Monograph:
Chmura, T., Nguyen, K. orcid.org/0000-0002-5892-5917 and Khan, T. (2024) Understanding responsibility in financial management: the role of fee structures. Working Paper. Sheffield Economic Research Paper Series, 2024013 (2024013). Department of Economics, University of Sheffield ISSN 1749-8368

The University Of Sheffield. | School Of Economics

Understanding Responsibility in Financial Management: The Role of Fee Structures

Thorsten Chmura, Tanvir Khan, and Kim Nguyen

Sheffield Economic Research Paper Series

SERPS no. 2024013

ISSN 1749-8368

18 November 2024

UNDERSTANDING RESPONSIBILITY IN FINANCIAL MANAGEMENT

THE ROLE OF FEE STRUCTURES[1]

Thorsten Chmura[2], Tanvir Khan[3] and Kim Nguyen[4]

Abstract

The principal-agent problem is prevalent in the financial management industry, where financial agents are responsible for managing their clients' payoffs. Although extensive literature examines the risk-taking behavior of agents when making decisions for others, the results remain mixed. We conduct laboratory experiments that investigate situations where agents make decisions for themselves and for others under two incentive structures: fixed incentives, in which agents are responsible only for others' payoffs and welfare, and variable incentives, where agents' payments align with their principals. Our findings show that agents are most efficient when making decisions for themselves. The performance-based scheme proves to be more efficient for both parties than the fixed incentive scheme. Agents are more likely to trade and engage in risky behaviors, such as speculative trading, under the fixed incentive treatment. Bubble formation is significantly smaller in principal-agent scenarios where agents have sole responsibility under the fixed treatment. Women tend to show greater concern for the welfare of others, even when their own payoff is fixed. Cognitive ability, psychopathy, and the big five personality traits also play significant roles in trading behavior and wealth generation, although these relationships depend on specific environmental conditions.

Keywords: responsibility, decision making for others, speculation, asset markets, bubbles

JEL Classification: C91, D31, G11

---

[1] Acknowledgment: We are grateful to Professor Karl Taylor and Professor Jesse Matheson for their helpful comments.

[2] Professor in Economics at Nottingham Business School, Nottingham Trent University (thorsten.chmura@ntu.ac.uk).

[3] Assistant Professor at North South University, Dhaka, Bangladesh (khan.tanvir@northsouth.edu)

[4] Lecturer in Economics at the School of Economics, University of Sheffield (corresponding author; Email: k.nguyen@sheffield.ac.uk).

1. Introduction

The notion that retail investors without expert investment knowledge can achieve better returns by entrusting professionals in the financial markets (e.g., investment bankers, hedge funds, and mutual funds) began to gain popularity in the 1970s. This delegation of responsibility has provided tangible benefits, such as reduced transaction costs and improved risk distribution. However, it has also created conflicts between the principal (i.e., the investor) and the agent (i.e., the asset manager), leading to issues of adverse selection and moral hazard. Various payment structures, such as combinations of salary and bonus, options, capped incentives, and penalties, have been employed to alleviate these issues. The goal is to align the interests of the principal and the agent, who is primarily responsible for the well-being of the principal. Nevertheless, some studies (Rajan, 2006; Bebchuk et al., 2010) suggest that these incentive-based arrangements encourage fund managers to take more risks with other people's money, which can destabilize the market. Allen and Gorton (1993) present a theoretical model of the agency problem between investors and managers acting on behalf of the investors. In this framework, the manager retains a portion of the proceeds but does not share in the losses. Their study reports on "rational bubbles," as the convex incentive structure encourages managers to trade at prices significantly above fundamental values.[5]

Making risky decisions on behalf of others is a common phenomenon in finance and economics. Professionals managing funds make investment decisions for their clients, while individuals in top management positions of publicly traded companies act on behalf of their shareholders. The relationship between decision-making for others and risk preferences has been widely discussed in economics. On one hand, there is extensive evidence showing that agents are more likely to act selfishly and take greater risks when making decisions for others. For instance, in a large-scale incentivized experiment, Andersson et al. (2016) found that subjects take more risks when making decisions for others. Similarly, a meta-analysis by Polman and Wu (2020), which reviewed 128 effects from 71 published and unpublished papers (totaling 14,443 observations), confirmed the existence of a risk shift when people make choices on behalf of others.

[5] In a similar setup, Jensen and Meckling (1976) modelled the agency problem between shareholders and debtholders of the firm. They show how limited liability allows the shareholder to transfer the risk to the bondholders by obtaining any upside gain but not bearing the full downside risk. Consequently, the firm can undertake projects that are not necessarily value-adding, i.e., negative net present value projects. Similarly, Allen and Gale (2000) study how intermediation by the banking sector results in a comparable agency problem which also leads to asset bubbles.

On the other hand, when individuals are concerned about the economic well-being of others, they tend to alter their behavior in a more pro-social way. Charness (2000) suggested that an economic agent looking after someone else's interests would act more pro-socially. Similarly, Bolton and Ockenfels (2010) showed that being responsible for others' welfare increases risk aversion. Buckle et al. (2024) revealed that agents are less likely to take risk when making decisions for their principals. Recent practices in financial markets, particularly the design of financial professionals' incentive structures, have been heavily criticized following the global economic meltdown in 2007. Many argue that these incentives may encourage behavior that destabilizes the market environment (Guo et al., 2015). We argue that the distortive effect of incentives on market prices can be mitigated under conditions of responsibility, and that this impact is more pronounced in the absence of monetary incentives.

The Boston Consulting Group published a report in 2019 indicating that, from the customer's perspective, performance-based fee models are the most attractive[6]. Yet, the value of St. James' Place, the largest wealth management firm in the UK, has nearly halved since the start of 2023 (The Financial Times), due to overcharging their clients[7]. Clients are increasingly concerned about the fees they pay and the effectiveness of financial advisors, especially when compared to passive, lower-cost investments like index funds. We address this issue by examining the effectiveness of fixed and performance-based fee structures when agents are responsible for others' payoffs. Under the fixed fee structure, agents are merely responsible for their clients' payoffs and welfare, whereas the performance-based fee structure aligns the interests of both agents and clients. Our aim is to test whether agents' trading behavior changes when making decisions for themselves versus on behalf of others, under different incentive schemes, and to analyze the outcomes of those strategies.

We investigate these issues in the context of a laboratory asset market experiment, as introduced in the seminal paper by Smith et al., (1988) (hereafter SSW, 1998). This design allows us to measure various aspects of trading behavior, such as trading volume, short-term speculation, and bid-ask spreads, as well as the impacts of these decisions on wealth generation and bubble formation. We have three treatments, traders trade for themselves based on SSW (1998), traders trade for passive participants sitting in the same room for a fixed payment (responsibility), and traders trade for a performance-based payment. We conducted

[6] The report can be accessed using this link: https://www.bcg.com/publications/2019/solving-the-pricing-puzzle-in-wealth-management

[7] https://www.ft.com/content/54a93482-2f26-4643-b4df-05ad00e862ed

six markets for each of the three treatments, totaling 18 markets. In each market, there were 9 passive traders and 9 active traders, while in the *baseline* treatment, only 9 traders participated. In the fixed responsibility treatment, traders receive a flat payment, whereas in the *variable* responsibility treatment, their payoff is based on trading performance during the experiment. We compared the results of these two responsibility treatments with those from six *baseline* markets. Our findings show that responsibility significantly reduces overpricing in markets where traders receive a fixed salary for performing the task. However, the effect of responsibility is somewhat diminished when the trader's payoff is tied to their trading performance. Additionally, agents are more likely to trade and speculate in the treatment where their payoff is fixed.

We also examine the impacts of individual agent characteristics on their responsibility and trading for others. Ifcher and Zarghamee (2024) indicate that there is no gender gap when people make decisions for others. Nevertheless, we find that females consistently earn more than males across all treatments, and they continue to prioritize caring for others, even when they receive a flat fee for their trading. In a post-experiment questionnaire, we measure cognitive ability using the Cognitive Reflection Test (CRT) (Frederick, 2005), psychopathy levels (Levenson et al., 1995), and the big five personality traits (John et al., 1991). We then correlate these traits with agents' trading behavior in different settings.

The literature shows that individuals with higher CRT scores are more likely to be successful in financial markets (Corgnet et al., 2015; Noussair et al., 2016), while there are limited studies on the roles of psychopathy and the big five personality traits in the context of making decisions for others. The psychopathy measure addresses traits such as selfishness, lack of empathy, and manipulative behavior, which is relevant with the context of responsibility and make decisions for others. We find that agents with higher CRT scores perform better, but this is not the case in the *fixed* treatment, where they know their payoffs do not depend on their performance. Similarly, traders with high psychopathy scores are less likely to trade in the *fixed* treatment. Traders who are extraverted, conscientious, and open to experience tend to earn more when trading for themselves, while agreeable traders earn significantly less. Our study is closely related to the work of Kleinlercher et al. (2014), Fabretti et al. (2017), Kirchler et al. (2018), Kleinlercher and Stöckl (2018), Füllbrunn and Luhan (2020), and Cui et al. (2022).

This study makes four main contributions to the literature on trading for others and the effectiveness of incentive structures. First, we make an original contribution to the literature

on experimental asset markets and decision-making on behalf of others. To the best of our knowledge, we are the first to explicitly investigate the impact of responsibility on price stability in laboratory asset markets. While some research has explored the concepts of responsibility and decision-making for others in various economic settings, this issue has received little attention within the experimental asset market literature. For instance, Ifcher et al. (2024) employed a summation task under different payment schemes to measure the gender gap in competition when making decisions for others, while Andersson et al. (2016) asked participants to choose between risky lotteries when deciding for others. Our design uniquely uses an asset market to replicate financial markets within the context of responsibility in financial management. The presence of the principals in the same room encourages agents to make more responsible decisions. Also, the asset market format enables us to measure agents' risk-taking behavior by assessing short-term speculative trading, trading volume, and how these decisions impact market stability and bubble formation, insights that are highly useful for both market participants and policymakers.

Second, we contribute to the understanding of factors influencing individual behavior by examining the effects of various incentive schemes. We explore whether responsibility alone, as opposed to a combination of responsibility and monetary incentives, can encourage pro-social behavior. In recent years, professional fund managers have received considerable attention (Ding and Wermers, 2012). According to Rajan (2006), the widespread use of convex incentive structures is a primary factor contributing to instability in major markets worldwide, as the potential for substantial upside gains, combined with limited downside risk, encourages managers to take excessive risks.

Third, our study contributes to the literature on risk-taking on behalf of others. Several related works have documented a ‘cautious shift’ prompted by responsibility (e.g., Charness, 2000; Charness and Jackson, 2009). These studies suggest that being responsible for another person's welfare often leads to pro-social actions, such as more risk-averse decision-making. In line with this literature, we also measure agents' risk-taking behavior when making decisions for others. However, unlike previous studies that primarily use lottery settings to assess risk preferences, we evaluate risk-taking and trading behavior in a financial market context by analyzing speculative trading decisions, bid-ask spreads, and trading volume. Our primary findings support the existence of a cautious shift under conditions of responsibility. This study also relates to experimental work examining the effects of different payment

incentives in asset markets (James and Isaac, 2000; Cheung and Coleman, 2014; Holmen et al., 2014; Baghestanian et al., 2017).

Finally, we contribute to the literature by examining how individual characteristics such as cognitive abilities, psychopathy, and the big five personality traits influence decision-making on behalf of others. These findings offer valuable insights for the recruitment of financial managers.

The remainder of the paper is structured as follows: Section 2 presents a literature review, Section 3 introduces the experimental design and hypothesis development, Section 4 discusses the results, and Section 5 concludes the study.

2. Literature review

2.1 Decision making for others

Economic theories associated with risky decisions, such as expected utility theory (Von Neumann and Morgenstern, 1947) and prospect theory (Kahneman and Tversky, 1979; Tversky and Kahneman, 1992), primarily focus on decisions at the individual level, i.e. scenarios where the outcome is relevant only to the decision-maker. However, in real-life situations, many decisions are made on behalf of individuals who are not part of the decision-making body. The economic contexts in which the choices of decision-makers affect the outcomes of others, as well as their own, represent a common category of phenomena.

Many studies in recent years have shed light on the topic of decision-making for others. For example, Pahlke et al. (2015) used a 50-50 lottery experiment with gain and loss domains to examine the role of responsibility in risk-taking decisions. The results differed across the two domains: in the gain domain, agents were prone to risk aversion, while in the loss domain, they were more willing to take risks. Füllbrunn and Luhan (2017) indicated that risk aversion is significantly reduced when subjects make decisions on behalf of others. Similarly, Eriksen and Kvaløy (2010) found that decision-makers behaved more cautiously when acting as agents for another entity, i.e., when deciding on behalf of others. Chakravarty et al. (2011) studied the attitude toward risk in subjects making decisions for others in a simple experimental setup. Their study focused on comparing subjective preferences in situations where decision-makers only made decisions for themselves versus when they made decisions for others. It was found that subjects were much less risk-averse when making decisions for others than when making decisions for themselves. Participants were generally risk-averse when only they were affected by their decisions but appeared close to risk-neutral when deciding on behalf of others. Bolton et al. (2015) focused on the hypothesis that social responsibility increases risk aversion in decision-makers compared to *baseline* scenarios, where decisions are made at an individual level. They observed a higher level of caution in decision-making when agents were socially responsible.

Various hypotheses about the level of risk aversion have been tested in the literature on risk-shifting. Following the seminal work of Stoner (1961), several studies have suggested that decisions made by groups exhibit a lower level of risk aversion compared to those made by individuals. However, some contemporary studies show the opposite pattern, indicating that group decisions can be riskier than individual decisions. The focus of our study is on situations where an individual decides for a group, rather than on decisions made by groups collectively.

The key distinction between group decisions and decisions made under responsibility is that, in the latter case, the decision-maker is solely responsible for the outcome. A cautious shift is expected in such scenarios, as the individual responsible for the outcome may act more cautiously to avoid negative consequences, driven by an aversion to guilt.

Studies in the decision-making literature distinguish between responsibility and the closely related concept of accountability (Hall et al., 2017). According to Hall and Ferris (2011), accountability involves a perceived expectation that an audience will judge the decision-maker's actions. This means that decisions are evaluated by individuals or groups who may not be part of the decision-making body but are affected by the decisions or actions of the decision-maker. Hall et al. (2017) emphasize that expected evaluation and the presence of a salient audience are crucial components of accountability. While some studies (e.g., Frink et al., 2008) treat these terms as equivalents and use them interchangeably, other studies (such as Schlenker et al., 1994) distinguish between accountability and responsibility. These works suggest that responsibility does not necessarily require the presence of an external audience. In our experimental design, decision-makers are aware that they are making decisions both for others and for themselves. However, they also understand that their choices are unobservable to the principal, and the principal cannot influence their final payoff. Thus, the decision-maker (or trader) in our experimental design is not accountable for her decisions; she is only responsible for others' economic well-being.

2.2 Incentive schemes and investment decisions

The impacts of incentive schemes and investment decisions have been examined in various studies. Kleinlercher et al. (2014) explored four incentive schemes, linear, penalty, bonus, and cap[8], and found that identical expected dividends yielded price differences over 100% depending on the scheme. Bonus incentives led to the highest prices, while penalty incentives led to the lowest. In mixed-incentive markets, bonus-incentivized traders took more risks, whereas penalty-incentivized traders were conservative. Kirchler et al. (2018) investigated rank incentives in a game involving professionals and students, finding that both rank and tournament incentives increased risk-taking among underperforming professionals, while only tournament incentives affected students[9]. This effect persisted across various conditions,

[8] BONUS: A fixed salary with additional bonus payments for strong performance. CAP: A fixed salary with bonus payments for good performance, but with a maximum limit. LINEAR: A salary directly proportional to performance. PENALTY: A fixed salary with deductions for poor performance (Kleinlercher et al., 2014).
[9] Tournament incentives consist of two key elements. The first component includes salary and other material rewards that are based on performance, creating competition-driven monetary incentives to surpass others. The

including investment framing, payoff consequences, social identity priming, and professional gender. Other studies include Andersson et al. (2013), who found that decision-makers' increased risk-taking due to incentives was moderated by altruistic preferences and pro-social traits. Fabretti et al. (2017) found that increasing convex incentive contracts raised prices and volatility while reducing market liquidity. Risk aversion's influence on trader decisions decreased with more convex contracts, and wealth disparities among traders had similar effects. Gärling et al. (2017) discovered that bonuses for short-term performance could lead to poor timing in purchases. Kleinlercher and Stöckl (2018) examined the effects of salient (individual decision-based) and non-salient (changing endowment and show-up fee) incentive schemes, finding no differences between salient schemes but significant impacts with non-salient schemes. Previous participation significantly affected the perception and understanding of incentive schemes but not motivation. Füllbrunn and Luhan (2020) conducted an experiment with money managers investing for themselves and clients separately and together, discovering that without bonus systems, decision-makers invested less for others. Limited liable decision-makers invested more for others than for themselves. Cui et al. (2022) found that both tournament incentives and penalty framing significantly increased the price of high-risk assets. Additional analysis revealed significant gender differences in trading behavior and performance, with a possible connection between the two.

Our design differs from previous studies in two significant ways. First, we incorporate two incentive schemes, fixed payments and performance-based payments, reflecting the primary models used in the mutual fund and wealth management industries. This approach allows us to examine the impacts of responsibility on decision-making for clients. Second, our design not only assesses the decisions made by fund and wealth managers but also evaluates their effects on financial markets, particularly regarding bubble formation. While other studies focus on selecting risk-free or risky assets under various compensation schemes, we additionally consider risk factors associated with speculative decisions and place a stronger emphasis on trading behavior. The visibility of clients in the laboratory setting also highlights the responsibility of participants.

---

second component involves non-monetary incentives that also encourage individuals to outperform their peers. The second component is also known as rank incentives (Kirchler et al., 2018).

3. Experimental design and hypothesis development

The design of our experiment is based on the seminal work of SSW (1988) to investigate whether bubbles in experimental asset markets are influenced when traders make decisions on behalf of others and take responsibility for those decisions. The structure of each market is indistinguishable from that of design 4 defined in SSW's (1988)[10]. There are nine traders in each market who trade for 15 periods, each lasting 120 seconds. The total number of shares in circulation at any point during the experiment is 36. Traders receive dividends for each share they hold at the end of each period. The dividends are randomly determined at the end of every period from the following distribution: 0, 8, 16, or 40 ECUs.[11] Traders can view the dividend amount on the screen before proceeding to the next period. Each number is equally likely to occur, resulting in an expected dividend of ECU 16 per period. Since this information is common knowledge, traders can promptly assess the fundamental value of the shares in every period. With an expectation of ECU 16 in each period, the intrinsic value of a share in period t is calculated as $16 \times (16 - t)$, meaning ECUs 240 in the first period, 224 in the second period, and so forth, reaching 16 at the beginning of the final period (period 15).

We conducted the laboratory experiment at the Centre for Research in the Behavioural Sciences (CRIBS), University of Nottingham with 270 students recruited via ORSEE (Greiner, 2015). The asset market experiment was designed and programmed using z-Tree (Fischbacher, 2007)[12]. At the beginning of period 1, each participant is assigned to a group of nine traders. Each trader receives a unique subject ID upon entering the laboratory. There are three treatments in our study. The trading procedure is the same across all treatments, but traders receive different types of incentives in each treatment. In the *baseline* treatment (*baseline*), traders trade on behalf of themselves, i.e., they are not responsible for others' payoffs. In the other treatments (*fixed* and *variable*), traders represent the economic interests of someone else as well as their own (agents responsible for their passive investors or principals). Participants were randomly assigned the roles of traders and passive investors in the fixed-salary and variable-salary treatments. In these two treatments, 18 subjects participated, with half of them being assigned the role of traders and the other half the role of

---

[10] This design has the most appropriate asset endowment ratio (1:3) to prevent overvaluation (Kirchler, Huber, & Stöckl, 2012).

[11] In our experiment, the money is expressed in ECU (Experimental Currency Unit).

[12] Instructions, taken primarily from Haruvy and Noussair (2006), were read aloud in the experimental lab to the audience (i.e., participants in the laboratory) at the beginning of the experiment (Appendix D). The ethics application for this experiment is approved by the Ethics committee at the Nottingham University Business School.

passive investors. Traders and passive participants were randomly and anonymously matched at the beginning of a session and remained paired for the entire experiment.[13] In all treatments, each trader receives an equal amount of money (ECU 280) and an equal number of shares (four shares) at the start of the experiment. Traders can use the money to purchase shares. The value of the asset (share) will be zero after receiving the final dividend payment.

Table 1 compares the three treatments, *baseline*, *fixed* and *variable*. In the *baseline* treatment, traders are not responsible for others' payoffs. In the *variable* treatment and *fixed* treatment, traders trade on behalf of another participant (a passive participant) in the lab and receive a variable salary and fixed salary, respectively. It can be noted that the interests of the trader and the passive participant in the group are perfectly aligned in the *variable* treatment, i.e., the payoff for the trader and the passive member in *variable* treatment sessions is the same. In the variable-salary treatment, the trader is trading for both himself/herself and the passive member, whereas in the fixed-salary environment, traders are trading for others.

The role of responsibility is more prominent in the *fixed* treatment compared to that of the *variable* treatment due to the absence of any monetary incentives. The feeling of being responsible for others' payoffs (and wellbeing) is the only thing that incentivizes the traders in this environment. A trader receives a fixed salary of ECU 1100 from this experiment for carrying out trading activities on behalf of the passive member of his/her group in the fixed salary with responsibility markets. We emphasize the fact that the trader is solely responsible for the economic well-being of the passive member in this responsibility treatment.

It is well-known that incentives can shape individual behavior. Incentives are a critical component of our experimental design, which follows the approach of James and Isaac (2000). Their pioneering work on laboratory asset markets primarily focused on the impact of non-linear incentives on asset price stability, demonstrating the emergence of mild overpricing in these markets. In our experimental setup, we also inform traders, who are trading on behalf of a two-person group, that the person they represent is physically present in the room. Additionally, we make them aware that they are responsible for the final payoff of the subject in their group.

[13] We asked each participant to pick a number (which is used as an ID) from a box. By picking a random number, they determined their role in the experiment. We ensured that participants did not see the number before making their selection. If a participant picked a number between 1 and 9, they were given the role of a trader. If the number was greater than 9, participants assumed the role of a passive member. Payoffs were denoted in experimental currency units, where 125 ECU equals 1 British pound.

A set of studies in the literature on risk-taking for others relates choices made for oneself and choices made for other individuals in the group to the outcome of the decision. In one case, the decision-maker is unaffected by the outcome of the decision, while in the other case, the decision-maker is affected by the choices they make. For example, Beisswanger et al. (2003) studied decisions when the outcome does not have any economic relevance for the decision-maker. On the other hand, Eriksen and Kvaløy (2010) and Chakravarty et al. (2011) studied this phenomenon by incorporating monetary incentives, i.e., the decision-maker is affected by the outcome of the decision. We varied the prominence of responsibility in two responsibility treatments. In the responsibility with fixed salary, the role of responsibility is more prominent since monetary rewards no longer motivate traders. The decision-maker is essentially deciding for another participant in this environment, and the outcome of the decision is irrelevant to the decision-maker's final payoff. In terms of design similarities, our study is closest to Baghestanian et al. (2017). However, whereas they mainly focused on the effect of different compensation schemes on the trading behavior of participants paired with another subject in the experimental lab, we focused on the fact that traders are responsible for someone else's payoff. Several studies show that assets in laboratory markets do not follow intrinsic value, leading to the formation of bubbles that burst in the final phases of the assets' life. While it is not entirely obvious in our experiment what pro-social behavior would be, we might nevertheless expect players to choose a safer strategy when someone else's welfare depends on their decision.

An important issue concerning delegated decisions is whether there is a misalignment between the risk preferences of the decision-maker and the parties affected by those decisions. Using the Holt and Laury (2002) experiment to measure risk preferences, Bolton et al., (2015) indicate that decision-makers, in general, tend to be more risk-averse when others are also affected by what they decide. Charness and Jackson (2009) also studied the behavior of decision-makers in the variation on Rousseau's classic Stag Hunt game with two situations, decision-makers were making decisions for themselves, and they were also responsible for another individual. It was revealed that under responsibility, the "safer" strategy was selected in most cases. Eriksen and Kvaløy (2010) show how agents become more loss averse when they are responsible for their principals. In our trading experiment, we use short-term speculation behavior of agents, which is measured by the frequency of switching, as a proxy for risk-taking decisions (Li, 2018). Additionally, we estimate trading volume, the spread between trading price and fundamental value, and bid-ask spread as the main trading decisions

of agents in different treatments. We expect that agents will be less likely to trade and speculate when making decisions for others, especially when they know their payoffs are fixed.

$$Q_{baseline} > Q_{variable} > Q_{fixed}$$

in which Q represents the average number of trades in each period.

$$S_{baseline} > S_{variable} > S_{fixed}$$

in which S represents the average frequency of switching (speculation) in each period.

$$S = \frac{Number\ of\ switches}{Number\ of\ possible\ switches}$$ [14]

Hypothesis 1: *Risk-taking behavior is less prominent when agents make decisions for others, especially when the fee is flat.*

We also hypothesise that the effect of responsibility will be manifested in the magnitude of asset market bubbles. Based on the previous discussions, it is reasonable to expect that agents will exhibit more cautious trading behavior in markets with responsibility. We expect that the size of the bubble, mainly measured by the relative absolute deviation (RAD) and relative deviation (RD), is the smallest when the role of responsibility is more prominent. Between the two responsibility treatments, the one where traders' salary is fixed is, for that reason, expected to induce the most significant cautious shift.

$$RAD_{baseline} > RAD_{variable} > RAD_{fixed}$$

$$RD_{baseline} > RD_{variable} > RD_{fixed}$$

in which,

$$RAD = \frac{1}{N}\sum_{p=1}^{N}\frac{\left|\bar{P}_p - FV_p\right|}{\left|\overline{FV}\right|}$$

$$RD = \frac{1}{N}\sum_{p=1}^{N}\frac{\bar{P}_p - FV_p}{\left|\overline{FV}\right|}$$

[14] For example, if a participant makes three trades in one period – sell, buy, sell – this results in 2 switches. The total possible switches are also 2, meaning the frequency of switching (speculation) is 1.

Where N is the number of periods, $\overline{P_p}$ is the mean price of period p, FV_p is the fundamental value of period p, $\overline{FV}$ is the mean fundamental value.

Hypothesis 2*: The price bubble is smaller in markets with responsibility and smallest where traders do not have any monetary incentives.*

We look at the association between subjects' cognitive ability and their trading behavior in different types of markets to supplement the analysis of the responsibility effect. As pointed out by Corgnet et al. (2015), cognitive capabilities, as measured by the Cognitive Reflection Test (CRT), do seem to matter. They show that subjects with a high level of cognitive ability (i.e., with higher CRT scores) earn more money by feeding the bubble in the initial phases and getting out of it at the later stages of the market's lifespan. Bosch-Rosa et al. (2018) showed that markets populated by traders with high cognitive ability did not produce bubbles. Markets with traders low in cognitive ability, nonetheless, produced bubbles. Whether varying the nature of the contract available to the trader can weaken or strengthen the relationship between cognitive capabilities and the magnitude of mispricing in experimental asset markets remains to be an exciting topic. Various studies find that individuals with higher cognitive ability are different from individuals who score low on this dimension in a number of ways. Typically, they have a longer life expectancy, higher income, longer working memories, quick reaction times, and are more prone to visual illusions (Jensen, 1998). We used the CRT score (Frederick, 2005) to measure subjects' cognitive ability, which is associated with general intelligence measures, as well as key decision-making aspects such as preferences for time and risk (Frederick, 2005) and levels of reasoning (Branas-Garza et al., 2012). Oechssler et al. (2009) showed that high CRT subjects are less associated with incidences of behavioral biases such as conservatism and conjunction fallacy in probability updating. We expect that the influence of cognitive prowess will be weaker in markets where traders are more conservative, i.e., in an environment where traders trade more cautiously. The feeling of being responsible for someone else's welfare should make the traders more circumspect, which in turn should limit the size of the price bubble in the corresponding markets. Following Corgnet et al. (2015), we conjecture that in a cautious environment, it will be more difficult even for a smart trader (a high CRT subject in our context) to take advantage of ones with lower cognitive ability. We expect this phenomenon to be translated into a lower earnings dispersion between these two groups, high CRT traders and low CRT traders.

Hypothesis 3*: The association between CRT and wealth is expected to be weaker in the absence of monetary incentives.*

Personality is a cornerstone of the psychology of individual differences, so it is perhaps surprising that its relation to economic behavior appears to be weak. Becker et al. (2012) examine associations of the so-called big five personality traits with experimental and survey measures of economic preferences. For risk and time preferences, these being the preference dimensions most relevant to financial decision-making, the authors find that correlations with personality measures tend to be small, statistically insignificant, and not always consistent across datasets. Nevertheless, we expect some personality traits to play a role in environments where decision-making occurs in a social context. In the *fixed* treatment, traders do not have any economic reason to exert more effort as the salary is fixed. The rational response from a strictly economic point of view would be to exert a low amount of effort, i.e., not trading at all on behalf of the passive member of the group.

Economists increasingly view personality as a type of non-cognitive skill that can have important consequences for the economic decisions that individuals make and the outcomes they achieve. This perspective has generated interest in the process of personality change (Cobb-Clark and Schure, 2012). Openness is a personality dimension that represents the difference between conservative thought and open thought. It is the individual's tendency to pursue novel, artistic, flexible, and intellectual factors (Costa et al., 1992). Individuals who score high on this dimension tend to be intellectual, imaginative, sensitive, and open-minded. According to Roccas et al. (2002), those who score low tend to be down-to-earth, insensitive, and conventional. Openness to Experience is highly compatible with the motivational goals of self-direction (autonomy of thought and action and openness to new ideas and experiences) and universalism (understanding and tolerance for all people and ideas and appreciation of beauty and nature). It is also compatible with the motivational goals of stimulation values (novelty and excitement). Openness to Experience conflicts with the motivational goals of conformity, tradition, and security, all concern preserving the status quo and avoiding what is new and different. We expect traders scoring high on the dimension of agreeableness and openness to exert more effort on behalf of their passive member in the group. We do not expect them to trade differently in the two other treatments.

There is a vast literature on the important role of psychopathy in the criminal justice system. However, we know much less about the relevance of psychopathy and its implications in economics, largely due to the difficulty in obtaining the active cooperation of business organizations. The phenomenon of psychopathy is understood as a personality disorder characterized by an absence of compassion for others. We use the Levenson Self-Report

Psychopathy (henceforth LSRP) scale, a test of sociopathy, to determine the extent to which subjects are associated with this personality variable (Levenson and Kiehl, 1995). The scale was developed for research in the discipline of psychology. We expect psychopaths to exert effort when there are monetary incentives, but we suspect that they will exert less effort when there is no monetary gain from trading. In other words, we predict them to trade less in the fixed-salary with responsibility treatment.

We propose the following hypotheses:

Hypothesis 4a*: The big give personality traits is positively associated with more effort in the form of trading in the fixed-salary with responsibility treatment.*

Hypothesis 4b*: Participants with a high psychopathy score are expected to put less effort (trade less and speculate less) in the fixed-salary with responsibility environment.*

The study is based on experimental data collected in the United Kingdom. Participants were randomly invited from a pool of university students to participate in the laboratory experiment. We recruited all our participants from a major university located in the UK. Two hundred and seventy subjects from that university participated in the *baseline* and responsibility with a variable salary (*variable*) treatment and responsibility with a fixed salary (*fixed*) treatment.

4. Results and discussion

4.1 Trading behavior

The designs separate two market environments where traders make decisions for themselves (*baseline*) and for others (*fixed* and *variable*). In cases where traders make decisions for others, their payments can be either fixed or performance-based, depending on the treatment they are allocated to. This setup highlights the differences in trading behavior among traders across treatments. We measure trading behavior using four variables: trading volume, short-term speculation, p-fv spread (price-fundamental value spread), and bid-ask spread. Trading volume indicates the number of trades each participant makes in one period. Speculation is defined as the decision to shift from a selling position to a buying position within the same period, and vice versa (Hanke et al., 2010). For example, if a participant makes three trades in a period - sell, buy, and sell - without any new information suggesting a change in position, these trades are considered short-term speculation. The value of this variable is estimated by dividing the number of switches by the possible switches in one period. In the previous example, the participant switches two times out of the two possible switches, resulting in a speculation value of 100% for that period. The p-fv spread is the difference between the trading price and the fundamental value, while the bid-ask spread is the difference between the buying and selling price in a period.

Table 2 presents the trading behavior and wealth generation for each participant across the periods[15]. The results show that the trading volume is significantly higher in the treatment where traders make decisions for others, with the highest volume occurring when the fee structure is fixed (2.285 and 1.570 in the *fixed* and *variable* treatments, respectively, compared to 1.302 in the *baseline* treatment). This finding indicates that traders are more conservative when trading for themselves but tend to overtrade when responsible for others' financial outcomes. The effect is particularly severe when traders know their fee will be fixed regardless of the outcomes. We observe a similar pattern in short-term speculation, participants are less likely to speculate when trading for themselves but are more likely to speculate when trading for others, especially under a fixed fee structure (short-term speculation rate is 27.1% and 20.3% in the *fixed* and *variable* treatments, respectively, compared to 14.9% in the *baseline* treatment). We believe this is an important finding of the study, as it confirms the conditions of the agency problem, where agents tend to act selfishly. The problem can be mitigated with

[15] Nine participants x six markets x fifteen periods = 810 observations.

a sound fee structure and compensation scheme, which in this design is a performance-based fee structure.

For the difference between the trading price and the fundamental value, the spread is significantly lower in the *fixed* and *variable* treatments compared to the *baseline* (-33.656 and 0.438, respectively, compared to 19.415). This indicates a reduced likelihood of exaggerating the price relative to the fundamental value in the responsible treatments. This decision leads to significantly lower wealth in these treatments compared to the *baseline*. Indeed, traders earn more when they trade for themselves compared to when they trade for others. Interestingly, their wealth is lowest in the *fixed* treatment. Knowing that their payment is fixed regardless of the trading outcomes, traders in the *fixed* treatment have less motivation to generate wealth for the other participants.

(Insert Table 2 here)

We estimate the trading behavior and wealth generation across trading periods. Figure 1 confirms the previous discussion, showing that trading volume and speculation are high in the treatments where traders make decisions for others, and highest in the *fixed* treatment. Meanwhile, wealth is low in the treatments where traders make decisions for others, and lowest in the *fixed* treatment. These results are consistent across all 15 periods. The findings of this study support the strand of literature showing that agents are more likely to take risks when making decisions for others (Andersson et al., 2016; Polman and Wu, 2020). However, the substantial trading volume and speculation lead to significantly lower returns for the principals, while the agents still receive the same payoff. Fixed incentives are found to be inefficient for both agents and principals, whereas performance-based incentives demonstrate a more positive impact on wealth.

(Insert Figure 1 here)

4.2 Bubbles formation

We measure the bubble formation in the three treatments by comparing the median trading prices in each period and the fundamental values, shown in Figure 2. The upper panel of Figure 2 Panel A illustrates the mean prices by period for *baseline*, *fixed*, and *variable* markets and Panel B summarizes the price trends for individual asset markets. The fundamental value

is represented by the bold diagonal line, which is declining over time. The fundamental value (FV) drops by ECU 16 every period, and the value is zero when period 15 ends.

The figures show that bubbles occur in the *baseline* treatment and *variable* treatment to a smaller degree. Both treatments demonstrate a bubble-and-crash pattern roughly comparable to what is detected in various studies in experimental asset markets (e.g. Eckel and Füllbrunn, 2015). In the *fixed* treatment, prices rise above intrinsic value, mainly in the second half of the assets' life, but the magnitude of the discrepancy is comparatively much smaller, and prices track intrinsic values closely compared to the *baseline* markets. The results show that traders did not value the share very highly in *fixed* sessions and the difference between the values appears substantial when compared with observed transaction prices in *baseline* sessions. Nevertheless, prices appear not to follow the fundamental value of the asset in all three types of markets. In the *baseline*, prices cross the fundamental value very quickly and remain at levels higher than the fundamental value for a longer duration. On the other hand, in the *fixed* markets, it takes longer (period 8 compared to period 5 in the *baseline* and *variable* treatments) for prices to cross the intrinsic value threshold.

It is essential to understand that traders in *fixed* markets are 100% free of any economic incentives, and therefore the only tool that can act as motivation is being responsible for others' wellbeing. The *variable* markets, on the other hand, does not wholly remove the self-interest component, so the motivation is not purely altruistic.

The absence of self-interest, coupled with responsibility, is expected to lead to low-risk trading behavior. Which, in turn, should lead to smaller bubbles in fixed salary markets where traders are responsible for someone else's payoffs. The pattern that is visible on figure 2 is that *fixed* markets are significantly different from the *baseline* markets in the first half of the markets' life span.

(Insert Figure 2 here)

We employ various bubble measures to assess the treatment effect on price dynamics in experimental markets with declining fundamental value. The two main measures are the relative absolute deviation (RAD), used to measure mispricing, and relative deviation (RD), for estimating the overvaluation or undervaluation of fundamental values. All other measures include Amplitude, Average Bias (AB), Total Deviation (TD), Positive Deviation

(PD), Negative Deviation (ND), Boom, and Burst (descriptions available in Appendix A). The results in Table 3 indicate that the mispricing level is significantly lower in the *fixed* and *variable* treatments (0.726 and 0.654, respectively) compared to the *baseline* treatment (1.126). While overvaluation is observed in the *baseline* and *variable* treatments (0.364 and 0.024, respectively), the price level is undervalued in the *fixed* treatment (-0.153), and the difference is significant.

Other bubble measures indicate similar results, especially for Amplitude, AB, TD, and PD. Interestingly, there are no differences in bubble levels between the *fixed* and *variable* treatments throughout the trading periods. The responsibility of traders in the two treatments boosts them to make identical decisions in terms of trading prices.

With lower motivations for trading in the *fixed* treatment, agents devalue the fundamental values of assets, which leads to lower bubbles across most measures. Interestingly, even with a so-called better incentive scheme, traders do not value the assets at the same level as when they trade for themselves. This result may have important implications for the stability of financial markets, especially with the increasingly active participation of retail investors. As van der Beck and Jaunin (2021) and Baig et al. (2023) suggested, the participation of more retail investors results in substantially higher variation in stock returns and a negatively persistent impact on the stability of stock prices.

(Insert Table 3 here)

Based on the shapes of the bubble formation in Figure 2, we divided the trading periods into five phases, each comprising three trading periods, to examine the trading behavior of participants and how it differs among the *baseline*, *fixed*, and *variable* treatments. The results in Appendix B show that the mispricing (RAD) is significantly different in phases 3 and 4 (periods 7-9 and 10-12, respectively), with the lowest mispricing occurring in treatments where traders are responsible for others. The results are identical for overvaluation (RD) in these two phases, where trading prices are more overvalued in the treatment traders trade for themselves and therefore care more about their welfare. Interestingly, trading prices are significantly undervalued in the *fixed* treatment in the second phase, indicating a lack of concern from the traders when they know their payment will be fixed.

4.3 Personality traits and trading behavior

We introduced a post-experiment questionnaire to measure demographic characteristics and selected personality traits of participants, such as gender, risk preferences, cognitive ability, psychopathy, and big five personality traits (details of these measures can be found in Appendix C). The results in Table 4 show that our participants are gender-balanced, and participants are homogeneous across the three treatments, except for differences in age, risk level, conscientiousness, and openness. However, we control for these variables in the regressions.

(Insert Table 4 here)

4.3.1 Cognitive ability

Extensive literature shows that people with better cognitive ability make better trading decisions, which in turn results in higher income (e.g. Tai et al., 2018). We incorporate the measure of Frederick (2005), which uses an algebraic nature and consists of three questions intended to evaluate the capability to override an instinctive response that is wrong and to engage in further thinking leading to the correct answer (CRT).

The CRT has been a popular approach to measuring subjects' cognitive ability, which is used to rank participants accordingly. We use scores (0, 1, 2, and 3) on the CRT and compare them with participants' earnings across treatments. Corgnet et al. (2014) show that participants with high CRT scores earn more money by making smart exits before the bubble crashes. They demonstrated a significant and positive association between participants' cognitive ability as measured by CRT scores. Bosch-Rosa et al. (2018) showed that the cognitive ability of traders could play a significant role in determining price efficiency in experimental asset markets.

The results in Table 5A show that CRT scores are significantly and positively correlated with wealth and bid-ask spread while significantly and negatively correlated with speculation and p-fv spread[16]. Interestingly, while the correlation between CRT and wealth is significant in the *variable* and *baseline* treatments, it is not significant in the *fixed* treatment. Given that traders in the *fixed* treatment receive a fixed payment regardless of their performance, participants with high CRT scores do not significantly boost their

[16] We can measure CRT score of 27 participants in the *baseline* treatment only but for all 108 participants in the *fixed* and *variable* treatments.

earnings, as they know they will receive the same amount of money regardless. This is an important finding, which could be applied in the wealth management industry regarding fee structures. If the wealth management firm introduces a fixed fee structure, it may demotivate wealth managers and financial advisors, especially the ones with high cognitive ability, from fully committing to trading on behalf of their clients. A fee structure based on performance would be a win-win strategy for both clients and wealth managers.

We further the analysis by examining the performance and trading strategies of participants with CRT scores equal to 0 and the rest. The results in Table 5B show that the total wealth generated by participants with a CRT score equal to 0 is significantly lower than that of others with CRT scores higher than 0 in all treatments except the *fixed* treatment. This finding confirms the previous analysis that the fixed payment does not provide sufficient incentives for traders, especially those with better cognitive ability. These results are illustrated in Figure 3.

(Insert Table 5 here)

(Insert Figure 3 here)

4.3.2 Psychopathy scores, big five personality traits and gender effect

Table 6 presents the main findings related to trading patterns and the psychopathy scale and big five personality traits[17]. Panel A shows the correlation between the participants' scores on the Levenson Self-Report Psychopathy Scale with the primary and secondary scales. The primary items are created to measuref selfish, uncaring, and manipulative behavior towards others, while the secondary items are meant to assess impulsivity and a self-defeating lifestyle (Levenson, Kiehl, and Fitzpatrick, 1995). We do not find any significant correlation between wealth and the psychopathy scale. However, we find that traders who score high on the primary psychopathy scale are less likely to trade and speculate in the *fixed* treatment. This result is interesting because this measure captures selfish, uncaring, and manipulative behavior, suggesting that individuals displaying these traits exert less effort in trading activities when there is no performance-based incentive. In contrast, traders scoring high on the secondary psychopathy scale are more likely to trade and speculate in the *baseline* treatment when trading for themselves, and they exhibit lower bid-ask spreads in the *variable* treatment.

[17] We can measure psychopathy scores and big five personality traits of 27 participants in the *baseline* treatment only but for all 108 participants in the *fixed* and *variable* treatments.

The literature on psychopathy mainly focuses on its role in the workplace. Boddy et al., (2010) indicate the negative effects of having a corporate psychopath in the leadership team on corporate social responsibility. Boddy et al. (2015) show that corporate psychopaths engage in extreme forms of mismanagement, such as poor personnel management, directionless leadership, mismanagement of resources, and fraud. Boddy (2011) reports empirical evidence of ethical issues, such as bullying and unfair supervision in the workplace, in the presence of corporate psychopaths. Omar et al., (2019) also report that psychopathy leads to issues in annual report narratives, questionable integrity, excessive risk-taking, and failure to contribute to charitable undertakings, which tend to reduce future shareholder wealth. In our study, traders with high psychopathy scores prioritize their own welfare when trading for themselves and show less concern for others' welfare when responsible for them under a fixed incentive. This finding suggests that personality traits should be considered in the recruitment process within the financial and wealth management industries to ensure that financial advisors and wealth managers demonstrate caring and responsible behavior on behalf of their clients.

We also measure the big five personality traits (John et al., 1991) and correlate them with trading behavior and wealth generation. Table 6, Panel B, shows that trading volume is significantly and positively correlated with agreeableness and openness across all data, particularly in the *fixed* treatment. Agreeable traders are also more likely to engage in speculation activities, although this strategy is less likely to be used by extraverted and conscientious traders when they trade for themselves. Neurotic traders are more likely to exaggerate the bid-ask spread in the *variable* treatment. With different trading strategies, extraverted, conscientious, and open traders are more likely to earn significantly higher in the *baseline* when they trade for themselves, while agreeable traders earn significantly less compared to others when we consider all data. These results imply that Big Five personality traits play an important role in the trading behavior of traders, whether they are trading for themselves or for others, and these choices significantly impact their final wealth. Once again, these traits should be considered in the recruitment process.

(Insert Table 6 here)

After considering different personality traits, we examine the fundamental difference between trader, gender. The literature on the impact of gender on performance is mixed[18],

[18] Prior studies generally report that female-owned companies underperform compared to male-owned ones (for a review, see Klapper and Parker, 2011). However, other research states otherwise. For example, Robb and

while there is limited literature on the gender effect on responsibility in investment. Recently, Ifcher and Zarghamee (2024) indicate that there is no gender gap when people make decisions for others. In this study, we examine the gender effect in investment, considering the responsibility of traders on behalf of other people. Table 7 indicates the impacts of gender on wealth and trading strategies. The results show that females are more likely to widen the bid-ask spread in the *fixed* treatment, and their wealth is significantly higher in all treatments, regardless of whether they trade for themselves or for others. This finding indicates that females still prioritize caring for others, even when they know their efforts may not be compensated accordingly. In contrast, the wealth generated by males in the *fixed* treatment is the lowest compared to the wealth generated by all genders across all treatments (801 ECU). This result contrasts with the findings of Ifcher and Zarghamee (2024) but is consistent with the literature on gender differences in decision-making, which indicates that females care more about others. Simmons and Emanuele (2007) found that females donate more time and money using the US dataset on giving and volunteering in 1999. Similarly, Manner (2010) and Yuan et al. (2019), among others, find that female CEOs are positively correlated with corporate responsibility performance.

(Insert Table 7 here)

4.3.3 Empirical analysis

We ran the following ordinary least squares regression to test the validity of the treatment effect and personality traits (Table 8).

$$Y_i = \beta_0 + \sum_{j=1}^{k} \beta_j X_{ji} + \gamma_1 fixed_i + \gamma_2 variable_i + \varepsilon_i$$

where Y_i denotes the trading decisions (trading volume, speculation, bid-ask spread) and wealth of agent i; X_{ji} represents the agent's characteristics; *fixed* refers to the *fixed* treatment, and *variable* refers to the *variable* treatment compared to the *baseline*.

The results confirm our initial analysis of the treatment effect: compared to the *baseline* treatment, trading volume and speculation are significantly lower in the *fixed* treatment, while the bid-ask spread is significantly higher in the *variable* treatment. When making

Watson (2012) indicate that there is no difference between female and male-owned new ventures. Similarly, Arráiz (2018) reports that there is no gender difference in the effectiveness of entrepreneurs as long as they have access to the same resources and time. Interestingly, Amore et al. (2014) provide empirical evidence that female directors improve the operational profitability of female-led firms.

decisions for others without monetary incentives, agents are more likely to take risks by overtrading and engaging in speculative trading. However, with a monetary incentive scheme in place, agents behave as if they are trading for themselves, though they tend to exaggerate the bid-ask spread, which results in significantly higher income. This finding aligns with the strand of the literature showing that agents take greater risks when making decisions for others (Andersson et al., 2016; Polman and Wu, 2020). However, it contrasts with Füllbrunn and Luhan (2020), who showed that agents invested significantly less for others than for themselves in the absence of a bonus system. In our study, we find that trading volume is highest in the *fixed* treatment, where agents lack monetary incentives to trade. The regression analysis further confirms that agents are more responsible when trading for themselves, and that a performance-based incentive scheme is more effective in minimizing the principal-agent problem in financial management.

After controlling for the treatment effect, we find that agents with high cognitive ability are less likely to speculate, more likely to exaggerate the bid-ask spread, and make significantly more money, which is consistent with previous analyses and the literature (e.g., Corgnet et al., 2014). The interaction between cognitive ability and *fixed* and *variable* treatments shows a statistically significant negative impact on the bid-ask spread, suggesting that under both *fixed* and *variable* treatments, agents with higher cognitive reflection are less likely to exaggerate the bid-ask spread. Similarly, agents with high primary psychopathy scores (selfish, uncaring, and manipulative behavior) are less likely to trade in the *fixed* treatment due to a lack of monetary incentives. Understandably, by the nature of this measure, agents with high primary psychopathy scores are less likely to care about the welfare of others and are more likely to be selfish. The big five personality traits play a significant role in the trading behavior of agents, with agreeable agents being more likely to trade and speculate, while conscientious agents are less likely to do so. Additionally, open-to-experience agents are also more likely to trade. However, these decisions do not significantly affect their wealth. Demographic characteristics also play a significant role in trading behavior. For example, students studying finance and economics are less likely to trade but earn significantly more compared to students in other majors, and age negatively affects both the bid-ask spread and wealth. More interestingly, compared to males, females are less likely to exaggerate the bid-ask spread and earn significantly less. The impacts of individual characteristics on risk-taking behavior and trading decisions when making decisions for oneself versus for others are novel in the

literature. These findings provide insights for market participants, especially financial firms, to consider these characteristics in the recruitment process for financial managers to help minimize the agency problem.

(Insert Table 8 here)

5. Conclusion

Several studies endorse the notion that individuals behave differently when they are looking after the economic interest of other individuals. The feeling of being responsible for a third party can act as a strong debiasing force and can shape the risk-taking behavior of individuals (Leder and Betsch, 2016). The main objective of the study is to understand the influence of responsibility in experimental asset markets with assets with a finite but relatively long lifespan, i.e. whether bubbles are dampened in the presence of responsibility. The study uses the SSW (1988) laboratory market set-up to examine how social context affects decision making. We compare markets where traders are responsible for someone else's payoff with markets where traders are not responsible. Two scenarios under responsibility are considered: responsibility in the presence of monetary incentives and responsibility in the absence of monetary incentives. We find smaller price bubbles in markets where traders are responsible but have monetary incentives, and the effect is stronger when traders do not have any monetary incentives, i.e., traders receive a fixed payoff for performing trading activities on behalf of others. In the fixed-salary treatment, the role of responsibility is even more significant as any monetary incentive no longer motivates traders. We observed that although the magnitude of bubbles is smaller in fixed-salary markets under responsibility, the price did not come down quickly to the fundamental value during the latter part of the experiment. In the treatment where traders trade for themselves, the magnitude of bubbles is significantly high across all measures, indicating greater instability in a market with more retail investors.

The study incorporates responsibility by allowing the subjects for whom traders make choices (i.e., perform the trading activity) to be physically present in the room during the sessions. Traders in responsibility treatments are informed that they are paired with a passive subject in the room. We find that the feeling of being responsible has an impact on prices dynamics, especially when responsibility is not coupled with monetary incentives, i.e. when responsibility plays a more prominent role. The amplitudes of the bubbles in our declining-value markets under responsibility are significantly smaller than those without responsibility. Interestingly, in markets with fixed salaries, where traders do not have any monetary incentives, there is significantly higher trading activity compared to both *baseline* and *baseline* salary markets. However, this increased activity does not result in more wealth generation. This suggests that traders could become careless about the beneficiaries when they know they will receive a fixed payment. We show that traders with higher cognitive ability earns more than traders with lower cognitive ability in the variable salary with responsibility

markets. We do not see the same pattern in the *fixed* treatment. Women show greater concern for the welfare of others even when their compensation is fixed. Traders who scored high on the primary psychopathy scale (selfish, careless, and manipulative traders) are less likely to trade in the *fixed* treatment. Extraverted, conscientious, and open-to-experience traders are more likely to earn better when they trade for themselves, while agreeable traders earn significantly less. Age and field of study also affect trading decisions and wealth generation.

References

Allen, F. and Gale, D., 2000. Bubbles and crises. *The Economic Journal*, *110*(460), pp.236-255.

Allen, F. and Gorton, G., 1993. Churning bubbles. *The Review of Economic Studies*, *60*(4), pp.813-836.

Amore, M.D., Garofalo, O. and Minichilli, A., 2014. Gender interactions within the family firm. *Management Science*, *60*(5), pp.1083-1097.

Andersson, O., Holm, H.J., Tyran, J.R. and Wengström, E., 2016. Deciding for others reduces loss aversion. *Management Science*, *62*(1), pp.29-36.

Andersson, A.C., Idvall, E., Perseius, K.I. and Elg, M., 2013. Sustainable outcomes of an improvement programme: do financial incentives matter?. *Total Quality Management & Business Excellence*, *24*(7-8), pp.959-969.

Arráiz, I., 2018. Time to share the load: gender differences in household responsibilities and business profitability. *Small Business Economics*, *51*(1), pp.57-84.

Baghestanian, S., Gortner, P. and Massenot, B., 2017. Compensation schemes, liquidity provision, and asset prices: an experimental analysis. *Experimental Economics*, *20*, pp.481-505.

Baig, A., Blau, B.M., Butt, H.A. and Yasin, A., 2023. Do Retail Traders Destabilize Financial Markets? An Investigation Surrounding the COVID-19 Pandemic. An Investigation Surrounding the COVID-19 Pandemic. 2021. *SSRN Electronic Journal. https://doi. org/10.2139/ssrn*, *3782159*(10).

Bebchuk, L.A., Cohen, A. and Spamann, H., 2010. The wages of failure: Executive compensation at Bear Stearns and Lehman 2000-2008. *Yale J. on Reg.*, *27*, p.257.

Becker, A., Deckers, T., Dohmen, T., Falk, A. and Kosse, F., 2012. The relationship between economic preferences and psychological personality measures. *Annu. Rev. Econ.*, *4*(1), pp.453-478.

Beisswanger, A.H., Stone, E.R., Hupp, J.M. and Allgaier, L., 2003. Risk taking in relationships: Differences in deciding for oneself versus for a friend. *Basic and Applied Social Psychology*, *25*(2), pp.121-135.

Boddy, C.R., 2011. Corporate psychopaths, bullying and unfair supervision in the workplace. *Journal of Business Ethics*, *100*(3), pp.367-379.

Boddy, C.R., Ladyshewsky, R.K. and Galvin, P., 2010. The influence of corporate psychopaths on corporate social responsibility and organizational commitment to employees. *Journal of Business Ethics*, *97*, pp.1-19.

Boddy, C., Miles, D., Sanyal, C. and Hartog, M., 2015. Extreme managers, extreme workplaces: Capitalism, organizations and corporate psychopaths. *Organization*, *22*(4), pp.530-551.

Bolton, G.E. and Ockenfels, A., 2000. ERC: A theory of equity, reciprocity, and competition. *American Economic Review*, *91*(1), pp.166-193.

Bolton, G.E., Ockenfels, A. and Stauf, J., 2015. Social responsibility promotes conservative risk behavior. *European Economic Review*, *74*, pp.109-127.

Bosch-Rosa, C., Meissner, T. and Bosch-Domènech, A., 2018. Cognitive bubbles. *Experimental Economics*, *21*, pp.132-153.

Brañas-Garza, P., García-Muñoz, T. and González, R.H., 2012. Cognitive effort in the beauty contest game. *Journal of Economic Behavior & Organization*, *83*(2), pp.254-260.

Buckle, G.E., Füllbrunn, S. and Luhan, W.J., 2024. The needs of the many, the wealth of the few: How responsibility affects decision-making for others. *Economics Letters*, *244*, p.111986.

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

Charness, G., 2000. Responsibility and effort in an experimental labor market. *Journal of Economic Behavior & Organization*, *42*(3), pp.375-384.

Charness, G. and Jackson, M.O., 2009. The role of responsibility in strategic risk-taking. *Journal of Economic Behavior & Organization*, *69*(3), pp.241-247.

Cheung, S.L. and Coleman, A., 2014. Relative performance incentives and price bubbles in experimental asset markets. *Southern Economic Journal*, *81*(2), pp.345-363.

Cobb-Clark, D.A. and Schurer, S., 2012. The stability of big-five personality traits. *Economics Letters*, *115*(1), pp.11-15.

Corgnet, B., Hernán-González, R., Kujal, P. and Porter, D., 2015. The effect of earned versus house money on price bubble formation in experimental asset markets. *Review of finance*, *19*(4), pp.1455-1488.

Costa Jr, P.T. and McCrae, R.R., 1992. Four ways five factors are basic. *Personality and Individual Differences*, *13*(6), pp.653-665.

Cui, X., Feltovich, N. and Zhang, K., 2022. Incentive schemes, framing, and market behaviour: Evidence from an asset-market experiment. *Journal of Economic Behavior & Organization*, *197*, pp.301-324.

Kahneman, D. and Tversky, A., 1979. Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, 47(2), pp.263-291.

Ding, B. and Wermers, R., 2012. Mutual fund performance and governance structure: The role of portfolio managers and boards of directors. *Available at SSRN 2207229*.

Dunkley, E. and Hickey, S., 2024. How deep are the problems at St James's Place? *Financial Times*. Available at: https://www.ft.com/content/54a93482-2f26-4643-b4df-05ad00e862ed

Eckel, C.C. and Füllbrunn, S.C., 2015. Thar she blows? Gender, competition, and bubbles in experimental asset markets. *American Economic Review*, *105*(2), pp.906-920.

Eriksen, K.W. and Kvaløy, O., 2010. Myopic investment management. *Review of Finance*, *14*(3), pp.521-542.

Fabretti, A., Gärling, T., Herzel, S. and Holmen, M., 2017. Convex incentives in financial markets: an agent-based analysis. *Decisions in Economics and Finance*, *40*, pp.375-395.

Fischbacher, U., 2007. z-Tree: Zurich toolbox for ready-made economic experiments. *Experimental Economics*, *10*(2), pp.171-178.

Frink, D.D., Hall, A.T., Perryman, A.A., Ranft, A.L., Hochwarter, W.A., Ferris, G.R. and Todd Royle, M., 2008. Meso-level theory of accountability in organizations. In *Research in personnel and human resources management* (pp. 177-245). Emerald Group Publishing Limited.

Frederick, S., 2005. Cognitive reflection and decision making. *Journal of Economic Perspectives*, *19*(4), pp.25-42.

Füllbrunn, S. and Luhan, W.J., 2020. Responsibility and limited liability in decision making for others–An experimental consideration. *Journal of Economic Psychology*, *77*, p.102186.

Füllbrunn, S.C. and Luhan, W.J., 2017. Decision making for others: The case of loss aversion. *Economics Letters*, *161*, pp.154-156.

Gärling, T., Fang, D. and Holmen, M., 2020. Review of behavioral explanations of how rank-based incentives influence risk taking by investment managers in mutual fund companies. *Review of Behavioral Finance*, *12*(2), pp.136-150.

Greiner, B., 2015. Subject pool recruitment procedures: organizing experiments with ORSEE. *Journal of the Economic Science Association*, *1*(1), pp.114-125.

Guo, L., Jalal, A. and Khaksari, S., 2015. Bank executive compensation structure, risk taking and the financial crisis. *Review of Quantitative Finance and Accounting*, *45*, pp.609-639.

Hall, A.T. and Ferris, G.R., 2011. Accountability and extra-role behavior. *Employee Responsibilities and Rights Journal*, *23*, pp.131-144.

Hall, A.T., Frink, D.D. and Buckley, M.R., 2017. An accountability account: A review and synthesis of the theoretical and empirical research on felt accountability. *Journal of Organizational Behavior*, *38*(2), pp.204-224.

Hanke, M., Huber, J., Kirchler, M. and Sutter, M., 2010. The economic consequences of a Tobin tax—an experimental analysis. *Journal of Economic Behavior & Organization*, *74*(1-2), pp.58-71.

Haruvy, E. and Noussair, C.N., 2006. The effect of short selling on bubbles and crashes in experimental spot asset markets. *The Journal of Finance*, *61*(3), pp.1119-1157.

Holmen, M., Kirchler, M. and Kleinlercher, D., 2014. Do option-like incentives induce overvaluation? Evidence from experimental asset markets. *Journal of Economic Dynamics and Control*, *40*, pp.179-194.

Holt, C.A. and Laury, S.K., 2002. Risk aversion and incentive effects. *American Economic Review*, *92*(5), pp.1644-1655.

Ifcher, J. and Zarghamee, H., 2024. Does decision making for others close the gender gap in competition?. *Management Science*, *70*(6), pp.3510-3526.

Klapper, L.F. and Parker, S.C., 2011. Gender and the business environment for new firm creation. *The World Bank Research Observer*, *26*(2), pp.237-257.

James, D. and Isaac, R.M., 2000. Asset markets: How they are affected by tournament incentives for individuals. *American Economic Review*, *90*(4), pp.995-1004.

Jensen, A.R. 1998. The g factor: The science of mental ability, Westport, CT: Praeger Publishers.

Jensen, M. and Meckling, W., 1976. Theory of the firm: managerial behavior, agency costs and ownership structure. *Journal of Financial Economics,* 3, pp.305–360.

John, O.P., Donahue, E.M. and Kentle, R.L., 1991. Big five inventory. *Journal of Personality and Social Psychology*.

Kleinlercher, D., Huber, J. and Kirchler, M., 2014. The impact of different incentive schemes on asset prices. *European Economic Review*, *68*, pp.137-150.

Kirchler, M., Huber, J. and Stöckl, T., 2012. Thar she bursts: Reducing confusion reduces bubbles. *American Economic Review*, *102*(2), pp.865-883.

Kirchler, M., Lindner, F. and Weitzel, U., 2018. Rankings and risk-taking in the finance industry. *The Journal of Finance*, *73*(5), pp.2271-2302.

Kleinlercher, D. and Stöckl, T., 2018. On the provision of incentives in finance experiments. *Experimental Economics*, *21*, pp.154-179.

Leder, J. and Betsch, T., 2016. Risky choice in interpersonal context: Do people dare because they care?. *Journal of Economic Psychology*, *52*, pp.1-23.

Levenson, M.R., Kiehl, K.A. and Fitzpatrick, C.M., 1995. Assessing psychopathic attributes in a noninstitutionalized population. *Journal of Personality and Social Psychology*, *68*(1), p.151.

Li, B., 2018. Speculation, risk aversion, and risk premiums in the crude oil market. *Journal of Banking & Finance*, *95*, pp.64-81.

Oechssler, J., Roider, A. and Schmitz, P.W., 2009. Cognitive abilities and behavioral biases. *Journal of Economic Behavior & Organization*, *72*(1), pp.147-152.

Omar, A.M., Wisniewski, T.P. and Yekini, L.S., 2019. Psychopathic traits of corporate leadership as predictors of future stock returns. *European Financial Management*, *25*(5), pp.1196-1228.

Pahlke, J., Strasser, S. and Vieider, F.M., 2015. Responsibility effects in decision making under risk. *Journal of Risk and Uncertainty*, *51*, pp.125-146.

Polman, E. and Wu, K., 2020. Decision making for others involving risk: A review and meta-analysis. *Journal of Economic Psychology*, *77*, p.102184.

Manner, M.H., 2010. The impact of CEO characteristics on corporate social performance. *Journal of Business Ethics*, *93*, pp.53-72.

Noussair, C.N., Tucker, S. and Xu, Y., 2016. Futures markets, cognitive ability, and mispricing in experimental asset markets. *Journal of Economic Behavior & Organization*, *130*, pp.166-179.

Rajan, R.G., 2006. Has finance made the world riskier?. *European Financial Management*, *12*(4), pp.499-533.

Robb, A.M. and Watson, J., 2012. Gender differences in firm performance: Evidence from new ventures in the United States. *Journal of Business Venturing*, *27*(5), pp.544-558.

Roccas, S., Sagiv, L., Schwartz, S.H. and Knafo, A., 2002. The big five personality factors and personal values. *Personality and Social Psychology Bulletin*, *28*(6), pp.789-801.

Schlenker, B.R., Britt, T.W., Pennington, J., Murphy, R. and Doherty, K., 1994. The triangle model of responsibility. *Psychological review*, *101*(4), p.632.

Simmons, W.O. and Emanuele, R., 2007. Male-female giving differentials: are women more altruistic?. *Journal of Economic Studies*, *34*(6), pp.534-550.

Smith, V.L., Suchanek, G.L. and Williams, A.W., 1988. Bubbles, crashes, and endogenous expectations in experimental spot asset markets. *Econometrica: Journal of the Econometric Society*, pp.1119-1151.

Stoner, J.A.F., 1961. *A comparison of individual and group decisions involving risk* (Doctoral dissertation, Massachusetts Institute of Technology).

Tai, C.C., Chen, S.H. and Yang, L.X., 2018. Cognitive ability and earnings performance: Evidence from double auction market experiments. *Journal of Economic Dynamics and Control*, *91*, pp.409-440.

Tversky, A. and Kahneman, D., 1992. Advances in prospect theory: Cumulative representation of uncertainty. *Journal of Risk and Uncertainty*, *5*, pp.297-323.

van der Beck, P. and Jaunin, C., 2021. The equity market implications of the retail investment boom. *Swiss Finance Institute Research Paper*, (21-12).

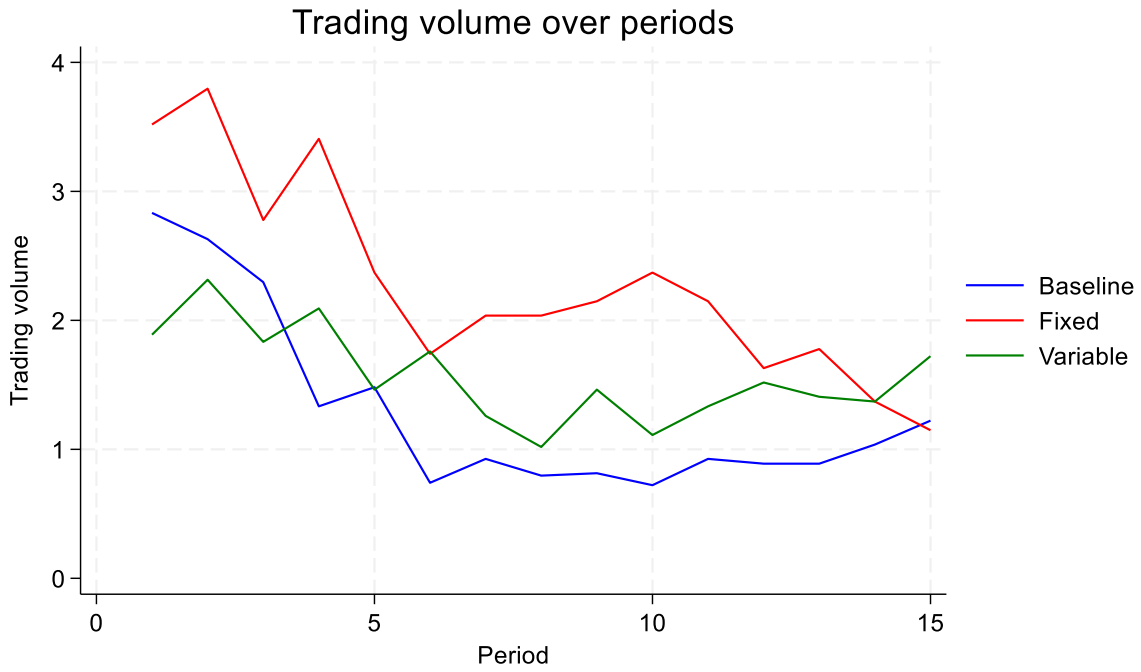
Von Neumann, J. and Morgenstern, O., 1947. Theory of games and economic behavior, 2nd rev.

Yuan, Y., Tian, G., Lu, L.Y. and Yu, Y., 2019. CEO ability and corporate social responsibility. *Journal of Business Ethics*, *157*, pp.391-411.

Zakrzewski A., Alm E., Goyal, D., Kowalczyk, Ł., Martin, M., and Wachters, I., 2019. Solving the Pricing Puzzle in Wealth Management. *BCG report*. Available at: https://www.bcg.com/publications/2019/solving-the-pricing-puzzle-in-wealth-management

Figure 1: Trading volume, speculation and wealth generation across the periods

This figure illustrates the trading volume, speculation, and wealth of traders over the 15 periods.

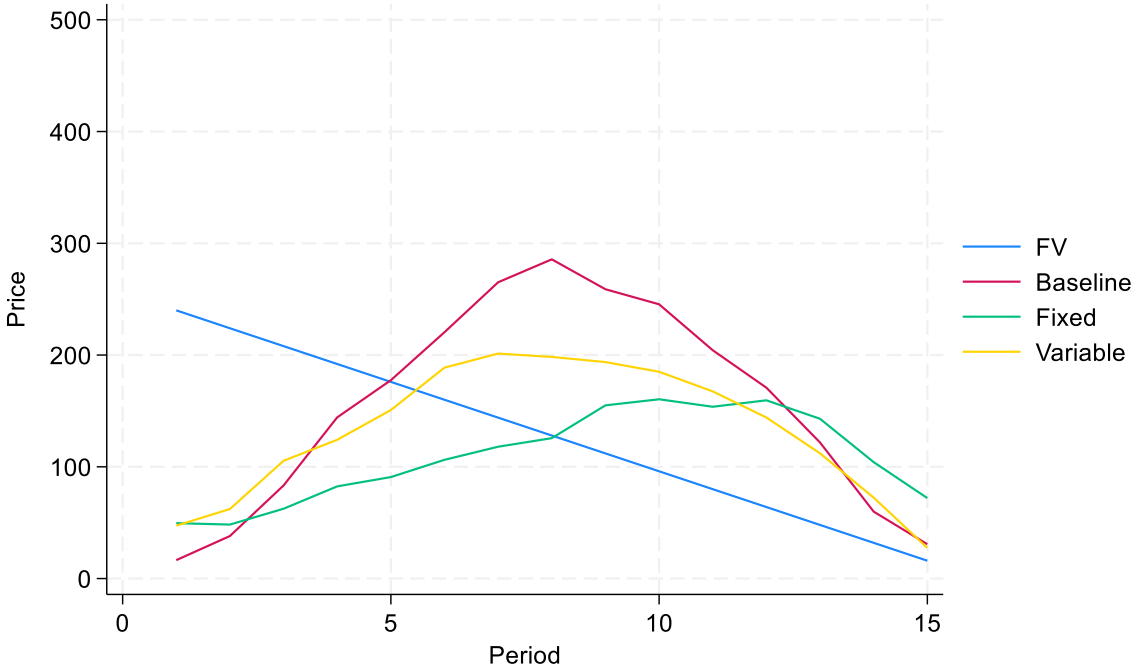



Wealth over periods
1400
1300
1200
1100
1000
Wealth
0
5
10
15
Period
Baseline
Fixed
Variable

Figure 2: Price trajectory

This figure shows the mean of median prices across the three treatments (Panel A) and the eighteen markets (Panel B).

Panel A – All treatments



Panel B – All 18 markets

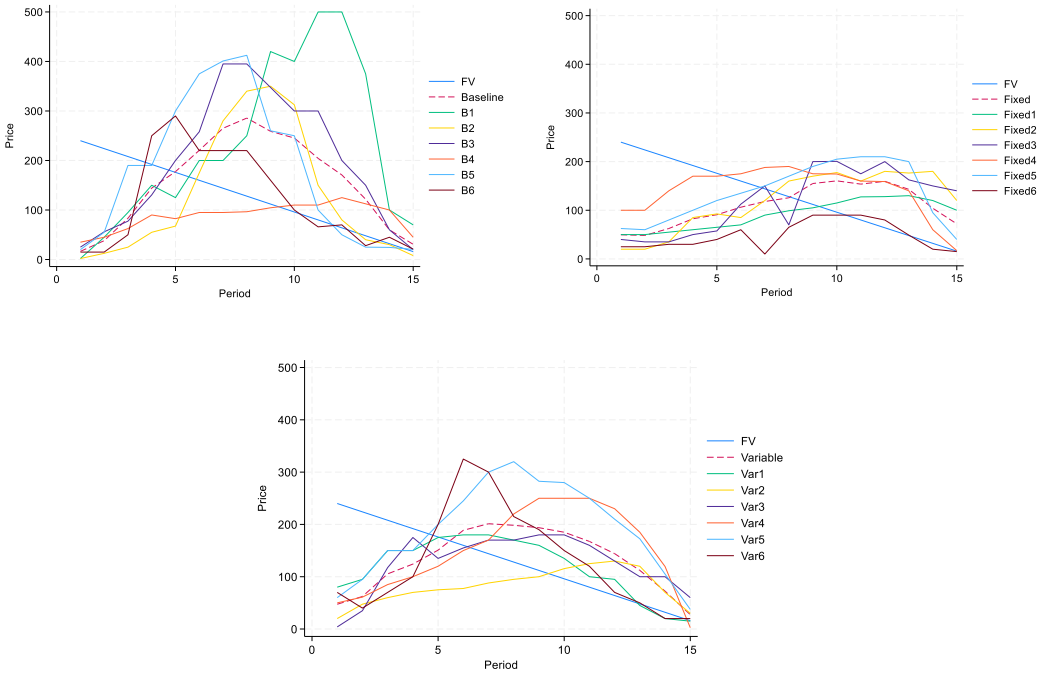
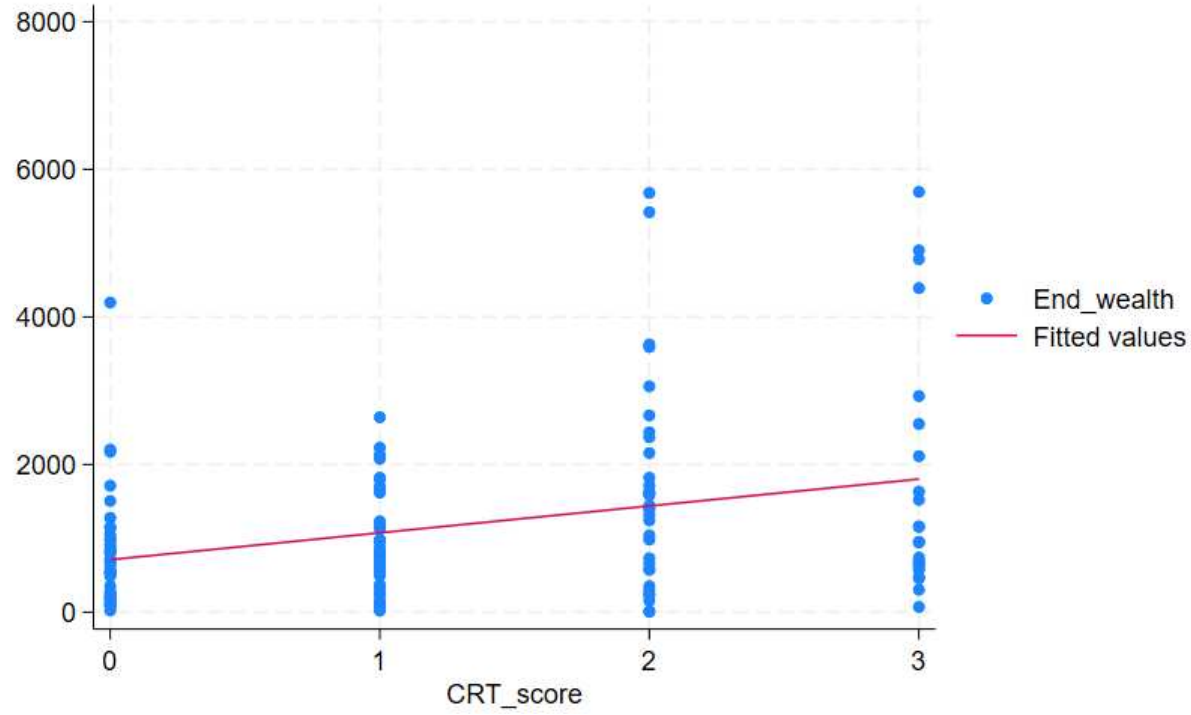


Figure 3: Wealth and CRT score in different treatments

This figure shows the wealth distribution of participants with varying CRT scores (0-3).

A – All treatments



B - All treatments except the Fixed treatments

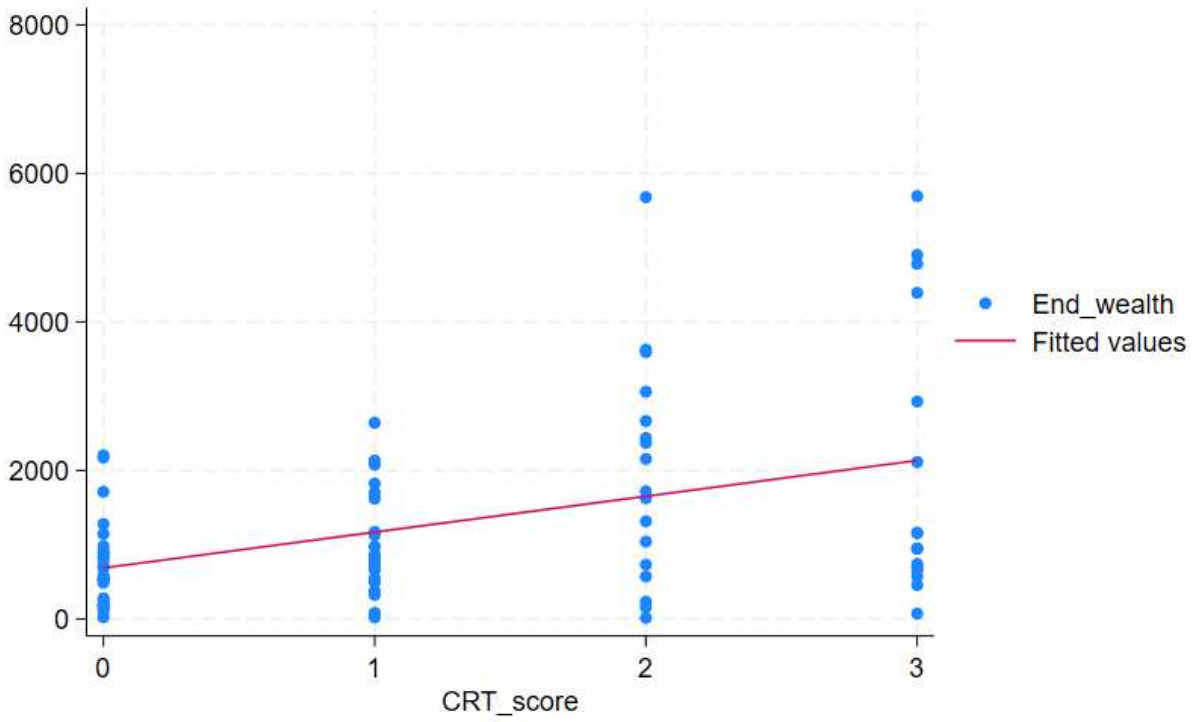


Table 1: Market characteristics in different treatments

This table describes the features of the three treatments, *baseline*, *fixed* and *variable*.

Treatments	Number of traders	Number of passive traders	Number of periods	Total shares in circulation	Length of a period (seconds)	Expected dividend per period	Salary structure of the trader
Baseline	9	0	15	36	120	16	Equal to the end value of the wealth
Fixed	9	9	15	36	120	16	Fixed*
Variable	9	9	15	36	120	16	Equal to the end value of the wealth

*Average earnings in the fixed treatment is actually the amount a trader earned for the passive member in his group. The traders in this treatment gets a fixed amount (ECU 1100) for performing the tasks on behalf of the passive subject.

Table 2: Trading behavior and wealth generation in the three treatments

This table reports the number of trades (trading volume), speculative trades (speculation), price-to-fundamentals spread, bid-ask spread, and the wealth of each trader in each period, resulting in a total of 810 observations (9 participants × 6 markets × 15 periods).

	Trading volume	**Speculation**	**P-FV spread**	**Bid-ask pread**	**Wealth**	**N**
Baseline	1.302	0.149	19.415	-0.021	1323.556	**810**
Fixed	2.285	0.271	-33.656	0.023	1147.911	**810**
Variable	1.570	0.203	0.438	0.036	1290.489	**810**
Base vs Fixed	**0.000*****	**0.000*****	**0.005*****	0.174	0.837	
Base vs Variable	**0.000*****	**0.002*****	0.707	0.816	**0.028****	
Fixed vs Variable	**0.000*****	**0.000*****	**0.009*****	0.284	**0.003*****	

*** p<0.01, ** p<0.05, * p<0.1

p-values are taken from the Mann Whitney U-test

Table 3: Bubbles formation in the three treatments

This table reports the magnitude of bubbles using various measures.

A – Relative Absolute Deviation (RAD) and Relative Deviation (RD)

Treatment	RAD	RD
Baseline	1.126	0.364
Fixed	0.726	-0.153
Variable	0.654	0.024
Base vs Fixed	**0.003*****	**0.025****
Base vs Variable	**0.003*****	0.109
Fixed vs Variable	0.423	0.521

*** p<0.01, ** p<0.05, * p<0.1
p-values are taken from the Mann Whitney U-test

B – Other bubbles measures and trading volume

Treatment	Amp	AB	TD	PD	ND	Boom	Burst
Baseline	2.246	48.144	2192.833	1457.5	735.333	9	6
Fixed	1.263	-19.233	1373.167	542.333	830.833	7.333	7.666
Variable	1.309	4.061	1256.917	658.916	598	8.5	6.5
Base vs Fixed	**0.003*****	**0.024****	**0.003*****	**0.003*****	0.334	0.182	0.182
Base vs Variable	**0.003*****	0.108	**0.003*****	**0.053****	0.107	0.615	0.615
Fixed vs Variable	0.748	0.423	0.423	0.872	0.262	0.465	0.465

*** p<0.01, ** p<0.05, * p<0.1
p-values are taken from the Mann Whitney U-test

Table 4: Characteristics of the participants

This table reports the characteristics and personality traits of the participants. We include age, major (finance & economics students vs. others), gender, risk preferences, and big five personality traits for all 162 participants, as well as CRT scores and primary and secondary psychopathy scores for 135 participants.

Characteristics	All	Baseline	Fixed	Variable
Age	22.75	21.62	**23.31*** **	**23.31*** **
Major (Finance & Econs)	22.22%	16.67%	24.07%	25.93%
Gender (Female)	50.62%	48.15%	55.56%	48.15%
Risk preference	5.266	4.652	**5.587****	**5.560****
Extraversion	3.214	3.282	3.203	3.157
Conscientiousness	3.626	3.551	**3.734***	3.594
Conscientiousness	3.501	3.510	3.574	3.419
Neuroticism	3.082	3.107	3.023	3.115
Openness	3.511	3.540	3.640	**3.353****
N	162	54	54	54
CRT	1.437	1.370	1.444	1.462
Primary psychopathy	2.344	2.305	2.260	2.447
Secondary psychopathy	2.602	2.588	2.574	2.637
N	135	27	54	54

*** p<0.01, ** p<0.05, * p<0.1

We compare the characteristics of participants in the fixed treatment and variable treatments to the baseline treatment, respectively. P-values are taken from the Mann Whitney U-test. (For the CRT, psychopath, and big five personality trait measures, we have data for only 27 participants)

Table 5: Cognitive ability (CRT), trading behavior and wealth

This table reports the correlation between CRT scores and trading decisions and wealth.

A – Correlation between CRT and trading behavior/ wealth

Trading behavior and wealth	All	Baseline	Fixed	Variable
Trading volume	-0.049	0.067	-0.066	-0.085
Speculation	**-0.202****	**-0.341***	-0.133	**-0.261***
P-FV spread	**-0.151***	-0.201	-0.155	-0.115
Bid-ask spread	**0.299*****	**0.444****	0.182	**0.341****
Wealth	**0.289*****	**0.392****	0.220	**0.330****
N	135	27	54	54

*** p<0.01, ** p<0.05, * p<0.1

p-values are taken from the Spearman's rank correlation

B – High and low CRT analysis

	All		Baseline		Fixed		Variable	
	CRT=0	CRT>0	CRT=0	CRT>0	CRT=0	CRT>0	CRT=0	CRT>0
Trading volume	28.684	24.951	21.777	21.444	37.250	33.452	26.294	22.243
Speculation	4.073	**3.003****	3.000	1.929	4.700	3.889	4.198	**2.520****
P-FV spread	-2.222	**-19.755***	43.309	8.663	-23.196	-36.645	-11.521	-14.408
Bid-ask spread	-0.959	**0.849***	-2.127	0.550	0.580	0.447	-1.428	**1.451****
Wealth	796	**1339****	659	**1882***	944	1022	763	**1435****
N	38	97	9	18	12	42	17	37

*** p<0.01, ** p<0.05, * p<0.1

p-values are taken from the Mann Whitney U-test

Table 6: Psychopathy, big five personality traits, trading behavior and wealth

This table reports the correlations between personality traits and trading decisions and wealth.

A – Correlations between psychopathy scores and trading behavior/ wealth

Psychopath score	Treatment	Trading volume	Speculation	P-FV spread	Bid-ask spread	Wealth	N
Primary	All	-0.105	-0.030	0.078	-0.031	-0.006	135
	Baseline	0.151	0.224	0.240	0.058	-0.125	27
	Fixed	**-0.293****	**-0.250****	-0.145	0.010	0.014	54
	Variable	-0.027	0.110	0.054	-0.141	-0.016	54
Secondary	All	0.040	0.087	-0.024	-0.049	-0.115	135
	Baseline	**0.366***	**0.329***	0.138	0.097	-0.081	27
	Fixed	0.033	0.028	-0.038	0.183	-0.018	54
	Variable	-0.083	0.071	-0.119	**-0.321****	-0.179	54

*** p<0.01, ** p<0.05, * p<0.1

p-values are taken from the Spearman's rank correlation

B – Correlations between big five personality traits and trading behavior/ wealth

Big Five	Treatment	Trading volume	Speculation	P-FV spread	Bid-ask spread	Wealth	N
Extraversion	All	0.065	0.067	0.014	-0.010	-0.022	
	Baseline	-0.208	**-0.399****	-0.166	0.074	**0.337***	
	Fixed	0.172	0.220	0.023	0.018	-0.191	
	Variable	0.171	0.111	0.086	-0.061	-0.076	
Agreeableness	All	**0.211****	**0.194****	0.021	-0.064	**-0.159***	
	Baseline	-0.046	0.134	0.196	-0.145	-0.194	
	Fixed	**0.239***	0.221	-0.068	0.032	-0.217	
	Variable	0.191	0.079	0.093	-0.153	0.008	
Conscientiousness	All	-0.049	-0.087	-0.033	0.001	0.083	
	Baseline	-0.291	**-0.338***	0.151	-0.047	**0.426****	
	Fixed	-0.000	-0.060	-0.093	0.102	0.015	
	Variable	-0.050	-0.040	-0.006	-0.073	-0.022	
Neuroticism	All	-0.035	-0.023	-0.027	-0.010	0.033	
	Baseline	0.092	0.010	-0.062	-0.170	-0.064	
	Fixed	-0.164	-0.127	-0.087	-0.226	-0.026	
	Variable	0.136	0.084	0.018	**0.269****	0.105	
Openness	All	**0.171****	0.054	-0.038	0.086	0.049	
	Baseline	-0.004	-0.245	0.016	0.292	**0.337***	
	Fixed	**0.330****	0.184	-0.032	0.020	-0.044	
	Variable	0.042	0.017	-0.020	0.033	-0.026	

*** p<0.01, ** p<0.05, * p<0.1

p-values are taken from the Spearman's rank correlation

Table 7: Gender effect on trading behavior and wealth

This table reports the correlation between gender and trading decisions and wealth.

Treatment	Gender	Trading volume	Speculation	P-FV spread	Bid-ask spread	Wealth
All	Male	26.956	3.643	-25.646	-0.724	848
	Female	27.939	2.950	-3.502	**1.454****	**1540*****
Baseline	Male	21.461	2.424	0.679	-1.917	990
	Female	21.642	2.158	38.350	1.121	**1923****
Fixed	Male	34.466	4.437	-38.430	-1.006	801
	Female	34.083	3.610	-27.689	**2.330****	**1260*****
Variable	Male	21.038	3.337	-24.057	0.196	832
	Female	25.821	2.779	-3.696	0.868	**1587****

*** p<0.01, ** p<0.05, * p<0.1

p-values are taken from the Spearman's rank correlation

Table 8: Regression analysis

This table reports the impact of individual characteristics and personality traits on trading volume, speculation, bid-ask spread, and participants' wealth, controlling for treatment effects.

A – Trading volume and speculation

VARIABLES	(1) Q	(2) Q	(3) Q	(4) Speculation	(5) Speculation	(6) Speculation
CRT		-1.439	1.701		**-0.510****	-0.231
		(1.359)	(3.286)		**(0.216)**	(0.520)
Psycho1		-4.650	3.914		-0.259	0.342
		(3.961)	(9.486)		(0.629)	(1.502)
Psycho2		0.151	5.352		0.0339	0.953
		(4.398)	(10.21)		(0.698)	(1.616)
Age		0.568	0.518		0.027	0.004
		(0.466)	(0.477)		(0.073)	(0.075)
Finance and Econs		**-6.529***	-5.654		-0.632	-0.490
		(3.429)	(3.534)		(0.544)	(0.559)
Gender		-4.025	-3.897		0.215	0.276
		(2.895)	(2.914)		(0.459)	(0.461)
Risk		0.146	0.506		0.0602	0.120
		(0.731)	(0.762)		(0.116)	(0.121)
Extraversion		0.324	-0.142		0.161	0.182
		(2.207)	(2.411)		(0.350)	(0.382)
Agreeableness		**6.559****	**6.534****		**0.946***	**0.923***
		(3.144)	**(3.159)**		**(0.499)**	**(0.500)**
Conscientiousness		**-4.822***	-3.573		**-0.791***	-0.494
		(2.700)	(2.868)		**(0.429)**	(0.454)
Neuroticism		1.936	2.633		0.206	0.358
		(2.357)	(2.421)		(0.374)	(0.383)
Openness		**5.414***	4.631		-0.0373	-0.205
		(3.123)	(3.164)		(0.496)	(0.501)
CRT*fixed			-5.321			-0.300
			(4.170)			(0.660)
CRT*var			-2.730			-0.382
			(3.873)			(0.613)
Psycho1*fixed			**-20.01***			-2.741
			(11.84)			(1.875)
Psycho1*var			-3.494			0.753
			(11.05)			(1.749)
Psycho2*fixed			-3.665			-0.953
			(11.97)			(1.894)
Psycho2*var			-10.61			-1.676
			(12.46)			(1.973)
Fixed	**12.74*****	**12.06*****	**73.13****	**1.783*****	**1.680*****	**10.65***
	(3.650)	**(4.026)**	**(34.50)**	**(0.580)**	**(0.639)**	**(5.461)**
Variable	1.963	3.505	40.94	0.762	0.713	3.528
	(3.650)	(4.034)	(34.04)	(0.580)	(0.640)	(5.389)

Constant	21.56***	-9.833	-49.34	2.286***	0.906	-3.848
	(2.980)	(27.00)	(36.97)	(0.473)	(4.286)	(5.853)
Observations	135	135	135	135	135	135
R-squared	0.120	0.228	0.269	0.073	0.188	0.235

Q denotes trading volume; CRT represents cognitive ability; psycho1 and psycho2 refer to primary (selfish, uncaring, and manipulative behavior) and secondary (impulsivity and a self-defeating lifestyle) psychopathy scales, respectively.

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

B – Bid-ask spread and wealth

VARIABLES	(1) Spread	(2) Spread	(3) Spread	(4) Wealth	(5) Wealth	(6) Wealth
CRT		**0.957***	**3.199*****		**0.182***	0.322
		(0.505)	**(1.212)**		**(0.101)**	(0.247)
Psycho1		-0.339	4.262		-0.0691	-0.139
		(1.473)	(3.498)		(0.296)	(0.714)
Psycho2		-0.406	-0.0935		0.0565	1.064
		(1.635)	(3.764)		(0.328)	(0.769)
Age		**-0.328***	**-0.300***		**-0.0754****	**-0.0724****
		(0.173)	**(0.176)**		**(0.0348)**	**(0.0360)**
Finance and Econs		0.006	0.525		0.417	**0.521***
		(1.275)	(1.303)		(0.256)	**(0.266)**
Gender		**-1.952***	**-2.202****		**-0.739*****	**-0.775*****
		(1.076)	**(1.074)**		**(0.216)**	**(0.219)**
Risk		0.106	0.183		-0.0771	-0.0853
		(0.272)	(0.281)		(0.0545)	(0.0574)
Extraversion		0.023	-0.373		0.025	0.001
		(0.821)	(0.889)		(0.165)	(0.182)
Agreeableness		-0.373	-0.170		-0.195	-0.159
		(1.169)	(1.165)		(0.235)	(0.238)
Conscientiousness		-0.640	-0.379		0.273	0.329
		(1.004)	(1.057)		(0.202)	(0.216)
Neuroticism		-0.275	-0.0497		0.0212	0.0652
		(0.876)	(0.893)		(0.176)	(0.182)
Openness		1.155	0.999		0.252	0.224
		(1.161)	(1.167)		(0.233)	(0.238)
CRT*fixed			**-2.986***			-0.162
			(1.538)			(0.314)
CRT*var			**-2.685***			-0.208
			(1.428)			(0.292)
Psycho1*fixed			-5.216			0.118
			(4.367)			(0.892)
Psycho1*var			-4.828			0.115
			(4.074)			(0.832)
Psycho2*fixed			2.508			-0.802
			(4.413)			(0.901)
Psycho2*var			-4.021			**-1.752***
			(4.595)			**(0.938)**
Fixed	0.819	1.127	10.05	-0.265	-0.0411	1.956
	(1.360)	(1.497)	(12.72)	(0.289)	(0.301)	(2.598)
Variable	0.887	1.367	**26.05****	-0.0557	0.202	**4.744***
	(1.360)	(1.500)	**(12.55)**	(0.289)	(0.301)	**(2.564)**
Constant	-0.342	8.248	-7.147	6.666***	7.400***	4.479
	(1.110)	(10.04)	(13.63)	(0.236)	(2.016)	(2.785)
Observations	135	135	135	135	135	135
R-squared	0.004	0.130	0.189	0.009	0.229	0.257

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

APPENDIX A – VARIABLE DESCRIPTIONS

Relative absolute deviation (*RAD*): measures mispricing, i.e. the size of price deviations compared to the fundamental value.

$$RAD = \frac{1}{N}\sum_{p=1}^{N}\frac{\left|\bar{P}_p - FV_p\right|}{|\overline{FV}|}$$

Relative deviation (*RD*): measures overvaluation.

$$RD = \frac{1}{N}\sum_{p=1}^{N}\frac{\bar{P}_p - FV_p}{|\overline{FV}|}$$

Amplitude: measures the magnitude of peak-to-trough price deviations compared to the fundamental value.

$$Amplitude = \max\frac{(\bar{P}_p - FV_p)}{FV_1} - min\frac{(\bar{P}_p - FV_p)}{FV_1}$$

Average Bias is the average deviation of median price from the fundamental value.

$$Average\ Bias = \sum\frac{P_t - FV_t}{15}$$

where Pt and FVt are the median price and fundamental value in period t, respectively.

Total dispersion is the sum, over all 15 periods, of absolute deviation of median period price from the fundamental value. Correspondently, a low Total dispersion indicates close deviations of prices from fundamentals.

$$Total\ Dispersion = |P_t - FV_t|)$$

Positive (Negative) Deviation as the sum, over all 15 periods, of the absolute per period deviation of the median price from the fundamental value if prices are above (below) fundamental value.

$$Positive\ deviation = \sum|P_t - FV_t| \qquad where\ P_t > FV_t$$

$$Negative\ deviation = \sum|P_t - FV_t| \qquad where\ P_t < FV_t$$

Boom Duration (Burst Duration) is the greatest number of consecutive periods above (below) fundamental value.

Turnover is the standardised measure of trading activity and defined as the sum of all transactions divided by the number of shares in the market. High Turnover is related to high trading activity and is associated with mispricing (Eckel and Fullbrunn, 2015)

$$Turnover = \frac{\sum_{t=1}^{T} Q_t}{36}$$

where N is the number of periods, $\overline{P_p}$ is the mean price of period p, FV_p is the fundamental value of period p, $\overline{FV}$ is the mean fundamental value. Q_t is the total executed offers in a market.

APPENDIX B – BUBBLES MEASURES – PHASES ANALYSIS

Phase	RAD			Kruskal-Wallis	RD			Kruskal-Wallis
	Baseline	Fixed	Variable	p-value	Baseline	Fixed	Variable	p-value
1	1.433	1.352	1.206	0.112	-1.433	-1.352	-1.206	0.112
2	0.490	0.669	0.452	0.419	-0.230	-0.656	-0.161	**0.077***
3	1.453	0.390	0.577	**0.003*****	1.259	0.042	0.485	**0.002*****
4	1.674	0.626	0.683	**0.031****	1.674	0.620	0.683	**0.031****
5	0.581	0.592	0.349	0.610	0.553	0.581	0.324	0.675

*** p<0.01, ** p<0.05, * p<0.1

p-values are taken from the Kruskal-Wallis test

APPENDIX C: THE MEASURES OF PERSONALITY TRAITS

Personality traits	**Details**	**References**
Risk preferences (0-10)	Measure the switching point from a risky asset to a safe asset, 0-3 represents risk-loving; 4 is risk-neutral and 5-10 represent risk-averse.	Holt and Laury (2002)
Cognitive ability (0-3)	Three cognitive questions	Frederick (2005)
Psychopathy scale (total score)	26-item, 4-point Likert scale Primary Psychopathy: created to measure selfish, uncaring, and manipulative behavior towards. Primary psychopathy refers to individuals who are completely rational, lack anxiety and have high levels of interpersonal charm. Others. Secondary Psychopathy: assess impulsivity and a self-defeating lifestyle. The secondary psychopath is more likely to suffer from intense emotional arousal and psychological issues.	Levenson, Kiehl, and Fitzpatrick (1995)
Big five personality traits (total score)	44-item, 5-point Likert scale Openness to Experience Conscientiousness Extraversion Agreeableness Neuroticism	John et al. (1991)

APPENDIX D: THE INSTRUCTION

D1 – The *Baseline*

Thank you for agreeing to participate in today's experiment. You are about to participate in some decision-making experiments and at the end of the session you will be paid in cash for your participation. Different participants may earn different amounts, depending upon their decisions and/or the decisions of other participants. The instructions which we have distributed to you, are solely for your private information. Please do not communicate with the other participants during the experiment. Please raise your hand if you have questions; an experimenter will help you.

This is an experiment in the economics of market decision making. At no point during or after the experiment other participants in the experiment learn your identity. In the same manner, you do not find out the identity of other participants at any point during or after the experiment.

- **Money in this experiment is expressed in ECU (**ECU 125 = 1 GBP**).**
- **The assets or goods that can be bought and sold in the market are called Shares.**

The experiment lasts for **15 periods**.

The experiment will consist of a **sequence of 15 trading periods** in which **traders** will have the opportunity to **buy and sell shares**. Each period will last for **120 seconds**.

You might earn a considerable amount of money if you follow the instructions and make good decisions. At the beginning of period 1, you will be assigned to a group of 9 traders. Each one of the traders will receive equal amount of money or cash (**ECU 280)** and equal number of shares (**4 shares)** at the **beginning** of the experiment. You can use the money to purchase shares.

At the end of every period, you will receive a dividend against each share you are holding. The dividend payments are randomly determined. The chance of receiving a specific amount as dividend is described below:

- **25% chance of a dividend ECU 40**
- **25% chance of a dividend ECU 16**
- **25% chance of a dividend ECU 8**
- **25% chance of a dividend ECU 0**

The expected dividend in each period is ECU 16. Dividends are revealed at the end of every period. So, you will receive dividends 15 times if you hold a share for 15 periods. The value of the asset (share) will be 0 after receiving the final dividend payment, i.e. dividend at the end of period 15.

- When you buy a share, your ***Cash*** balance decreases by the price of the purchase, but ***Shares*** increases by one.
- Similarly, when you sell a share, your ***Cash*** balance increases by the price of the sale and ***Shares*** decreases by one.

The number of shares at the end of a trading period is the number of shares at the beginning of the next period and is calculated as follows:

Shares = Number of Shares at the beginning of the period + Number of Shares Bought – Number of shares sold.

The cash balance at the end of a trading period is the cash balance at the beginning of the next period, which is calculated as follows:

Cash = Starting Cash Balance + Selling price*Number of shares sold - Buying price*Number shares bought + Dividend payment*Number of shares remaining.

Your wealth for a given period is calculated as follows:

Wealth = Cash + Number of shares*16*(15 - Period), where *Period* is an integer ranging from 1 to 15.

Your profit for a given period is calculated as follows:

Profit = Wealth at the end of current period - Wealth at the end of previous period.

Two examples are discussed:

Example 1: Suppose you have 4 shares and ECU 280 in Cash at the start of a period, and you make one transaction during the period; let's say you **purchased one share** for ECU 60 and the **dividend** for the period is ECU 8.

Your share holdings at the end of that period will be 5 units.

Your new cash holding will be:

280 - 60 (from purchasing 1 share) + **5*8** (each of the 5 shares received a dividend equal to 8) = ECU **260**

Example 2: Suppose you have 4 shares and ECU 300 in Cash at the start of a period. You made two transactions during the period: **purchased a share** for ECU 50 and **sold a share** for ECU 70. Suppose the **dividend** for the period is ECU 40.

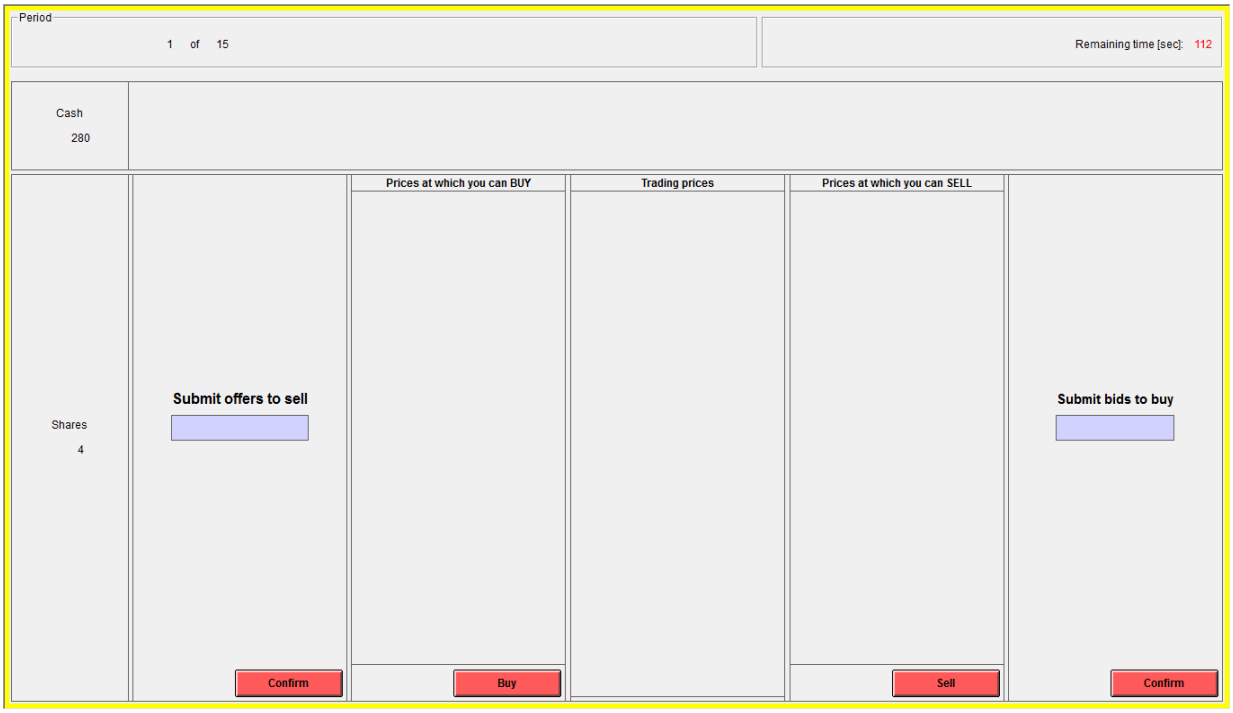
Your share holdings at the end of that period will still be 4 units. Your new cash holding will thus be:

300 + 70 (from selling 1 share) **- 50** (from buying 1 share) + **4*40** (each of the 5 shares received a dividend equal to 40) = ECU **480**

Traders' tasks:

Your trading screen would look like Figure A1

Figure A1



On the left panel of the **Trading Screen** you will see the amount of **Cash** available to buy shares and the current balance of **shares**. During every period, traders can buy or sell shares from one another by making offers to buy or to sell.

If you would like to offer to **sell a share**, use the text area labelled "**Submit offers to sell**". In that text area you can enter the price at which you are offering to sell a share and then select "confirm". Other traders can buy a share from you at this price.

All prices offered will appear in the column with the heading "**Prices at which you can BUY".** The highest ask price will always be on the top of that list and your offer will be highlighted in blue. If you want to purchase a share, you can select the price you are prepared to pay for a share and then press **"Buy".** Remember, you cannot select your own offer.

In the same way, if you would like to offer to **buy a share**, use the text area entitled "**Submit bids to buy**". In that text area you can enter the price at which you are offering/willing to buy a share. You need to select "Confirm" in order to place your offer. Other traders can sell a share to you at this price.

All bid prices will appear in the column with heading "**Prices at which you can SELL".** The lowest offered price will always be on the top of that list and your offer will be highlighted in blue. If you want to sell a share, please select the price of your choice and then press "**Sell".** Remember, you cannot select your own offer. The column with the name "**Trading prices**" lists prices associated with all the successful transections.

You will be provided with information on your performance after every period. The pieces of information include: cash balance before dividend payment, dividend per share, total income from dividends, current cash balance, and current shares.

Payment

The payment from this experiment is computed based on the wealth level of the trader at the end of Period 15. The exchange rate is:

ECU 125 = 1 GBP

D2 – *Variable*

This is an experiment in the economics of market decision making. In this experiment, you will be a part of a **two-person group**. At no point during or after the experiment other participants in the experiment learn your identity. In the same manner, you do not find out the identity of other participants at any point during or after the experiment.

- **Money in this experiment is expressed in ECU (**ECU 125 = 1 GBP**).**
- **The assets or goods that can be bought and sold in the market are called Shares.**

The experiment lasts for **15 periods**. Each group has

- **A trader**
- **A passive member**

Each one of you will be given one of the two roles. Your role is randomly determined.

The experiment will consist of a **sequence of 15 trading periods** in which **traders** will have the opportunity to **buy and sell shares**. Each period will last for **120 seconds**.

Half of the subjects (9 out of 18 subjects) in this experiment will **participate in buying and selling of shares** and the rest of the subjects will play a **passive role**. Subjects who are going to participate in buying and selling of shares are the **traders**. Each **passive** participant is paired with a **trader** in this room. **A passive participant will not trade shares**. Which means that **a trader will be trading not only for himself but also on behalf of the passive participant he is paired with**.

A Trader might earn a considerable amount of money for himself and the other individual he is representing if he follows the instructions and makes good decisions. **The payoff for both the trader and the passive member in a pair will be the same.**

At the beginning of period 1, a trader will be assigned to a group of 9 traders. Each one of the traders will receive equal amount of money or cash (**ECU 280)** and equal number of shares (**4 shares)** at the **beginning** of the experiment. You (if you are a trader) can use the money to purchase shares.

At the end of every period, traders will receive a dividend against each share they are holding. The dividend payments are randomly determined. The chance of receiving a specific amount as dividend is described below:

- **25% chance of a dividend ECU 40**
- **25% chance of a dividend ECU 16**
- **25% chance of a dividend ECU 8**
- **25% chance of a dividend ECU 0**

The expected dividend in each period is ECU 16. Dividends are revealed at the end of every period. So, you will receive dividends 15 times if you hold a share for 15 periods. The value of

the asset (share) will be 0 after receiving the final dividend payment, i.e. dividend at the end of period 15.

- When you buy a share, your ***Cash*** balance decreases by the price of the purchase, but ***Shares*** increases by one.
- Similarly, when you sell a share, your ***Cash*** balance increases by the price of the sale and ***Shares*** decreases by one.

The number of shares at the end of a trading period is the number of shares at the beginning of the next period and is calculated as follows:

Shares = Number of Shares at the beginning of the period + Number of Shares Bought – Number of shares sold.

The cash balance at the end of a trading period is the cash balance at the beginning of the next period, which is calculated as follows:

Cash = Starting Cash Balance + Selling price*Number of shares sold - Buying price*Number shares bought + Dividend payment*Number of shares remaining.

Your wealth for a given period is calculated as follows:

Wealth = Cash + Number of shares*16*(15 - Period), where *Period* is an integer ranging from 1 to 15.

Your profit for a given period is calculated as follows:

Profit = Wealth at the end of current period - Wealth at the end of previous period.

Two examples are discussed:

Example 1: Suppose you have 4 shares and ECU 280 in Cash at the start of a period, and you make one transaction during the period; let's say you **purchased one share** for ECU 60 and the **dividend** for the period is ECU 8.

Your share holdings at the end of that period will be 5 units.

Your new cash holding will be:

280 - 60 (from purchasing 1 share) + **5*8**(each of the 5 shares received a dividend equal to 8) = ECU **260**

Example 2: Suppose you have 4 shares and ECU 300 in Cash at the start of a period. You made two transactions during the period: **purchased a share** for ECU 50 and **sold a share** for ECU 70. Suppose the **dividend** for the period is ECU 40.

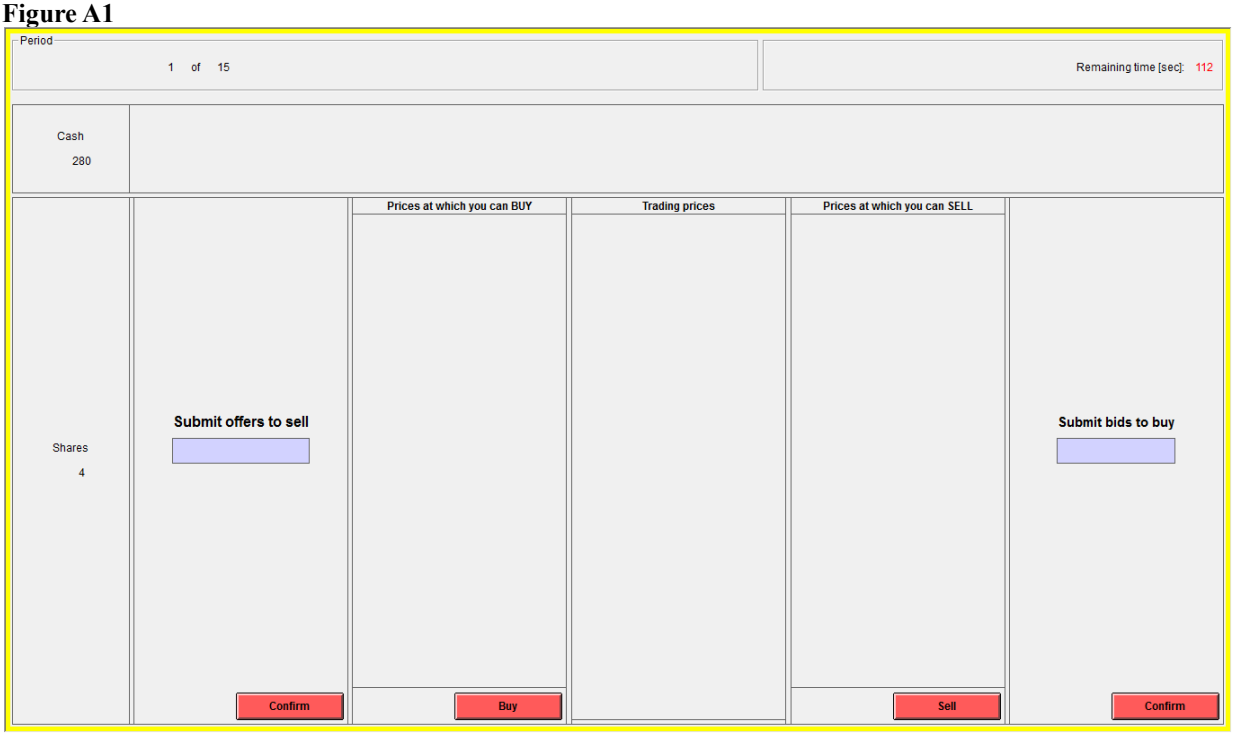
Your share holdings at the end of that period will still be 4 units. Your new cash holding will thus be:

300 + 70 (from selling 1 share) **- 50** (from buying 1 share) + **4*40** (each of the 5 shares received a dividend equal to 40) = ECU **480**

Traders' tasks:

Your trading screen would look like Figure A1

Figure A1



On the left panel of the **Trading Screen** you will see the amount of **Cash** available to buy shares and the current balance of **shares**. During every period, traders can buy or sell shares from one another by making offers to buy or to sell.

If you would like to offer to **sell a share**, use the text area labelled "**Submit offers to sell**". In that text area you can enter the price at which you are offering to sell a share and then select "confirm". Other traders can buy a share from you at this price.

All prices offered will appear in the column with the heading "**Prices at which you can BUY".** The highest ask price will always be on the top of that list and your offer will be highlighted in blue. If you want to purchase a share, you can select the price you are prepared to pay for a share and then press **"Buy".** Remember, you cannot select your own offer.

In the same way, if you would like to offer to **buy a share**, use the text area entitled "**Submit bids to buy**". In that text area you can enter the price at which you are offering/willing to buy a share. You need to select "Confirm" in order to place your offer. Other traders can sell a share to you at this price.

All bid prices will appear in the column with heading "**Prices at which you can SELL".** The lowest offered price will always be on the top of that list and your offer will be highlighted in blue. If you want to sell a share, please select the price of your choice and then press "**Sell".** Remember, you cannot select your own offer. The column with the name "**Trading prices**" lists prices associated with all the successful transections.

You will be provided with information on your performance after every period. The pieces of information include: cash balance before dividend payment, dividend per share, total income from dividends, current cash balance, and current shares.

Payment

Both members (the passive member and the trader) in a group will earn the same amount of money from this experiment. **The payment associated with a group depends entirely on the actions of the trader, thus making passive member's payment completely dependent on trader's performance.**

The payment from this experiment is computed based on the wealth level of the trader at the end of Period 15. The exchange rate is:

ECU 125 = 1 GBP

D3 – *Fixed*

This is an experiment in the economics of market decision making. In this experiment, you will be a part of a **two-person group**. At no point during or after the experiment other participants in the experiment learn your identity. In the same manner, you do not find out the identity of other participants at any point during or after the experiment.

- **Money in this experiment is expressed in ECU (**ECU 125 = GBP 1**).**
- **The assets or goods that can be bought and sold in the market are called Shares.**

The experiment lasts for **15 periods**. Each group has

- **A trader**
- **A passive member**

Each one of you will be given one of the two roles. Your role is randomly determined.

The experiment consists of a **sequence of 15 trading periods** in which **traders** will have the opportunity to **buy and sell shares**. Each period will last for **120 seconds**.

Half of the subjects (9 out of 18 subjects) in this experiment will **participate in buying and selling of shares** and the rest of the subjects will play a **passive role**. Subjects who are going to participate in buying and selling of shares are the **traders**. Each **passive** participant is paired with a **trader** in this room. Which means that **a trader will be trading on behalf of the passive participant he is paired with**, i.e. the **trader makes decisions on behalf of the passive member in his/her group.**

- **A trader will receive a <u>fixed salary</u> for performing the tasks (i.e. trading activities) on behalf of the passive member.**
- **Each of the 9 traders will receive a fixed salary of <u>ECU 1100</u> for this experiment.**
- **A Passive participant's payoff from this experiment depends on the trader's performance in his/her group**.

A Trader might earn a considerable amount of money for the individual he is representing if he follows the instructions and makes good decisions.

Trading

At the beginning of period 1, a trader will be assigned to a group of 9 traders. Each one of the traders will receive equal amount of money or **cash (ECU 280)** and equal number of **shares (4 shares)** at the **beginning** of the experiment. This money can be used to purchase shares.

At the end of every period, traders will receive a dividend against each share they are holding. The dividend payments are randomly determined. The chance of receiving a specific amount as dividend is described below:

- **25% chance of a dividend ECU 40**
- **25% chance of a dividend ECU 16**
- **25% chance of a dividend ECU 8**
- **25% chance of a dividend ECU 0**

The expected dividend in each period is ECU 16. Dividends are revealed at the end of every period. So, you will receive dividends 15 times if you hold a share for 15 periods. The value of the asset (share) will be 0 after receiving the final dividend payment, i.e. dividend at the end of period 15.

- When a share is bought, ***Cash*** balance decreases by the price of the purchase, but ***Shares*** increases by one.
- Similarly, when a share is sold, ***Cash*** balance increases by the price of the sale and ***Shares*** decreases by one.

The number of shares at the end of a trading period is the number of shares at the beginning of the next period and is calculated as follows:

Shares = Number of Shares at the beginning of the period + Number of Shares Bought – Number of shares sold.

The cash balance at the end of a trading period is the cash balance at the beginning of the next period, which is calculated as follows:

Cash = Starting Cash Balance + Selling price*Number of shares sold - Buying price*Number shares bought + Dividend payment*Number of shares remaining.

The wealth level for a given period is calculated as follows:

Wealth = Cash + Number of shares*16*(15 - Period), where *Period* is an integer ranging from 1 to 15.

The amount of profit for a given period is calculated as follows:

Profit = Wealth at the end of current period - Wealth at the end of previous period.

Two examples are discussed:

Example 1: Suppose you have 4 shares and ECU 280 in Cash at the start of a period, and you make one transaction during the period; let's say you **purchased one share** for ECU 60 and the **dividend** for the period is ECU 8.

The share holdings at the end of that period will be 5 units.

The new cash holding will be:

280 - 60 (from purchasing 1 share) + **5*8**(each of the 5 shares received a dividend equal to 8) = ECU **260**

Example 2: Suppose you have 4 shares and ECU 300 in Cash at the start of a period and you made two transactions during the period: **purchased a share** for ECU 50 and **sold a share** for ECU 70. Suppose the **dividend** for the period is ECU 40.

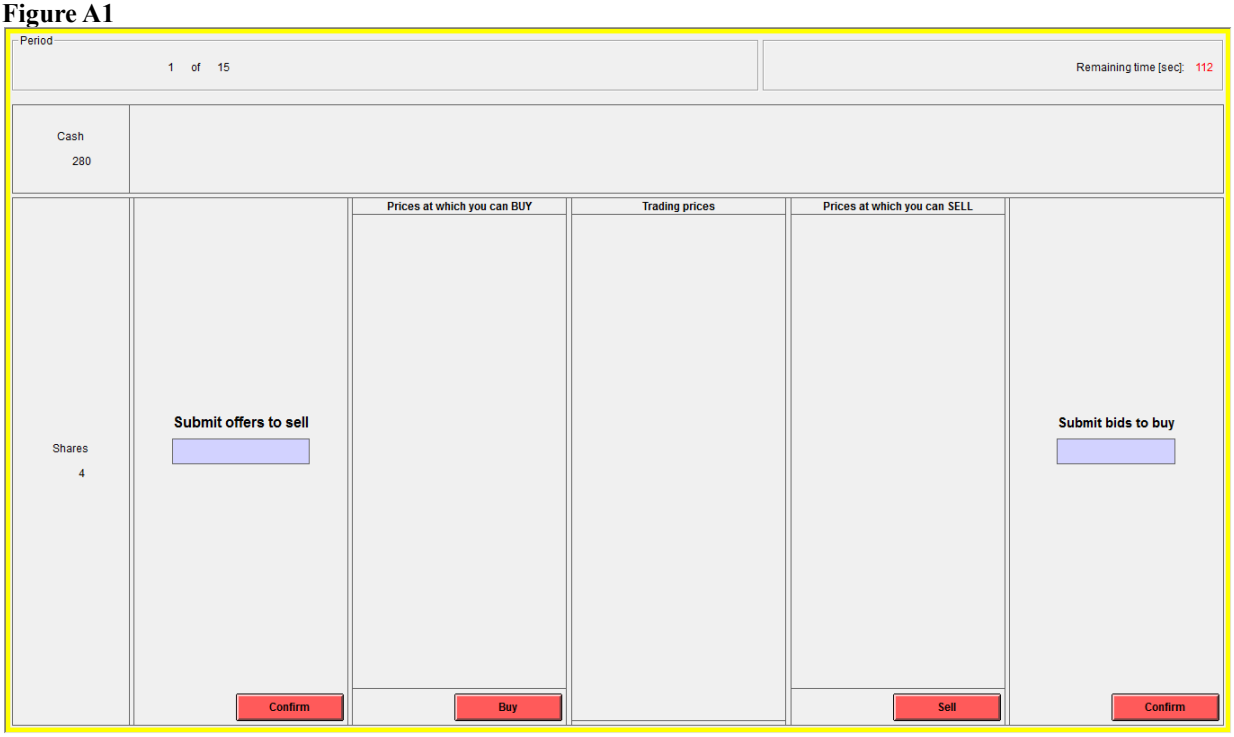
The share holdings at the end of that period will still be 4 units. The new cash holding will be:

300 + 70 (from selling 1 share) **- 50** (from buying 1 share) + **4*40** (each of the 5 shares received a dividend equal to 40) = ECU **480**

Traders' tasks:

The trading screen would look like Figure A1

Figure A1



On the left panel of the **Trading Screen** you will see the amount of **Cash** available to buy shares and the current balance of **shares**. During every period, traders can buy or sell shares from one another by making offers to buy or to sell.

If you would like to offer to **sell a share**, use the text area labelled "**Submit offers to sell**". In that text area you can enter the price at which you are offering to sell a share and then select "confirm". Other traders can buy a share from you at this price.

All prices offered will appear in the column with the heading "**Prices at which you can BUY".** The highest ask price will always be on the top of that list and your offer will be highlighted in blue. If you want to purchase a share, you can select the price you are prepared to pay for a share and then press **"Buy".** Remember, you cannot select your own offer.

In the same way, if you would like to offer to **buy a share**, use the text area entitled "**Submit bids to buy**". In that text area you can enter the price at which you are offering/willing to buy a share. You need to select "Confirm" in order to place your offer. Other traders can sell a share to you at this price.

All bid prices will appear in the column with heading "**Prices at which you can SELL".** The lowest offered price will always be on the top of that list and your offer will be highlighted in blue. If you want to sell a share, please select the price of your choice and then press "**Sell".** Remember, you cannot select your own offer. The column with the name "**Trading prices**" lists prices associated with all the successful transections.

Traders will be provided with information on their performance after every period. The pieces of information include: cash balance before dividend payment, dividend per share, total income from dividends, current cash balance, and current shares.

Payment

A trader will get a fixed salary of ECU 1100 from this experiment for carrying out the trading activities on behalf of the passive member of his/her group.

The Passive member's payoff depends on how much wealth the trader (in the same two-person group) can create for him/her, thus making passive member's payment entirely dependent on the trader's performance.

Passive players' payment from this experiment is computed based on the **wealth level** of the trading account managed by the trader at the end of Period 15. The exchange rate is:

ECU 125 = GBP 1