk aversion (Andersen et al.; 2006). Participants are asked to choose between two lotteries for 10 consecutive rows: for every row participants have to indicate whether they prefer option A to option B, or if they are indifferent between the two. As in Holt et al. (2002), the number of the safe choices is the measure of the individual's risk aversion.[10] After all decisions are made, one decision is randomly selected *ex post* and played for real, and the corresponding outcome is add to the final payment of the participants.

To measure the social preferences of the participants we conduct the Social Value Orientation (SVO) task (Murphy et al.; 2011). Participants choose how to split an amount

[8]Compared to the study conducted by (Pahlke et al.; 2012), our design reminds their REWARD BEFORE treatment. There are however some differences: the experimental setting differs (asset market instead of investment game). Further, compared to their treatment, in our setting the definition of the incentive scheme (by investors) is done and communicated to the manager not only before knowing the outcome but it is defined even before the manager starts to trade in the experimental asset markets.

[9]Detailed information about this process will be provided in markets' description section.

[10]A well-known disadvantage of adopting MPL as risk-attitude elicitation task consists in the possibility of multiple switching point: some subjects switch from Option A to B and viceversa more than once as they move down the rows of the MPL (Andersen et al.; 2006; Charness and Gneezy; 2012). Holt et al. (2002) qualify the switches back and forth as "errors", and use the number of the safe options selected as a measure of risk aversion even for participants who switched more than once because there is still a clear division between clusters of safe and risky choices. Moreover, Andersen et al. (2006) and Charness and Jackson (2009) point out that switching behavior is another way for participants to express indifference.

of (experimental) money between themselves and a randomly picked (by the computer) person in the lab.[11] Choices made by the participants will allow to compute the "SVO angle" which will then identify the degree of prosociality of the participant as one of the following types: altruist, pro-social, individualist or competitive. One of the decisions is played for real and the amount they get is added to the final payment.

The experiment concludes with a short questionnaire including general demographic questions followed by some statements to quantify how much the participants agree with the proposed sentences.[12] The final payment of the participants consists of the 3 Euro show-up fee, plus the payment of the trading part (the sum of the two fees for managers and the profit minus fees for investors) and plus the outcome of the MPL and SVO tasks.

2.3.1 Markets' description

In our experiment, there are two market settings characterized by assets with two different levels of risk: High (HR) or Low Risk (LR) (Kleinlercher et al.; 2014). The two assets do not pay any dividend during trading sessions, and only at the end of the last trading session all stocks (each manager has) are bought by the experimenter according to specific market rules. More precisely, in the LR market, the payback price may be 20 or 30 with equal probability, while in the HR market, the payback price may be 65 with 20% probability or 15 otherwise.[13] At the end of the last trading round, the final value of the portfolio (of each manager) is determined by summing cash and the random payback price multiplied by the corresponding number of stocks (*NumStocks*) in the respective market.[14] More precisely, the final value of the portfolio for a manager *"i"* is:

$$FinalValue_i = Cash_i + \left(PaybackPrice_{LR,i} \times NumStocks_{LR,i}\right)$$

$$+\left(PaybackPrice_{HR,i} \times NumStocks_{HR,i}\right)$$

[11] Participants are informed that the other could be any person in the lab, independently of the roles they were playing before and, especially, independently of the group composition in the main part of the experiment.

[12] Investors and managers were presented with different statements.The translated version of the questionnaire (from Italian) is provided in the Appendix.

[13] The two assets are characterized by a constant expected dividend of 25 ECU but what differs is the variance, which equals to 25 for the LR asset, while for the HR asset the variance is equal to 400 (Kleinlercher et al.; 2014).

[14] The random process determining the final payback price (in the respective markets) is set at individual level and not on global level, which implies that the random process is run independently of what others are paid.

Both experimental market settings are implemented as a continuous double-auction. Managers have the two markets simultaneously displayed on their screen, and they can decide whether to trade in one or both of them. During trading periods portfolio managers are continuously informed about all BID/ASK orders, the chronological order of all closed deals in the two markets, their own holdings both in assets and cash, and the initial portfolio composition (see Fig. A.1). As already anticipated, the only table investors see is the chronological order of the closed deals in the two markets (see Fig. A.2).

At the beginning of each trading period order books of the two markets are empty. Managers are allowed to freely place orders by specifying the amount they want to buy/sell and the price. The posted orders cannot be deleted. When the manager place an order, the amount of stocks and money (if ASK order) is "blocked" in order to make multiple transactions compatible with the available endowment (both cash and assets). There are no transaction costs and borrowing money is not allowed.

Participants are informed that the number of trading sessions has been decided before the experiment started, but it will not be communicated throughout the experiment.[15] The trading sessions are 11 (preceded by two training sessions), 120 seconds each. After every trading period, a *History screen* shows up. Portfolio managers are informed about their cash and stocks holdings in the two markets and the price of the last closed deal in each of the two markets (see Fig. A.3). Both, managers and investors, are informed about the average price per period in the respective markets (see Fig. A.4).

2.3.2 Portfolio composition

During the intermediate stage participants acting as investors are informed about the initial value of their (gained/house money) portfolio. For all investors, part of the initial endowment – 2000 ECU – is automatically converted in cash, while the remaining part is converted in stocks according to the rule *1 stock = 25 ECU*.[16]

Differently than in the already mentioned study by Baghestanian et al. (2017), investors have no opportunity to decide whether and how much of the initial endowment send to the manager and how much to keep or invest otherwise: by default, 100% of the initial endowment, in cash and stocks, is transferred to the manager. What investors can

[15] Subjects might behave differently if they know in advance which is the last period of the session (Friedman and Sunder; 1994). In our case, despite the fact that the number of periods is not specified, participants could think that the maximum number of possible periods is (at most) 15 since in one of the tables in the *History screen*, the number of periods on the *x-axis* is on a 1 to 15 scale (see Fig.A.3).

[16] For simplicity, the cost of a stock is the final expected value (EV) of the two assets, namely, 25 ECU.

decide is the initial portfolio composition: participants are asked to decide how many of the available stocks they want to be invested in the LR and how many of them in the HR market. The percentage of the risky stocks in the portfolio will then determine the level of risk of the portfolio: the higher is the number of risky assets, the higher the (initial) riskiness of the portfolio. The level of riskiness (in percentage on the total number of stocks) of the portfolio is computed as:

$$Portfolio\ riskiness\ (\%) = \frac{Nr\_Stocks_{HR} \times 100\%}{Nr\_Stocks_{HR} + Nr\_Stocks_{LR}}$$

On the contrary, an initial portfolio value lower or equal than 2000 ECU, entitles the investor to a portfolio consisting only of that amount of cash. This means also that, according to our definition, the initial level of risk of the portfolio is zero.

The initial portfolio, as decided by the investor, is then transferred to the manager. The portfolio composition, however, in not binding for the manager who is free to alter it throughout the main trading periods. The composition of the portfolio among managers may differ. This may happen because of investors' different willingness to take risk. Suppose that two investors had 2000 ECU and 40 available stocks to be divided between the two markets. The first investor chooses to have 15 LR stocks and 25 HR stocks, while the second one decides to have 30 LR stocks and 10 HR stocks. This means that, given the same initial value of the two portfolio, 3000 ECU (2000 cash plus 40 stocks, 25 ECU each), their riskiness and composition differ: 62.5% portfolio riskiness of the first investor and 25% portfolio riskiness for the second one. Consequently, the corresponding managers will have (at the beginning of the first period) the same initial value of the portfolio, but with different initial composition.

2.3.3 Treatments

In this study, there are two treatments: the endowment legitimacy (EM condition) is the first one, while the second treatment is characterized by the absence of the investors in the experimental setting (HM_NOInv). For what concerns endowment legitimacy, participants assigned to act as investors are asked to perform a real-effort task requiring concentration and attention. Differently than in Corgnet et al. (2015) in which independently of the exerted effort all participants earn the same amount of

money, in this study, the initial value of the portfolio is based upon the effort the investor exerts: the higher the effort, the higher the initial value of the endowment.

In the baseline group (HM condition), participants acting as investors are endowed with "house money" as in the usually implemented experimental settings. In the HM condition, because of comparability, participants acting as investors are randomly endowed with a portfolio whose initial value is similar to those of the investors in treatment group. For this reason, EM sessions were the first sessions we have conducted. For the remaining part of the experiment (portfolio composition, performance fee allocation, market sessions), there are no differences between the two conditions.[17]

Although also in the baseline group the investors may perform the counting task, their performance has no impact neither on the initial endowment nor on their or others' final payment.[18] More precisely, investors in the HM condition are informed that, while they are waiting for managers to get familiar with the markets, they have the opportunity to perform the counting task, but no reward will be provided for performing or not this task.[19]

The second treatment concerns the absence of the real investors in the experimental setting. As anticipated, participants in this group act as portfolio managers trading for fictitious investors. Market structure is the same as in the previous conditions: the difference wrt the HM condition consists in the fact that, not only the initial portfolio value and composition but also the performance fee allocation is the same as in the EM condition. The instructions in the HM_NOInv condition are the same as in HM condition, with the only difference that there is no reference neither to the presence of the investor, nor to decisions having been taken by participants acting as investors.[20] In order to check the possible implications of the relationship between manager and investor and possible effects on their behavior, HM_NOInv condition is a necessary treatment: it allows us to investigate whether and to what extent decisions taken by a investor (real person) may affect managers' behavior in the markets.

[17]The difference is in the instructions: in the EM conditions all participants are informed that the investor has to gain the initial endowment, while in the HM condition, all participants are informed that the investors will be randomly endowed with an initial endowment whose value may differ.

[18]Instructions for HM condition were expressly modified so that any reference to the compensation for correct answer to be excluded.

[19]Allowing investors in the HM condition to perform the (same) task as in our treatment group helps the experimenter to keep silence in the laboratory while managers get familiar with market sessions and it ensures also that experimental sessions under the EM and HM condition have the same duration. Further, counted tables (per minute) and the self-reported exerted effort can be used as a control for the treatment effect on the exerted effort.

[20]Thus, instructions and experimental setting becomes similar to the usually implemented experimental design in which decisions are taken for a fictitious investor.

2.4 Research questions and behavioral predictions

In asset price markets contexts, there are just few studies investigating the effect decision-making process on others' behalf, when investors experience actual gains or losses. The most common setting in the literature is the one in which all participants act as portfolio managers trading for fictitious investors. We stray from the existing literature by implementing a setting in which both investors and portfolio managers are real people and they are in the same room, excluding the sessions in which the absence of the investor is part of the treatment (HM_NOInv).

There is evidence that the interaction between investors and managers matters and that it affects market behavior in terms of bubbles' duration (Baghestanian et al.; 2017). However, to the best of our knowledge, there are no prior studies investigating investors' preferred performance fee, the portfolio composition they would suggest, nor of studies investigating whether and to what extent the endowment legitimacy affects these decisions. In order to address the mentioned issues, the first research questions we investigate are:

RQ 1: *How does endowment legitimacy affect investors decisions?*
RQ 1a: *In terms of allocated performance fee?*
RQ 1b: *In terms of investors' initial portfolio riskiness?*

Because of the lack of evidence from delegated portfolio management, we will consider results obtained in other (similar to some extent) contexts. There is evidence from the dictator game (DG) context that endowment legitimacy is recognized and the effort induces participants toward selfishness and diminishes the altruistic behavior (Cherry et al.; 2002; Oxoby and Spraggon; 2008).[21] In line with this reasoning, a transfer (to the manager) of equal value, has a different "symbolic" value (for the investor) when earned compared to when he is endowed with windfall money. Given that also in our experiment the initial endowment (and the corresponding value) is performance-based, in line with results from the DG context, we expect investors in the EM condition to allocate a lower performance fee (in percentage terms) than those in the HM condition.

Endowment legitimacy may affect also the initial portfolio riskiness, which might be considered as a "signal" (to the manager) of investor's willingness to take risk. There is evidence that people become more risk taking when endowed with house money (Ackert

[21]The parallelism we make is due to the fact that in our experiment as in the DG context, one of the players decides the reward of the second player, with no bargaining-power for the latter.

et al.; 2006). In line with these findings, we expect investors in the EM condition to choose a less risky initial portfolio composition (lower percentage of risky asset) than those the HM condition.

Because of the interaction between investors and managers, the endowment legitimacy may affect also managers behavior, since they could recognize investors' asset legitimacy and thus, behave differently. Thus, the next research questions we investigate are:

RQ 2: *Does endowment legitimacy affect managers' behavior in the markets?*

RQ 2a: *In terms of deviation wrt the Expected Value of the assets?*

RQ 2b: *In terms of volume of transactions?*

RQ 3: *Does the presence of the investor matters?*

In absence of social spillovers, Corgnet et al. (2015) have found that trading with own earned or windfall money will affect the volumes of transactions. When social spillovers are part of the setting, Baghestanian et al. (2017) have found that when managers are not liable for losses, investors contribute to fuel the bubble, meaning that the interaction between the players may influence market behavor. By combining the two studies (although the settings are structurally different which make the generalizability difficult), we expect higher volume of transactions under windfall money condition compared to EM condition.

Compared to the baseline (HM) condition, in absence of investors (HM_NOInv condition) we lose the social spillovers and also the possible effects of the "accountability principle". In the baseline condition, although the identity of the manager is anonymous, managers can be affected by the "accountability principle". Experimental evidence suggests that managers, when asked to decide on the behalf of others, they invest the same amount they believe their investors would invest for themselves and that, managers invest for self more than in the case they are delegated to make decisions for others (Füllbrunn and Luhan; 2015). For this reason, compared to the baseline, in the HM_NOInv condition we expect managers to have a more "speculative" behavior (because of no social spillovers involved), with higher activity in the HR market as opposed to the LR market associated also with higher prices.

In order to provide the full answer on how the managers behave in the designed asset-markets, the last research questions to be investigated are:

RQ 4: *Does investors' choices affect managers' behavior?*

RQ 4a: *Which is the role played by the performance fee?*

RQ 4b: *Which is the role played by the suggested portfolio composition?*

If managers behavior are driven by the applied performance fee, consistent with the literature individuating in the incentive schemes the drivers of the undue risk taking (which can be measured here through the percentage of the risky asset in the portfolio), managers will be incentivized to positively deviate from the initial suggested portfolio composition, the higher is the performance fee allocated by the investor. This effect, however, could be mitigated by the presence of endowment legitimacy condition, which might bring to a lower deviation compared to the other conditions.

For what concerns the effect of the initial suggested portfolio composition, we expect that the higher the initial portfolio riskiness, the higher the portfolio deviation. Based on the evidence of investors' contribution to fuel a bubble when it occurs (Baghestanian et al.; 2017), we expect the effect to work also in the opposite direction, which means, to translate in higher (positive) portfolio deviation.

By comparing the three conditions, consistent with the "accountability principle" we expect managers to be influenced by the initial portfolio composition suggested by the investors. Thus, in absence of the investors we expect the managers to not show a pattern suggesting a possible anchor to the initial portfolio composition.

2.5 Results

The experimental sessions were conducted at CEEL (Cognitive and Experimental Economics Laboratory) of the University of Trento (Italy) from July 2016 to November 2017. Participants were recruited among undergraduate or master students who previously subscribed to CEEL's database. Each subject participated in only one experimental session and none of them had prior experience in asset market experiments. The experiment was programmed and conducted using zTree by Fischbacher (2007). Eight market sessions were run for each of our three conditions: EM, HM and HM_NOInv. The total number of students involved in the experiment was 335. Mean age of the participants was 22 years old, almost the same gender composition, and, overall, almost the same share of participants from Economics and Management (E& M) Department compared to

other departments. In total, each experimental session (time to read instructions and to be paid included) lasted approximately 80 min. The overall average payment was €8.8.

2.5.1 How do investors behave?

In order to provide an answer to research questions concerning investors behavior and understand how do they behave in the case in which all the bargaining power deriving from the delegated portfolio management contract is in their hands, we analyze investors' decisions concerning the allocated share of profits to the corresponding manager.

The summary table concerning investors allocated share of profits to reward managers for portfolio management is provided in Table 2.1. As results clearly indicate, both the mean and the median allocated performance fees in the asset legitimacy condition are lower than in the baseline group (HM). However, these observed differences are not statistically significant (t-test: p-value = 0.328).

Table 2.1: The applied performance fees by investors

Condition	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
EM	1.00	2.75	9.50	13.06	20.00	50.00
HM	1.00	3.50	10.00	15.41	25.00	50.00

Although there is no statistically significant effect of the treatment, we obtain another interesting result. Consistent with the findings by Linciano et al. (2016), our investors allocate a significantly lower performance fee than the usually applied (20%) performance fee (Agranov and Tergiman; 2013). Thus, if the bargaining power is in investors' hands, they will be willing to pay half of the usually applied fees: the median share of profits the investors both from the EM and HM condition allocate is around 10% . To the best of our knowledge this it is the first evidence on how much investors would be willing to pay their managers. This provides useful insights for regulatory purposes: if consider only investors' willingness to pay in a regulatory perspective, probably the usually applied performance fee should be around (the median) 10%.

The fact that there are no significant treatment effects is further confirmed also by regression results in Table 2.3 (Models 1 to 3). What will lower the allocated performance fee will be the individual characteristics, namely, being individualist.[22] This result is further confirmed by the fact that, by excluding this variable from the analysis, the

[22]The SVO task has not been performed for all the sessions. For this reason, we reduce the dataset to the only sessions which included this task and results are shown in Model 2.

coefficients do not change significantly, and the only coefficient which becomes marginally significant is the coefficient of the dummy variable controlling for the field of study (E&M department).[23] There is extensive literature supporting the evidence on economics students being more selfish (individualists) than those from other fields.[24] Given that in presence of the SVO coefficient this dummy coefficient is not significant we argue that this marginally significance is due to the absence of SVO effect.

For what concerns the (suggested) portfolio composition, it represents another useful tool in the hands of the investors. Through the specification of initial portfolio composition the investor can (indirectly) tell the manager the own risk attitude. The summary table showing the percentage of risky asset decided by the investors (compared to the total available assets they could allocate) is presented in Table 2.2.

Table 2.2: Investors' suggested portfolio composition

Condition	**Min.**	**1st Qu.**	**Median**	**Mean**	**3rd Qu.**	**Max.**
EM	0.00	25.00	34.82	35.45	50.00	71.59
HM	0.00	26.04	37.50	38.80	48.22	100.00

According to the results, if investors are allowed to decide how many of the available stocks they are willing to be invested in the HR and how many of them in the LR market, the average portfolio riskiness under endowment legitimacy condition will be around 35%, while it will increase to 38% in the baseline condition (HM). However, this difference in mean is not statistically significant (t-test: p-value = 0.263) nor the variance is (F-test: p-value = 0.918). This is further confirmed by regression results in Table 2.3 (Models 4 to 6): the treatment effect although negatively affecting the level of the portfolio riskiness, it is not significant. Furthermore, the only relevant variable in influencing initial portfolio riskiness is the gender variable: in line with the existing literature, females decide for a lower portfolio riskiness.[25]

We further check whether investors perceived the counting task as important since determining their initial endowment: we find that in the EM condition as opposed to baseline (HM) the reported exerted effort in the counting task was significantly higher (p-value = 0.013),[26] supported by the fact that the counted tables per minute in the

[23] This is a dummy variable assuming value 1 if the participant is studying E& M and zero otherwise.

[24] See among others Frey and Meier (2003); Bauman and Rose (2011).

[25] See for example Charness and Gneezy (2012).

[26] Thereafter, when the averages are compared, the statistical test we refer to is the Wilcoxon-Mann-Whitney test, while for the difference between two distributions, p-values are computed by running the Kolmogorov-Smirnov test.

Table 2.3: Investors' decisions and possible determinants

	Dependent variable:					
	Allocated Performance fee			Initial portfolio riskiness (in % of HR asset)		
	(1)	(2)	(3)	(4)	(5)	(6)
Earned Money	−2.346	−3.492	−3.530	−3.350	−1.766	−2.639
	(2.408)	(2.888)	(2.476)	(2.981)	(3.626)	(3.049)
Svo type= individualist		−7.148**			−2.196	
		(2.847)			(3.574)	
Svo type= competitive		−14.259			5.464	
		(14.166)			(17.784)	
Risk averse		0.344	0.413		−0.159	−0.645
		(3.281)	(2.752)		(4.119)	(3.389)
Age		−0.137	0.160		−1.072	−0.656
		(0.683)	(0.592)		(0.857)	(0.729)
Female		1.465	2.097		−8.381**	−6.999**
		(2.897)	(2.457)		(3.637)	(3.026)
E& M Department		−1.917	−4.637*		1.415	1.304
		(3.015)	(2.607)		(3.785)	(3.211)
Constant	15.408***	22.147	13.453	38.803***	66.645***	56.008***
	(1.658)	(16.089)	(13.898)	(2.053)	(20.199)	(17.115)
Observations	135	99 (a)	135	135	99 (a)	135

Note: *p<0.1; **p<0.05; ***p<0.01

(a): Observations from the only sessions in which the SVO task was performed.

EM condition was higher (p-value= 0.001).[27] Thus, exerting effort to gain the initial endowment was perceived as relevant by the participants although we do not find support for significant treatment effect on their choices.

Thus, our first results can be summarized as follows:

Result 1: *Endowment legitimacy does not affect neither investors' willingness to pay their manager nor the initial portfolio riskiness they suggest. The only significant effect in allocating the performance fee is driven by personal characteristics: participants being individualist allocate a lower performance fee. For what concerns the suggested portfolio riskiness only the gender matters: females suggest a less risky initial portfolio composition than males do.*

Result 2*: Both the average and median allocated fees - both in the EM and HM condition - are bellow the usually applied (20%) performance fee within the fund management industry.*

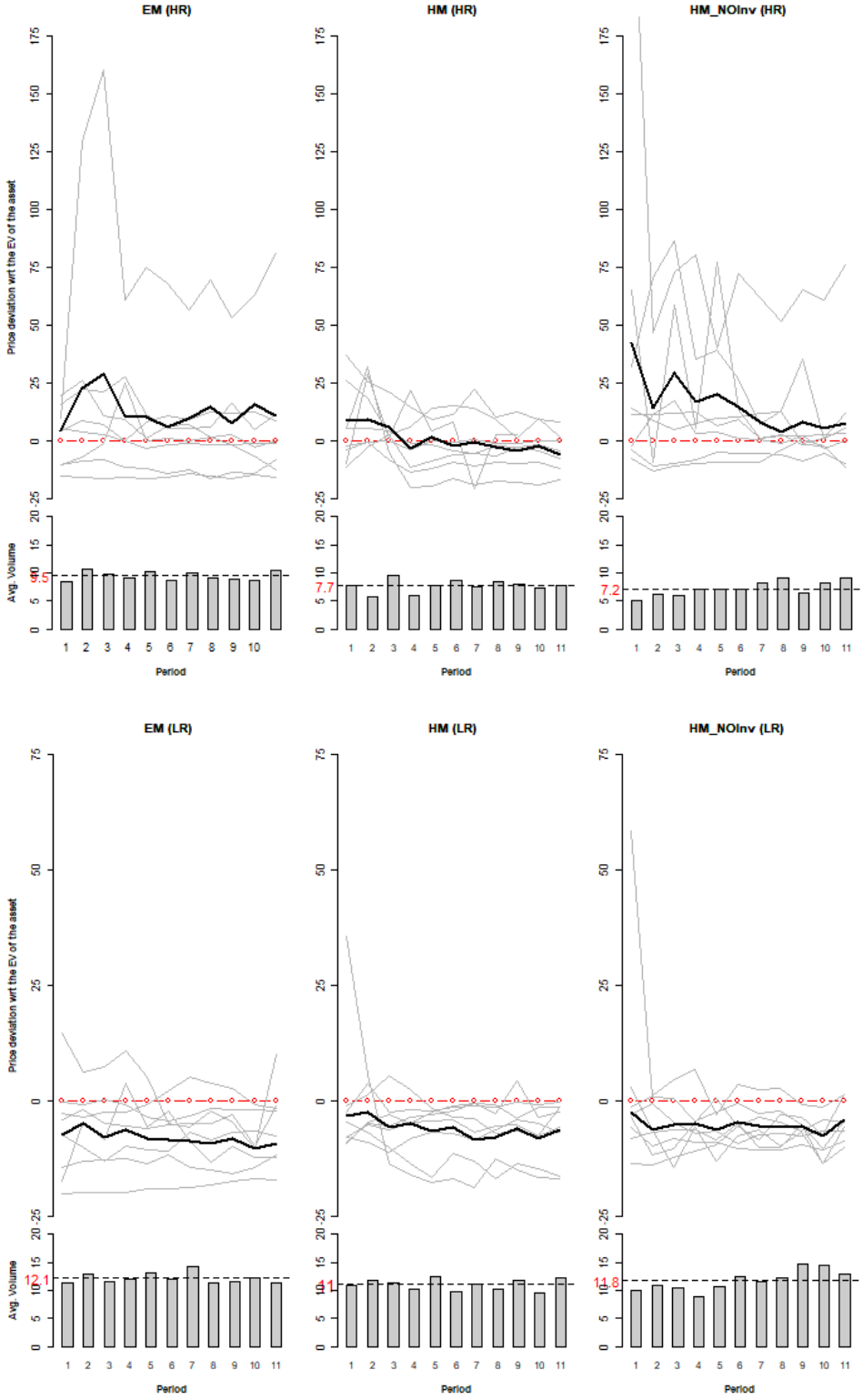
2.5.2 How do managers behave?

The second result we want to provide answers questions about managers behavior, both in terms price (of the closed deals) and their deviation relative to the EV of the assets and in terms of exchanged quantities per period in the respective markets. The summary of these variables is presented in Fig. 2.2: in the upper part of the graphs the overall average price deviation per condition is represented by the black bold line, while the average price deviation per session within the conditions is represented by the grey lines. The red line (with dots) is drawn in correspondence of zero and it represents the reference point to compute the price deviation: a null price deviation means that the price of the closed transaction equals to 25, which is the final EV of the assets. In the lower part of the graphs, the average traded volumes of the (two) markets per period is represented by the histograms, while the overall average volume of transactions per condition is represented by the dashed lines.

What we find is that managers' behavior in the two markets is different: in the HR market there is a positive deviation wrt the EV of the assets, while the deviation assumes negative sign in the LR market. Statistical analysis shows that overall mean

[27] For the sake of completeness, we check for a possible effects of the exerted effort on the allocated performance fee or on the portfolio riskiness. However, regression results do not show any significant relationship between these variables and the initials suggested portfolio riskiness.

Figure 2.2: Mean price deviation (per period and per condition) wrt the EV of the assets and average volumes of transactions. On the *x-axis* we have the *"Period"*, while on the *y-axis* the *"Price deviation wrt the EV of the asset" in the respective markets and conditions*.



price deviation between HR and LR market within each condition differs and that this difference is statistically significant (p-value< 0.001 within each condition). The same observed results hold also for the observed average volumes of transactions within conditions.

For what concerns the between group analysis, in the EM conditions compared to the baseline, in the HR market there are no statistically significant differences in mean price deviation (p-value = 0.289) and the result holds also in the LR market (p-value = 0.155). We do not find statistically significant difference neither in the overall volumes of transactions (per period) in the HR market (p-value = 0.483) although the two condition differ for what concerns the number of the concluded transactions per condition (p-value=0.02).[28] This means that although the level of activity (number of transactions) differ, the overall exchanged volumes per condition does not: a higher number of exchanged quantities mitigates the effect of the higher activity in the market. For what concerns the LR market, results of the statistical test indicate that the difference in overall volumes of transaction (per condition) is marginally significant (p-value = 0.03), while the number of concluded transactions do not differ significantly (p-value=0.59).

Results change in absence of investors. Compared to the baseline, in the HM_NOInv condition both prices deviation wrt the EV of the assets (p-value=0.006) and the overall volumes of transactions are higher and statistically significant (p-value=0.001). We do not find significant differences also in the number of the concluded transactions between the two conditions (p-value= 0.24), nor the observed differences hold also for the LR risk market: the to conditions do not differ neither in mean price deviation (p-value = 0.387) nor in the average volumes of transactions (p-value = 0.155) or in the number of concluded transactions per condition.

According to linear mixed-effects regression results (see Table 2.4)[29] we can conclude that endowment legitimacy of the investor does not affect managers behavior neither in terms of price deviations wrt the EV of the assets nor in terms of overall volumes of transactions. Trading for fictitious investors instead has a significant effect especially on the volumes of transactions: managers in this condition trade significantly lower

[28]The volume of transactions is the sum of the all exchanged quantities per period while the number of concluded transactions means the number of closed deals per period in each of the two markets.

[29]The model we run here is a linear mixed effects model with random effects on SubjectID and (experimental) SessionID. We cannot use here (and also in other regressions) an OLS model because the independence assumption would be violated. Through the mixed effect model instead we account for by-subject and by-session differences in the dependent variables. As a further check, we control for the possible effect of the individual characteristics and other variables on the percentage of the risky asset at the end of the last trading period (see Table A.1): besides the initial portfolio composition, none of the considered variables are statistically significant.

Table 2.4: Markets' behavior: prices deviation relative to the EV of the assets and volume of transactions

	Dependent variable:	
	Price deviation wrt the EV of the assets	Volume of transactions per period
Earned Money (EM)	2.004	−4.415
	(6.310)	(7.340)
Period	−0.338	−0.624
	(0.214)	(0.518)
NO Investor	6.727	−14.070*
	(6.335)	(7.340)
High Risk market (HR)	21.317***	−20.233***
	(1.509)	(3.514)
EM : Period	0.407	0.169
	(0.268)	(0.636)
Period : NO Investor	−0.434	1.015
	(0.276)	(0.636)
Period : HR	−1.032***	0.238
	(0.219)	(0.518)
Constant	−6.543	50.854***
	(4.511)	(5.476)
Observations	5,218	525
Note:		*p<0.1; **p<0.05; ***p<0.01

volumes but to higher prices although the latter effect is not statistically significant.[30] Compared to the LR market, in the HR market price deviation wrt the EV of the assets is significantly higher while volumes of transactions are lower, which means that on average, compared to the LR market, managers trade lower quantities but to significantly higher prices. Furthermore, given the HR market, the increase in the played number of periods will reduce the price deviation: the "speculative" behavior decreases over time.

As anticipated, the final EV of the two assets is the same in the two markets: what changes is the level of risk the two assets incorporate. The positive deviation wrt the EV of the assets suggest that the difference in final expected values in the HR market looks like increases the probability of the speculation to take place, especially when investors are fictitious. This results is further confirmed by the fact that differences between HR and LR market (in terms of price deviations) within conditions are statistically significant. Hence, for what concerns our RQ 2 and 3 we can summarize our results as follows:

Result 3: *The endowment legitimacy of the investors does not affect managers behavior in the markets neither in terms of price deviation wrt the EV of the assets nor in terms of volumes of transactions.*

Result 4: *The presence of the investors matters. Compared to the baseline, when investors are fictitious, managers trade lower volumes in both markets but to higher prices, especially in the HR market.*

The last check we make regards the random process defining the final value of the portfolio. The (individual) random process deciding for the payback price for two assets at the end of the last trading period did not favour none of the groups: the distribution of the final payback prices for the LR and HR asset is the same between condition. There are no statistically significant differences in the mean realized level of profit – the difference between final and the initial value of the portfolio – between groups ($p - value > 0.5$ for all between-groups comparisons). Assuming the performance of the managers to be measured by the realized profit, we do not find significant difference in their performance.

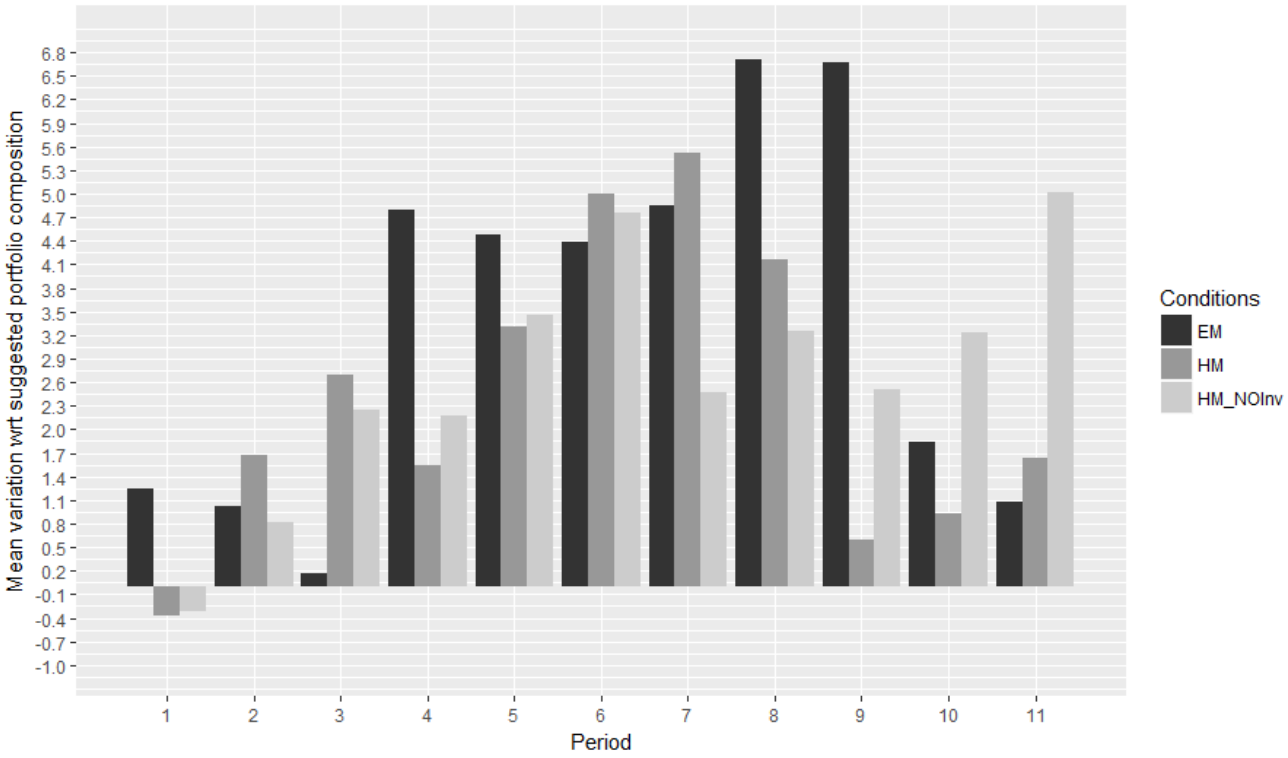
[30] The difference in the number of observations is due to the fact that, for the regression on the volumes of transactions we compare the aggregate results: we compute the average traded quantities per market and per period and then run the regression on the (obtained) means. Furthermore, we have 525 instead of 528 observations (2 markets*24 sessions*11 periods) because in some sessions there were no transactions in one of the two markets.

2.5.3 Do managers follow investors' indications?

Evidence suggests that the interaction between the investor and the portfolio manager matters because it may influence the results (Baghestanian et al.; 2017). In order to conclude our analysis and understand whether this result holds also in our setting, we investigate to what extent managers are affected by investors' decisions. We firstly looking to managers' "reaction" to the suggested portfolio composition and then, we check whether the portfolio deviation (whether observed) is affected the allocated performance fee.

In order to investigate managers' deviation relative to the initial (suggested by investors) portfolio composition, we compute the portfolio deviation as the difference in the percentage of risky asset at the end of every period compared to the initial suggested one. The mean portfolio deviations per period and per condition are shown in Fig. 2.3.

Figure 2.3: Mean portfolio deviation per period and per condition



What we observe in Fig. 2.3 is that managers positively deviate wrt the initial portfolio composition, which means that compared to the initial suggested percentage of the risky component, the portfolio riskiness at the end the trading periods increases, and

this is true for all experimental conditions. To better understand the observed behavior of the managers (between conditions), we compute a "deviation index", which states "how far" managers deviate from the initial (suggested) portfolio composition. The index is computed as the ratio between the mean of the portfolio deviations at the end of the rounds compared to the initial suggested portfolio riskiness, and the standard deviation of these portfolio variations.[31] Compared to the baseline (HM) there are no statistical differences neither in the distribution of the deviation index under asset legitimacy condition (p-value=0.5) nor in absence of investors (p-value=0.91). This (non) result allows us to conclude that managers in all the conditions not only moved in the same direction (positive deviation) but also the degree ("how far") of deviation was very similar.

The fact that our treatments do not (significantly) affect our results is further confirmed by regression results in Table 2.5 (Model 1), in which the only effect of the two treatments is considered. In order to understand whether the portfolio deviation is related to other factors, we run models 2 and 3 in which other (possible relevant) variables are included. In model 2 the variables we consider are the allocated performance fee and the initial value of the portfolio. Through the introduction of the performance fee into the regression model we check whether the reported (in the literature evidence and) causality between risk taking and incentive schemes finds support also in our setting, while through the *initial value of the portfolio* we check whether a higher initial value of the portfolio contributes to increase the portfolio deviation. Differently, in model 3 only the personal characteristics are included. We find that none of the considered variables are significantly affecting the mean portfolio deviation. Besides the fact that very few managers reported to be satisfied by the allocated performance fee independently of the treatment, based on our regression results, we exclude allocated performance fee as a driver of mean portfolio deviation. Thus, our result does not provide further support to the literature considering the performance-based incentive schemes as positively influencing managers' risk taking in the financial industry.

An interesting finding consists in the fact that, compared to the initial periods, in the intermediate periods managers increase the risky component. To better understand whether observed patterns are robust, we run a regression model by introducing dummy variables for initial (period 1 to 3), intermediate (period 4 to 8) and final periods (pe-

[31] To compute the index we firstly compute the difference in risky component between portfolio riskiness at the end of every trading period and the initial (suggested) one. We compute the mean of these variations and we divide it by their std deviation. The number we obtain is the *"deviation index"*. Thus, our index considers not only the direction of the deviation but also how much the managers deviated from the initial (suggested) portfolio composition in the respective conditions.

Table 2.5: Average portfolio deviation from the initial suggested portfolio riskiness

	Dependent variable:		
	Mean portfolio deviation		
	(1)	(2)	(3)
Earned Money	0.957	−0.074	1.591
	(3.239)	(3.344)	(3.306)
NO Investor	0.264	−0.124	−0.026
	(3.226)	(3.245)	(3.253)
Performance fee	/	−0.037	/
		(0.098)	
Initial Value of the portfolio	/	−0.002	/
		(0.002)	
Risk averse	/	/	−1.052
			(2.888)
Age	/	/	−0.107
			(0.486)
Gender	/	/	3.976
			(2.709)
Constant	2.428	11.187	3.338
	(2.230)	(7.353)	(11.039)
Observations	200	200	200
Note:	*p<0.1; **p<0.05; ***p<0.01		

Table 2.6: Portfolio deviation: dummy variables for the played rounds

	Dependent variable:
	Portfolio deviation (per period) wrt suggested portfolio riskiness
Earned Money	0.956
	(3.239)
No Investor	0.265
	(3.226)
Intermediate Periods	2.892***
	(0.884)
Final Periods	1.088
	(0.955)
Constant	1.080
	(2.285)
Observations	2,200
Note:	*p<0.1; **p<0.05; ***p<0.01

riod 9 to 11).[32] Regression results in Table 2.6 confirm that portfolio deviation in the intermediate periods compared to initial ones is statistically significant.[33]

Thus, in the intermediate periods it looks like managers "forget" about initial suggested portfolio composition. Once the final experimental period is approaching, instead, we find that managers go back to initial suggested portfolio composition. There is evidence that knowing when the experiment finishes, might influence participants' behavior so that a different behavior might be observed (Friedman and Sunder; 1994). Although it looks like this "anchoring" effect is more pronounced for settings in which investors are real, regression results indicate that this effect is not significant: for the accountability

[32]The dummy variables were constructed by following the observed path in Fig. 2.3: the deviation look a much more significant from period 4 to 9, and this is why we decided to define these periods as "intermediate periods".

[33]As a further check, we run a regression model in which Period is considered as factor so that effect per period is captured (see Table A.2 in the Appendix). Regression results confirm that portfolio deviation wrt initial (suggested) portfolio composition is statistically significant from Period 5 to 9.

principle to hold the coefficient of *No Investor* (no accountability) should be significant, but this is not the case. The possible explanation is that the observed anchoring is not due to the interaction between players but it is due to a more general psychological bias, namely the pure *"anchoring effect"* defined by (Tversky and Kahneman; 1974) as the bias toward initial values.

The fact that what we observe is an anchoring effect is confirmed also by the fact that the number of managers reporting that they considered the initial portfolio composition during trading sessions is much higher than those who report that they did not considered it.[34] Thus, what we find is further support to the evidence on managers to be affected by "anchoring" bias.[35]

Based on our results, none of the considered variable can explain why the anchoring effect does not hold also for the intermediate periods. A possible explanation could be that during the intermediate periods they experiment a bit, but once they think the end of the experiment is approaching, they go closer to the initial portfolio composition. The observed change in behavior once the final round is approaching is the opposite compared to the extensive literature on calendar turning points and the one on the (widespread) change in returns once the month is turning.[36] While in these studies market behavior changes between the end of the month/year and the beginning of the new one, we find that managers' behavior changes significantly in the intermediate periods while at the end they restore the initial portfolio composition. The explanation for the observed difference in results can be individuated with the different applied methodology to compute the payment: in our setting the final expected value of the assets is determined by a random process. Probably, because of the high uncertainty of the outcome for the risky asset, our participants prefer to anchor to the initial portfolio composition.

Thus, our last results can be summarized as:

[34]The wording (translated from Italian) was: "During trading sessions, I did not considered the portfolio composition suggested by the investor". In the HM_NOInv condition, we omitted "suggested by the investor". Participants were asked to choose a value between 0 and 5, where 0 is the minimum and 5 is the maximum of agreement with the statement. We do not find significant differences between the (overall) distributions of the provided answers. We then define a dummy variable taking value 1 if managers have reported that they did not considered the initial portfolio composition (those who answered 4 or 5 to this question) and zero otherwise. We the check how many times one or the other answer was provided.

[35]The differences between experiments conducted with professionals compared to participants being students is mixed and it depends on the context. For what concerns the "anchoring" bias, there is evidence that both professionals and students are affected. Although professionals are less affected by this bias than students do, the effect is still significant (Kaustia et al.; 2008).

[36]See among others Ariel (1987); Jacobs and Levy (1988); McConnell and Xu (2008); Aziz and Ansari (2018).

Result 5: *Initial portfolio composition matters. We find evidence that managers anchor to the initial (suggested) portfolio composition at the beginning and once the end of the experiment is approaching, while in the intermediate periods it looks like they forget about it.*

2.6 Conclusions

In an experimental asset markets in which both investors and managers are present, we explore to what extent investors' decisions regarding the incentive schemes and of the portfolio composition affect managers' behavior. We explore players' behavior under two treatment manipulations. Compared to the baseline condition (house money condition), we run a treatment under endowment legitimacy (of the investors) with effort and another one with windfall money but in absence of the investors (i.e., fictitious investors).

We find that endowment legitimacy does not affect significantly neither investors' nor managers' behavior. More precisely, compared to the baseline condition we find investors under endowment legitimacy condition to be less generous in the allocated performance fees, but this effect is not statistically significant. The other relevant decision in the hands of the investors was the initial portfolio composition, which can be seen also as a signal of the own willingness to risk. Nor in this case we find a significant treatment effect: what we find is that females decide for a less risky portfolio composition, which is consistent with the literature on gender difference in risk taking.

For what concerns managers' behavior, we find that endowment legitimacy does not affect their behavior in terms of prices deviation wrt the expected value of the two assets, nor in terms of volumes of transactions. What will affect managers' behavior is the absence of the investors in the lab: compared to the baseline, when managers trade for fictitious investors and there are no social spillovers, their behavior is more speculative: lower volumes are traded but transactions are made to higher prices, especially in the high risk market. Compared to the existing literature this is a novel result. In the usually implemented market settings, investors are fictitious players and not real participants. In our setting instead, the two setting are compared. Based on our results, the weakness (or absence) of the relationship between portfolio managers and investors negatively affects the market behavior. Given the increasing use of the digital economy and also the one of the investment services (UNCTAD; 2017), this result highlights the importance of this relationship in a regulatory perspective: if the aim is to make markets less volatile, it has to be taken into account not only the conflict of interests emerging from to the

relathionship between investors and managers, but also their proximity.

For what concerns portfolio deviation relative to the initial (suggested) portfolio riskiness, besides the fact that we do not find statistically significant difference between the distribution of the deviations between conditions, none of the two treatments nor other considered variables are found to significantly affect the observed portfolio deviations. Furthermore, we observe that managers maintain almost the same initial portfolio riskiness at the beginning of the experimental rounds and once they have the feeling that the last trading period is approaching, while in the intermediate periods it looks like they experiment a bit. The observed behavior do not present differences between conditions. Thus, we do not find support for the accountability principle, while results can be considered to (further) support the *"anchoring effect"*, which refers in this case to the initial portfolio riskiness.

Given that we do not find a significant effect of the suggested (by investors) initial portfolio composition on subsequent managers' behavior in the markets, nor results supporting our hypothesis on performance fee affecting the portfolio deviation, it could be that there are factors (different than the allocated performance fee) influencing the variations wrt initial portfolio composition. If the performance fee is not one of the drivers, it might be that the only presence of the performance fee drives this behavior, but we cannot test this hypothesis.

What is quite robust instead is that, if (all) the bargaining power was in hand of the investors, the performance fees would be almost half the currently applied ones. This result is very important because it relates to the ongoing debate on the performance fees, considered by some authors as one of the drivers of excessive risk taking in the industry. A common practice is to apply small management fees (1-2% of the endowment) and a bigger performance fee (15-25%) which is profit-based. The norm in the market seems to be 2% management fee plus 20% performance fee (Agranov et al., 2013). Our experiment perfectly mimics reality for what concerns fixed fees because the management fee is 2% of the initial value of the portfolio, but what differs is the fact that, while in the financial market investors can only accept the applied performance fee, in our setting the opposite is true: who decides is the investor and the manager accepts the proposed fees. Based on our setting, we find that the mean allocated performance fees in the earned money condition was 13% (median =9.5%), while in the house money condition, the mean performance fee investors allocated to the managers was 15.4% (median= 10%). Although the difference in the allocated performance fees is not statistically significant, what we observe here is that, independently of endowment legitimacy, the average

allocated (by the investors) performance fee is far from the commonly applied (20%) performance fees. Furthermore, according to the Report on Financial Investments of Italian Households, investors state that among main reasons why they do not demand for professional (financial) advice is because of high fees (Linciano et al.; 2016). To the best of our knowledge, this is the first study providing not only a support for these findings, but also a measure of investors' willingness to pay fees. Thus, if consider only investors interests, by combining our results with those of the mentioned report, our feeling is that the usually applied fees are (effectively) too high: probably 10% (the median) performance fee is a better percentage of shared (with the manager) profits.

However, if consider only investors' interest, as expected, we find that managers are not so much satisfied with the allocated performance fee. We are convinced that regulatory interventions should consider interests of both investors' and managers'. There is evidence that the interaction between the two players influence and change the general results. In fact, if we reverse the situation and we let investors to decide the incentive scheme, we find that allocated performance fees are much lower than the currently applied ones. Thus, if our aim is to make both investors and managers happy about the applied performance fees, we have to consider that their interests diverge and the only way to make the two interests to align is to let the two players to bargain on the applied fees. By combining this result with the findings by Linciano et al. (2016) we conclude that by lowering the applied fees (probably) the market participation would increase, which will benefit both managers and investors.

CHAPTER 3

COMPETITION AND DISCLOSURE IN THE FINANCIAL INDUSTRY: AN EXPERIMENT

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and Matteo Ploner, University of Trento

Abstract:

In an experimental investment setting in which investors decide whether entrust the own endowment to a manager or not, we investigate whether the competition between managers in "attracting" investors endowments and/or the disclosure about other competitors' practices influences managers' decision concerning the proposed combination of fees for portfolio management. Furthermore, we investigate also which are portfolio managers and investors prefered fees combination. Within this setting, our main findings are: i) Competition encourages market participation; ii) Competition benefits both the investors and the managers: the former pay lower fees and the latter are able to collect more capital to be managed; iii) Disclosure about other managers does not heavily affect market dynamics; iv) Better performing managers attract more capitals, though better performances are mainly driven by chance.

JEL classification: C92,D4, G4, G11

Keywords: Delegated portfolio management; competition and disclosure; conflict of interests; incentive schemes; market competition;

"In theory, theory and practice are the same. In practice, they are not."
Albert Einstein

3.1 Introduction

The occurrence of a financial bubble constitute a violation of Fama's (1970) efficient market hypothesis, which implies that all available information is anticipated and already incorporated by market prices. But within the financial market this is not the only contradiction to theoretical predictions. According to the (general) economic theory, in a competitive market, the price is determined by the intersection between demand and supply, price equal to marginal cost, there is full disclosure of information, none of the market players is a market maker, no transaction costs, no barriers to enter or exit the market, and, more in general, all the players are better-off. If refer to financial industry and to the delegated portfolio management specifically, field evidence is a bit different: the price is not necessarily equal to marginal cost, there are big funds managed by few managers, there is asymmetric information between players, there are transaction costs which affect market participation, and so on.

While economic theory predicts all market players to be better-off within a competitive market, opposite (and mixed) outcomes are provided by the field evidence: there is still a debate on whether competition in itself is the problem or whether the incentive schemes are designed not in a suitable way (Rajan; 2006; Golec and Starks; 2004; Drago et al.; 2010). The presented divergence in opinions does not help to solve the other challenges the financial market is facing. Beside the increased competitiveness, in the recent years, financial market faced also an increase in the demand for delegated portfolio management. There is thus the need for an agreement on the source of the problem so that regulatory interventions could be designed appropriately and provide (also) the expected outcomes. If the incentive scheme in itself is the problem, there is the need to find a contract that does not induce managers to take undue risk, but it has to be designed in such a way that it accounts also for the difference in investors' and managers' incentives and interests. On contrary, if the problem is the market and the competition

between managers, other tools have to be adopted in order to make the field evidence to fit economic predictions.

By using the presented context as starting point, we implement an experimental delegated portfolio management setting characterized by competition between managers to get investors' endowments when practices of other competitors are disclosed: we will call this setting (competition and disclosure) thereafter as the *"market structure"*. In this setting, we investigate which are the dynamics consequence of the interaction between investors and managers, and whether and to what extent these dynamics are affected by the market structure. More precisely, we are concerned about the agreed fees combination and about portfolio strategies.

Based on our setting, we find that: i) Competition encourages market participation; ii) Competition benefits both the investors and the managers: the former pay lower fees and the latter are able to collect more capital to be managed; iii) Disclosure about other managers does not heavily affect market dynamics; iv) Better performing managers attract more capitals, though better performances are mainly driven by chance.

The study is structured as follows. In section 3.2 a brief literature review will be provided to position the study and the research questions. In section 3.3 we provide a description of the experimental design by specifying the treatments and the implemented methodology. The results of the experiment are presented in section 3.4 and it is divided into subsections investigating managers' behavior, investors behavior, market concentration and investment strategies. The conclusion and discussion will be provided in section 3.5. Additional tables and figures, experimental instructions and screenshots are presented in Appendix B.

3.2 Positioning the study and research questions

The fact that market competition brings market inefficiency (the observed higher risk taking) is something which contradicts theoretical predictions: according to the economic theory in a competitive market, more in general (besides other features), all market players are better-off. By referring to the consequences of the last financial crisis, if the competition (between managers) is the problem, it is clear that there is the need to deepen the role of the competition within the financial markets.

The delegated portfolio management framework has been already discussed in Chapter 1 of this thesis. It has been already anticipated also the fact that general theoretical predictions are not supported by the evidence. For what concerns market competition,

while general economic theory predicts a well functioning market, evidence suggest that this is not the case. According to some authors, among drivers of the most recent financial crisis we find the competition within financial market and how managers reacted to it, the applied contracts and the consequences of some ”errors” in the design.

For what concerns the relationship between competition in the markets and the charged fees in the mutual fund industry, while economic theory predicts fees to be lower in a competitive setting, in the literature there is an ongoing debate on whether they increase with competition or not. To the already presented evidence suggesting that fees are high, Coates IV and Hubbard (2007) argue that the opposite is true and that these markets are actually very competitive also in terms of fees. To better understand the sign of this relationship, Parida and Tang (2017) have analysed a dataset on US equity funds from 2000 to 2015. What they find is puzzling: funds operating in more competitive markets increase the charged fees. Furthermore, what authors find is that in the competitive settings the expense ratio is driven by the increase in management fees which are not caused, however, by the higher costs of fund operations. In line with the view of Christoffersen and Musto (2002), Parida and Tang (2017) explain this behavior as being consistent with the strategic fee setting (by funds): given that more performance-sensitive investors prefer less competitive markets (because of the better and more persistent performance), those which are relatively less performance-sensitive will end up in the competitive setting. Because of the inelastic demand curve faced in the competitive setting, funds increase the management fees by taking advantage of this demand characteristic, which will then reduce the net return to the investor. Consistent with this interpretation, based on a dataset on the U.S. Mutual Fund for the period from December 1961 to December 2005, Gil-Bazo and Ruiz-Verdú (2009) have found that here is a negative relation between the performance of the funds before-fees and the charged fees. The empirical analysis supports the strategic-pricing explanation: ”lower expected before-fee performance and funds with less elastic demands charge higher marketing and non-marketing fees”.

”Does it pay to pay performance fees?” This question was addressed by many authors. By analysing (40 to 108) mutual funds from 1990 to 1999, this question has been addressed by Elton et al. (2003). What authors find is that, compared to funds without (fulcrum) incentive fees,[1] empirical evidence suggests that in the funds with incentive fees there is a better stock selection ability. Authors find also that the risk taken in funds

[1]It is a performance-based fee charged if the portfolio performance is greater that the one of the benchmark.

with fees is higher than in those without fees. Furthermore, after a bad performance managers increase risk taking while they decrease it after a good performance. Despite the beta less than one, in funds with incentives this beta is greater than those of the funds that don't use incentive fees.[2] A different evidence is provided by Broeders et al. (2017) who investigate the relationship between investment returns and the paid performance fees, by analysing a dataset including 218 Dutch occupational pension funds from 2012 to 2015. Authors do not find significant evidence of the pension funds paying performance fees to asset managers for active investing to perform better or worst than pension funds that do not pay performance fees. Thus, the evidence answering the relationship between fees and performance is mixed.

The other relevant aspect considered in this work is information *disclosure*, which is one of the key factors for an effective decision-making by the investors (and other stakeholders). In fact, providing higher quality disclosures pays: based on a dataset including trades and portfolio positions of individual investors at a major U.S. discount-brokerage firm for the period between January 1994 and December 1996, Lawrence (2013) has found that individuals invest more in firms with better financial disclosures. Because of the importance assumed by financial disclosure, to help investors to understand financial statements is one of the objects of regulation of the Securities and Exchange Commission (SEC).

There is evidence that because of the limited attention and processing power, different presentations of the information will provide different results (Hirshleifer and Teoh; 2003; Hogarth et al.; 2011; Securities et al.; 2012). Furthermore, many investors do not read the disclosure documents containing information on mutual fund costs nor pay sufficient attention to mutual fund expenses (Palmiter et al.; 2008). In order to account for this lack of attention from investors' side and to help investment clients better understand how much they are paying in fees for their mutual funds, on April 14, 2016, the SEC's Investor Advisory Committee recommended investment companies to start printing their fees on customer statements in terms of dollars instead of percentages.[3] These recommendations find support in the evidence that many mutual fund investors underestimate the amount they pay annually in mutual fund fees as well as their impact on investment returns (Securities et al.; 2012).

Beside the already presented differences between managers and investors in terms

[2]It is a measure of portfolio performance compared to the market as a whole. A beta equal to 1 means that the theoretical volatility of the portfolio is in line with the market one, while when lower/higher than 1 means that the portfolio is theoretically less/more volatile than the market.

[3] The full text is available here

of incentives and interests, according to results of a survey examining mutual fund purchase practices conducted by the Opinion Research Corporation on behalf of the Consumer Federation of America, investors and managers have a different opinion on which are the most important factors when selecting a mutual fund. In fact, according to this survey analysis, financial experts consider a fund's risks and its expenses to be the most important factors while according to the investors, reputation of the fund manager (or company) and the past performance compared to other funds are the most important factors. According to professionals, reputation and past performance are less important.[4]

We design a laboratory experiment in which investors entrust the own endowment to a manager who will choose an investment strategy and, according to the chosen combination of fees, be paid for the management of the endowment in every period. In our experimental work, we investigate whether and how the interaction between investor and manager affects fees combinations and investments strategies. Furthermore, we investigate whether market dynamics are affected by knowledge about others' prices and/or by the degree of competition in the market. More precisely, in light of the presented inconsistencies between theory and empirical evidence, the research questions we investigate are:

- **RQ 1:** Does competition affect the Performance fee and Management fee (demanded and paid)?
- **RQ 2:** Does disclosure about others' affect the fees (demanded and paid)?
- **RQ 3:** How does the market structure affect market participation?

We aim to mimic as much as possible a real-world environment which accounts for some of the presented gaps. In order to account for the fact that in their daily jobs professionals are often required to make risky choices for others (such as clients and shareholders) rather than for themselves (Pollmann et al.; 2014), and that these clients are real people, in our setting we have participants acting as investors and others as managers. Furthermore, to mimic the difference in knowledge (and skills) between managers and investors, we restrict the participation as portfolio managers to the only master students in finance, who are more familiar (than participants from other fields of study do) with issues like portfolio management, returns, volatility. For the same (heterogeneity) reason, no restrictions are set for participants acting as investors.

[4]The full text is available here.

In order to account for the different incentives usually faced by investors and managers, participants are allowed to interact and (indirectly) bargain over the fees combination: managers propose a fee combination while investors decides whether and which fees combination to accept. This experimental manipulation allow us to deal with the well recognized conflict of interests: the assumption we make is that in each decisional period, both investors and managers will act so that their decision will (the best) reflect the own interests.

The fee combination we are looking for is the one preferred both by investors and by the managers: we are interested to see whether managers and investors agree on a unique fees' combination or whether multiple solutions emerge. Given that there is no communication between managers and investors nor between competitors, the proposed fees will be a consequence of the market dynamic: given that the investor has also the risk free alternative, by entrusting the endowment to a manager, it means that there is am agreement between the willingness to pay and be paid. As a consequence, because of the possibility to bargain on the applied combination of fees, probably it will positively affect also the market participation.

The information (return and fees) is fully disclosed to investors and to managers whether allowed by experimental setting. In accordance with SEC's Investor Advisory Committee recommendations (April 14, 2016), fees are represented not only in percentage terms but also in (experimental) currency terms. This will benefit not only investors but also the managers who will have a better understanding of how many investors have entrusted them the own endowment. We assume that investors read the financial information we provide because it is functional for the decision making.

In our setting, the (implicit) ranking will be provided by the disclosure of the gross and net returns of the competitors. As discussed in the chapter 1, ranking affects managers' behavior, but there is evidence that it does not affect also students' behavior (Kirchler et al.; 2017). Thus, we assume that ranking effect and also possible implications as evidenced in the literature will not affect our results. Furthermore, we randomize the order of the managers in the lab and, the order in which their performance is shown in the tables seen by investors (and managers when allowed) is a logical order.

3.3 Design

The design of the experiment considers a sequence of events to be repeated for X periods both by managers and by investors. The decisions participants acting in the two roles

are asked to take during the investment task are different: in each period, managers are asked to make an investment strategy and choose a fee combination to apply, while investors are asked to decide whether and to whom (1 out of 4 managers) entrust the own endowment.

When defining their investment strategy, managers choose how much of the disposable wealth allocate to an *index*, a *stock* and a *risk free bond*. The three investment sources differ in terms of expected returns (μ) and also in terms of standard deviation (σ). The characteristics of the investment strategies are the following:

Table 3.1: Characteristics of the financial tools

	μ	σ
Individual Stock	6%	20%
Index	5%	10%
Risk free bond	1%	0%

The underlying distribution of the index and asset returns were simulated. The mean (μ) and standard deviation (σ) refer to those of the entire time horizon, training periods included. Furthermore, the returns of the individual stock and those of the index are independent random draws, and thus, uncorrelated.

The manager may invest 100% of the disposable wealth in one of the financial instruments or allocate a certain percentage in two or all of them, by the only condition that the sum of the percentages must be equal to 100% of the endowment. Managers are not allowed to borrow money or invest own endowment: in the case in which none of the disposable endowments have been entrusted to a manager, the investment strategy is recorded, but the portfolio return for the corresponding period will be zero.

The management of the endowment entitles the manager to the payment of a management fee (M) and (conditional upon a positive profit) of a performance fee (P). Differently that in the usual studies, managers are free to choose the fees combination they ask for the portfolio management. The 16 possible combinations of M and P among which the managers can choose are shown in Table 3.2.

The management fee – a percentage of the endowment – is paid independently of the realized profit, while the performance fee – a percentage of the realized profit – is paid only if a positive profit is realized. Thus, the necessary conditions for the management fee to be paid is a investor's decision to entrust the own endowment to a manager, while for the performance fee, the further condition consists in the realization of a positive profit, defined as the difference between the final value of the investment and the initial value

Table 3.2: Combination of fees (M+P)

	Management fee (M) (% of endowment)				
		0%	**1%**	**2%**	**3%**
Performance fee (P) (% of profits)	**0%**	0%+0%	0%+1%	0%+2%	0%+3%
	10%	10%+0%	10%+1%	10%+2%	10%+3%
	20%	20%+0%	20%+1%	20%+2%	20%+3%
	30%	30%+0%	30%+1%	30%+2%	30%+3%

of the endowment. Whenever the investor decides to not entrust the own endowment to none of the managers, fees are equal to zero for him/her.

3.3.1 Treatments

In a between-subjects design, we randomly assigned participants in groups of 12, 8 of them acting as investors and the other 4 as portfolio managers. The managers are randomly assigned the label "Manager A, B, C and D", and, none of the other participants (in the room) can guess the exact position in the lab because labels are assigned in such a way that they do not follow the (logic) sequence. Groups maintain the assigned roles (and group composition) throughout the experimental sessions. Each group plays only once in one of the 4 conditions we describe below. More precisely, the experiment has a 2x2 design: COMPETITION treatment: *Competition* / *No Competition condition* additional to the DISCLOSURE treatment: *Disclosure* / *No Disclosure condition*.

The COMPETITION treatment concerns, on one hand, managers' ability to attract investments, and, on the other hand, investors' opportunity to choose the manager to whom entrust the own endowment. In the *Competition* condition, managers choose the fee combination they apply, and then, the 8 investors decide whether entrust their own endowment to 1 out of the 4 managers or not. In the *No Competition* condition instead, participants are randomly assigned to sub-groups of 3 participants – 1 manager and 2 investors each – with no possibility to change the composition throughout the experiment. Differently that in the other condition, the investor can now decide whether entrust their own endowment to the manager in the same sub-group or not. When the investors do not want to entrust their own endowment, they can invest the endowment in the risk free bond and get 1% sure return.

In the *Competition* condition, in an extreme scenario all 8 investors could choose the very same manager and no investors for the other three of them. In the *No Competition*

condition, the extreme scenarios are: both investors or none of them decide to entrust the own endowments to the manager. In our setting, if none of the investors entrusts the own endowment to a manager, the investment return of the manager for the specific period is zero. The reason why we do not allow managers to invest also own money is because of the aim to disentangle the possible drivers of the decision to choose a manager compared to others (or none of them). Besides that, by allowing to invest also own wealth will add more noise to the results.

The DISCLOSURE treatment affects only managers, and it deals with the knowledge about other competitors' practices. More specifically, in the *Disclosure* condition, after the fourth training period, managers (and also investors) are informed about other competitors' performance, and, starting with the first real period, they are also informed about the combination of fees each manager has applied in the previous period. By contrast, in the *No Disclosure* condition this piece of information is not provided: every manager knows only her own investment strategy and the corresponding outcome.[5]

For the sake of the informed choice, the *Disclosure* treatment do not concerns also investors: the applied fee combination and the realized (gross and net) returns are key factors and the only information the investors have in order to decide (according to the corresponding treatment) whether and to whom entrust the own endowment. A *No Disclosure* condition for investors in this setting would bring to undesired random choices.

3.3.2 Methodology

The experiment is fully computerized and programmed with zTree (Fischbacher; 2007). During the experiment, all amounts were expressed in Taler. The conversion rule applied to convert from Taler to Euro (and viceversa) is 200 Taler = 1 Euro.

The structure of the experiment is a stage-game: events and decisions of the managers and investors take place sequentially. Participants have been informed that the number of periods they will be playing is between 10 and 25 (training period excluded), and that the exact number will not be communicated in advance. Before starting the real periods (13 periods),[6] managers are given the possibility to get acquainted with the designed investment setting: they have 6 training periods.

[5] An example of the (different) screens shown on managers' displays is presented in Figures B.3 and B.4 in the Appendix.

[6] In order to have a more realistic setting and avoid also a possible effect of the known final period (end-effect), we decided to not choose as ending period multiples of 5.

At the beginning of every training period managers are endowed with a fictitious endowment by 1.000 Taler: they can choose any investments strategy (even the most risky ones) and the outcome of the investment has no effects on the final payment. The rationale is the following: managers need some training periods to become familiar with the designed setting without any pressure of outcome or performance. A part from this, before starting real periods investors need to have some information on managers' performance. To conciliate the two needs, for the first 4 (out of 6) training periods the performance of the managers (return of the investments strategy) remains private information, while later than the fourth period this piece of information starts to be provided to investors.[7] For the sake of the informed choice investors are allowed to have a track-record on managers' performance, but not also of the investment strategy which remains always private information: investors see a table indicating the label of the manager (A, B, C, D) and the corresponding investment return in the previous period.

Once real periods start, the sequence of events to be repeated by the last period of the experiment is the following. Managers are presented a table summarizing the last period investment strategy (private information) and the realized returns of the other competitors whether allowed. Mangers are then asked to decide the investment strategy (as during the training periods) and the combination of M and P they apply for the current period.[8] Once all the managers have decided, investors enter the stage. Investors are endowed with an initial endowment of 10.000 Taler and before deciding whether and to whom entrust 100% of their endowment, investors are informed about their last period gross (and net) return and about the fees they have paid in the case in which they have entrusted the endowment to a manager in the previous period: the information on the fees is presented both in percentage and Taler terms.[9] Besides that, investors are informed also about the realized (gross and net) returns by all the managers, the corresponding applied fees combination in the last period and also of the currently proposed one. Once investors are ready to decide, they choose whether entrust the endowment to a/the manager (according to the condition they are playing) or invest in the risk free bond. Once investors confirm their choice, they exit the stage and the round is concluded.[10] This sequence of events is repeated by the last period of the experiment. Once the last round finishes, participants are shown the usual summary

[7] This piece of information is provided also to the other competitors (managers) only if they are playing under *Disclosure* condition.

[8] For an example of the decisional screen, see Fig.B.3 and Fig. B.4 in the Appendix.

[9] If the investor have decided to invest in the risk free bond, gross and net return coincide (1% return) and both fees are equal to zero.

[10] For an example of the decisional screen, see Fig.B.5 and Fig. B.6 in the Appendix.

tables but no decision has to be taken: they are told instead that the payment for this task will be done once the experiment will be finished.[11]

For the investment task, both investors and managers are paid by considering only the profits, and not also the initial endowment. In every period, the payment of the manager is the sum of the corresponding amounts in Taler for the two applied fees. Formally, the payoff (π) of the manager *"i"* in every period (t) becomes:

$$\pi_{i,t} = \Big(M_t * E_t * n_t\Big) + \Big(P_t * \rho_t * n_t\Big)$$

where M is the applied percentage of management fee, E is the endowment investors have in every period (i.e. 10.000 Taler each), n is the number of investors who entrust their endowments to manager *"i"*, P is the applied percentage of performance fee and ρ is the realized profit by manager *"i"* in period *"t"*.

Similarly, the payment of the investors in every period (in the case in which the investor entrusts the own endowment to a manager) is the return net of the paid fees. More precisely the payoff of the investor *"j"* becomes:

$$\pi_j = \rho_t - \Big(M_t * E_t - P_t * \rho_t\Big)$$

In the case in which the investor decided to invest in the risk free bond, $\pi_j = 100$ Taler, which corresponds to 1% return of the risk free bond.

For what concerns the final payout, both investors and managers are paid the sum of the returns obtained in three randomly drawn periods. In case of negative payoffs the loss is recovered by exerting effort in a task before leaving the room.[12] Specifically, the task the participants are asked to perform is the counting task: for every correctly counted table they recover a 200 Taler loss.

Immediately after the investment task, risk preferences are elicited: participants have to choose one prospect in a no-loss context followed by a setting in which prospects present a probability to incur in a loss (Eckel and Grossman; 2008). One of the two selected prospects is then played for real and the outcome is added to (subtracted from) the final payment. The experiment concludes with a questionnaire on financial literacy

[11] These details are anticipated in the General Instructions of the experiment.

[12] Because of the structure of the experiment, the negative profits may be realized only by the investors. Whenever a loss is realized, the worst scenario for the manager consist in zero (paid) performance fee. In fact, the loss is recovered by the investors, who will recover not only the realized loss in the selected periods, but also the management fees they had to pay in that period: the management fee is due independently of the realized return.

(Van Rooij et al.; 2011) and a control for basic financial knowledge, a questionnaire on generalities followed by the payment stage.[13]

3.3.3 Portfolio efficiency

In order to check portfolio diversification the *"Sharpe ratio"* will be computed. This measure of portfolio performance was firstly introduced by Sharpe (1966) with the name of *"reward-to-variability-ratio"*, and now, although with some critiques, it is commonly adopted measure for risk-adjusted performance (Cantaluppi and Hug; 2000; Kourtis; 2016). This measure can be computed (*ex-ante* or *ex-post*) as:

$$Sharpe\ Ratio = \frac{(Mean\ portfolio\ return - Risk\ free\ rate)}{Std\ deviation\ of\ the\ portfolio\ return}$$

with the only difference that the *ex-ante* measure uses the expected returns while the *ex-post* measure, the realized ones.

The Sharpe ratio allows to understand whether the results of the investment decisions are the result of good investments strategies or whether are due to the high risk. The greater the outcome of the ratio, the better is the risk-adjusted performance of the portfolio.

3.3.4 Investors' concentration per manager

In order to check whether there is a monopolistic holding of investors' assets or whether the assets are more spread between managers, we will investigate investors' concentration per manager given the maximum possible number of endowments within the condition. To answer this question we will adopt the *Herfindahl-Hirschman Index* (HHI), which is a commonly used measure of market concentration.[14] In the usual application of the *HHI* it is computed as

$$HHI = \sum_{i=1}^{N} s_i^2$$

where s_i is the market share of the competing firms which in our case are managers. In

[13]The English version of the questionnaires is shown in the Appendix.

[14]This analysis is reasonable only in the competitive setting. Under *No Competition*, the number of possible investors per manager is reduced by design up to 2 (instead of 8). Furthermore, because of the absence of interaction between managers (they do not compete), in this setting we can see the four managers acting as monopolists in four different markets. Thus, computing the HHI in No Competition setting will provide misleading results.

our setting, the market share is a function of the number of investors who have entrusted the own endowment to a manager. More precisely, it is defined as the ratio between the number of investors who have entrusted the own endowment to a manager and the maximum possible endowments (to be entrusted) in the competitive setting, k. In the case in which all the investors decide to entrust own endowments to one of the managers, the maximum possible number of endowments $k = 8$. However, there are cases in which not all the investors decide to entrust the own endowment to a manager, and this means that the $k = x < 8$. Beside this, it may also happen that one (or more) manager(s) receive no endowments in a certain period. To get rid of these problems we will compute the market share as the number of entrusted endowment compared to x in each period, and use a normalized version of the index which does not depend upon the number of managers. Namely, the normalized HHI is computed as:

$$HHI^* = \frac{HHI - \frac{1}{N}}{1 - \frac{1}{N}}$$

where $N = 4$, the number of managers in the setting. The index takes values between 0 and 1: the higher the value, the higher the market concentration, which means that one or two managers hold all the endowments. The value equal to 1 indicates a monopolistic holding of the assets, while lower values of the index will indicate a more equilibrate distribution of the assets between managers.

3.3.5 The financial literacy index

To check the financial knowledge of the participants, we adapt the questionnaire by (Van Rooij et al.; 2011) by selecting some questions checking for basic and some other for advanced financial knowledge. As a further control, we add another question eliciting to assess whether they know what standard deviation means and then, we check whether they really know by asking them to answer another question.[15] We compute then the basic knowledge index by checking the correct answer to questions 1,2 from section B.4 and question 2 from section B.5, while all the others (except for question 1 in B.5), for the advanced financial knowledge. The questions needed to compute each index are weighted equally: both indexes take value from 0 to 1. The higher the value of the two indexes, the higher (we assume) the financial knowledge of the participant.

[15]The English version of the questions is provided in section B.4 and B.5 in the Appendix.

3.3.6 Methodological issues

In our design we have different measures and observations per subject. For this reason, in cases in which the independence assumption is violated, the OLS regression will be substituted by the mixed-effects regression model with random effects on SubjectID and (experimental) SessionID. In this way we will account for by-subject and by-session differences in our dependent variables of interest. Whenever the dependent variable is a dummy, the linear model is substituted by the *logit* regression model.

Further, because of the structural differences between settings, regression models will be run by separating *Competition* from *No Competition* when these differences can affect the results. In cases in which we need a reference point for our variable, the first real period will be excluded from the analysis, which means that lower number of observations will be available.

3.4 Results

For each of the four conditions we run 6 experimental sessions, for a total of 24 sessions by 12 participants, with a total of 288 students. The experimental sessions were conducted both at the University of Innsbruck (Austria) and at the University of Trento (Italy).[16] Each subject participated in only one experimental session. In total, each experimental session lasted approximately 70 min, including 20 min to read aloud the (general) written instructions, the main experiment (including 6 trial periods), risk elicitation task, general demographic questions and financial literacy questionnaire. Participants realizing a loss could not leave the room before entering and concluding a further stage, which was the counting task. The average of the counted tables to recover the loss was 1.1 tables. The average payout to subjects was 9.3 Euros.

3.4.1 Managers' behavior

The first question we want to address concerns managers' behavior in response to our experimental manipulations. One of the main decisions managers are asked to make concerns the combination of fees they propose in each period as compensation for the asset management. To answer this question we firstly investigate which are the proposed

[16] Half of the experimental sessions were run in Innsbruck and half of them in Trento, for a total of 144 students per university. In the Appendix B we provide some results per university: differences in results obtained in the two universities, can be due to the sample size. As (Falk et al.; 2015) have found, risk taking is similar in the two countries.

combinations of management (fixed) and performance fees within the four experimental conditions. The average proposed fees are presented in Table 3.3.[17]

Table 3.3: Average proposed fees by condition.

	No Disclosure	**Disclosure**	**Disclosure effect (No Discl.→ Discl.)**
No Competition	M =1.57 P =19.33	M = 1.49 P =16.86	(↓) M = - 5.10% (↓) P= - 12.78%
Competition	M =1.07 P =16.03	M =0.84 P =15.35	(↓) M= - 21.50% (↓) P= - 4.24%
Competition effect (No Comp.→ Comp.)	(↓) M= - 31.85% (↓) P= - 17.07 %	(↓) M= - 43.62% (↓) P= - 8.96 %	

Note: M represent the average proposed Management fee and P the average Performance fee.

According to our results, both *Competition* and *Disclosure* decrease the proposed fees: the former affects more the fixed fees while the latter, the proposed performance fees. More precisely, because of the *Disclosure* the average proposed management fees are lower compared to *No Disclosure* by around 13% and by 8.5% the proposed performance fees. Furthermore, by comparing the effects on the two fees, we find that the effect of DISCLOSURE treatment is significantly higher for the fixed fees within the competitive setting, while in absence of competition it is much higher for the proposed performance fees (p-value < 0.001 in both cases).[18]

For what concerns the effect of the COMPETITION treatment, we find it to be much stronger than DISCLOSURE. In fact, we find that compared to *No Competition*, in the competitive setting the proposed fixed fees diminish on average by 37%: the fixed fees reduction is statistically significant independently of the DISCLOSURE (p-value $<$ 0.001). *Competition* affects also the proposed performance fees, with a total decrease of 26% compared to *No Competition*: the decrease is statistically significant both within *No Disclosure* (p-value < 0.001) and within *Disclosure* setting (p-value = 0.014).

According to the principles of economic theory, people react to incentives and the change in behavior occurs when costs or benefits change (Mankiw; 2009). Cost and benefits in our setting coincide with the fact that managers hold or not investors' endowments. Given that the negative return will affect only investors and not the managers, the cost

[17] The relative frequencies of the proposed combination of fees are shown in Table B.7 and B.8 in the Appendix

[18] In this study, whenever the averages are compared, the statistical test we refer to is the Wilcoxon test, while for the difference between two distributions, results of the o-values are those of the Kolmogorov-Smirnov test.

for the managers consists in no payment of the performance fees in case of negative portfolio return, or in the worst case, no payment at all if the manager has none of the investors have entrusted him endowments to be invested. On contrary, the benefits coincide with the possibility to have higher paid fees because of the higher number of entrusted endowments. Managers are continuously balancing costs and benefits, and, more than reacting to incentive schemes here is a matter of using the combination of fees strategically as a way to reduce costs and increase benefits given the different experimental manipulations.

To better understand how fees combination evolved, the mean proposed fees per condition and per period is plotted in Fig.3.1. In the upper part of the plot the management fees are represented, while in the lower graphs, the performance fees. On the *x-axis* we represent the decisional period (round), while on the *y-axis*, the proposed fee percentage. the boxplots represent the proposed fees per period and per condition, while the red diamonds represent the average proposed fees per period.

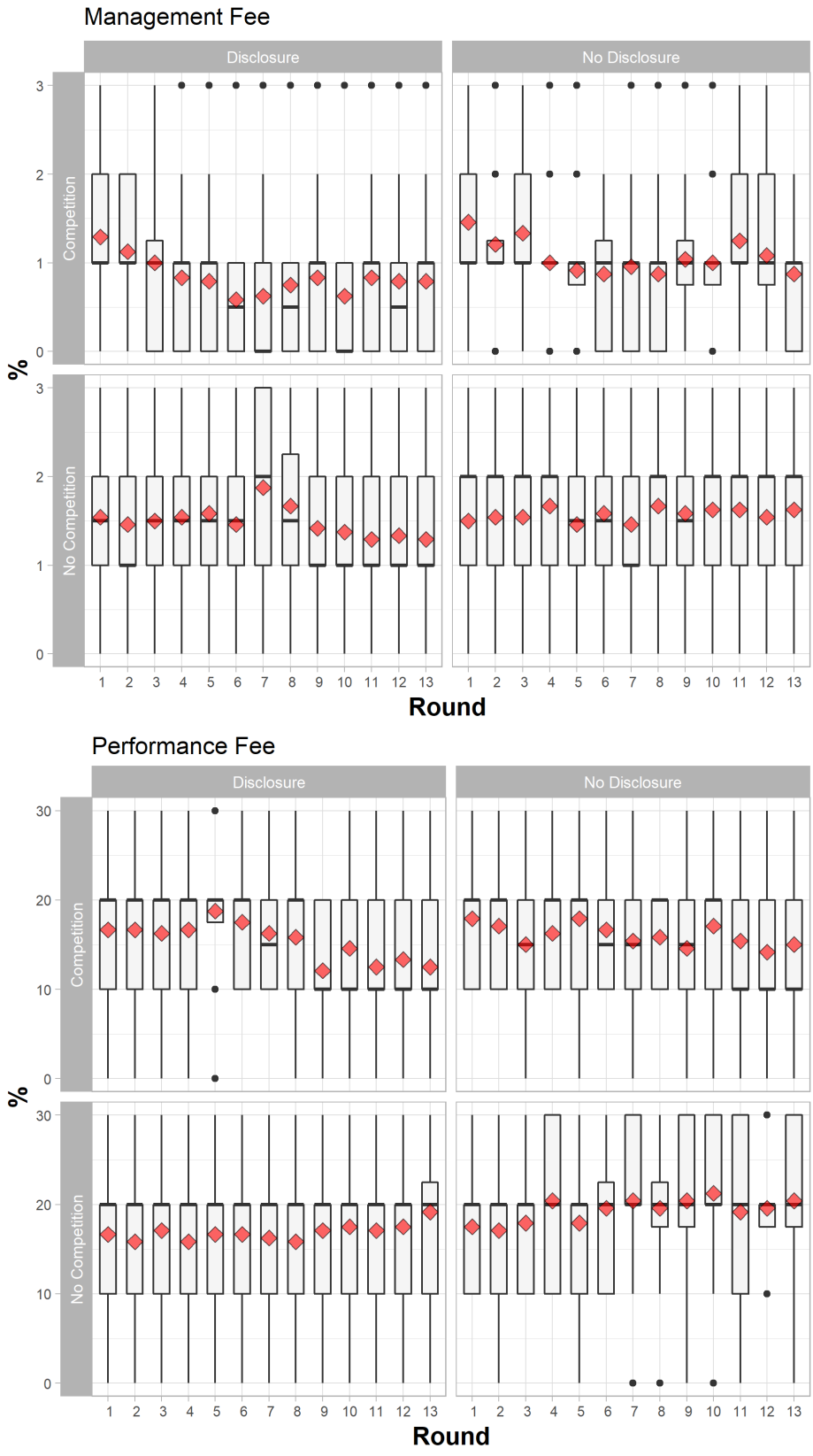
What we can observe from this dynamic picture is a certain degree of (fees) dispersion around the mean and that conditions differ between them. Furthermore, it look like it is the ”work” of COMPETITION that brings down the proposed fees, especially for the fixed fees: in the first period of our experimental sessions, management fees in *Competition* and *No Competition* look very similar. Starting with period 2, within the competitive setting the proposed fixed fees decrease while they remain almost at the same level (with some exceptions) within the *No Competition* condition. Statistical tests then conclude that we can reasonably assume the distribution of the fees within *Competition* to differ (p-value=0.0001), while within *No Competition* they do not (p-value=0.677). For what concerns the difference within DISCLOSURE, results of the both statistical tests confirm that the distribution of the fees differ (p-value$<$ 0.001).

We find also that there are no statistical differences between the distribution of the proposed performance fees within *Competition* (p-value=0.807) while they are marginally significant within *No Competition* (p-value=0.031). For what concerns DISCLOSURE treatment, we observe significant differences between the two distributions only in absence of it (p-value$<$ 0.001) while within *Disclosure* the two distributions can be reasonably assumed to not differ (p-value=0.112).

Thus, what we can conclude is that,

Result 1: *Both Disclosure and Competition affect managers' behavior, although COMPETITION treatment effect is stronger that DISCLOSURE: the former affects more*

Figure 3.1: Proposed fees per period and per condition



the fixed fees while the latter, the proposed performance fees. In absence of competition, performance fees are higher but fixed (management) fees are even higher.

The proposed fees might be influenced by different variables. In order to further continue with our analysis on the observed proposed fees, we run a linear mixed effects models with the two proposed fees as dependent variables. We consider different models' specification: models 1 and 4 consider a basic model specification with the only treatments included as independent variables, while in the other models other variables are included. Since *Competition* and *No Competition* setting differ, models including also other variables will be run by distinguishing between the two conditions so that the effects do not overlap. Results of the regression models are shown in Table 3.4.

According to the results of the basic models specifications (Models 1 and 4), Competition is confirmed to drive down both the proposed management and performance fees although is statistically significant only for the former. In fact, the only COMPETITION drives down fixed fees by almost 0.6%, which is a lot if consider that these fees are on a 0 to 3 scale. The effect of COMPETITION on the performance fees is by - 2.4%, that, beside of the no statistical significance, it is only a marginal reduction of these fees if considering that they were represented on a 0 to 30 scale. Despite also DISCLOSURE drives down both the proposed fees, the effect is not statistically significant in none of the cases.

To identify other possible drivers of the proposed fees, we run regressions by distinguishing between *Competition* (Models 2 and 5) and *No Competition* (Models 3 and 6). We find that in the higher is the number of played period, the lower the fees in the competitive setting. This result provided further support to the fact that "market works": at the beginning of the experimental sessions managers have no "anchoring" so that they propose fees combinations which reflect the their actual willingness to be paid for portfolio management. Because of the market and because of the interaction with investors as well as with other managers, the higher the number of played rounds, the more the managers adapt to the market behavior.

This result do not hold also in absence of competition: the proposed fixed fees diminish (although not significantly) the higher the number of the played periods, while the proposed performance fees increase. A possible explanation could be identified with the experimental design: the only way to have a higher return (given that the maximum possible endowments to be entrusted in this setting are two) is to increase the proposed fees, and managers do it in a strategical manner. More precisely, while the management fees remain almost the same, the proposed performance fees increase.

Table 3.4: Determinants of the proposed fees

	Dependent variable:					
	Management Fee			Performance Fee		
	(1)	(2)	(3)	(4)	(5)	(6)
		Comp.	No Comp.		Comp.	No Comp.
COMPETITION	−0.577***	/	/	−2.404	/	/
	(0.176)			(1.628)		
DISCLOSURE	−0.157	−0.238	−0.082	−1.571	−0.666	−2.464
	(0.176)	(0.222)	(0.282)	(1.628)	(2.005)	(2.649)
Period	/	−0.026***	−0.008	/	−0.289***	0.188***
		(0.007)	(0.006)		(0.064)	(0.063)
Portfolio Return in the previous period	/	0.013***	0.011***	/	−0.013	0.044
		(0.004)	(0.003)		(0.032)	(0.032)
Investors' Concentration in the previous period	/	−0.025	/	/	−3.374***	/
		(0.141)			(1.235)	
Constant	1.607***	1.377***	1.632***	18.878***	20.498***	16.717***
	(0.153)	(0.184)	(0.215)	(1.410)	(1.647)	(2.045)
Observations	1,248	624	624	1,248	624	624

Note: *p<0.1; **p<0.05; ***p<0.01

Another relevant variables is the portfolio return in the previous period, although the effect could be considered as relevant only for the fixed fees. In fact, the own performance in the previous period (portfolio return) will increase (although the coefficient is very little) the proposed management fees and this is true independently of the *Competition*. Finally, in the competitive setting, what matters is also the investors' concentration per manager in the last period: the higher the number of investors who entrusted the own endowment to a manager (compared to the maximum achievable number of endowments in that period), the lower the proposed performance fees. A possible explanation is that, given in the previous period the manager had a higher number of endowments to invest, by lowering the fees managers expect to attract even more endowments which will compensate the lower percentage of proposed fees. The other possible explanation is that there are some market dynamics not explored yet.

According to these first results, it looks like we find opposite evidence compared to Parida and Tang (2017): while they find that in more competitive markets the fees are higher, we find that Competition reduces the proposed fees. This result is promising because lower fees are what we would expect in a competitive market.

3.4.2 Investors' behavior

In our experimental setting, investors face a trade-off between risk and return. By entrusting the endowment to the manager can (potentially) provide a higher return, but it might happen that manager is not as good as he signals. Alternatively, by investing in the risk free alternative, the return is safe but also lower. To understand how do investors solve this trade-off, we investigate whether the two treatments influence or not investors' decision to entrust (or not) their endowments to a/the manager. The summary of investors' behavior associated with these decisions is shown in Table 3.5.

What we find is that, when investors are given the opportunity to switch manager (*Competition*) as opposed to the case in which group matching is fixed, in 86% of the cases investors will decide to entrust the own endowment to a manager, both in the *Disclosure* and *No Disclosure* environment. Consequently, it means also that within this conditions, investors decide to (directly) invest in the risk free bond only for less than 14% of the cases. When competition is no more available and, given the fixed group matching, the investors can not change the manager although they would be willing to, investors decide to invest in the risk free bond more than twice than in the competitive setting (around 30% of the cases). For what concerns the DISCLOSURE treatment, we do not observe significant differences, but this can be explained by the experimental

design: DISCLOSURE affect managers but not also investors who continue to receive the same information independently if playing under *Disclosure* or *No Disclosure* condition.

Table 3.5: Investors' decisions: entrust their endowment to a manager

		DISCLOSURE	
		YES	**NO**
COMPETITION	**YES**	86,22 %	86,38 %
	NO	67,63 %	70,03 %

The following questions to be addressed answers to when and why do investors prefer the safe option, decide to change manager or change to the safe option. In order to answer these questions, we run linear mixed effects regression models by considering different dependent variable: results of these regression models are shown in the Table 3.6.[19] The decision to *change to safe* (meaning that in the previous period the investor entrusted the own endowment to a/the manager) is considered by separating *Competition* (*Comp.*) from *No Competition* condition (*No Comp.*). Finally, the decision to *"Change manager"* can be investigated only in the competitive setting because in absence of competition it coincides with the decision to *"invest safe"*.

Our regression results confirm that COMPETITION negatively affects the decision to invest in the safe option. We find that this treatment negatively affects also investors' decision to *"change to safe"*, which means that other strategies are adopted by investors if not satisfied in terms of fees combinations or managers' performance. Having suffered a loss in the previous round and being risk avverse positively affects the decision of the investors to go for *"safe investment"*, while what will negatively affect this decision is the mean portfolio return realized by the other investors (except investor "j") : in that case investors will decide to entrust their endowment to a/the manager. Results are confirmed also for what concerns the decision to *"change to safe"* option, with the only difference that , by splitting the sample into *Competition* and *No Competition*, the higher realized

[19]All regression models in Table 3.6 were run excluding the first period from the analysis because of the need of a reference point.

Table 3.6: Determinants of investors' decisions

	Dependent variable:				
	Safe investment	Change to safe investment			Change Manager
	(1)	(2)	(3)	(4)	(5)
			Comp.	No Comp.	Comp.
COMPETITION	−1.953***	−1.651***	/	/	/
	(0.344)	(0.334)			
DISCLOSURE	0.056	0.049	−0.204	0.182	0.383
	(0.271)	(0.252)	(0.631)	(0.269)	(0.262)
Period	0.017	0.012	0.002	0.014	−0.009
	(0.016)	(0.022)	(0.037)	(0.027)	(0.020)
Loss in t-1	0.476***	0.958***	1.429***	0.769***	0.725***
	(0.176)	(0.222)	(0.411)	(0.261)	(0.226)
Loss Aversion	−0.475	−0.466	−0.067	−0.508	−0.132
	(0.379)	(0.307)	(0.874)	(0.309)	(0.412)
Risk Aversion	1.420***	1.631***	2.325***	1.352***	0.376
	(0.413)	(0.377)	(0.740)	(0.413)	(0.292)
Net Return in t-1	−0.012	0.004	−0.007	0.011	−0.110***
	(0.017)	(0.021)	(0.036)	(0.024)	(0.021)
Mean other investors	−0.062***	−0.055**	−0.027	−0.067*	0.096***
Net Return in t-1 (a)	(0.018)	(0.027)	(0.043)	(0.036)	(0.021)
Constant	−2.457***	−3.034***	−5.457***	−2.779***	−0.495
	(0.448)	(0.495)	(0.906)	(0.568)	(0.384)
Observations	2,496	1,795 (b)	996	799	1,050 (c)

Note: *p<0.1; **p<0.05; ***p<0.01

(a): Investor "j" excluded.

(b): Only those who entrusted the endowment to a manager in t-1 are included. The first real period is excluded from the analysis.

(c): We exclude investors switching to safe option.

portfolio return by other investors will negatively affect invetsor's decision to *"change to safe"* only in the *No Competition* condition.

Finally, in the competitive setting, the fact that in the previous period the manager has realized a negative return is enough for the investor to decide to *"change manager"* and the individual characteristics do not matter. What will not make investors change the manager is the higher realized portfolio return by others, but only if the investor is not satisfied with the own portfolio return: the higher return realized by the own manager will make the investor to remain with same manager.

The results obtained by now confirm that, when competition between managers is allowed, investors will take advantage of this chance. In case investors are not happy with the performance of the manager they have entrusted the own endowment in the previous period, the way investors will show their "disappointment" will be to change manager.[20]

Result 2(a): *Competition increases market participation: when group matching is fixed ad there is no opportunity for the investors to change manager, they will choose the risk free option less frequently.*

3.4.3 Which is the combination of fees actually paid the investors?

Proposed fees do not necessarily imply that these fees combinations are actually paid by investors. In order to check whether this is true, we analyse fees combinations of the managers who were selected by the investors.[21] What we observe is that *Competition* benefits not only managers but also investors. Among those who decided to entrust the own endowment to a/the manager, *Competition* reduces management fees by around 50% and the paid performance fees by around 11%, independently of the Disclosure (Table 3.7). Results of the statistical tests then confirm that the distribution of both paid management and performance fees between *Competition* and *No Competition* are significantly different (p-value < 0.001).

Within the competitive setting, *Disclosure* diminishes the paid management fees by 14.5% and by 12.3% the paid performance fees. According to results of the statistical tests,

[20]Investors changed manager 523 times (over 1050 observations) compared to the 102 times to "change to safe". The other 527 times, investors confirmed the previous choice: continue investing risk free or remain with the same manager.

[21]Tables B.9 and B.10 in the Appendix B provide the relative frequencies of each fees' combination.

Table 3.7: Average paid fees by condition

	No Disclosure	**Disclosure**	**Disclosure effect (No Discl.→ Discl.)**
No Competition	M =1.49 P =17.34	M = 1.43 P =15.36	(↓) M= - 4.03% (↓) P= - 11.42%
Competition	M = 0.76 P = 15.55	M =0.65 P =13.64	(↓) M= - 14.47% (↓) P= - 12.28%
Competition effect (No Comp.→ Comp.)	(↓) M= - 48.99% (↓) P= - 10.32%	(↓) M= - 54.55% (↓) P= - 11.20 %	

both the difference in mean performance fee and management fee within COMPETITION are statistically significant (p-value=0.003 and to 0.001). In absence of competition instead, because of the *Disclosure* the paid management fees decrease by 4% while the paid performance fees by 11.4%. According to the statistical tests the difference in mean paid performance fees when fees are disclosed or not (to managers) differ significantly (p-value=0.007) while the difference in mean fixed fees does not (p-value=0.081).

Among possible drivers of investors' willingness to pay fees (see Table 3.8), regression results confirm the negative relationship between *Competition* and the paid fixed fees while the sign is positive but not significant for what concerns the paid performance fees. We find also that within the competitive setting, having suffered a loss in the previous period will negatively affect investors' willingness to pay management fees. Results further confirm that within competitive setting both fees decrease with the number of played periods: despite regression coefficient seems to indicate a higher impact on the performance fees, it has to be mentioned that performance fees are ten times higher than fixed fees. For this reason, the impact on the two variables of the time dimension it has to be considered as being very similar.

In absence of competition, instead we find that, while in the competitive setting the higher the number of played periods reduce the willingness to pay performance fees, here the opposite is true: the increase in the number of periods is positively (and significantly) affecting investors paid performance fees but not also fixed fees. The fact that for investors in the *No Competition* condition are more sensitive to performance fees is further confirmed by the fact that a negative return in the previous period will negatively affect current decision to pay high performance fees. Thus, we find that

Result 2(b) : *The difference between Competition and No Competition is the Management fee. Investors are ready to give more profit if good performance but not fixed fees.*

Table 3.8: Determinants of investors' choice of the fees to be paid.

	Dependent variable:					
	Management Fee			Performance Fee		
		Comp.	No Comp.		Comp.	No Comp.
	(1)	(2)	(3)	(4)	(5)	(6)
COMPETITION	−0.395***			1.330		
	(0.140)			(1.284)		
DISCLOSURE	−0.091	−0.105	−0.093	−1.715	−1.773	−1.848
	(0.140)	(0.212)	(0.200)	(1.284)	(1.923)	(1.834)
Period		−0.016***	−0.006		−0.237***	0.169**
		(0.005)	(0.007)		(0.062)	(0.079)
Net Return in t-1		−0.004	0.016***		0.041	−0.041
		(0.004)	(0.006)		(0.045)	(0.066)
Average other investors'		0.005	0.007		−0.009	−0.027
Net Return in t-1		(0.005)	(0.010)		(0.062)	(0.107)
Loss in t-1		−0.129**	−0.065		0.428	−1.818**
		(0.052)	(0.071)		(0.644)	(0.803)
Constant	1.048***	0.891***	1.120***	12.123***	16.440***	10.595***
	(0.121)	(0.165)	(0.173)	(1.112)	(1.618)	(1.714)
Observations	2,496	1,152(a)	1,152(a)	2,496	1,152	1,152

Note: *p<0.1; **p<0.05; ***p<0.01

(a): the number is lower because the first real period is excluded from the analysis.

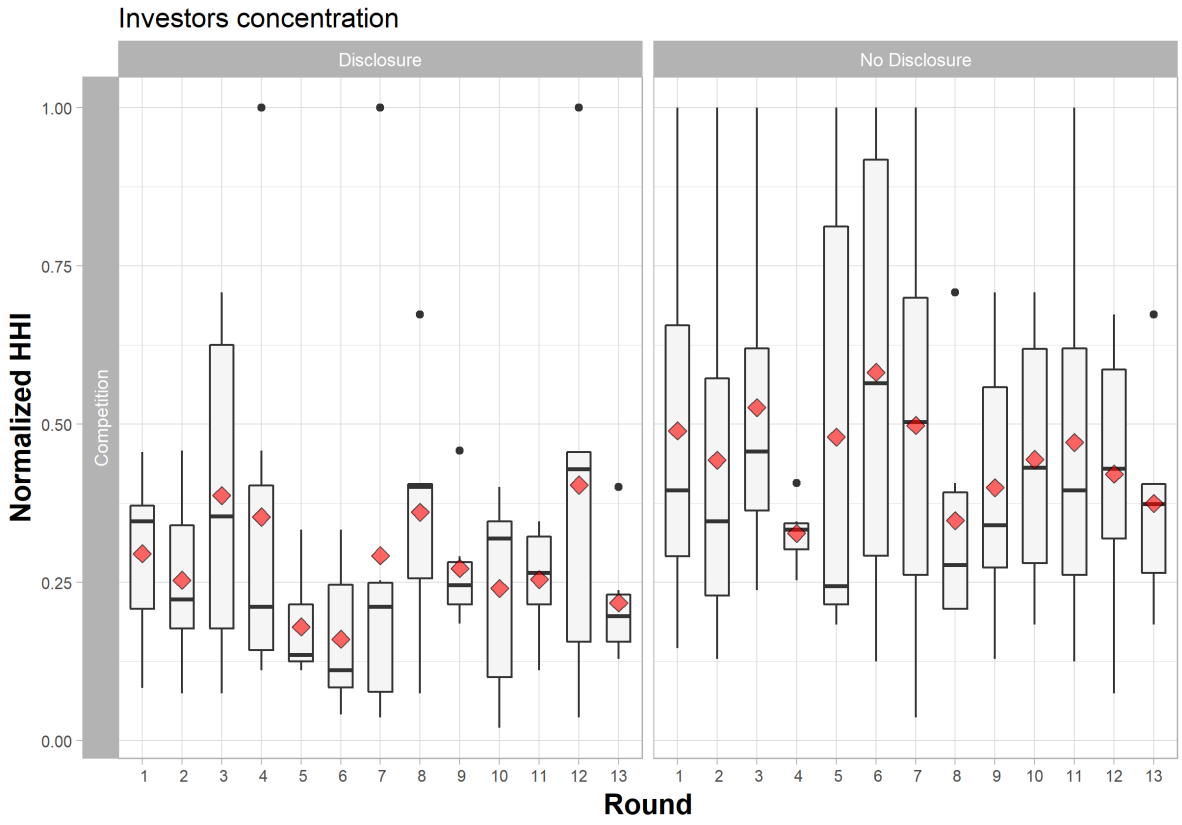
As a mean to understand whether a unique fees' combination emerges, we compute the relative frequency of the proposed and paid fees combinations (see Tables from B.7, to B.10 in Appendix B). Deliberately, the structure for both fixed and performance fees considers the possibility to apply zero-fee, low, medium or high fee percentages. What we find is that, in different conditions, different fees' combination emerge. We find also that, while there is an agreement in the first preferred managers' proposed and investors' paid fees, second and third preferred options differ. More precisely, we find that in the competitive setting (independently of the *Disclosure*) the first preferred fees combination, both for managers and investors, consists in low percentages of both fees (1%+10%). As second preferred fees combination in this setting, managers prefer no fixed fees combined to medium performance fees (0%+20%) while investors prefer no fixed fees combined with low performance fees (0%+10%). The situation is reversed for the third preference: managers propose low fixed fees combined with medium performance fees (1%+20%) while investors accept the proposed performance fees but not also the fixed fees (0%+20%).

In the *No Competition* condition fees are higher: while in *Disclosure* condition the first preferred fees' combination consists of low fixed fees combined with medium performance fees (1%+20%), as second preferred choice, managers and investors agree on medium management fees additional to low performance fees (2%+10%). The *No Competition* and *No Disclosure* condition is the one in which the higher fees are proposed and paid: the most preferred fees' combination on which they agree consists of medium percentages of both fees (2%+20%). As second preference, managers prefer low fixed fees combined with high performance fees (1%+30%) which for investors is the third preferred fees' combination, while investors prefer to pay as second choice 1% management fee combined with 10% performance fee, which is the third choice of the managers.

3.4.4 How concentrated are investors per manager?

The next step of our analysis is investors' concentration per manager. What we are interested to see is whether there is a monopolistic holding of investors' assets or whether assets are more spread between managers. To achieve our aim, we explore the distribution of the investors per manager. To achieve our goal, we use the *Herfindahl-Hirschman Index* (HHI), a commonly adopted measure for the study of market concentration: the higher the value of the index, the higher the assets concentration in the hands of two or one manager.

Figure 3.2: Investors concentration per session and per period (only *Competition*). On the *x-axis* of the graph we represent the period (round), while on the *y-axis* the normalized value of the HHI. The boxplots represent the distribution of the values of the index per sessions and per period while the red diamonds represent the average value of the index per period.



The dynamic picture of investors' concentration within competitive setting is provided in Fig. 3.2. The graph shows how investors' concentration changed during the experimental session by distinguishing between *Disclosure* and *No Disclosure*.According to our results, among investors who decide to entrust the own endowment to a manager, in the competitive setting in the case in which managers see other competitors' practices, asset holdings is more distributed between managers. This means that within *Disclosure* condition, more or less, managers receive the same amount of endowments from the investors. On the contrary, in the *No Disclosure* condition, besides the higher variance in our data, we find that situations in which there is a high market concentration (oligopolistic situations) occur with higher frequency than in the other condition. A test on the distribution of the market shares (the variable we use to compute the HHI)[22] between

[22]Computed as the ratio between the endowments entrusted to a manager compared to the number

Disclosure and *No Disclosure* confirm that the difference in distributions is significant (p-value = 0.007). Thus, what we can conclude is that,

Result 3 (a): *Disclosure of other practices is fundamental for a more equal distribution of investors' endowments between managers: monopolistic holdings, and more in general, oligopolistic situations are rare events in this setting. On contrary, in the No Disclosure condition we find that oligopolistic asset holdings occur with a higher frequency.*

The explanation of this result is that, *Disclosure* is functional for managers to adapt to the market practices: the knowledge about other practices allows managers to "quickly" adapt to market because it provides information on all investors and not only on those who decided to entrust them an endowment. As a consequence, all the managers have more or less the same amount of asset holdings. More importantly, we find support for what economic theory predicts: in a competitive setting with perfect information about others' practices, agents hold small market shares.

In order to understand which are the determinants of the observed investors' concentration per manager, we run regression models in which the (adjusted version of the) concentration of the investors per manager is the dependent variable,[23] and results are shown in Table 3.9. The first model specification considers market shares the manager holds as being influenced only by the two proposed fees (M and P), the previous period portfolio return and by the attainment of a loss in the previous period. This model considers all the main (intuitive) factors which could possibly drive investors' decision to entrust the own endowment to a manager. However, there are other possible (relevant) variables which are the consequence of the competition between managers: we will refer to these effects thereafter as *"ranking effects"* deriving from the competitive setting. More precisely, the variables we refer to are the average proposed fees (M and P) and average realized return by all the other managers, manager *"i"* excluded. This further model specification (Model 2) allows us to better understand whether there are some dynamics involved in the decision making in this context. Model 3 instead is similar to Model 2 with the only difference that the proposed fees are excluded.

What we find is that, despite the results of the first model specification seems to

of all entrusted endowments in that period which could be also lower than eight, the maximum possible number in the competitive setting.

[23] Namely, the number of investors entrusting the endowment to a manager compared to the number of those who decided to entrust the own endowment to a manager in the current period.

Table 3.9: Investor concentration per manager and the relevant factors.

	Dependent variable:		
	Normalized share of investors per manager		
	(1)	(2)	(3)
DISCLOSURE	−0.032	0.005	0.039
	(0.046)	(0.039)	(0.052)
Period	−0.005**	−0.001	0.003
	(0.002)	(0.002)	(0.002)
Management Fee (M)	−0.105***	−0.117***	
	(0.012)	(0.011)	
Average proposed M by the other managers		0.122***	0.108***
		(0.019)	(0.022)
Performance Fee (P)	−0.008***	−0.008***	
	(0.001)	(0.001)	
Average proposed P by the other managers		0.009***	0.008***
		(0.002)	(0.002)
Net Return in t-1	0.006***	0.010***	
	(0.001)	(0.001)	
Average of other managers' net return in t-1		−0.013***	−0.008***
		(0.001)	(0.001)
Loss in t-1	−0.026	−0.069***	−0.134***
	(0.023)	(0.022)	(0.022)
Constant	0.545***	0.267***	0.009
	(0.057)	(0.073)	(0.078)
Observations	624	624	624

Note: *p<0.1; **p<0.05; ***p<0.01

With *"t-1"* we indicate the *"previous period"*.

When the average of others managers is computed, manager *"i"* is excluded.

confirm the negative relationship between the dependent variable and the proposed fees and the positive relationship with the past performance, these variables are no more significant when we consider also the possible competition/ranking effects (Model 2): the higher the proposed fees, the lower the share of investors per manager. The same mechanism applies also for the realized portfolio return: results indicate a positive relationship with the (own) realized portfolio return and a negative one with the average portfolio return of the other managers. Furthermore, having attained a loss in the previous period becomes relevant for the decisional process only if also the *ranking effects* are considered. Our results are robust to the exclusion of the proposed fees (M and P) by manager *"i"* (Model 3).

The just presented results allows us to make the following consideration: the only proposed fees, although significant in (an intuitive) basic model, are not enough in order to explain the investors' concentration per manager. What could be really considered as drivers of investors' concentration per manager are what has been defined as *ranking effects*: what matters is what a manager does compared to the average of the other managers.

As explained before, studying the concentration per manager within the *No Competition* setting will not provide truthful results. However, what we can do is to investigate whether there are some dynamics driving and explaining investors' willingness to entrust the endowment to a/the manager, namely, by looking to the ability of the managers' to attract at least one endowment. The dependent variable is a dummy assuming value one in the case in which the manager receives at least one endowment and zero otherwise. The regression models have the same model specification as in Table 3.9 (model 2) and we distinguish between *Competition* and *No Competition*. Results of the regression models are presented in Table 3.10.

In absence of competition investors are supposed to decide by taking into account the behavior and the performance of the own manager in "isolation". What we observe is that, consistent with our expectations, investors decision whether to entrust the own endowment in the *No Competition* condition is not affected by the comparison relative to other competitors, except for the average portfolio return realized by the other managers in the specific period. The possible explanation is that investors cannot control for managers' exerted effort to achieve a good result. What investors can do is to use others' performance in the same period as a proxy for market behavior and, based on this, measure and understand whether their manager is performing well or not given

Table 3.10: Determinants of receiving at least one endowment from the investors.

	Dependent variable:	
	Manager receives at least one endowment	
	Comp.	No Comp.
	(1)	(2)
DISCLOSURE	0.783^{***}	-0.560
	(0.002)	(0.603)
Period	0.012^{***}	0.022
	(0.002)	(0.041)
Management Fee	-1.293^{***}	-0.989^{***}
	(0.002)	(0.267)
Mean proposed M by other managers	1.282^{***}	0.335
	(0.002)	(0.390)
Performance Fee	-0.096^{***}	-0.098^{***}
	(0.002)	(0.027)
Mean proposed P by other managers	0.080^{***}	-0.028
	(0.002)	(0.040)
Net Return in t-1	0.086^{***}	0.052^{*}
	(0.002)	(0.027)
Mean Net Return realized by the other managers (except “i") in t-1	-0.105^{***}	0.072^{**}
	(0.002)	(0.030)
Loss in t-1	-0.421	-0.463
	(0.339)	(0.467)
Constant	0.792^{***}	5.882^{***}
	(0.002)	(1.543)
Observations	624 (a)	624 (a)

Note: *p<0.1; **p<0.05; ***p<0.01

(a): The number of observations is lower because the first real period is excluded from the analysis.

the market conditions.[24] We find also a negative relationship with the proposed fees. The explanation is that being "forced" to remain with the same manager does not imply also that investors will automatically accept also the proposed fees: the higher the proposed fees, the higher the chance that investors will decide to invest in the risk free bond instead of entrusting the own endowment to the manager by accepting to receive a lower return.

Regression results confirm that there are different dynamics within *Competition* and *No Competition* conditions. In fact, differently than in the *No Competition*, in the competitive setting "ranking effects" are present and matter. While Disclosure does not affect significantly the market concentration, managers' ability to get at least one endowment does. This result confirms the significance of the ranking effect within competitive setting. Thus, we can conclude that,

Result 3 (b): *When deciding which manager to choose, investors will not consider a manager in isolation but the manager is compared to the other competitors. Because of this "ranking effect", Disclosure is not functional to achieve a higher holding of endowments but to get at least one endowment it does.*

To conclude our analysis on the proposed and paid fees, we need a measure of both investors' and managers' payment in each of the experimental conditions. Next, in Table 3.11 and 3.12 we provide the average of the payment (in Taler) of the two players during the played rounds, by dividing the payments per player and by condition.[25] The results of these tables indicate that, overall, compared to *No Competition*, in the case in which investors entrust the own endowment to a manager in the competitive setting, both players are paid more. According to the statistical tests we can conclude that the difference in the average payment of the managers between *Competition* and *No Competition* is significant (p-value=0.001), while for investors "only" marginally significant (p-value=0.083).

By combining the results obtained by now with the last two tables, we can say

Result 3 (c): *Competition benefits both managers and investors and make them better-off: investors pay less while managers ask less but attract more endowments.*

[24] Although there is no interaction between managers and decisions are taken in isolation, all the managers face the same environment and the same market risk.

[25] The summary tables are provided in the Appendix B.

Table 3.11: Managers' payment in Taler

		DISCLOSURE		
		No	**Yes**	**effect**
COMPETITION	**No**	402	376	(↓) **- 6.47** %
	Yes	507	354	(↓) **- 30.18** %
	effect	(↑) **+ 26.12** %	(↓) **- 5.85** %	

Table 3.12: Average investors' payment (in Taler) among those who entrusted their endowment to a manager

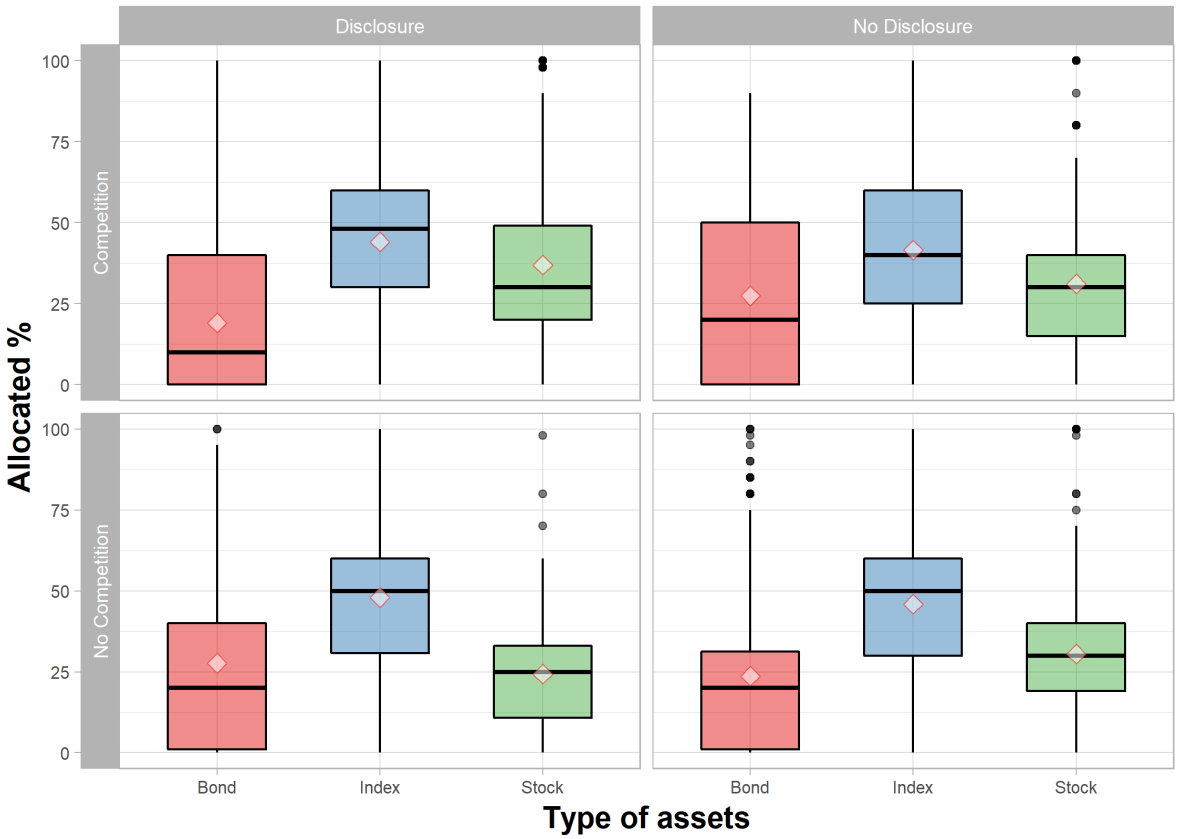
		DISCLOSURE		
		No	**Yes**	**effect**
COMPETITION	**No**	165	167	(↑) **+ 1.21** %
	Yes	237	251	(↑) **+ 5.91** %
	effect	(↑) **+ 43.64** %	(↑) **+ 50.30** %	

As mentioned before, in the case in which investors are not allowed to switch manager and the proposed fees are higher than their willingness to pay fees, investors decide to invest in the risk free bond although it implies a lower (possible) return for them. If the investors invest in the risk free option it implies also than managers receive no-payment in the specific period. These tables confirm that lowering the fees makes all players better-off.

3.4.5 Investment strategies and portfolio composition

The last question we need to provide an answer concerns the portfolio composition. As mentioned before, there are two risky types of assets and a risk free one. The two risky assets do not differ much in the expected return (just 1% difference), but they differ significantly in terms of risk: for one additional percentage of return, the risk to be taken by investing in Stock is double the one of the Index. This means that the risk-seeking managers will prefer Stock to Index justifiable by the higher willingness to take risk. In order to understand more about portfolio allocations, we start the analysis with the summary of the distribution of the three three financial assets: summary (boxplot) results are presented in Fig. 3.3.

Figure 3.3: Overall (average) portfolio allocation per condition. The boxplots represent the distribution of the percentages of wealth (*y-axis*) invested in each of the three financial tools (*x-axis*).



This picture shows some small differences between the distributions of the portfolio strategies (the combination of the three assets) between conditions, but to better under-

stand whether differences are significant, we run some tests. According to results of the statistical tests we can reasonably assume that, *Disclosure* compared to *No Disclosure*, within competitive setting differ in terms of distribution of the percentage invested in the Bond (p-value=0.001) and Index (p-value=0.25), while in the *No Competition*, the difference is significant when the distribution of the percentages invested in Stock are compared (p-value < 0.001). For what concerns COMPETITION, the two conditions differ in terms of almost all the distributions though with some differences. The portfolio strategies per period and per condition are shown in Fig. B.2 in the Appendix.

In order to understand whether managers' strategies are good, we analyse the realized portfolio returns and compute the *Sharpe ratio*. What we find is that average (both theoretical and ex-post) *Sharpe Ratio* is very low in all the experimental conditions,[26] which means that on average, the return is due to luck and not to the good strategy.[27] This induce us to think that participants had a bad timing and suffered for *"hot-stove effect"*: according to this theory, good outcomes increase the probability for that choice to be repeated, while negative ones, reduce it (Denrell and March; 2001; Cunningham; 2007). To check for this effect, we check whether the loss in the previous period affects current decision to take risk. We run regression models in which the percentage invested in the more risky asset is the dependent variable (Stock) and another one in which the percentage is the one invested in both risky assets. The percentage invested in the Bond is captured by the intercept. To account for the setting differences, we run separate regression models for *Competition* and *No Competition* condition.

According to regression result in Table 3.13, we find that having attained a negative portfolio return in the *No Competition* condition is not one of the main drivers in deciding how much to invest in the risky assets, while in the competitive setting it is.What remains unchanged independently of the model specification is the effect of *Disclosure* within *No Competition* condition: there is a negative relationship between *Disclosure* and the percentage invested in Stock, but not also in Index. When we control for the effects of individual characteristics (Table B.17), the sign of the relationship remains but it is no more significant. By combining the two results a possible explanation is that *Disclosure* triggers some market dynamics: managers anticipate that investors use the comparison to other competitors to have a feeling of the common environment they are facing. Being allowed to see what other competitors are doing, the risk taking is reduced.

Finally, regression models accounting for the possible effects of the individual charac-

[26] See summary Table B.13 and B.14 in the Appendix.

[27] For the theoretical and realized returns, see summary tables B.16 and B.15 in the Appendix.

Table 3.13: Investment strategy: market dynamics

	Dependent variable:			
	Percentage of wealth allocated to...			
	Stock		Stock and Index	
	Comp.	No Comp.	Comp.	No Comp.
	(1)	(2)	(3)	(4)
DISCLOSURE	5.717	−6.157*	8.285	−3.997
	(7.673)	(3.416)	(8.752)	(8.363)
Period	0.194	0.024	0.173	−0.040
	(0.191)	(0.157)	(0.149)	(0.148)
Loss in the previous period	3.823**	−0.500	2.659*	0.663
	(1.821)	(1.377)	(1.418)	(1.301)
Constant	27.838***	30.294***	69.848***	76.688***
	(5.996)	(3.229)	(6.499)	(6.250)
Observations	624	624	624	624
Note:				*p<0.1; **p<0.05; ***p<0.01

teristics effect are shown in Table B.17. Results of these regression models are consistent with the evidence on risk aversion literature: being risk averse induces to a more conservative investments strategy. By interpreting the results obtained by Van Rooij et al. (2011), we confirm that the higher financial knowledge positively affect risk taking: within *No Competition* condition this effect is also significant. Our intuition of this results is that the higher knowledge becomes a tool to deal with the uncompetitive setting: given that managers in the *No Competition* condition may get up to two endowments, they risk more in order to convince their investors to entrust them the endowments. For what concerns being loss averse, it will induce managers to increase significantly only the percentage invested in Stock (the more risky asset), but not also in Index, and only in the *No Competition* condition. This allows to conclude that individual characteristics affect managers' decisions but the effect is context dependent.

To sum up, according to our results we do not find strong relationship between loss and current decision and that individual characteristics support the existing evidence in the literature. More in general, we find that in our setting,

Result 4: *It looks like the uncompetitive setting induces managers to behave differently (reduce risk) in order to deal with challenges provided by this environment.*

3.5 Conclusions

In this experiment, we explore the influence of *Competition* and *Disclosure* on both investors and managers behavior. The former is about managers' competition in getting investors' endowments, while the latter has to do with the knowledge about other competitors' practices. We extend the existing literature by considering these two dimensions and by allowing the two players to interact. We check whether and to what extent the two treatments affect market participation, the proposed and paid fees and the portfolio strategies adopted by the managers.

We find that market participation increases in the competitive environment: compared to the competitive setting, in the case in which competition between managers is not allowed, almost one over three investors decide to not entrust their endowment to the manager, and this percentage is twice the one of the competitive setting. This behavior finds the explanation in the lack of an alternative: being forced to remain with the same manager, it does not mean also that investors will entrust the own endowments no matter what the manager will be doing. In fact, when investors are given the opportunity to switch manager if not satisfied with the proposed fees or realized returns, in the competitive setting investors take advantage of this opportunity. Otherwise, if switching manager is not allowed, investors accept to have a lower return and invest in the risk free bond. As a consequence, managers receive less endowments from the investors, which implies also a lower payment, or, in the worst case, no payment at all (when they have no endowments to be invested).

In our setting, investors cannot control managers' performance because only managers know market behavior. What investors can do, and they actually do, is to use the information on what other competitors are doing as a proxy for the common environment they are facing, in order to understand whether the performance of the managers is good or not. The comparison relative to the other managers is stronger in the competitive setting.

Competition benefits both managers and investors: the former proposes lower fees but it is compensated by the higher capital to invest while the latter is happy to pay lower fees. Based on our results, we find that compared to the other conditions, *No Disclosure*

and the absence of competition is the condition in which managers ask to be paid and investors pay more fees. By combining results obtained on investors willingness to pay fees with the diminishing concentration of investors per manager over time, we argue that managers increase the performance fees to deal with the lower investors' concentration (per manager), while investors, those who continue to entrust own endowments to their manager, accept to pay this higher price.

Compared to *Competition*, *Disclosure* effect is weaker. However, it remains an important characteristics which allows managers to adapt to the market. We find that when Disclosure is no more available, managers have no more information on what the others are doing and this makes them to adapt slowly to the market. The *No Disclosure* hides a big piece of information: what are the preferences (for fees) of all in the investors and not only of those who entrusted them the endowment and also which are other competitors' practices. We find that *Disclosure* does not allow to achieve of a higher market concentration, but it increases the probability of the manager to receive at least one endowment from the investors, which is better than being paid zero.

Compared to Parida and Tang (2017) who argue that competition itself is not enough in order to reduce fees, we find that by allowing investors and managers to bargain over the fees' combination, competition makes both players better-off. Furthermore, based on our design, our results support theoretical predictions: lower fees, an increased market participation, low market concentration and, more in general, both players are better-off. Because of the lower proposed fees managers are able to get more endowments from the investors and thus, they have also a higher capital to invest. As a consequence, despite the lower fees they are able to be paid more because of the higher number of entrusted endowments.

We do not find significant results also for portfolio composition: whenever differences between conditions are observed are due to luck and not to the good investment strategy. We do not find neither robust results for what concerns the way the managers react to a negative returns: only in some cases the effect becomes significant, but in our opinion is a matter of model specification.

Thus, beneficial to the ongoing debate on the market competition effect, our results suggest that, in accordance with economic theory predictions, higher competition helps achieve better outcomes both for investors and managers. Furthermore, we find also that market participation can be encouraged by safeguarding a competitive environment. This is a very important result: while there is an extensive literature providing evidence

on the fact that a competitive environment may lead to unwanted outcomes, our results suggest the opposite. When there are no costs to switch manager and investors are given this possibility, in a competitive setting they will take advantage of this possibility.

By introducing a more equilibrate bargaining power (no more only in the hands of the managers), a competitive market is able to reduce the fees and results support for theoretical predictions. Thus, policy interventions accounting for the difference in investors and managers interests can be implemented and results are the expected ones.

Conclusions and further developments

In this Doctoral Thesis, the design of the incentive schemes within a delegated portfolio management context is investigated. In the light of the observed inconsistencies between theory and empirical evidence, it is clear that the context or the rules of the game have to be changed. In line with Bebchuk and Spamann (2009), we argue that in order to make better regulatory intervention we should consider that interests on investors and managers differ. Furthermore, as described in Chapter 1, we cannot extend results obtained in the agency theory because, compared to delegated portfolio management, there are some structural differences. Because of the more complex challenges, in order to answer to questions arising from (the specific) delegated portfolio relationship, we have to look to characteristics of this contract in itself.

Through the experimental method we manipulate the way the contracts are designed within a delegated portfolio management context. In settings in which there are participants acting as investors and others acting as portfolio managers, in the first experiment (Chapter 2) the contract is designed by investors, who decide the performance fees to be allocated to their manager as a compensation for the portfolio management. In this setting managers have no bargaining power: they can only accept the allocated fees. The other included manipulations in this experiment concern the endowment legitimacy and the presence of fictitious investors. In the second experiment instead (Chapter 3) we allow managers and investors to bargain over the fees' combination: former are asked to propose fees' combination while the latter choose the one they want to pay. To study the market dynamics we implement a 2x2 design: the first treatment concerns the competition between managers in getting endowments from the investors, while the second treatment concerns the knowledge about other competitors' practices.

In the first experiment (Chapter 2) we find that endowment legitimacy does not affect neither investors' nor managers' behavior. Although investors in the earned money condition allocate a lower performance fee that those in the house money conditions, the statistical tests suggest that the difference is not significant. Endowment legitimacy does not affect neither the suggested portfolio riskiness: the only relevant factor is the gender.

In line with the existing literature, we find that females risk less (Charness and Gneezy; 2012). For what concerns managers' behavior, we do not find endowment legitimacy to affect neither the prices deviation relative to the expected value of the assets, nor the volumes of transactions. The possible explanations for the market behavior are two. The first explanation could be the implemented methodology: it could be that the setting was too complex. As Kirchler et al. (2012) have found, by changing the context participants are less confused and the result differs compared to when a standard experimental asset market context is implemented. In line with their findings, it could be that also our setting was too complex to observe also an endowment effect. The other possible explanation is in line with Paul et al. (2015) interpretation, who argue that probably endowment legitimacy is not a relevant factor in the asset markets. What matters in this experiment is the presence of a real investor: compared to the baseline, when managers are endowed with house money and trade on behalf of a fictitious investor, a more speculative behavior is observed. Furthermore, although the endowment legitimacy is not perceived as important, if the figure of the investor is real (and not fictitious), we find that because of this interaction, an anchoring to the suggested portfolio riskiness is possible.

Another results of this experiment has to do with the ongoing debate on the fees, considered by some authors as one of the drivers of excessive risk taking in the industry. While we do not find significant effect of the (allocated) fees on the portfolio deviation, we find support for the fact that investors believe fees are too high (Linciano et al.; 2016). When investors are allowed to decide the performance fee to allocate, what we observe is that, independently of endowment legitimacy, the average allocated (by the investors) performance fee is far from the commonly asked (20%) performance fee. Thus, if consider only investors interests, by combining our results with those of the mentioned report, our feeling is that the usually applied fees are (effectively) too high: probably 10% (the median) performance fee is a better percentage of shared (with the manager) profits. However, if consider only investors' interest, as expected, we find that managers in this setting are not satisfied with the allocated performance fee.

We believe that regulatory interventions should consider interests of both investors' and managers' and not only those of the former or the latter, and this is what we do in the second experiment (Chapter 3). In a setting in which managers compete for investors' endowments, we find that by allowing managers to propose and investors to choose the combination of fees, competition makes both players better-off: the former pay lower fees and the latter are able to collect more capital to be managed. Because of the lower

proposed fees, managers are able to get more endowments from the investors and thus, they have also a higher capital to invest. As a consequence, the lower proposed fees are counterbalanced by the fact that managers are able to get a higher number of entrusted endowments, and thus, this allows them to be paid more.

Compared to *Competition*, *Disclosure* effect is weaker. However, it remains an important characteristics which allows managers to adapt to the market. We find that when Disclosure is no more available, managers adapt slowly to the market. Thus, we find that *Disclosure* does not allow to achieve of a higher market concentration, but it increases the probability of the manager to receive at least one endowment from the investors, which allows them to receive a positive payment.

Beneficial to the ongoing debate on the market competition effect, our results suggest that, in accordance with economic theory predictions, higher competition helps to achieve better outcomes both for investors and managers. Furthermore, we find also that market participation can be encouraged by safeguarding a competitive environment. This is a very important result: while there is an extensive literature providing evidence on the fact that a competitive environment may lead to unwanted outcomes, our results suggest the opposite. When there are no costs to switch manager and investors are given this possibility, in a competitive setting they will take advantage of it. One of the assumptions we make here consists in the full disclosure of the relevant information at no cost for investors nor for managers. Of course, if searching this information by themselves, it will cost a lot of effort and time to both players. Nevertheless, this cost can be reduced for market players if it is paid by the regulator: a shared platform (for example) providing this relevant information can answer this need. The authority of the regulator guarantees also the truthfulness of the provided information.

To sum up, in this thesis we manipulate the way the contract is designed. We find that by introducing the interaction between managers and investors results change. In the first experiment we find that the median allocated performance fee is around 10%. By changing the setting and the way the contract is design, in experiment 2 we find this 10% performance fee one more time: in the competitive setting, the first preferred proposed by managers and paid by investors fees' combination consists in low fixed fees (1%) and 10% performance fee. Our results suggest that fees could be lowered and the bargaining between investors and managers could be the solution. By introducing a more equilibrate bargaining power (no more only in the hands of the managers), a competitive market is able to reduce the fees and results support for theoretical predictions. Thus, policy interventions accounting for the difference in investors' and managers' interests

can be implemented, and results are the expected ones.

Limitations and further research

In Chapter 2 we find a puzzling *anchoring* to the initial suggested portfolio composition in the first periods and once the end of the experiment is approaching. Our intuition is that in the intermediate periods, compared to the initial ones, the anchoring becomes less salient and this is why managers experiment more. Once the final periods are approaching, the anchoring effect becomes more salient and managers go back to the initial suggested portfolio composition. Further research can help to understand this non-monotonic pattern in our data.

Future developments of the setting should include also a financial literacy indicator. There is evidence that financial literacy can influence financial decisions: people with a higher financial literacy level are more likely to ask for financial advice, increase the rate of participation in the stock market, make better decisions to save and invest for retirement.[28] Furthermore, evidence suggest that financial literacy is also an important factor of the observed gender differences concerning financial decisions (Lusardi and Mitchell; 2008, 2014). Thus, not only the financial literacy can mitigate the gender differences we observe (for what concerns initial portfolio riskiness), but, more in general, it can probably increase the bargaining power of the investors.

As for any laboratory evidence, the findings of Chapter 3 would benefit from complementing evidence from field experiments in the style of Kirchler et al. (2017). By conducting field experiment will allow to find a design which accounts also for ranking effect and other factors that make professionals' behavior to differ from the one of the students.

[28] See among others Collins (2012); Van Rooij et al. (2011); Lusardi and Mitchelli (2007); Lusardi and Mitchell (2008).

APPENDIX A

SUPPLEMENTARY MATERIAL TO CHAPTER 2

A.1 Additional tables

Table A.1: Other possible effects

	Dependent variable:		
	Percentage of the risky asset in the last period		
	(1)	(2)	(3)
Earned Money	−3.868	−3.742	−2.689
	(5.048)	(6.251)	(4.897)
No Investor	0.209	−0.078	1.503
	(4.897)	(5.996)	(4.754)
Performance fee	−0.011	0.102	−0.007
	(0.148)	(0.176)	(0.143)
Initial Value of the portfolio	0.0005	−0.001	−0.0002
	(0.003)	(0.003)	(0.003)
Initial portfolio riskiness			0.438***
			(0.117)
Risk averse	2.365	2.380	2.495
	(4.368)	(5.154)	(4.229)
SVO type : individualist		−2.043	
		(5.031)	
SVO type : competitive		−4.429	
		(29.583)	
Constant	37.308***	41.715***	22.676*
	(11.674)	(14.412)	(11.961)
Observations	200	152(a)	200

Note: *p<0.1; **p<0.05; ***p<0.01

(a): reduced dataset containing observations of the only sessions in which the SVO task was performed

Table A.2: The effect of each period on the portfolio deviation

	Dependent variable:
	Mangers' deviation wrt suggested % of the risky asset in the portfolio
Earned Money	0.956
	(3.239)
No Investor	0.265
	(3.226)
as.factor(Period)2	1.014
	(1.771)
as.factor(Period)3	1.578
	(1.771)
as.factor(Period)4	2.621
	(1.771)
as.factor(Period)5	3.562**
	(1.771)
as.factor(Period)6	4.556**
	(1.771)
as.factor(Period)7	4.145**
	(1.771)
as.factor(Period)8	4.517**
	(1.771)
as.factor(Period)9	2.993*
	(1.771)
as.factor(Period)10	1.796
	(1.771)
as.factor(Period)11	2.386
	(1.771)
Constant	−0.223
	(2.530)
Observations	2,200
Note:	*p<0.1; **p<0.05; ***p<0.01

A.2 Printed Instructions

[Instructions for HM condition are in *italic*. For the HM_NOInv condition, instructions were those adopted for the HM condition, with the only difference that any reference to the investor was excluded. The player-specific instructions (investors or managers) were presented on the screens.]

Welcome!

You are about to take part in an experiment concerning decisions in the field of portfolio management: some of you will be randomly assigned the role of investor, while others, the one of portfolio manager. Please do not talk to other participants during the experiment, otherwise you will be excluded from the experiment without being paid. We inform you that all data will be collected anonymously: your identity will never be revealed to the other participants.

The experiment is composed of various parts. Detailed instructions on each part will be provided during the experiment.

Experiment structure and compensation:

The experiment of today is composed of different parts. During the first two parts you will be randomly associated with another participant: the compensation for the first two parts will depend on the role that will be assigned to you, on your decisions and on decisions of the participant you are associated with.

The remaining parts will be performed individually. Each of you will be asked to make decisions. One of the decisions you will make will be randomly drawn by the computer and will be part of your final payment. More details will be provided during the experiment. The experiment will then end with a short questionnaire.

During the experiment you will use experimental points (ECU), which will be converted into euros at the end of the experiment. The exchange rate is 500 ECU = 1 €. In any case, for the participation to the experiment, and for showing up on time, you earn €3.

Instructions for the first two parts of the experiment:

As already anticipated, for the first two parts of the experiment, you will be associated with another participant in the room: each of you will be randomly assigned a role that can be INVESTOR or MANAGER. Depending on the assigned role, you will receive different instructions and you will have to perform different tasks independently, but the final result will depend on the choices of both of you.

PART 1:

At the end of the first part of the experiment, participants acting as INVESTOR has the opportunity to earn experimental points by performing a task requiring attention and concentration. The earned experimental points will be converted in a portfolio consisting of stocks and cash, according to the procedures that will be communicated later. This portfolio will then be entrusted to the MANAGER, who will then decide on how to invest it according to the rules which will be communicated later.

While the INVESTOR will perform the task to earn experimental points, the MANAGER can practice to gain experience in the financial markets where the experimental points will be then invested.

HM condition: *During the first part of the experiment, the investor will be endowed with a portfolio consisting of stocks and partly of cash. The investor will then decide the composition of the portfolio according to procedures which will be explained later.*
This portfolio will then be entrusted to the MANAGER, who will then decide on how to invest it according to the rules which will be communicated later.

Who will have the role of MANAGER can exercise to gain experience in the financial markets where the experimental points will be then invested.

PART 2: Financial markets

In the second part of the experiment, only the MANAGER will have an active role, while the INVESTOR can only see the behavior of the markets in which the MANAGER will operate. The INVESTOR will receive no information about the MANAGER to him associated and will have no opportunity to intervene or influence MANAGER's behavior.

In this experiment there are two markets characterized by two different levels of risk: LOW and HIGH risk. The MANAGER will have access (constantly) to both markets and s/he may invest in each of them. The market is divided into sessions of 120 seconds each. The total number of sessions has been decided before the experiment but it will

not be communicated. You will know which was the last session only after the market phase will be completed.

During each session MANAGERS can either buy or sell stocks. Stocks in the two markets do not pay any dividends throughout the experiment. At the end of the experiment, all the stocks held by the MANAGERS in the respective markets will be bought by the experimenter according to the following criteria: In the LOW risk market the price may be:

Payback price	Probability
20	50%
30	50%

In the HIGH risk market the price may be:

Payback price	Probability
65	20%
15	80%

The amount you will obtain once all stocks will be bough by the experimenter will determine the final value of the portfolio of each pair, and will be needed as an indicator of MANAGER's performance.

The INVESTOR or each pair will be given the opportunity to decide in which of the two markets wants the MANAGER to invest: this choice, however, is not binding for the latter.

EARNINGS

Portfolio management requires the payment of a management fee equal to 2% of the initial value of the portfolio. These expenses will be part of the payment of the MANAGER. For example, if the initial value of the portfolio was 3,000 ECU, the operating costs will amount to $0.02 * 3000 = 60\ ECU$, and this amount will be deducted from the final value of the portfolio.

INVESTORS may decide a performance fee to assign to the MANAGER. The measure of the performance of the MANAGER is given by the difference between the initial value of the portfolio and the final value of the portfolio, i.e., after the last trading session is concluded and the stocks are bought by the experimenter. This difference will be hereinafter called profit.

INVESTORS can decide what percentage of the profit to allocated to the manager as compensation for his/her performance. The performance fee will be paid only if the profit will be positive.

The final gain of the MANAGER will be thus defined by the compensation of management and performance fees. The final gain investor will be given by the final value of the portfolio in the last trading session minus the total compensation manager.

Should you have any questions, raise your hand and we will answer your questions privately.

A.2.1 On-screen instructions

A.2.1.1 Only for investors:

You have been assigned to the role of INVESTOR. You will be randomly matched throughout the experiment with a participant acting as portfolio manager. Each of you will have to complete different tasks independently, but the final result will depend on the choices of both of you. You will never know the identity of the manager and the manager will never know your identity.

As anticipated, earnings of the first part, depend only on the effort you will exert.[1] Detailed information will be provided later. Here you have a summary of the things you are asked to do.

- The amount you earn in the first part of the experiment will constitute the initial value of your portfolio.

  HM condition: *The computer will randomly assign you a portfolio, whose value will be communicated soon.*

- Each portfolio will be composed partially by cash (2000 ECU), and partially by stocks: the number of the stocks depends on the amount of experimental currency you have earned in the first part.

  HM condition: *Each portfolio will be composed partially by cash (2000 ECU), and partially by stocks: the number of stocks will be communicated later.*

- The management of the portfolio involves the payment to the MANAGER of the 2% of initial portfolio value.

[1] Excluded from HM condition instructions.

You will be asked to:

- decide how many of the stocks in your portfolio you want to be invested in the HIGH risk and how many of them, in the LOW risk market;
- choose the share of profits — measured as the difference in value between the initial and the final portfolio — to be assigned to the MANAGER.

You will know the results obtained by the MANAGER only once the experiment will be concluded.

Your final payment will be consist of the final value of the portfolio reduced by the payment of the MANAGER.

If you have any questions, please do not hesitate to raise your hand: we will answer your questions privately.

Portfolio composition

The number of correctly counted tables is _____.
This corresponds to _____ **ECU**, and it constitutes the initial value of the portfolio.

HM condition: *The initial value of the randomly assigned portfolio is _____ ECU.*

Given the initial value of the portfolio, this means that management expenses amount to ____ ECU. As already mentioned, part of the portfolio will consist of cash and part of it will instead be converted into stocks. The cost of a stock is **25 ECU**. Given the amount of ECU you have, this means that your portfolio is made up of 2000 ECU and of _____ stocks.

How many of your stocks you want to be invested in the LOW risk market (B)?

How many of your stocks you want to be invest in the HIGH risk market (A)?

Choice of the performance fee

The portfolio manager will be paid according to the difference between the initial value of the portfolio and its value in the last trading session. You are given the opportunity to decide the percentage of this difference to be assigned to the manager. More precisely, if the final value of the portfolio is greater than _____ ECU (corresponding to the initial value of the portfolio), the manager will have a percentage of the profits. You

can choose the percentage of profits to be allocated to the manager by writing the desired percentage in the provided space and by clicking **OK** button to confirm your choice.

Choose the percentage of profits to be allocated to the manager by writing the desired percentage in the provided space and click **OK** button to confirm your choice.

Which percentage of the profits do you want to assign to your portfolio manager? (%) _____

A.2.1.2 Only for portfolio managers

You have been assigned to the role of portfolio MANAGER. You will be randomly matched throughout the experiment with a participant acting as investor. Each of you will have to complete different tasks independently, but the final result will depend on the choices of both of you. You will never know the identity of the investor and the investor will never know your identity.

In the first part of the experiment, the investor will have to perform a task to earn the experimental points will form the portfolio.

HM condition: *In the first part of the experiment, the investor will be endowed with a portfolio.*

This portfolio will be then transferred to you. Your task will be to manage the mentioned portfolio. More precisely, the portfolio consists stocks which are tradable in the two financial markets: HIGH and LOW risk market. On your computer screen you will see and you will have access to both markets simultaneously.

In the first part of the experiment, while the investor will be busy with his task,[2] you will be given the opportunity to practice and gain experience in the two markets. For the training sessions you will be given a fictitious portfolio. Your performance during training sessions will have no impact on the final outcome or on your final payment.

[2]Excluded from HM condition instructions.

Market instructions

Financial markets will be divided into periods, 120 seconds each, during which you can both sell and buy stocks in the two markets. At the end of each period, your stocks and your cash (ECU) will be transferred to the next period. As anticipated, the number of periods of the experiment have been decided before the start of the experiment but this information will not be communicated. You will know the total number of periods only when the market phase will be over. All your stocks in the two markets in the last trading period will be bought by the experimenter according to the already mentioned rules.

- All MANAGERS will have a portfolio consisting of ECU 2000 (cash) and a number of stocks which varies and depends on the amount of experimental currency gained by investors in the previous phase.[3]
- In each session, you can buy and also sell stocks in the two markets simultaneously.
- As a seller, you can sell any amount of stocks you own at a price that ranges from 0 to 999.
- As a buyer, you can buy at a price ranging from 0 to 999 any amount of stocks you prefer, with the only condition that the money at your disposal are enough to cover the cost.
- You can sell only the stocks you actually own and can buy only if you have enough available ECU for that particular transaction.
- When you buy, your ECU decrease by an amount corresponding to the price paid for the number of stocks you buy.
- When you sell, your ECU increase by an amount corresponding to the price paid for the number of sold stocks.
- Use . for decimal.

Information on management and performance fee

For the management of the portfolio you will receive _____ ECU.

[3]Excluded from HM condition instructions.

Your payment depends on your final performance. The investor has decided to assign you _____ % of the profits if the final portfolio value of the portfolio (the value in ECU after the experimenter will have bought your stocks) will be greater than _____ ECU.

A.3 Trading and History screens

Figure A.1: Manager's screen during market sessions

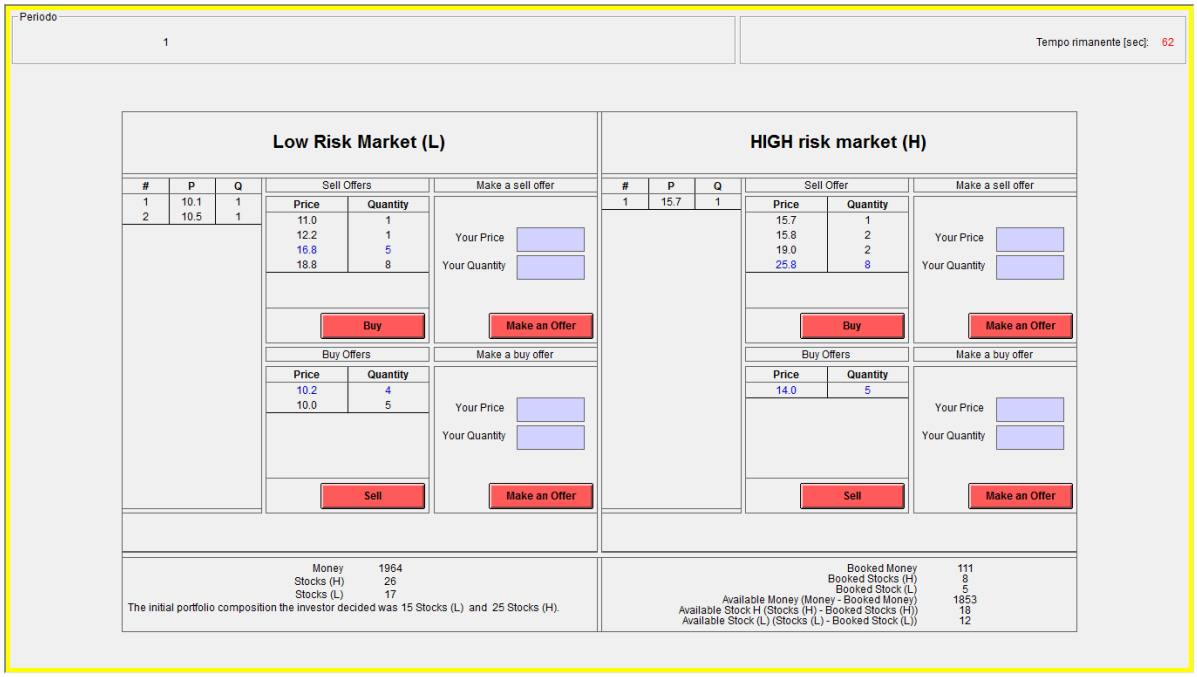


Figure A.2: Investor's screen during market sessions

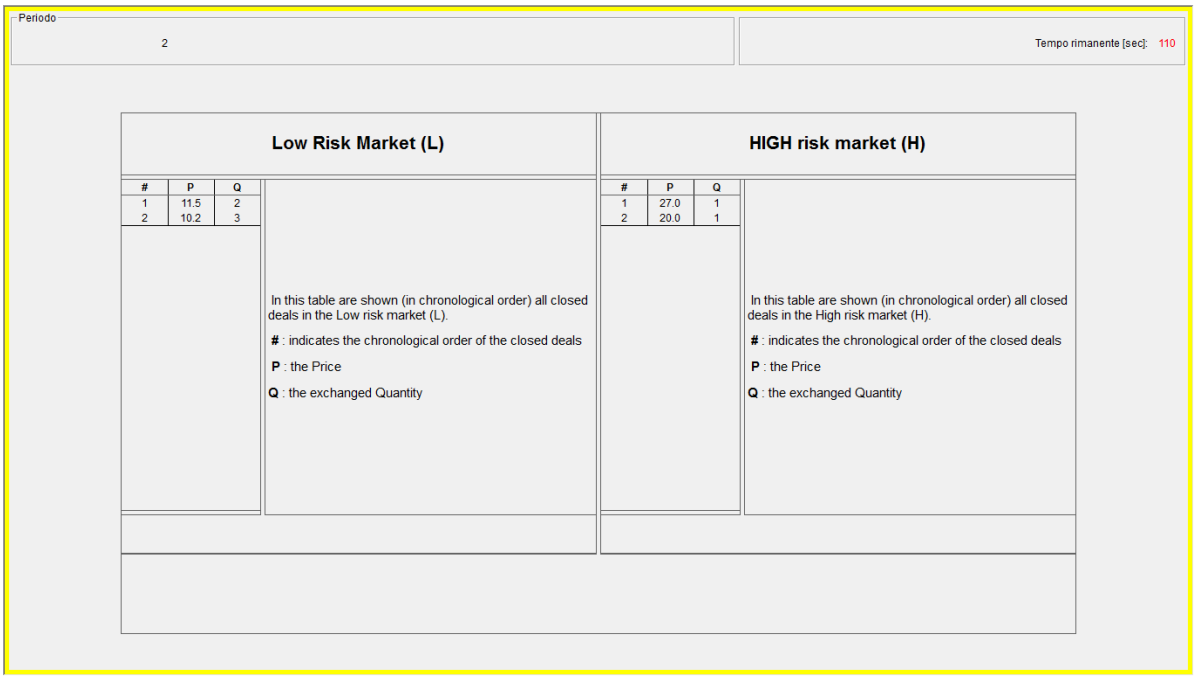


Figure A.3: Managers' *History screen during market sessions*

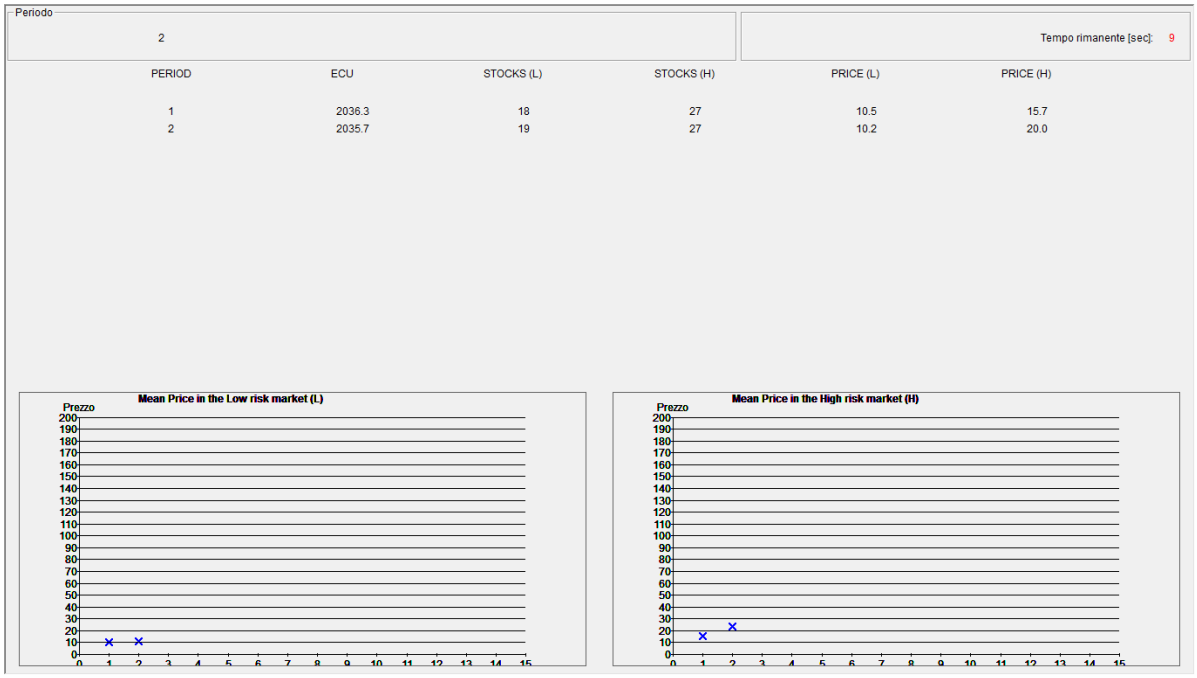
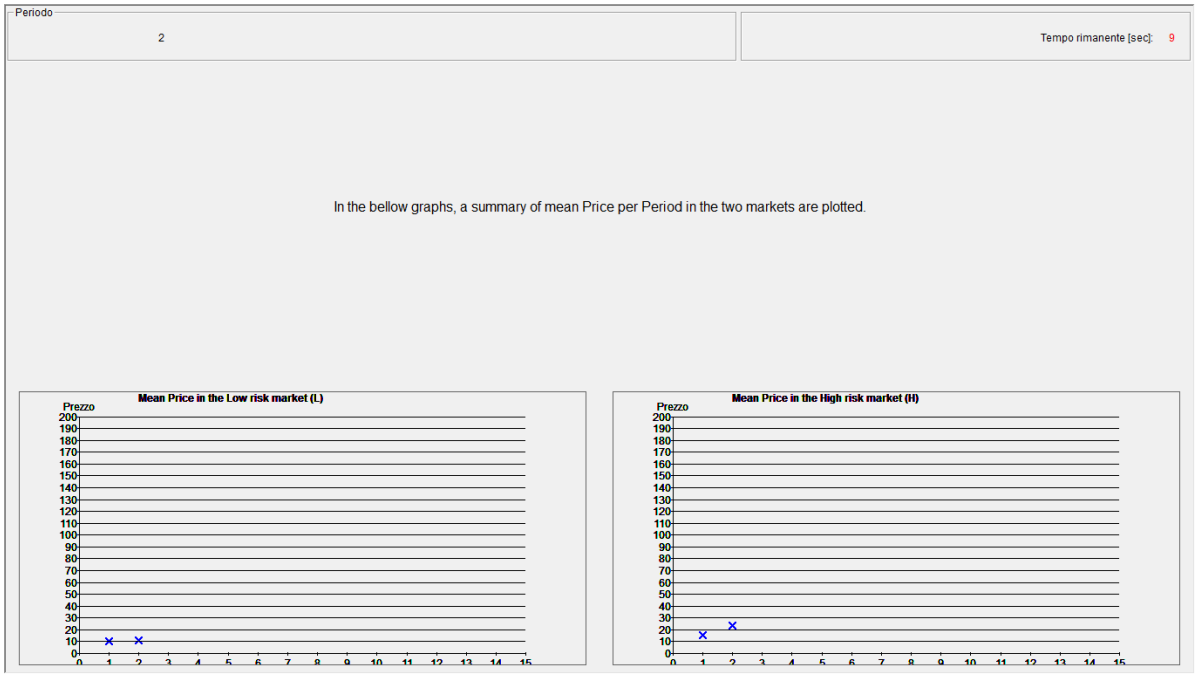


Figure A.4: Investors' *History screen*

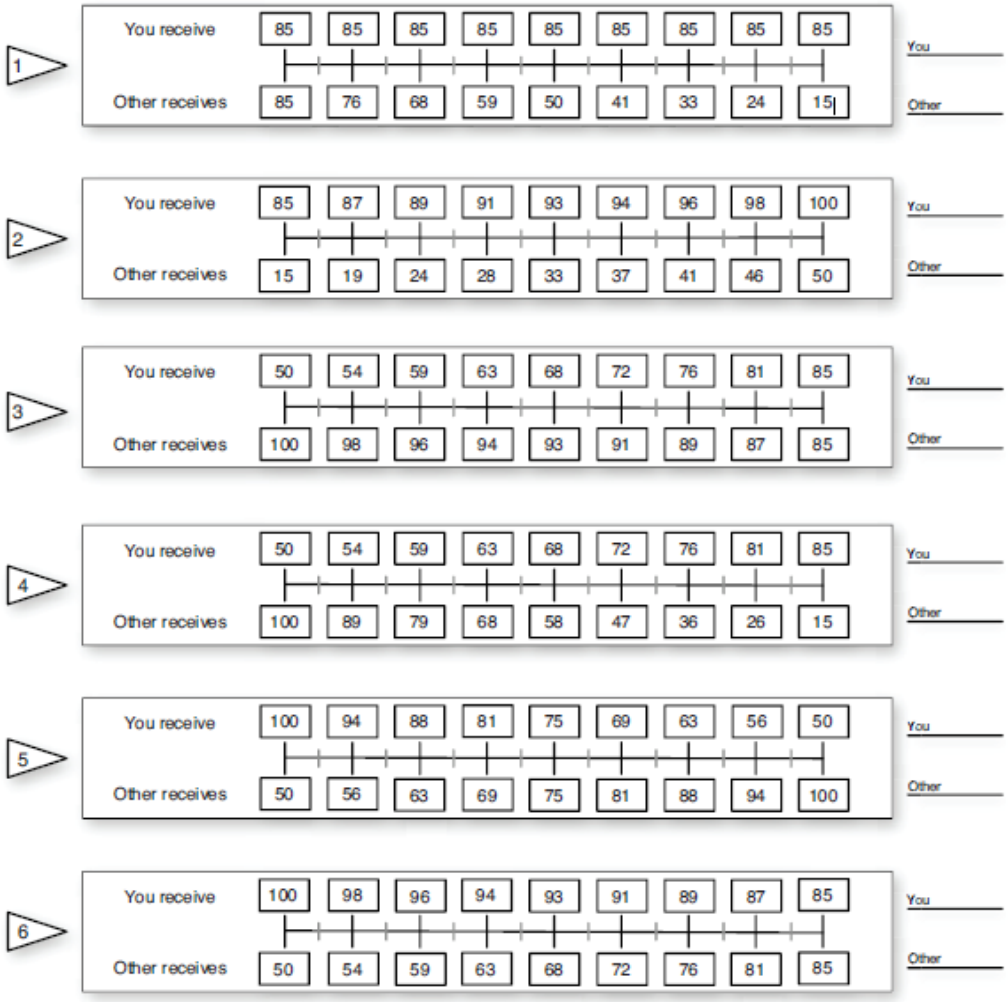


A.4 Tables and Figures: experimental tasks

Table A.3: Risk elicitation task. The 10 paired lottery-choice decisions with low payoffs converted in ECU

Option A	Option B
1/10 of 1000 ECU, 9/10 of 800 ECU	1/10 of 1925 ECU, 9/10 of 50 ECU
2/10 of 1000 ECU, 8/10 of 800 ECU	2/10 of 1925 ECU, 8/10 of 50 ECU
3/10 of 1000 ECU, 7/10 of 800 ECU	3/10 of 1925 ECU, 7/10 of 50 ECU
4/10 of 1000 ECU, 6/10 of 800 ECU	4/10 of 1925 ECU, 6/10 of 50 ECU
5/10 of 1000 ECU, 5/10 of 800 ECU	5/10 of 1925 ECU, 5/10 of 50 ECU
6/10 of 1000 ECU,4/10 of 800 ECU	6/10 of 1925 ECU, 4/10 of 50 ECU
7/10 of 1000 ECU, 3/10 of 800 ECU	7/10 of 1925 ECU, 3/10 of 50 ECU
8/10 of 1000 ECU, 2/10 of 800 ECU	8/10 of 1925 ECU, 2/10 of 50 ECU
9/10 of 1000 ECU, 1/10 of 800 ECU	9/10 of 1925 ECU, 1/10 of 50 ECU
10/10 of 1000 ECU, 0/10 of 800 ECU	10/10 of 1925 ECU, 0/10 of 50 ECU

Figure A.5: SVO task. The six primary slider items presented to the participants



A.5 General demographics and questionnaire

- Age
- Gender
- Field of study
- How much do you agree with the following statements? For every statement choose a value between 0 and 5 (where 0 is the minimum and 5 is the maximum).

  1. Investors
     - I did my best in the counting task.
     - I guess that during market sessions the manager did his best given market conditions.
     - I guess that during market sessions the manager did his best given the allocated performance fee.
     - In manager's place I would have invested more in the HIGH risk market.
     - In manager's place I would have invested the same percentage of stocks in the two markets.
  2. Managers
     - During market sessions I did my best given market conditions.
     - During market sessions I did my best given the allocated share of profits.
     - During markets sessions I altered portfolio composition wrt initial suggested portfolio composition because advantageous.
     - During markets sessions I did not considered the initial portfolio composition suggested by the investor.[4]
     - I am satisfied with the percentage of profits the investor has decided to share with me.
     - In investor's place I would have allocate the same initial portfolio composition (allocation of stocks).

[4] These words are excluded in the HM_NOInv condition.

APPENDIX B

SUPPLEMENTARY MATERIAL TO CHAPTER 3

B.1 Additional Tables and Figures

Table B.1: General comparison between participants from the two universities

	Nr. of participants	**Mean age**	**Nr. of females**	**Nr. Risk Averse participants**
Innsbruck	144	23.44	58	99
Trento	144	22.49	60	122

Table B.2: Summary table: average proposed Management fee

	Mean proposed M in		**Nr of participants in**		
	Innsbruck	**Trento**	**Innsbruck**	**Trento**	**p -value**[1]
No Comp. + No Discl.	1.70	1.51	8	16	0.030
Comp. + No Discl.	1.01	1.19	16	8	0.118
No Comp. + Discl.	0.81	1.83	8	16	<0.001
Comp. + Discl.	0.71	1.09	16	8	0.001

[1] Wilcoxon-Mann-Whitney test

Table B.3: Summary table: average proposed Performance fee

	Mean proposed P in		**Nr of participants in**		
	Innsbruck	**Trento**	**Innsbruck**	**Trento**	**p -value**[1]
No Comp. + No Discl.	20.19	18.89	8	16	0.266
Comp. + No Discl.	16.83	14.42	16	8	0.005
No Comp. + Discl.	20.48	15.05	8	16	<0.001
Comp. + Discl.	13.85	18.37	16	8	<0.001

[1] Wilcoxon-Mann-Whitney test

Table B.4: Investors decision (by university): entrust their endowment to a/the manager

	The percentage		**Nr of participants in**		
	in Innsbruck	**in Trento**	**Innsbruck**	**Trento**	**p -value**[1]
No Comp. + No Discl.	71.15 %	69.47 %	16	32	0.666
Comp. + No Discl.	92.07 %	75.00 %	32	16	< 0.001
No Comp. + Discl.	68.75 %	67.07 %	16	32	0.672
Comp. + Discl.	87.26 %	84.13 %	32	16	0.286

[1] Wilcoxon-Mann-Whitney test

Table B.5: Summary table: average selected management fee by investors in the two universities

	Mean selected M in		**Nr of participants in**		
	Innsbruck	**Trento**	**Innsbruck**	**Trento**	**p -value**[1]
No Comp. + No Discl.	1.60 %	1.43 %	16	32	0.016
Comp. + No Discl.	0.68 %	0.96 %	32	16	0.448
No Comp. + Discl.	0.70 %	1.80 %	16	32	<0.001
Comp. + Discl.	0.57%	0.81 %	32	16	0.001

[1] Wilcoxon-Mann-Whitney test

Table B.6: Summary table: average selected performance fee by investors in the two universities

	Mean P in		**Nr of participants in**		
	Innsbruck	**Trento**	**Innsbruck**	**Trento**	**p -value**[1]
No Comp. + No Discl.	14.39 %	18.86 %	16	32	0.003
Comp. + No Discl.	16.27 %	13.78 %	32	16	<0.001
No Comp. + Discl.	16.85 %	14.59 %	16	32	0.055
Comp. + Discl.	12.73 %	15.54 %	32	16	0.002

Table B.7: Frequencies of each proposed fee combination in the competitive setting

Competition+Disclosure					
Management fee	**Performance Fee**				
	0 %	10%	20%	30%	**Rel.Freq.**
0%	1,92%	16,35%	17,95%	4,81%	41,03%
1%	1,28%	21,47%	17,31%	1,28%	41,34%
2%	1,60%	2,88%	5,13%	0,96%	10,57%
3%	3,21%	0,00%	0,64%	3,21%	7,06%
Rel. Freq.	**8,01 %**	**40,70%**	**41,03%**	**10,26%**	**100%**

Competition+No Disclosure					
Management fee	**Performance Fee**				
	0 %	10%	20%	30%	**Rel.Freq.**
0%	0,00%	6,41%	12,18%	5,13%	23,72%
1%	0,96%	24,04%	21,15%	4,49%	50,64%
2%	0,96%	10,90%	8,65%	0,32%	20,83%
3%	0,96%	2,88%	0,64%	0,32%	4,80%
Rel. Freq.	2,88%	44,23%	42,62%	10,26%	100

Table B.8: Frequencies of each proposed fee combination in the No Competition condition

No Competition+ Disclosure					
Management fee	**Performance Fee**				
	0 %	10%	20%	30%	**Rel.Freq.**
0%	0,00%	1,60%	7,69%	4,17%	13,46%
1%	2,88%	9,29%	21,15%	6,09%	39,41%
2%	2,56%	16,35%	10,58%	2,56%	32,05%
3%	0,96%	5,45%	7,37%	1,28%	15,06%
Rel.Freq.	6,40%	32,69%	46,79%	14,10%	100%

No Competition+ No Disclosure					
Management fee	**Performance Fee**				
	0 %	10%	20%	30%	**Rel.Freq.**
0%	0,00%	1,28%	2,88%	4,49%	8,65%
1%	0,96%	12,50%	11,86%	13,14%	38,46%
2%	0,96%	9,62%	25,32%	4,17%	40,07%
3%	1,28%	2,56%	5,13%	3,85%	12,82%
Rel.Freq.	3,20%	25,96%	45,19%	25,65%	100%

Table B.9: Frequency of (actually) paid fees by investors

Competition+ Disclosure					
Management fee	**Performance Fee**				
	0 %	10%	20%	30%	**Rel.Freq.**
0%	4,09%	21,38%	21,00%	2,42%	48,89%
1%	3,35%	22,30%	13,94%	0,93%	40,52%
2%	1,49%	1,86%	4,09%	0,37%	7,81%
3%	2,23%	0,00%	0,00%	0,56%	2,79%
Rel.Freq.	11,16%	45,54%	39,03%	4,28%	100%

Competition+ No Disclosure					
Management fee	**Performance Fee**				
	0 %	10%	20%	30%	**Rel.Freq.**
0%	0,00%	15,77%	18,18%	4,82%	38,77%
1%	0,93%	23,56%	20,59%	2,97%	48,05%
2%	1,11%	6,12%	3,90%	0,00%	11,13%
3%	0,74%	1,30%	0,00%	0,00%	2,04%
Rel.Freq.	2,78%	46,75%	42,67%	7,79%	100%

Table B.10: Frequency of (actually) paid fees by investors when No Competition

No Competition+ Disclosure					
Management fee	**Performance Fee**				
	0 %	10%	20%	30%	**Rel.Freq.**
0%	0,00%	2,13%	9,48%	3,55%	15,16%
1%	8,53%	8,77%	16,82%	6,64%	40,76%
2%	3,79%	16,11%	8,53%	1,90%	30,33%
3%	0,95%	5,92%	5,92%	0,95%	13,74%
Rel.Freq.	13,27%	32,93%	40,75%	13,04%	100%

No Competition+ No Disclosure					
Management fee	**Performance Fee**				
	0 %	10%	20%	30%	**Rel.Freq.**
0%	0,00%	1,37%	3,20%	5,26%	9,83%
1%	3,43%	14,87%	10,07%	13,04%	41,41%
2%	5,26%	9,15%	22,20%	2,29%	38,90%
3%	1,83%	2,29%	4,12%	1,60%	9,84%
Rel.Freq.	10,52%	27,68%	39,59%	22,19%	100%

Table B.11: Summary table: managers' payment in Taler

	Min.	**1st Qu.**	**Median**	**Mean**	**3rd Qu.**	**Max.**
Comp.+Discl.	0.00	82.93	245.14	353.88	485.9	3064.3
Comp.+ No Discl.	0.0	129.7	302.5	506.6	651.5	2671.5
No Comp.+Discl.	0.0	200.0	334.6	376.0	470.6	1634.9
No Comp.+ No Discl.	0.0	200.0	367.0	401.7	528.0	1517.2

Table B.12: Summary table: investors' payment (in Taler) among those who entrusted their endowment to a manager

	Min.	**1st Qu.**	**Median**	**Mean**	**3rd Qu.**	**Max.**
Comp.+Discl.	-3184.0	-139.3	214.7	251.1	724.0	4169.6
Comp.+ No Discl.	-3184.0	-156.2	191.2	236.9	729.4	3310.1
No Comp.+Discl.	-2288.8	-237.5	97.15	166.54	665.59	2236.8
No Comp.+ No Discl.	-4312.0	-265.6	141.0	165.0	609.0	2582.4

Table B.13: Theoretical Sharpe ratio: summary table

	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
Comp. + Discl.	0.0000	0.4025	0.4600	0.4266	0.5058	0.5385
Comp. + No Discl.	0.2000	0.4025	0.4600	0.4341	0.5000	0.5385
No Comp. + Discl.	0.0000	0.4047	0.4950	0.4629	0.5183	0.5385
No Comp. + No Discl.	0.0000	0.4025	0.4589	0.4362	0.5045	0.5385

Table B.14: Ex-post Sharpe ratio: summary table

	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
Comp. + Discl.	-1.87865	-0.17205	-0.04847	0.23752	0.73672	2.44919
Comp. + No Discl.	-1.92097	-0.23609	-0.09714	0.15525	0.62132	2.44701
No Comp. + Discl.	-1.8927	-0.1733	0.1778	0.3389	1.0010	2.7315
No Comp. + No Discl.	-1.9534	-0.2326	0.1759	0.3283	0.9549	2.4492

Note: According to the formula, the *Sharpe ratio* is negative when the investment return is lower than the risk free rate.

Table B.15: Realized portfolio returns

Condition	**Min.**	**1st Qu.**	**Median**	**Mean**	**3rd Qu.**	**Max.**
Comp.+ Discl.	-31.840	-0.734	3.168	4.164	9.379	52.120
Comp.+ No Discl.	-31.840	-0.617	3.152	4.240	9.394	41.376
No Comp.+ Discl.	-20.888	0.016	2.976	4.100	9.635	28.722
No Comp.+ No Discl.	-40.120	-0.959	3.401	4.312	9.995	36.030

Figure B.1: Evolution of mean proposed fees per condition and per period(round). On the *x-axis* the period we represent the period while on the *y-axis* the proposed fee combinations: on top the fixed (management) fees are plotted, while on bottom, the proposed performance fees. The grey lines represent the average proposed fees within each experimental session (in each round) while the bold line is the average fee per condition.

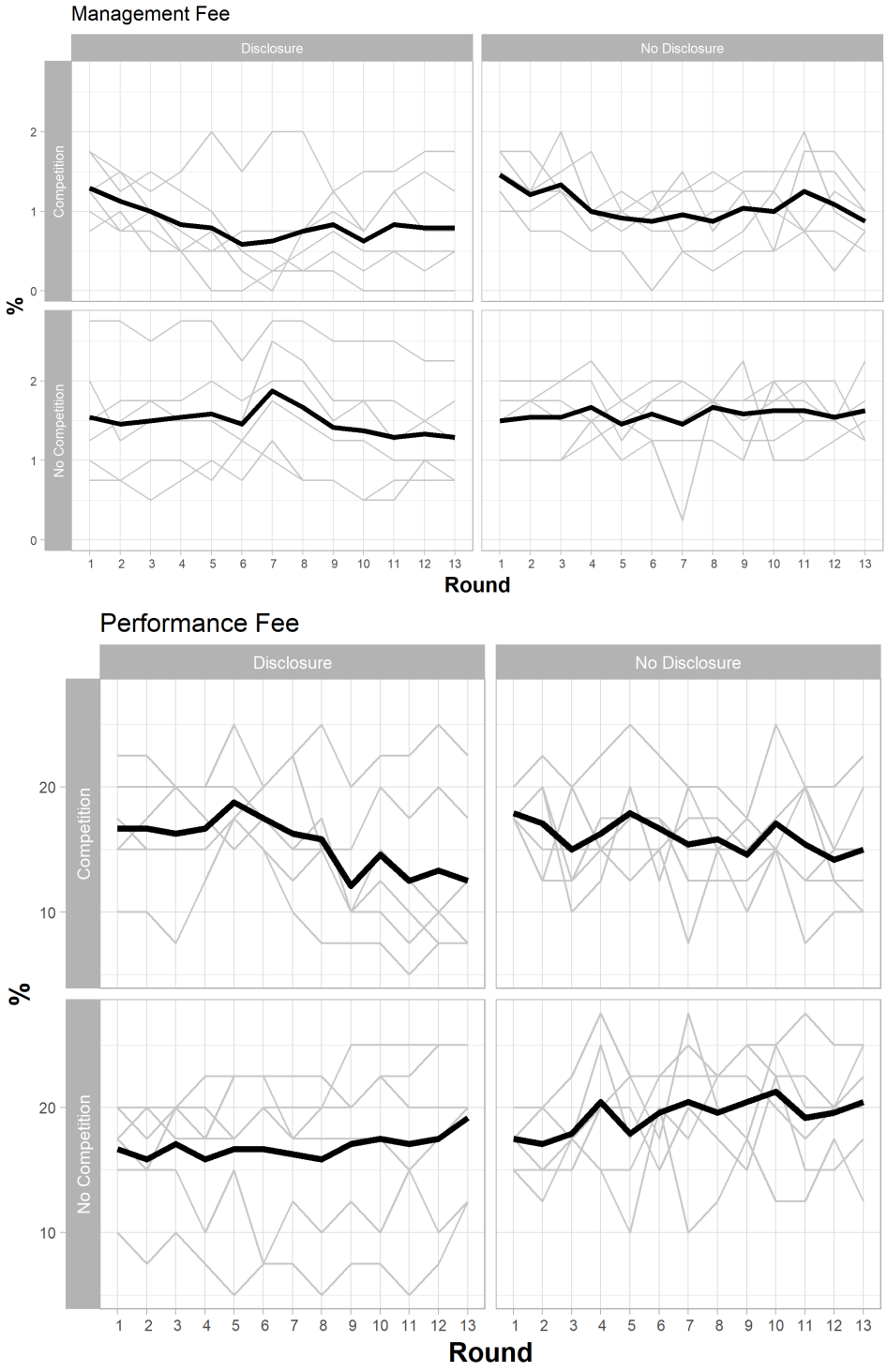


Figure B.2: Mean portfolio composition per period and per condition. On the *x-axis* we plot the period (round) while on the *y-axis*, the average per period percentage of wealth invested in each of the financial tools.

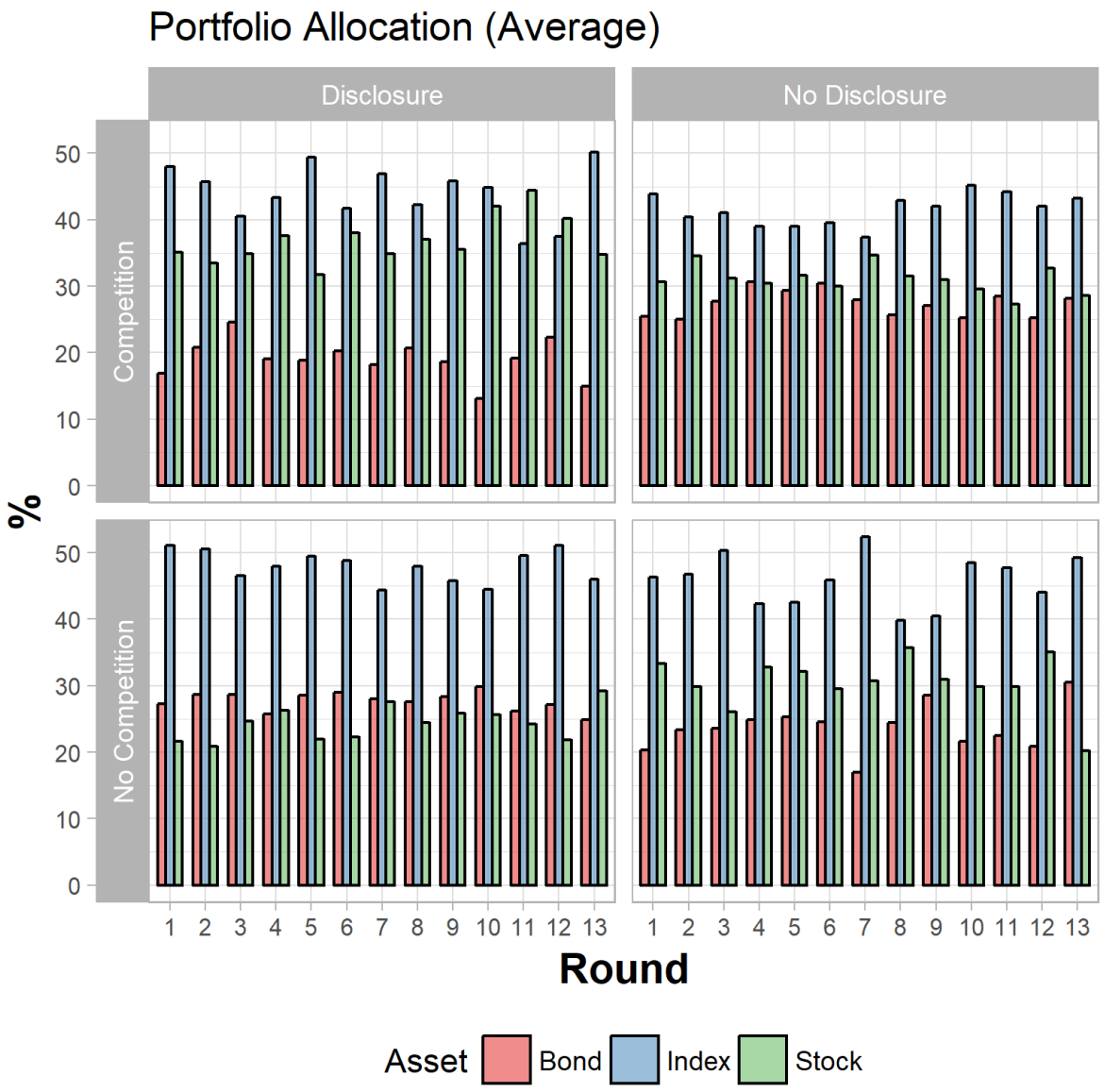


Table B.16: Theoretical portfolio returns

Condition	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
Comp.+Discl.	1,00	3,88	5,00	4,68	5,50	6,00
Comp.+No Discl.	1,45	3,30	4,70	4,32	5,50	6,00
No Comp.+ Discl.	1,00	3,70	4,70	4,37	5,46	6,00
No Comp.+ No Discl.	1,00	4,10	4,70	4,51	5,45	6,00

Table B.17: Investment strategy: individual characteristics effects

	Dependent variable:			
	Percentage of wealth allocated to...			
	Stock		Stock and Index	
	Comp.	No Comp.	Comp.	No Comp.
	(1)	(2)	(3)	(4)
DISCLOSURE	4.868	−1.919	8.160	5.039
	(6.254)	(3.040)	(7.954)	(7.136)
Period	0.136	0.035	0.133	−0.054
	(0.189)	(0.154)	(0.147)	(0.145)
Age	0.621	1.622	−2.691*	3.571
	(1.430)	(1.009)	(1.523)	(2.260)
Female	−2.984	−0.015	4.767	−9.581
	(7.730)	(3.462)	(8.111)	(7.747)
Advanced financial knowledge	0.927	20.257**	22.207	32.517*
	(13.861)	(8.625)	(14.718)	(18.811)
Risk Averse	−19.204***	−14.138***	−12.743**	−20.771***
	(5.420)	(3.459)	(5.738)	(7.436)
Loss Averse	2.679	8.219**	−5.649	8.319
	(7.503)	(4.132)	(7.927)	(8.959)
Constant	26.977	−18.142	126.616***	−22.692
	(37.804)	(23.992)	(40.422)	(53.653)
Observations	624	624	624	624
Note:				*p<0.1; **p<0.05; ***p<0.01

B.2 General instructions

[Instructions are for *Competition + Disclosure*. When there are changes for the other conditions, the text will be reported in italic.]

Welcome!

You are going to take part on a study investigating economic decision making. Please do not talk to other participants during the experiment, otherwise you will be excluded from the experiment without being paid. All data will be collected anonymously: your identity will never be revealed to the other participants.

For any questions about the instructions or during the experiment, please raise your hand and we will answer your questions privately.

General Instructions

You will be randomly assigned in one of two groups: INVESTORS and MANAGERS. There are two times as many INVESTORS as MANAGERS.

No Competition: *Every manager will be randomly matched with two investors and the group composition will remain the same for the main part of the experiment. Investors will be informed about the label of the manager in the same group at the beginning of the experiment.*

The experiment will run for a number of periods between 10 and 25. The exact number of periods have been defined before the experiment started, but it will not be announced in advance. In each period you will be asked to make decisions according to the rules we will explain later.

During the experiment the experimental currency you will use is Taler, and, at the end of the experiment, the amount of Taler you will have earned will be converted in Euro according to the rule 200 Taler =1 Euro. In addition to the earnings of the main part of the experiment, you will receive 3 Euro for your punctual attendance. The entire payment will be paid out in cash and privately after the experiment.

INVESTORS get an endowment each period (10.000 Taler=experimental currency) and have to decide whether to entrust this endowment to a MANAGER.

No Competition : *INVESTORS get an endowment each period (10.000 Taler=experimental currency) and have to decide whether to entrust this endowment to the MANAGER or not.*

If the INVESTOR entrusts the money s/he has to pay a management fee to the MANAGER. The MANAGER has to make an investment decision each period: s/he has to decide how much to invest in the stock index, an individual stock and risk-free bonds (see Table B.18).

Table B.18: Characteristics of the financial tools

	μ	σ
Individual Stock	6%	20%
Index	5%	10%
Risk free bond	1%	0%

The three investments differ in terms of expected returns (μ), with the individual stock providing a higher expected return (6%), followed by the index (5%) and by the bond (1%). The three investments differ also in terms of standard deviation (σ), with the individual stock characterized by the highest standard deviation (20%), followed by the index (10%) and by the bond (0%).

The μ parameter is a measure of investment profitability, while the σ parameter is a measure of risk of the investment. For the three sources of investment described above, a higher profitability correspond to a higher risk. Furthermore, the returns of the individual stock and those of the index are not correlated, namely, they are independent random draws.

If the investor decides to not entrust the money to the manager, s/he earns the risk-free return of 1%.

Participants acting as portfolio managers are master students in finance with experience and knowledge about portfolio management. They also have some training periods to get acquainted with the investment decision at hand. Results of training periods are not relevant for the final payment.

Detailed instructions for MANAGERS

In each period, the management of the portfolio entitles the manager to a management fee M (a percentage of the initial value of the endowment), plus a performance fee P, which is calculated as a percentage on the realized returns (final value of the investment

minus initial value of the endowment) in every period. More precisely, the 16 possible combinations of the fees are:

Table B.19: Combination of fees (M+P)

Performance fee (P) (% of profits)	**Management fee (M) (% of endowment)**			
	0%	**1%**	**2%**	**3%**
0%	0%-0%	0%-1%	0%-2%	0%-3%
10%	10%-0%	10%-1%	10%-2%	10%-3%
20%	20%-0%	20%-1%	20%-2%	20%-3%
30%	30%-0%	30%-1%	30%-2%	30%-3%

Participants acting as managers, at the beginning of every period, will be asked to decide the composition of the payment structure they ask for the management of the portfolio, by selecting one of the 16 possible combinations of M and P. This information will then be provided to INVESTORS who will decide whether and to whom to entrust their endowment.

The performance fee (P) will be allocated only if a positive profit is realized (and zero otherwise), while the management fee (M) will be paid independently of the realized profit.

A manager may have more than one investor entrusting him the endowment. After receiving all endowments, the manager decides on the percentages of wealth to invest in each financial tool (see Table B.18).

The MANAGER is free to choose any strategy s/he considers appropriate with the only condition that the investment decisions have to sum to 100% of the endowment in each period.

Once all investment decisions have been made, MANAGERS will see the own return on investment before and after the fees (M+P) are deducted.

Before starting the main periods, 6 training periods will be conducted: during these periods **your strategies will not be revealed**, but, starting with period 4 the returns will be shown to INVESTORS and to other MANAGERS.

No Disclosure: *Before starting the main periods, 6 training periods will be conducted: during these periods your strategies will not be revealed, but, starting with period 4 the returns will be shown only to INVESTORS.*

For these training periods the endowment every manager will have is 1.000 Taler. The main tables you will find on your screen will look like the one bellow:

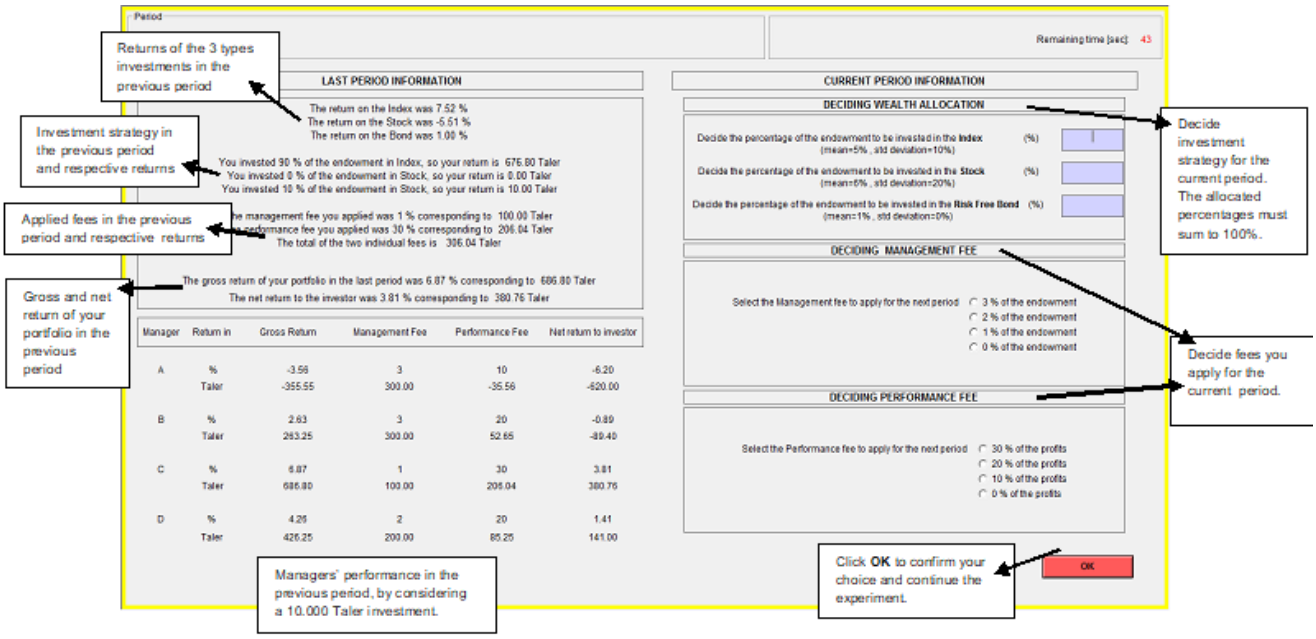


Figure B.3: Example of managers' decisional screen: Disclosure

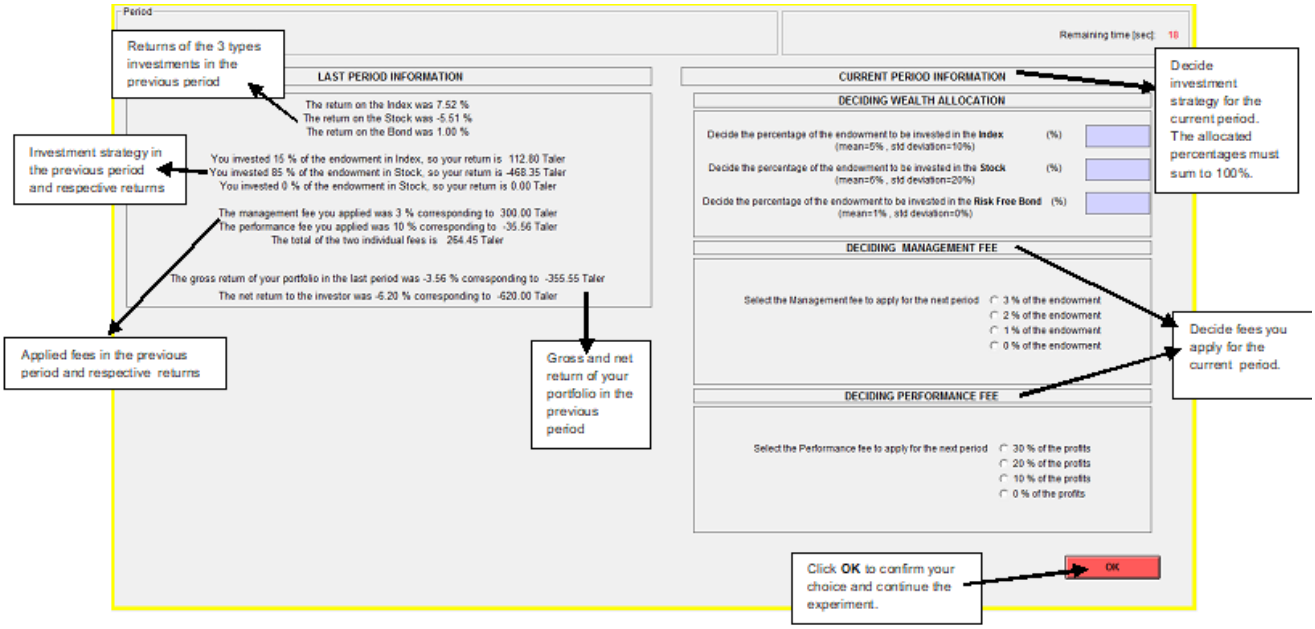


Figure B.4: Example of managers' decisional screen: No Disclosure

Detailed instructions for INVESTORS

At the beginning of every period, participants acting as INVESTOR will be endowed with 10.000 Taler. After the fees (M and P) and the returns of the last investment decision made by all MANAGERS will be shown, the INVESTORS will be asked to decide whether and to whom to entrust the 100% endowment.

NO Competition : *After the fees (M and P) and the returns of the last investment decision made by all managers will be shown, the investors will be asked to decide whether entrust the 100% endowment to the manager or not.*

If an INVESTOR does not want to entrust his endowment to any of the MANAGERS, the endowment is deposited on a separate account, and the return of the investment will be 1%, which is the risk free interest rate.

The main tables you will find on your screen will look like the one bellow:

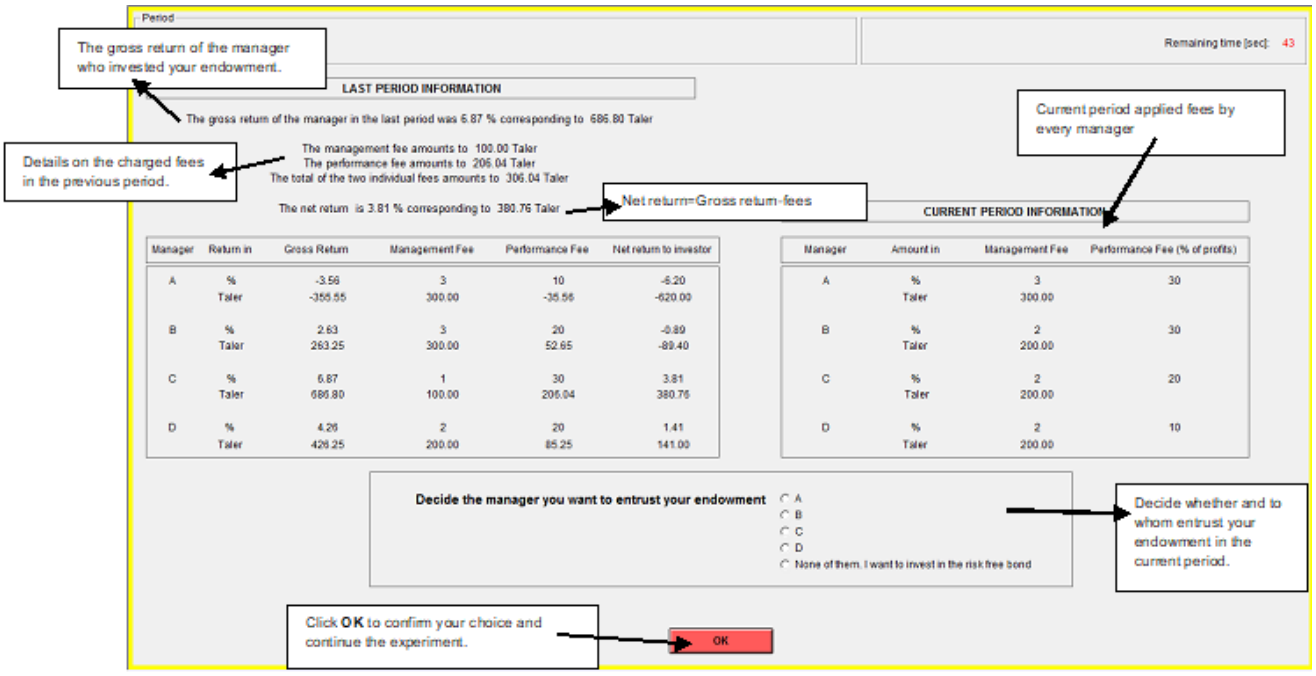


Figure B.5: Example of investors' decisional screen: Competition

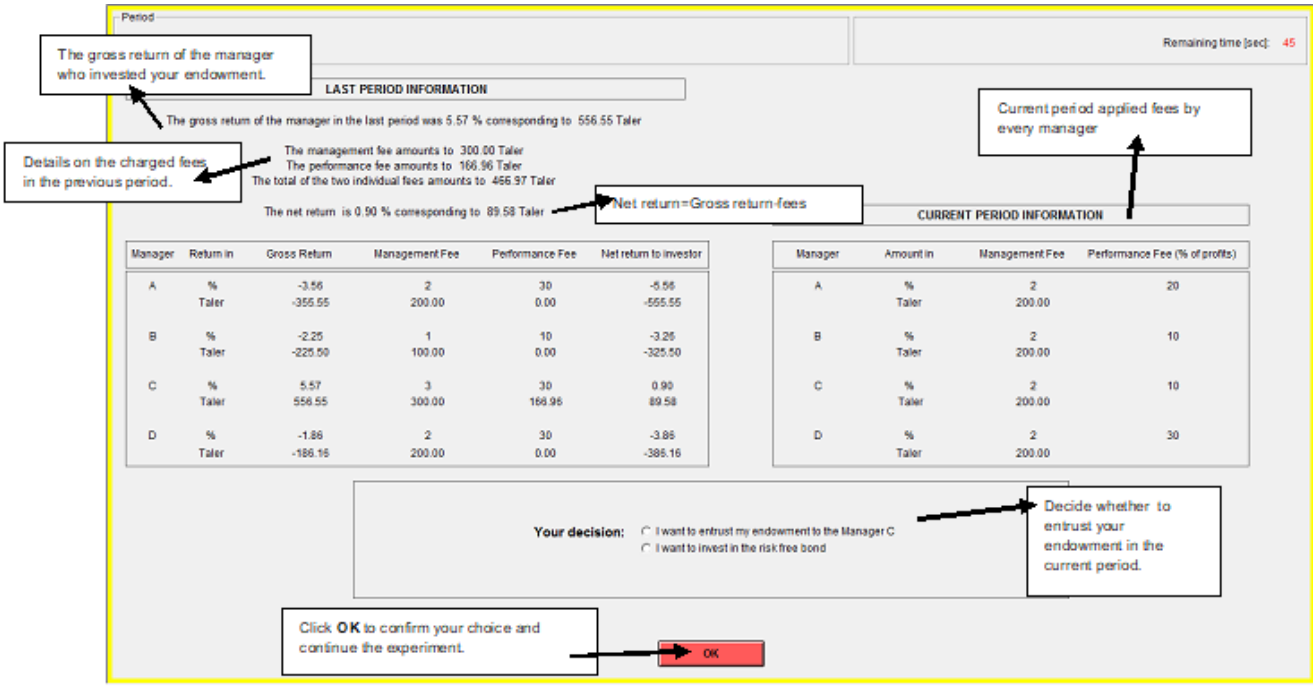


Figure B.6: Example of investors' decisional screen: No Competition

Payment

Both the INVESTORS and the MANAGERS will be paid on profits. Here are some examples of possible investment returns:

- Suppose an investor handed his endowment to a manager who demands 1% management fee and 10% performance fee. The manager invests and generates 5% profit. The investment thus grows from 10.000 to 10.500 Taler. The manager receives 1% of 10.000 = 100 plus 10% of profits (500) = 50 for a total of 150 Taler. The investor receives the profit of 500 minus the fees (150) = 350 Taler.

- Suppose that the demanded management fee was 2% and 20% of performance fee. The manager invests and generates a 7.2% profit, meaning that investment grows from 10.000 to 10.720 Taler. The manager thus receives 2% of 10.000=200 plus 20% of 720=144, for a total of 344 Taler. The investor receives the profit (720) minus the fees (344)=376 Taler.

- Suppose that the demanded fees were 2% of management fee and 10% of performance fee. The manager invests and generates a -2.5% return, meaning that the investment decreases from 10.000 to 9.750. The managers receives 2% of 10.000=200, and no performance fee. The investor receives the profit (-250) minus the fees (200), for a total loss of -450.

At the end of the experiment the payment of both INVESTORS and MANAGERS will be the sum of 3 randomly drawn realizations from the main periods. Suppose that the 3 realizations are examples above, thus:

- the payment of the MANAGER:
  - if only one INVESTOR entrusts the own endowment, the payment of the MANAGER will be 150+344+200=694 Taler;
  - if two INVESTORS entrusted their endowments the payment will amount to (2*150) + (2*344) + (2*200) = 1388 Taler;
  - if none of the INVESTORS entrusted their endowments, the respective MANAGER will get 0 (zero) Taler.

- the payment of the INVESTOR:

- amounts to 350+376+(-450)= 276 Taler if s/he entrusted the own endowment to the MANAGER;
- amounts to 100+100+100=300 Taler if s/he decided to invest in the Bond and get the risk free interest rate (1%).

Details about your payment for the investment task will be provided only at the end of the experiment, and not immediately after the investment task finishes.

During the experiment, participants acting as investors may incur losses. In that case, the loss must be recovered by performing a task in the laboratory at the end of the experiment. More precisely, participants who will register a loss will be asked to count the number of values equal to 1 in a table containing values from 1 to 9. For every correctly counted table you will obtain a loss compensation of 200 Taler. Once the participant will finish to correctly count the necessary number of tables, s/he can leave the laboratory. For example, if the loss was 530 Taler, the participant will have to correctly count 3 tables before leaving the room.

Other possible earnings

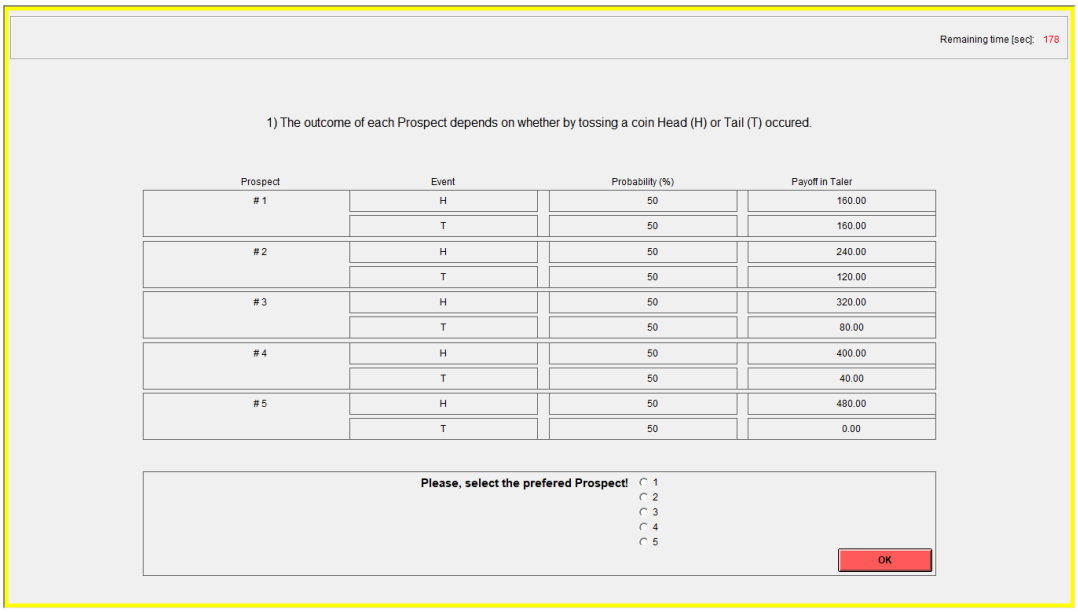
Once the main experiment is finished, each participant, independently of the previously assigned role, will be asked to (individually) make decisions which are relevant for the (own) final payment. In one of these tasks, you will be asked to choose between possible prospects. At the end of this phase, one of the selected (by you) prospects will be randomly chosen to be implemented, and the respective outcome will be added to your final payment. If the outcome of the selected prospect to be paid will be negative amount (a loss), the respective amount will be deducted from the 3 ? participation payment.

After this task, you will be asked to correctly answer to some questions. One of the questions will be randomly selected, and, if the answer you provided will be found to be correct, we will add to your final payment 200 Taler and zero otherwise. The experiment concludes with a short questionnaire.

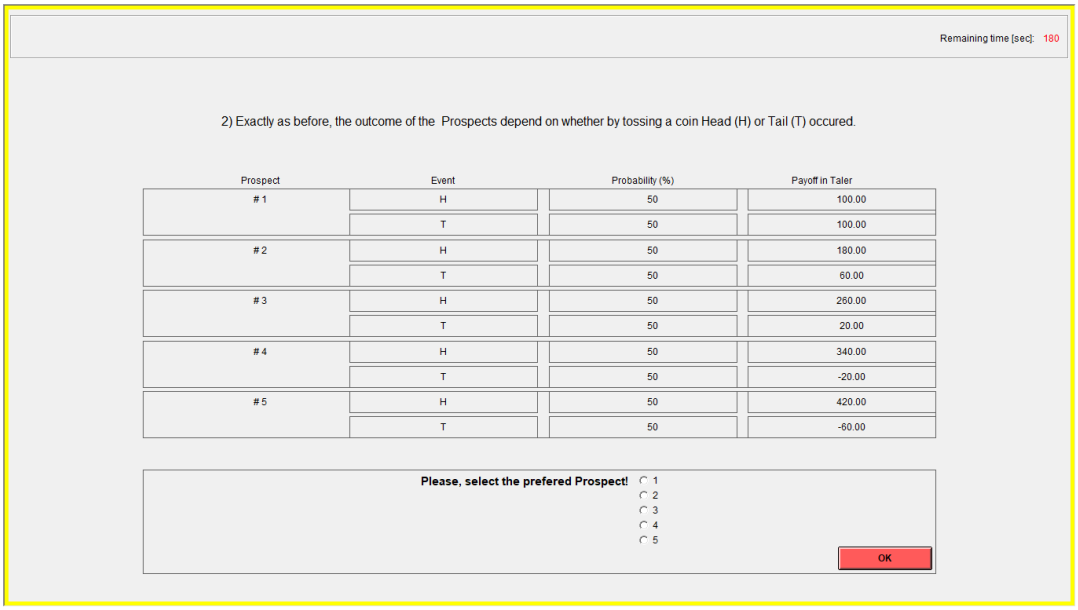
If there are no questions, we can start the experiment.

B.3 Risk elicitation task

B.3.1 Loss domain



B.3.2 No-loss domain



B.4 Financial literacy questionnaire

1. Suppose you have 100 € deposited in a bank account which remunerates your savings at an annual rate of 2%. After 5 years how many € you will have in your bank account if you leave your money deposited?

   a) More than 102

   b) Exactly 102

   c) Less than 102

   d) I don't know

2. Suppose you have 100 € deposited in a bank account which remunerates your savings at an annual rate of 20%, and suppose you do not withdraw from your bank account liquidity nor interest. After 5 years how many € you will have you been collected in your account?

   a) More than 200

   b) Exactly 200

   c) Less than 200

   d) I don't know

3. Which of the following statements is true? If somebody buys the stock of firm B in the stock market . . .

   a) s/he owns part of firm B.

   b) s/he has lent money to company B.

   c) s/he is liable for firm's B debts.

   d) None of the above

   e) Do not know

4. Considering a long period investment (e.g. 10 or 20 years) which asset normally gives the highest return?

   a) Savings accounts

   b) Bonds

   c) Stocks

d) Do not know

5. The stocks are usually more risky than bonds.

   a) True

   b) False

   c) I don't know

6. If the interest rate falls, what should happen to bond prices?

   a) Rise

   b) Fall

   c) Stay the same

   d) None of the above

   e) I don't know

B.5 Additional questions to check the basic financial knowledge

1. Do you know the meaning of the term "standard deviation"?

   a) YES

   b) NO

2. Given two lotteries, **L** and **G**, which one has a higher standard deviation?

   - **L**: 20 Euro with probability 60% and 10 Euro with probability 40% .
   - **G**: 22 Euro with probability 60% and 7 Euro with probability 40%

   $\Longrightarrow$ Your answer:

   - **L**
   - **G**
   - They have the same standard deviation
   - I do not know.

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