On Trading Decisions, Performance, and the Role of Personal, Emotional Factors

A Real-Life Stock Market Experiment on how Underlying Factors Affect Financial Decision-Making in a Trading Environment

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ABSTRACT

The complexity in management discourse concerning Human Resource Management practices, specifically recruitment processes of entry level professionals, discern a gap between theoretical knowledge and practical experience. Respectively, research is scarce on the topic of financial decision-making and performance by non-professional traders, in this case business students. As such, this thesis aims at investigating this duality by studying the role of personal and emotional factors. Through an experiment, a stock-trading simulation, 14 students traded for 2,5 consecutive hours, providing the opportunity for use of theoretical knowledge and experience. Observed trends showed that high performing individuals were characterised by their ability to specialise in markets, high numerical abilities, proclivity for positive emotions when trading, and tendency for pessimistic predictions about their future earnings. Empirical findings regarding participants' decision-making posited the presence of the disposition effect. The managerial implications of this thesis support the use of simulations in recruitment processes for organisations. And the relation of seemingly unconventional variables with prediction of performance levels.

Keywords: Disposition Effect, Emotion, Financial Decision-Making, Human Resource Management, Non-Professional Traders, Performance, Personality Traits, Recruitment, Simulation.

PREFACE

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1. INTRODUCTION

This master thesis aims at addressing performance in financial decision-making, that is through investigating the role of emotions and experience, predictive acumen, and personal traits. This was done by involving an unconventional method when examining students and their decisions when trading during a competition, involving a stock-trading simulation. Here, participants had the opportunity to apply their theoretical knowledge in a practical situation. Therefore, the thesis approaches one of the major problems for management which is the recruitment process of entry level professionals, namely the gap between theoretical knowledge and practical experience. By analysing such non-professional traders, the thesis will also examine levels of performance and returns. The background area of this section aims at motivating the current relevance of exploring financial decision-making related to day-trading activities among non-professional actors. The problem area in this section denotes why decision-making has previously been difficult to explain, and the absence of research on non-professional traders.

1.1 Background

From a scientific perspective, it is interesting to empirically examine non-professional traders with regards to how they make decisions when buying and selling securities or assets, but also if their environment has an impact on their behaviour when trading. Unlike institutional traders, non-professional traders use their own resources and money when trading securities and are not regulated in any form by organisational policies (such as institutionally imposed stop-loss mechanisms), which can restrict their decision-making. However, this also signifies that the outcome of their decisions is crucial for their own security and wealth. Although this phenomenon may contribute to increased incentives to perform well, it may also provide emotional reactions in the form of increased stress-levels, which has a direct impact on non-professional traders' decision-making.

In the past 10 years, global financial markets have experienced fundamental, and major, changes (Abbey & Doukas, 2015; Blomberg, et al., 2012) For example, robot trading instruments performing high frequency trading, algorithmic trading as well as artificial intelligence trading, has had major implications and has led to drastic changes within financial markets. At the same time, due to an increased presence of automatization-practices, the total number of institutional traders has diminished subsequently.

Trading made by non-professional traders stands for an increasing proportion of all global trading transactions, which includes both automated trading as well as trading from professional and non-professional individuals. Day-trading refers to when individuals buy or sell positions during a day, with the objective to earn money on market fluctuations, via short-term strategies. Further, day-trading has become an increasingly popular practise amongst non-professional traders and investors. This can be explained by the rising availability of trading systems, digital resources and presence of real time information, but also because of lower average costs per transaction (Ryu, 2012). For example, the total volume of transactions has been multiplied by more than four between 2004 and 2015 on the Swedish stock exchange. At the same time, the average cost of transactions has been divided by 5 (Nasdaq, 2015).

Today there is an increasing presence of non-professional traders, combined with a reduced number of professional ones. In addition, recent figures indicate that non-professional traders' decisions are becoming increasingly important due to their impacts on the financial markets development. As evidence shows that non-professional day-traders do have an impact on markets (example; see Fingerprint Cards B-Share; Svd.se, 2015), it provides opposing arguments to what previously was an academic presumption (Wärneryd, 2001). The profitability of non-professional individuals is debatable, as most non-professional investors have negative returns on capital (Barber, et al., 2008; Abbey & Doukas, 2015). However, some studies suggest a different view regarding non-professional individuals when trading. For example, Abbey and Doukas (2015) found that non-professional investors can surpass professional investors in terms of gross return, but without any significant differences in net performance returns.

1.2 Problem Area

There is previous research around professional individuals operating in markets, but also non-professional investors. Areas such as behaviour and decision-making (Barber & Odean, 2002), on personality (Repin, et al., 2005), performance (Wärneryd, 2001), earnings (Liao, et al., 2013; Barber, et al., 2008) and emotional relation to market or wealth changes (Seo & Barrett, 2007) have been investigated. In the light of a swiftly changing market environment and conditions, presented studies above have been made in a context that is very different from what it is today. Therefore, it is relevant to investigate individuals operating within financial markets, given current market conditions.

Table 1. A literature review regarding traders and investors' decision-making processes. The table denotes example studies made by researchers for each respective sub-discipline.

	Traders	Investors
Professional	Repin, et al., (2005), Fenton-O'Creevy, et al., (2004)	Fröberg (2016)
Non-Professional	-	Barber and Odean (2002) Seo and Barrett (2007)

Differences between traders and investors should primarily be clarified. Traders engage in financial activities with the objective of making profits on market movements over short periods of time, and have little attachment to the securities they trade (Blomberg, et al., 2012). Investors on the other hand can be described as having greater attachment to the financial products the trade, and seek to earn profits over a longer time-period. The term "professional" denotes that the employed actor trades or invest on behalf of an institution, company or organisation, and not with own financial means (Blomberg, et al., 2012). "Non-professional" indicates that the actor engages in financial activities using own financial resources. As illustrated in Table 1 above, insights on non-professional traders is limited to my best knowledge. Therefore, the study aims at characterising non-professional traders in an explorative way and on an individual level.

For example, previous observations made by (Barber & Odean, 2002) concluded the presence of imperfections and cognitive biases among non-professional investors' behaviour, such as difficulties to dispose losing trades with early enough, thus selling profitable postions too soon. One might also assume that personal traits, such as strong emotional stability, reduces fluctations in feelings, making way for rational behaviour among top performers. Demographic and proficinecy data could also contribute in explaining why some non-professional traders manage to earn more than others. Emotions also play a consequential role in the decisions humans make. Previous studies show that when decision occurs in a financial context, such as trading securities, dealing with personal savings or mortgage planning, human emotions play a key role. The way emotions affect human decision making is however complex and difficult to understand (Fenton-O'Creevy, et al., 2011). Moreover, judgments are not only based on evaluating the consequences and their probability of occurring, but also emotions and gut feelings (Bechara, 2004). Thus, poorly managed emotions can lead to significant mistakes in decision making. This can partly explain why a popular managerial discourse in organisations,

is to supress feelings as they are potentially threatening for efficient decision making (Seo & Barret, 2007).

In 2015, the Financial Supervisory Authority in Sweden (Finansinspektionen) released a study on the level of financial literacy – a test regarding the rate of savings, the effects of inflation and financial risk and spread risk. A concerning result was derived that approximately half of them answered correctly on all the three questions regarding basic financial knowledge. These results suggest that the lack of knowledge of basic financial concepts and contexts is a current and existing problem among Swedish consumers. The results of the study are in line with that observed in comparable countries, such as the US, where a third of the respondents gave correct answers (Finansinspektionen, 2015). It is therefore not a surprise that government regulators in the US are greatly concerned that non-professional actors exercising currency trading have lost significant amounts of money (Abbey & Doukas, 2015). According to another report by the Financial Supervisory Authority the respondents answered correctly on simple financial and sample calculations (Dagens industri , 2015). As this study is based on individuals' ability to assess probabilities on economic incentives, one can therefore draw parallels with the day-trading market where non-professional traders are placed in similar situations.

1.3 Purpose of the Study and Research Question

The purpose of this study is to analyse the role of personal traits (such as personality) and emotions in trading decision-making as well as performance. The thesis will thereby aim at describing participants' behaviour through their actions and feelings when trading. The sample consists of individuals who; have an interest in stock markets, are students within higher business education, show prominent level of numeracy and financial literacy, but lack of experience and thereby practical training to some extent. However, the clear majority of them had developed a strategy in view of their upcoming trading, and were placed into a real and practical scenario that involves competition. This is relevant to management in two ways. Firstly, the master thesis examines an activity performed by individuals, and thus underlying factors affecting their decisions. Secondly, these individuals are students with an educational baggage and are confronted to what could resemble to a real-life work scenario involving arguably realistic work related tasks. The expected contributions will also, by examining cognitive processes, emotions and performance when day-trading, take a moderate step towards

contributing towards behavioural finance. Notably, participants resemble non-professional individual traders, which is a rather unexplored area within behavioural finance.

Given the alarming levels of financial literacy seen from the results issued by the Financial Supervisory Authority, and observed difficulties of managing emotions in a financial trading context combined with the prevalence of non-professional trading today motivates the scope of the study. Secondly, growing interest in financial markets, such as foreign exchanges, is due largely to the online trading by private non-professional market actors (Abbey & Doukas, 2015). The paper will therefore aim at empirically draw on data regarding the role of predictive abilities, emotions and personal traits within financial decision making, also how this relates to performance and earnings. Further, the research will study how trading decisions are made. The research questions are the following:

Table 2. Overview of the thesis' research questions.

	Research question
A	How are trading decisions made?
B	How do predictive abilities relate to performance?
C	How do personal factors relate to trading decisions and performance?
D	How do emotions arise when trading?

1.4 Delimitations

The study focused solely on analysing a group of students, who resemble non-professional individual traders, and investigated their financial decision-making and behaviour when trading. The subjects were all students at SSE at a bachelor and master's level with, arguably, a similar background of higher education. One of the major delimitations is therefore regarding the group sample, as age levels, backgrounds and similar demographics variable, hence why the participants in the study are arguably not representative of the average non-professional individual trader or investor. Secondly, many trading strategies are focused on long-term investments as few non-professional traders refuse to commit capital they could risk losing overnight. However, this thesis' delimitation around this phenomenon concerns the time perspective, as the study analysed, among other things, individual decision-making during 2 hours and 30 minutes of trading activity- which is short in relative terms. In other words, behaviours and decision-making is solely analysed in a day-trading context. It is therefore important to note that the thesis examined decisions when trading, and not investing- a long-

term approach earn returns on financial instruments. Delimitations regarding markets and types of financial instruments should also be noted, as financial decision making and behaviour was observed when trading limited types of securities (such as shares) and mainly contracts for difference.

1.5 Definitions

Individual trader	A type of individual investor who invests loaned capital in financial activities with the objective of making profits on market movements over short periods of time (Cole, 2003).
Day trading	An activity in view of earning profits on small fluctuations of stock markets over short periods of time.
Financial instruments	Monetary contracts that can be divided as cash instruments or derivative instruments. For the sake of simplicity in this thesis, cash instruments denote securities (such as shares or options) and derivatives denote instruments that derive their value from an underlying index, interest rate, or asset (such as commodities).
Returns	A measure of profitability on invested capital in a security.
Transaction	In this thesis, the term denotes the monetary transaction obtained because of trading a financial instrument. Each transaction is created through an opened position and finalised by a closed position.
Opened position	In view of obtaining profits on a tradeable contract, a position is bought (ordered) at current market price level and the position thereby becomes “opened”.
Closed positions	When a contract is sold at current market price level, the position thereby becomes “closed”.

Contracts for differences (CFDs)	A type of financial derivative, based on the value of an underlying asset. The contract doesn't give the investor/trader ownership of a security, can provide greater benefits, but more risk.
Leverage	A monetary deposit used when purchasing a CFD contract, giving the investor/trader a higher value of a position than what has been deposited. Leverage is therefore used when a trader is unwilling to commit capital, and prefers taking on higher risk.

1.6 Expected Contribution

The findings of the master thesis aim to contribute to three scientific areas. Firstly, within management, findings are expected to contribute to training provided by organisations and education, with the use of simulations. The experiment in the thesis was conducted during a competition, using a stock-trading simulation. For example, Seo & Barrett (2007) were able to draw conclusions on discourses in management and policy making within organisations, when investigating individuals performing during a stock-simulation. Their paper was therefore used as an inspiration to this master thesis. Realistic simulations can also provide other implications, such as Chalouhi, et al. (2016) study showing that ultrasound simulators can be used as tools for improving teaching strategies for medical students. Just like participants in this study, research subjects in Chalouhi, et al.'s (2016) study had limited or no experience in the simulated field. By examining students during a stock-simulation, this master thesis therefore aims at providing learnings from participants in a stock-simulation that potentially could be included in relevant training by organisations and education.

Secondly, findings aim to contribute to human resource management, and more specifically recruitment processes such as assessment schemes. Participants in the study are close to become entry-level professionals. From a human resource management (HRM) perspective, parallels can thereby be drawn between assessment centres and simulations. In short, simulations, when recruiting and training, can often be used as adequate predictors for future performance (Thornton & Rupp, 2006). Studies within aviation can provide relevant examples. Flight simulators are regarded as essential tools for recruiting, training, and developing flight personnel and pilots (Kozuba & Bondaruk, 2014). In addition to theoretical and practical training, Simulator training plays a vital role in shaping pilots' competencies and situational

awareness needed when performing (Salas, et al., 1992). Key learnings from simulations have further been applied by Salas, et al. (2009) within management, claiming in their study that simulation-based training enhances management education and performance. Similarly, expected contribution will regard learnings occurring during a stock-investment simulation through personal factors and emotions and how this relates to management. As the two first expected contributions address the gap between theoretical and practical knowledge of entry-level professionals, findings will also attempt to contribute to the scientific area of behavioural finance. Research subjects can be viewed as non-professional traders, which is a rather unexplored area within behavioural finance. Moreover, two of the research questions attempt to explain how personal factors and emotional responses relate to financial decisions and performance. Results here can be of interest to researchers in psychology with a focus on personality and emotional research.

2. THEORETICAL FRAMEWORK

This section reflects the grounds and purposes of the chosen theoretical areas of the study. Specifically, it illuminates the theoretical backgrounds of general human decision making and its underlying processes, thus explaining mechanisms within financial psychology occurring when trading securities or financial instruments on financial markets. Describing previously observed psychological phenomena occurring when trading provides a theoretical basis and motivation for why the study was conducted and how the study could reduce potential theoretical research gaps.

2.1 Non-Professional Traders Are Like Managers

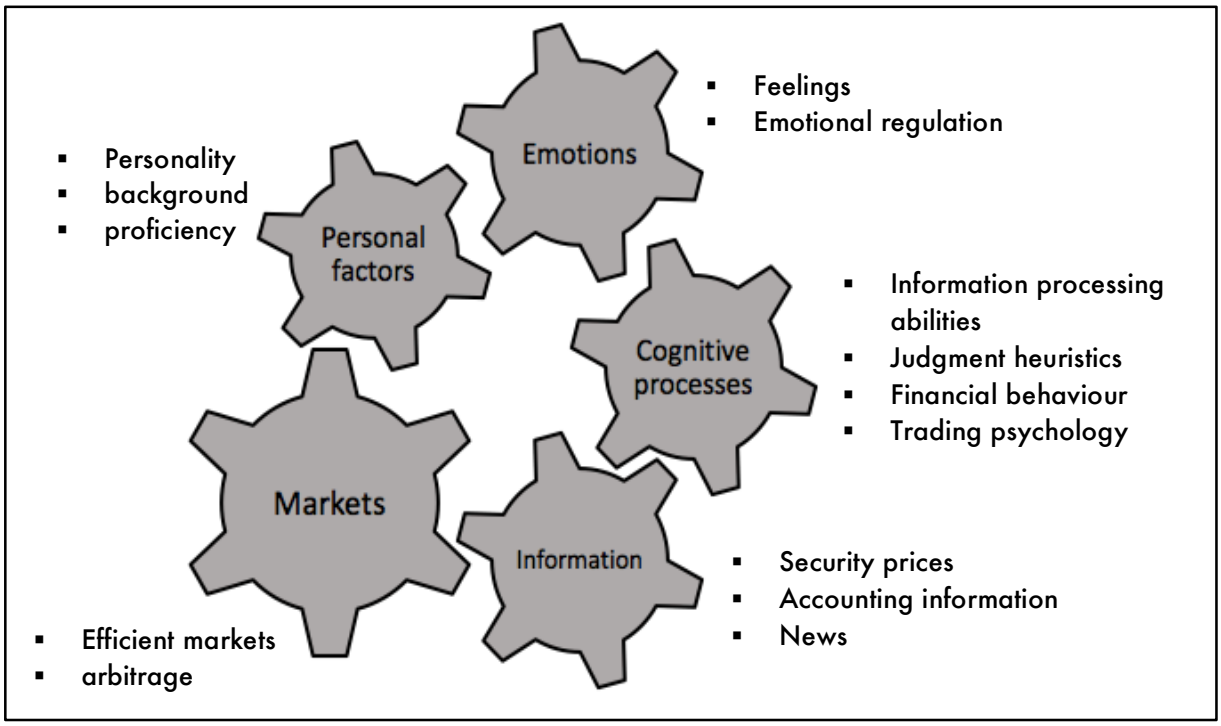
While some might regard non-professional traders as individuals attempting to earn money on their free time, others such as Finansinspektionen see them as consumers to a brokerage firm/site that offers securities (Finansinspektionen, 2015). However, these traders can be considered as very simple types of individual organizations, as the business consists solely of him or herself (Cole, 2003). While there are few barriers or formalities for setting up such an organization, the trader is fully accountable for any debts occurring within the business (Cole, 2003). As individual traders use their own financial means, the outcome of their buy and sell decisions become crucial for their own security and wealth. In a managerial context, individual traders control everything within the organization, and have full freedom to monitor it in any direction. Having a full ownership of the business, also means that the trader is obliged to oversee all parts of the business (Cole, 2003). Concluding on this note, one could assume that such traders are likely to be conditioned to self-management, by managing personal wealth and risk with little or no support from others, and self-leadership by engaging in processes influencing themselves to achieve financial performance and objectives.

2.2 Traders' Decision-Making Landscape

Researchers within behavioural finance have attempted to understand why some investors and traders are more successful than others. Although there is no clear explanation to what underlying factors it takes to be a successful trader, research shows empirical support that markets, information, personality traits, cognitive processes and emotions can partially explain variance in investment behaviour and financial decision-making.

The figure below illustrates the four key factors affecting and forming individuals decision-making processes when trading financial instruments. The presented framework is a simplified overview of the five principal areas that will be treated in this section. The figure is however not based on a theoretical model, excluding any other variables. Arguably, more factors could potentially affect an individual's financial decision making. From an academic point of view, each one of the five components have proven to affect and guide financial decision making to some extent in past studies, hence their relevance in the model.

Figure 1. A conceptual framework for understanding how trading decisions can be affected or relate to varied factors



Notes: The figure illustrates four individual factors that affect traders' decision-making. The examples of what these factors can be, are listed in the figure and will be reviewed in the literature section.

Moreover, figure 1 incorporates factors that have been studied on different "levels". That said, markets and information factors have been studied within the sphere of behavioural finance, and thus on an aggregated level-by studying considerable number of traders' decisions (Fenton-O'Creevy, et al., 2004). Market factors denotes variables such as market structures and how mechanisms in general affect aggregated behaviours within markets. Information factors denotes transcribed market output, such as news, that can play a significant role in how aggregated decisions look like (French, et al., 2017). The remaining factors are of interest to this master thesis, as they can be studied on a more individual level. Personal factors can be

referred to as personality traits, backgrounds and proficiency. As characters and personality related factors differ widely in general terms, research has explored its relation to financial performance among traders (Fang, et al., 2017). Cognitive processes under stress can often results in so called “thumb-rules”, which can lead to judgmental errors. Researchers have also explored this field within financial markets (Barber & Odean, 1998). Finally, emotions stand for emotional responses and feelings when taking financial decisions. This area of research has also contributed with striking results related to traders’ decision-making landscapes (Fenton-O'Creevy, et al., 2011).

2.3 Markets; Efficient Markets and Arbitrage

Markets play a significant role in the decisions that traders make on daily basis. From the early 1950s, neoclassical economists, such as Markowitz (1952), developed theories around stock porftolios that would change the world of finance. The emergence of these modern financial theories has implied major consequences for trading pracises. Examples of this are Markowitz’s (1952) proposition of diversification of securities, making way for what is refered today as modern potfolio theory (Blomberg, et al., 2012). In short, the theories build upon individual traders’ willigness to maximise portfolio returns in a more effieicent way, eliminating as much variance in return (“Expected return – Variance” rule) as possible. Given a certain level of risk of a number of portfolios, the most effiicient one is the one involving highest return- and vice versa. Securuties should therfore be carefully selected, thus diversified, in view of being independent and not correlate (Markowitz, 1952) and in order to minimise variance in returns.

Building on Markowitz (1952), other economist developed further related theories around the 60s and 70s, such as the capital asset pricing model (CAPM) and the efficient market paradigm.

The CAPM is the development and simplification of Markowitz 'Modern portfolio theory. The model investigates what part of the total risk of an asset that canont be diversified by a rational investor and will thus will be exposed to a market price for risk (Fenton-O'Creevy, et al., 2011). The foundation for this model is that the market price for risk is produced by aggregated risk preferences of individuals. The efficient market paradigm claims that imperfections regarding information, pricing, etc are non existent (Fama & Malkiel, 1970), hence that market conditions are consitent with effiency. For example, the paradigm claims that all available information are discounted and reflected in current prices, and that future security prices cannot be predicted.

In addition, efficient markets assume that individuals act in a rational way (Wärneryd, 2001). Needless to say that since modern financial theories were developed, studies have indicated that mechanisms depart from market efficicy (Repin, et al., 2005). In response to the rising presence of evidence that markets are in fact inefficient, a number of researchers began to use the term behavioural finance, to differentiate themselves from traditional neoclassists.

Arbitrage can be defined as purchasing securities in one market for resale in other markets, with the objective of profiting from price differences. In other words, arbitrage is a way of exploiting market anomalies (Fenton-O'Creevy, et al., 2011). However, its effect is often to act as a mechanism to bring out price "competition" in different locations or between similar securities. Thereby, it can also eliminate market anomalies. When presented acadmeically, arbitrage can appear as a no-risk strategy. However, according to Shleifer and Vishny (1997), arbitrage is not costless as it can implies risk. For example, when exploiting arbitrage, a trader needs to be confident that enough "rational" individuals are present on the market, to force different market prices to come together (Fenton-O'Creevy, et al., 2011). If this is not the case, the strategy becomes more risky.

2.4 Information

The securities are selcted within an abstract world we refer to as "the market". In addition of being a place for opportunities in buying and selling positions, markets are vital providers of information for traders. At present, key sources of market information are still used by both professional and non-professional traders and investors as foundation of their financial choices. At present, there are large amounts of informations around markets and many sources in which it can be gathered from. Using various sources of information, such as news and financial reports, professional traders attempt to visualise markets and how the evolve (Blomberg, et al., 2012). Acquiring information has a significant influence on trading behaviour according to Fang, et al. (2017). Their study suggests that after acuiring financial information, traders who differ in personality traits changes their frequency of trading. Morevoer, operating in a risky environment can cause ovveractions to news. De Bondt and Thaler (1985) found empirical evidence suggesting that, on aggregated levels, markets ovverreacted to news. In this study, securities susceptible to historical loss had greater changes in prices than for their counterparts that had historical gains, in response to news. The price changes were however not entirely mirrored nor explained in news.

2.5 Behaviour and Fundamental Cognitive Biases

2.5.1 Investment Optimism and Expectation Formation

As early as the 1930s, many economists and researchers increased their attention to how powerful investors' decision making was affected. When Keynes (1936) observed how decision makers formed their expectations of the future, he concluded the presence of over optimism, also referred to as the "animal-spirit". The formation of expectations and foresight, builds on human and non-human aspects. Non-human aspects, such as mathematical expectations (Wärneryd, 2001) be the calculations of probabilities, which can be hardly manoeuvred nor managed in human terms. Wärneryd (2001) argues that when a person commits an investment, it is because subjective expectations adheres to believe in the future. An individual's expectations are created and changed through memory, perception, cognitive processing and emotions. In short, these factors can build two types of expectations: intentional and contingent.

Intentional expectations make the individual believe that the future can (to some extent) be affected by him/herself, in a subjective manner (Wärneryd, 2001). On the other hand, contingent expectations create a feeling that the future can only be shaped by factors that are out of reach for the individual, and cannot be influenced by the individual him/herself. Wärneryd, (2001) argue that this is closely related to the well-known term "attribution-error". One type of attribution error is the self-attribution bias, which "occurs when people attribute successful outcomes to their own skill but blame unsuccessful outcomes on bad luck." (Shefrin, 1999, p.101). Doukas and Petmezas (2007) found empirical evidence of self-attribution biases among professional traders. In their study, traders attributed profitable trade deals to internal factors, the subject own perception of skill and abilities. The attribution error among private investors has been investigated by Barber and Odean (2002). Their study showed that private investor suffer from illsuion of control and knowledge, while failures were associated with external factors (such as unpredictable markets). This can explain both profits and losses on financial markets, partly due to subjects' unwillingness and inability to learn from past experiences.

2.5.2 Financial Behaviour and Psychology

Interestingly, financially-based models, such as CAPM[1], exclude all forms of irrationality, such as judgmental errors or illusion of control, among actors on the market (Willman, et al., 2002). Further, decision making under stress is not taken into consideration either. One of the most common behaviours observed in previous studies made within behavioural finance and economics is overconfidence- overestimating the possibility of being right. The concept can come in many forms, but majorly involves the human tendency of overestimating predictions. In short, individuals' subjective perception of their own knowledge is in some cases inferior to what it is. As an example, when taking insurance, human assessments often result in underinvestment in taking precautions (Sandroni & Squintani, 2004). This phenomenon has also been observed among traders on stock exchanges. For example, Huisman, et al.'s (2010) study used unique survey data on stock market predictions of individual institutional investors. Findings showed empirical evidence that experienced investors' predictions exceeded actual stock index levels. Expected market volatility was also found to be at a lower level than actual volatility, which also empirically supported the presence of overconfidence among investors. Doukas and Petmezas (2007) found emprical evidence that professional traders in their sample credit the success of their trades to their own ability and therefore become overconfident by purchasing or selling more securities.

2.5.3 Prospect Theory and the Disposition Effect

Cognitive processes refer mainly to heuristics occurring when trading. Moreover, the use of cognitive processes, such as heuristics can help traders to make rational decisions in some cases, and irrational ones in other cases. An important term within behavioural psychology is the prospect theory. Originally developed by Kahnemann & Tversky (1974), the theory suggests that individuals' decision making under risk, tends towards being risk-seeking in view of avoiding losses, but risk-avert in situations involving gains that are more certain. One of the most relevant observed implications within prospect theory is the so-called certainty effect, namely that humans have a strong preference for positive outcomes with a probability of P=1,0. (Kahnemann & Tversky, 1974; Wärneryd, 2001). According to the prospect theory, loss aversion can be described by individuals disliking losses more than they prefer profits, or as "the disutility of giving up an object is greater than the utility associated with acquiring it". (Kahneman & Tversky, 1974).

[1] Markowitz (1952), Capital Asset Pricing Model

As loss aversion is an important attribute within prospect theory, it can partially explain the disposition effect, which occurs when investors sell winning securities too soon and sell unprofitable positions too late (Fenton O'Creevy et al, 2011). The disposition effect presence among traders was also confirmed by Odean (1998), where he found that investors preferred disposing winning over losing positions. On that note, another interesting aspect regarding the disposition effect was found by Weber & Camerer, (1998). Their study showed empirical evidence that when prices were above the purchase price, traders tend to sell more than when they are below. Multiple reference points - historical price levels and purchase prices- could partially explain this effect.

2.5.4 The Anchoring Effect

The anchoring effect is another type of thumb-rule observed among actors operating within financial markets. Originally discovered by Kahneman and Tversky (1974), the cognitive bias can be described as an individual's misconception of initial, or easily obtianed, information when making predictions. More specifically, it denotes that initial values are often taken too heavily into consideration, which result in predictions being biased toward the original values. According to Liao et al. (2013), few studies have been conducted around the anchoring effect in a financial market context.. On that note, Liao, et al.'s (2013) study found empirical evidence of the anchoring effect among instiutional investors, as past market movements were used as anchors for predictions. Similar tendencies have been found among traders by De Bondt (1993), where investors based their forecast on current market situation. In other words, individuals showed pessimistic predictions when markets were falling and were optimistic when markets were rising. Morevorer, the few numbered studies regarding anchoring effect within financial markets have solely focused on instiutional investors of various form, while none have explored the phenomena among private retail investors.

2.6 Individual Traits

Currently, there are few studies around personality factors among non-professional traders (Repin, et al., 2005). Personality refers to differences in individuals regarding characteristic patterns in thoughts, feelings and behaviours. Personalities are relatively constant throughout life. One of the most accepted models in personality psychology includes five factors. These factors are referred to as openness, conscientiousness, outward direction, agreeableness and emotional stability. The five properties are referred to as the Big Five Model (Goldberg, 1990).

For example, emotional stability includes one of the characteristic patterns of thoughts, feelings (Fenton-O'Creevy, et al., 2011) and behaviours that individuals have and can be measured by responding to questionnaires that have been validated as instruments.

Fenton-O'Creevy, et al. (2004) argue that well performing professional traders could be described as introverts that are emotionally stable. More interestingly, these successful traders were open to new experiences. According to Fang, et al. (2017), investor personality traits moderate the relationship between trading behaviour and sources of information. For example, investors with extravert and agreeable personality traits increase their trading frequency due to financial word of mouth communication, while investors with openness, conscientiousness and neuroticism traits are more likely to reduce trading frequency in a similar situation (Fang, et al., 2017). A potential explanation for the observed differences could be that agreeable investors are more social, thus basing their decision making on communication with others. When acquiring financial advice, Fang, et al.'s (2017) results also showed that investors with prominent level of openness, extraversion, neuroticism and agreeableness personality traits trade more often than extraverted and conscientious investors. Opposed to findings mentioned above, Repin, et al. (2005) found that personality traits had non-existent significance on performance for professional traders.

2.6.1 Need for Cognition

In addition to the five-personality factor model, need for cognition (NFC)- a measure of the need to cognitively elaborate (Cacioppo & Petty, 1982)- will also be encompassed in this study. An individual's NFC can also be described as the "human tendency to engage in and enjoy thinking" (Cacioppo & Petty, 1982). A High NFC score can indicate, inter alia, acknowledgments for problem solving (Cacioppo & Petty, 1982). On the other hand, a low NFC scores indicates that an individual is inclined to effortless thinking, where heuristics and thumb rules are used when processing information (Nochelson & Grossklags, 2013). In previous studies, NFC has been linked to academic achievements and life satisfaction. For example, financial analysts have shown neutral levels of NFC, while asset fund managers have a distinctly high level of NFC.

2.6.2 Backgrounds; Experience, Practice and Expertise

Age and experience are relevant aspects when examining decision making among individual traders. For example, age determines levels of affective experience and affects cognitive

processes (Carstensen, et al., 2000) Educational levels as well as trading experience are all positively associated with total earnings of institutional traders. Willman, et al., (2002) showed that (on unstandardized regression coefficients,) one higher educational level (bachelor to masters' degree for example) implied £88,000 higher salaries per annum on average. In the same way, experience within the industry also has positive impacts on salaries (Willman, et al., 2002). While remunerations in this industry depends heavily on bonuses based performance (Blomberg et al, 2012), one might conclude that higher levels of education and experience do have an impact on how well an investor will perform in the future.

One of Repin, et al.'s (2005) conclusions implies that professional traders cannot be associated to any specific "trader personality profile", hence trading skills may not be inborn talent. In short, sufficient experience and practice may lead to equal performance among different personality types. Just like in other job industries, investors and traders can become experts within specialised fields such as geographical markets, type of securities, industrial sectors, etc. According to previous literature, the road to becoming an expert is ambient and opinions differ. One view (Ericsson, et al., 1993) on how individuals become experts is by deliberate practice, practice under the supervision of a coach resembling a form of drill and exercise, while disregarding the role of talent or inherited abilities. On this note, (Ericsson & Lehmann, 1996) conclude that: I) experts' superior performance relates in most cases to their area of expertise and transfer outside their speciality is scarce, II) attributes acquired by the experts during their experience of practice over longer time periods explain their superior differences with less proficient individuals III) success in a specific domain cannot be predicted by basic capacities within the same area. Opposed to Ericsson's views, many researchers have responded through various findings and theories. For example, Hambrick, et al. (2014) argue that deliberate practice cannot solely explain suboptimal performance, as some experts reach elite levels via varying amounts of successive deliberate practise. Other factors, such as personality, should also be taken into consideration. While most the above arguments have been studied on athletes and musicians, Fadde & Klein (2010) argue that successful professionals in the business world generate expertise by directly integrating various forms of exercices in their everyday work processes (deliberate performance).

Building on Ericsson, et al.'s (1993) research, evidence for financial expertise was found in terms of better predictive abilities and stock selection of experts (Ericsson, et al., 2005). Experts manage to forecast future market values for a small number of shares of companies in a specific

sector of the market thanks to lenglthly experience (deliberate practice), specialisation, and the development complex mental representations. In short, results show that financial experts acquire skills that are superior and differ from naïve investors who demonstrate biases within their decision-making in behavioural finance (Ericsson, et al., 2005). According to Blomberg et al, (2012), some institutional investors described their first experience of major financial setbacks as traumatic. To restore their confidence, the intervention of managers who had experienced similar scenarios was needed. This can be linked to Fadde & Klein's (2010) "experimenting", as trial-and-error exercices are integrated in work processes. But can private investors also benefit from deliberate performance?

Accrding to Lo (2002), decision-making performance and emotional experience is affected by experience in securities trading. Similarly, experience in terms of frequency of trading (transactions per day) rather than time periods was observed by Abbey & Doukas (2015). Here, the learning process of private investors (FX traders) is similar to weather forecasters and bettors, who receive timely feedback on their performance on a continuous basis (Russo & Schoemaker, 1992). Results show that investors exercising high-frequency day trading are skilled in assessing their own abilities, thus able to overcome overconfidence and that that higher trading activity indicates higher net returns (on a $p<0,01$ level). Receiving timely feedback in view of acquiring expertise and improving performance is praised by Klein (2009). However, several private investors are less active and trade less frequently over longer periods of time. Fadde & Klein (2010) claim that individuals lacking timely feedback can still assess their own feedback, by focusing on the process rather than the end-product (such as the outcome of a trade).

2.6.3 The Relevance of Numeracy and Financial Literacy

Numeracy refers to an individual's ability to understand and process numerical information (Lusardi & Mitchell, 2011). Existing studies have investigated whether individuals' numeracy means that rational decisions are taken while estimating probabilities. For example, Liberali, et al. (2012) show that people with high numeracy were subjects to fewer cognitive illusions. While it can primarily be claimed that the two aspects are closely related and therefore correlate, it should be noted that other studies argue that the link between numeracy and cognitive illusions do not exist. Moreover, research in this area shows that individuals with low numeracy find it harder to estimate risks.

Winman et al. (2014) investigated whether the numeracy effect may be related to calibration of probabilities. Respondents response was considered to be calibrated if their subjective probability estimate was consistent with the corresponding correct response. Furthermore, formulated the question of whether people with low numeracy overestimate probabilities and simultaneously show lower levels of accuracy in assessment of the different outcomes. In the study, there was empirical support for this issue. Winman, et al. (2014) concluded that respondents with high numerical abilities encourages correct probability assessment, thus arose fallacies even among these respondents. Based Winmans et al. (2014) study, conjunction fallacies are not a universal measure of an individual's ability to estimate probabilities.

Financial literacy can be described as basic financial knowledge (Almenberg & Säve-Söderbergh, 2011). Previous studies have explained non-professional traders' participation in the stock market, by their risk preferences (Barber, et al., 2008). However, Almenberg, (2011) found that beyond what can be explained by risk preferences, numeracy and financial capabilities are positively correlated with participation in the stock market. In line with, (Almenberg, 2011) this thesis will combine measures between numeracy and financial capacity, since risk on the other hand may be a partial explanation for the positive connection with participation in the asset markets.

It has recently been found that financial literacy does have an impact on financial decision making (Gathergood & Weber, 2017), combined with a high portion of the Swedish and worldwide population are financially illiterate (Finansinspektionen, 2015; Almenberg & Säve-Söderbergh, 2011) and lack of education in financial knowledge. Worse, governmental interventions in Europe to have failed to improve financial literacy, and explain only 0.1% of the variance in financial behaviour (Fernandes, et al., 2013). This motivates the presence of measuring financial literacy on the research subjects. Three basic questions have been developed by Lusardi & Mitchell (2011). The the questions are often reffered to as the "Big Three" due to their popularity among researchers and compatibility for being applied on financial literacy measures around the world (for example Finansinspektionen, 2015).

2.7 Emotions

Although emotions play a crucial role in our decision-making, their influence is not clear and is rather complex by nature. Emotions can be described as a combination of physiological reactions, behavioural tendencies, mental processes and subjective experiences (Bechara, 2004; Ericsson, et al., 2005).

Some research suggest that positive emotions result in poor decision-making and in simplified processing of information (Schwarz, 2000)but can also can produce better decisions (Isen, 1993).When the individual's attention of memory increases with an affective reaction, emotions have positive implications to decision making (Damasio, et al., 2000). Emotions can however have a negative impact on the decision if it affects the ability of individuals to take note of the contents of the information and that it increases the risk of biases. Studies on individuals who can no longer process emotional information in a normal manner indicate a weakened quality of decisions, due to "decays" in the decision-making process (Bechara, 2004). In other words, individuals of elevated level of intellect and great IQ can still be subjects of poor decision making, which can lead to negative impacts. Individuals operating within financial markets, such as individual traders, are relevant research subjects in this area. Not only are they exposed to taking decisions on continuous basis, but a high-risk environment around causes high levels of emotions and feelings, such as stress. They are therefore also subjects that are expected perform while handling and managing their emotions. This makes it interesting for the study to explore how non-professional traders feel when day trading.

2.7.1 The Role of Emotions Within Financial Decision-Making

Fenton-O'Creevy et al (2011) claims that emotions aren't necessarily a bad phenomenon in a financial context. This has also been confirmed by Seo & Barrett's (2007) emprical study on private investors' decision making. In other words, emotions have also proven to be useful. For example, an emotion can create attention, thereby indicating what to pay attention to and can even be a fundamental element for rational thinking. Even though the institutional financial industry has been automated and to a substantial extent driven by computers, researchers such as Fenton-O'Creevy, et al. (2011) believe that human psychology may explain the impact of financial crash of 2007 and 2008. Mirrored in the behaviour of in-debt individuals who decide to go shopping at the brink of their own bankruptcy, humans tend to avoid exploring and facing so called "bad" aspects which they face, but prefer to deliberately get distracted by other

priorities or interests. Firstly, emotions among investors and traders have previously been considered a consequence of market volatility, but recent studies show that emotions can be a factor causing volatility (Fenton-O'Creevy, et al., 2011).

Negative emotions are also important to take into consideration. Raghunathan and Tuan Pham (1999) claim a clear distinction between two negative emotions during decision making. Their findings show that individuals experiencing negative emotions such as sadness leads decisions aiming for higher rewards (involving more risk). On the other hand, anxiety led to risk-avoiding behaviours, seeking lower rewards. Observed "mood repairs", aiming for higher or lower rewards, hade therefore different functions for both sad and anxious research subjects (Raghunathan & Tuan Pham, 1999).

Decision-making under risk has also been shown to be explained by emotional implications and the effects of emotions (Fenton-O'Creevy, et al., 2011). Several studies have examined the relation of trading and emotions. In a study of private investors in the US, Seo and Barrett (2007) found that subjects who identified and distinguished their feelings, those with effective emotional regulation (Seo & Barrett, 2007), experienced lower levels of negative effects caused by emotions. Lo and Repin, (2002) found that body temperature, respiration and pulse of professional day traders changed during the time they traded currencies and this was strongly linked to market events. On this note, Fenton-O'Creevy et al.'s (2011) concluding remarks in their experiment is that high performing traders develop effective strategies when regulating their emotions. This involves to not supress negative emotions- but using them to your advantage.

2.7.2 Managing Others' Emotions and Regulating Own Emotions

Institutional traders (for example, investment bank employees), principally use their knowledge and expertise of the markets and trade on behalf of the firm while using the firm's resources. This practise is also referred to as proprietary trading, where institutional traders sit together in a trading room and interact with each other (Blomberg et al, 2012). Within this context, however, firms use regulations to manage traders' activity and decision making, but also govern them by measuring and evaluating their performance (Blomberg, et al., 2012)Institutional managers of traders are usually previously expert traders as they need to have a technical understanding of the markets and be able empathise with the stress the traders' role (Willman, et al., 2002).

However, effective regulation and use of emotions in their work is often a priority among traders and their managers. The common belief within financial institutions rely on the traditional view that the optimal, top performing, trader is purely rational and is therefore able to supress his or her own emotions. The regulation of emotions by trying to ignore them to avoid biased decision making is therefore popular on trading desks. In line with Seo and Barrett's (2007) findings, Fenton-O'Creevy, et al. (2011) believe that this managerial context is ineffective. Their comprehensive interview study of professional traders in the UK showed that top performing traders regulated their emotions effectively, compared to low performing ones that attempt to avoid emotional reactions by leaving the workplace when emotions were too strong. While these low performing individuals engage in high levels of cognitive effort in adjusting their emotional responses, experts tend to maintain objectivitity by accepting to cope with their own negative feelings. This also proves to be efficient in reducing negative experience impacts due to emotions. Fenton-O'Creevy, et al. (2011) findings also suggest that accepting to endure negative feelings in view of long-term goals may be lead to better results in performance. Purely defensive strategies trying to maintain positive feelings often lead to opposite effects (Fenton-O'Creevy, et al., 2004). In short, emotions can lead to biases and errors in financial decision-making, but they should not be ignored. This is because of the positive imlications they can have when managed in an efficient manner (Seo & Barrett, 2007).

2.8 Theoretical Research Gap

Firstly, few studies have been made on investors in households (Wärneryd, 2001), and more specifically individual and non-professional traders. Managerial studies, such as Fenton-O'Creevy, et al. (2011) have focused on institutional traders, such as managers at investment banks or funds. Studies within this field argues that managers focus on avoiding losses rather than making gains, which can partially be explained by prospect theory (Willman, et al., 2002). On an institutional level, policy makers have not been able to cope with employees' emotions in an effective manner by attempting to regulate them. While irrational behaviour among managers is due to the unavailability of effective monitoring (Jensen & Meckling, 1976), Willman, et al. (2002) indicate that even managers on trading desks are subjects to risk aversion. On that note, empirical evidence suggests that experienced traders and employees of investment banks experience difficulties to control emotional responses to the outcomes of their decisions when the market was volatile (Fenton O'Creevy et al., 2011). Because of this area of the

theoretical framework, research on how traders manage their own emotions, without being governed nor managed regarding their decision making, is arguably relevant.

Many studies made on both institutional and private investor's behaviour over a longer period and often multiple weeks (for example Huisman, et al., 2010) and in the absence of a brokerage firm (Seo & Barrett, 2007). However, the study in this thesis observed subjects for a relatively shorter time periods and together a broker (IG markets). However, previous studies demonstrate that research involving both aspects are feasible, and can lead to interesting results on non-professional actors. For example, Harris and Schultz (1998) successfully analysed the performance of private investors who held small entry positions for a few minutes and traded at a high-frequency, with results showing they can earn a small profit per trade. Garvey and Murphy (2005) found that over 50 percent of the day trades in their sample were profitable (net of transaction costs) while evaluating the performance of private investors from a broker in the United States.

Some of the prior research regarding behavioural finance has been questioned by (Wärneryd, 2001). While using a bias and heuristic approach as an important pillar for research, studies involving the presence of prospect theory (for example) among investors have been observed in a retroactive manner. In other words, exploring the phenomena after they occur. Few studies have strived towards testing in a "real-scenario" the use of heuristics on individual's behaviour when trading. More interestingly, Wärneryd (2001) argues in his own words that "there is room for stimulated research" on heuristics within financial behaviour on both institutional and private actors. In other words, a clear majority of prior research has assumed that investors and traders use simplistic "thumb-rule" approaches during their decision-making, while this paper proposes a deeper analysis on financial decisions on a more individual level. Wärneryd (2001) further suggests that such studies should be made using controlled environments, interviews and observations. As presented in the litterature review, limited research has been made regarding non-professional traders since 2001.

With regards to the expertise and performance area Andersson et al (2005), argue that future research on why financial experts can generate reproductive and higher performance should create ecologically valid tasks that involve investing and forecasting. This thesis will attempt to examine the structure of such expertise. Finally, there is limited research that has focused on examining how individual traders are affected by psychological phenomena and emotions

and how they relate to them. Andersson and Tour, (2005), suggest that day-traders are likely to be subjects to attribution errors overconfidence, and the disposition effect. In other cases, as shown by Repin, et al. (2005), all three phenomena had zero impact on how day traders performed. This indicates a clouded theoretical finding.

3. METHODOLOGY

This section describes the approach that was used in the research. One of the thesis' aim is to investigate whether emotions and personality traits affect financial performance when day-trading in a simulated context. Furthermore, a more general and exploratory study was made on of how trading behaviour is shaped, specialised expert-traits formed, and how various side effects can lead to managerial implications. The methodology will also aim at providing arguments for why the study was conducted by using an approach inspired by experience sampling, within an ecological context. For example, the choice of using a realistic scenario is motivated by using an internet-based trading platform, where actual market events occurred during the study.

3.1 Scientific Research Approach

There are two types of perspectives that can be used in scientific studies, an inductive or a deductive approval. An inductive perspective signifies that theory is the result of empirical studies. In other words, it seeks to create generalizable theories based on observed data. An inductive reasoning would rather use a qualitative study as the basis to create theories. In contrast to this method, deduction has been the most appropriate approach for this study. In line with Bryman and Bell (2011), who define deduction as the already mapped theories underlying the data collection and study. Based on this, quantitative data from my study described in this paper formed the basis for finding empirical support to the research questions of the thesis, which are formulated with the help of previous research and theories. As quantitative data collection is also a traditional method in behavioural science, a quantitative methodology was chosen as a platform.

The chosen method in the study was to collect data from three different surveys before, during and after a trading simulation. The study was conducted within a controlled environment, with the aim of entering a situation and to observe results of participants. However, it did not involve the manipulation of variables. Based on this, the data from my experiments formed the basis for seeking empirical support for the formulated research questions measured variables with the help of previous research and theory.

3.2 Procedure

A trading challenge for SSE students was organised. The virtual stock simulation was a competition based on individual performance, where participants used IG Market's [2] web trading platform. IG Markets are stockbrokers to non-professional traders. The event was conducted together with the Stockholm Student Investment Fund, as well as IG Markets representatives to market the event and attract participants. I targeted participants who had a genuine interest for stock markets, had experience related to financial markets, wanted to apply their trading strategies in real life and/or wanted to expand their knowledge for trading securities. IG markets' online trading platform was chosen thanks to their very low markets spreads[3], popularity and compatibility with many financial tools that the participants were keen on using, such as Metatrader[4] – a terminal aiding in advanced security analysis.

The start for the trading challenge was given at 09.00am (European central time), and lasted until 11.30 am. In this way, participants experienced all central European stock openings at 09.00, such as the Stockholm Stock Exchange, but also the London stock exchange opening at 10am. During these 2.5 hours, participants had no restrictions in types of securities or financial instruments they could trade, such as stocks in publicly listed companies, currency contracts, market indices and even commodities such as gold. It should also be noted that all participants had permission to place orders before the start, given that the monetary transactions would occur at 09.00 at earliest.

The clear majority of the financial instruments available on the trading platform were so-called contracts for differences (CFDs), meaning the trader was in fact exposed to trades of much greater value than their monetary deposit, using leverage. As an example, if a participant wanted to buy one long position in shares of Company X at a value of 250SEK per share, CFDs offered the opportunity to buy a contract containing 1,000 shares of company X (at 250 SEK/share, 250,000 SEK in total) for the total price of 2,500 SEK. In such circumstances, where the leverage ratio is 100:1 the trader "borrows" the remaining 247,500 SEK from the broker. The

[2] www.igmarkets.co.uk

[3] The difference between the maximum price that buyers are willing to pay for a security or an asset and the minimum price that sellers are willing to receive for it.

[4] https://www.metatrader4.com/en

100:1 ratio, implies that for every 100 SEK spent, 1 SEK comes from the individual's own capital. In other words, investors and traders can earn and lose larger amounts of capital[5] (Abbey & Doukas, 2015) -even from small market fluctuations over short time-periods. The choice of using leverage (rather than excluding it) in the stock market simulation is motivated by the conditions it offers where: I) the trader is free to take on more positions and be more active II) drastic changes in portfolio returns are more likely, enhancing the possibility for higher emotional variability throughout the simulation.

3.3 Selection of Study Design

Referring to the selection of the research approach above, a mix of quantitative experiments and qualitative approach to the collection of data was chosen. Quantitative experiments have been more beneficial when observing traders' performance and decision-making. These types of measurements allow for a consolidation of the approach to draw conclusions when quantitative data enables statistical analysis of various nature. For example, the analysis regarding transactions made by participants. On the other hand, a qualitative scope brought an inductive approach to the data collection regarding emotions and personal traits. This can be more of a subjective method, but relevant when examining subjects on a deeper and individual level. This was relevant as the group sample was relatively small (14 people)

3.4 Participants

This section describes the entry of respondents. An invitation (see Appendix 2) was distributed on social media via the Stockholm Student Investment Fund's Facebook page (325 subscribers) and the Student Association of the Stockholm School of Economics website. There were 32 respondents registered and 14 out of these participated in the trading competition. Participants were all current (N=13) or former students (N=1) at the Stockholm School of Economics. The study, conducted during the trading competition, targeted only individuals who regularly trade or have previous experience in trading. More importantly, participants in the competition signed up on their own will, in view of competing and putting their skills into practise. This can be explained by the study's primary objective to investigate the behaviour of educated students

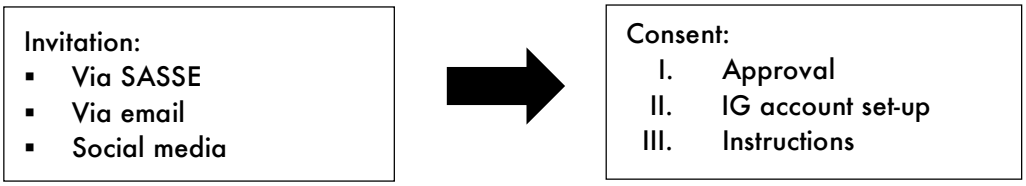
[5] Than without leverage, using a 1:1 ratio in this case means spending 2,500 SEK in exchange for 10 Shares, using 2,500 SEK of own financial means.

who have experience in this field. Participants in the challenge received breakfast during the competition and the three top performers were given prices.

3.5 The Structure of the Experiment

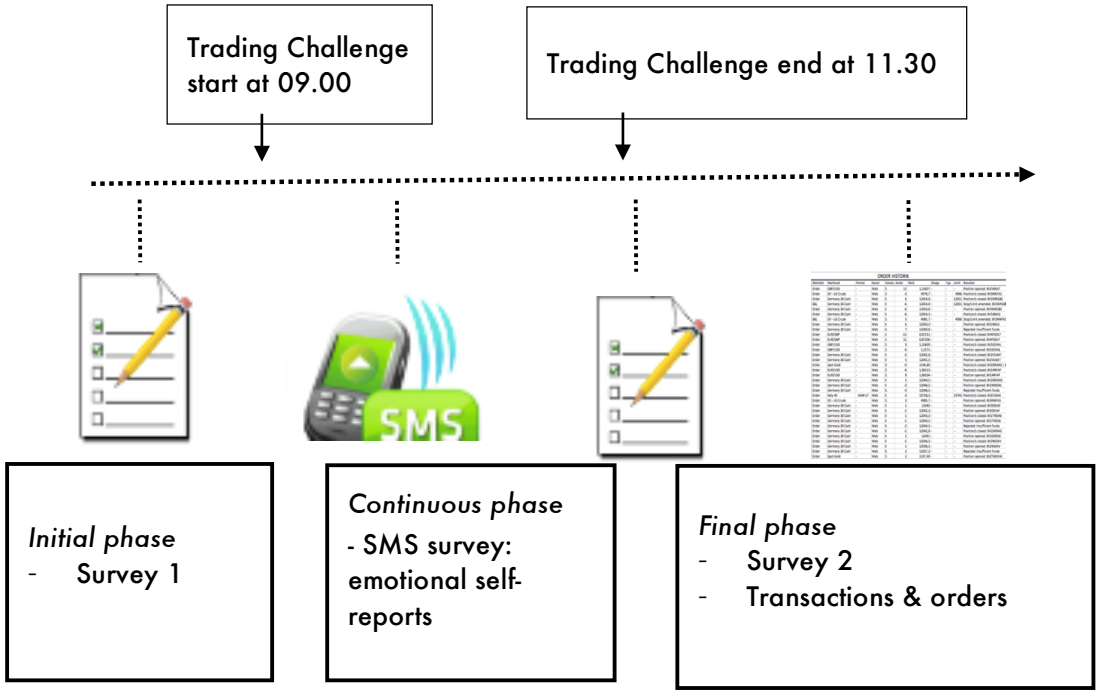
This section consists of a summary of the study followed by the construction of the survey and the various elements used in the research. The data collection of the study consists of 4 parts: 1) a preliminary survey carried out electronically regarding personality traits, experience, demography, calibration, predictive abilities and numerical skills 2) an experience sampling questionnaire carried out by SMS text messaging, involving emotional state, mood and feelings over time, 3) a second survey carried out physically with an explorative scope on expectations and judgmental abilities and 4) the data collection of all trading transactions and order history in view of assessing performance over time. As illustrated in figure 2, participants were invited via various channels. The recruited participants were then asked to set up an account and follow instructions in view of the competition.

Figure 2. Recruitment of participants to the trading challenge.



Respondents were further asked to familiarise themselves with the digital trading platform and explore the stock-trading simulation. In addition to this, the initial survey (Survey 1) was distributed via email to all respondents. All respondents were given 100,000 SEK or 10, 000 £ as initial capital at the start of the competition and where only allowed to place their orders from 09.00 am on the day of the competition. An introduction of how to place orders and some information regarding securities, CDFs and leverage was also given to the respondents. In view of motivating subjects participate, prices were announced to be given to the three top performing participants (three highest of returns on initial capital).

Figure 3. An overview of how the experiment was conducted on Friday the 10th of March. After approval and registration, subjects received all information in forms of instructions of how to trade on IG markets trading terminal, the rules of the competition (such as no transactions before 09.00 or after 11.30). When the competition was over, the participants sent over their orders and transactions and the 3 winners were announced and given prices.



3.5.1 Survey 1 – Personality Traits, Experience Demography and Predictions

The first questionnaire was designed to measure financial knowledge, levels of experience, personality traits, personality variables and demography. It should be noted that this survey was completed by respondents before the stock market simulation took place. The early questions in the survey are designed to get a grasp on how much practice, experience and knowledge subjects had. These questions regard for example if they are currently trading securities, have a strategy for the upcoming competition, how their usual strategy looks like and how they relate to claims about financial market mechanisms. Some of the claims were based on to the efficient market paradigm, such as "Historical price patterns can be used to predict future price developments".

Further, the next part of survey 1 was designed to measure two rather various aspects regarding personal traits. The first area involves Need for Cognition (NFC), a measure of needs to cognitively elaborate (Cacioppo & Petty, 1982). The survey used the shorter version of the questionnaire (Cacioppo & Petty, 1982) selecting 5 of those questions. The survey aims to identify personality traits such as emotional stability and intends to designate the participants'

personality traits and what their characteristic personality traits are. Therefore, to identify traits, the initial survey used ten claims according to the Five Factor Model (see Goldberg, 1990). Participants' predictive abilities were also measured in the initial survey. With inspiration from Huisman et al.'s (2010) study on experienced traders expectations, a similar set of questions were defined regarding expected return on portfolio and future market index levels. Participants were also asked predict their future performance and were asked indicate how much return their portoflio would generate, given an initial capital of 100 000 SEK.

3.5.2 Survey 1 – Financial Literacy

The questions in this part of the survey were three basic questions developed by Lusardi & Mitchell (2011). These questions involved three questions regarding the rate of savings, the effects of inflation and financial risk and spread risk. The question regarding risk was linked to the CAPM model (Markowitz, 1952) and diversification. For example, in the pneultimate question, participants were asked "Buying stock in a single company is usually safer than buying shares in a mutual fund. True or false?".

3.5.3 Survey 1 – Test for Understanding Numerical Concepts

To test and examine the participants' numeracy and understanding regarding probabilities also included a numeracy test in the questionnaire. The participants were then asked four questions in a test of understanding of probabilities, developed by Ghazal, et al. (2014) called the Berlin Advanced Numeracy Test (BANT). This test was chosen partly because it has a very good definition of understanding of probabilities and partly to BANT primarily intended for highly educated groups of individuals (Ghazal, et al., 2014). The relevance of the Berlin Numeracy test in this research is also motivated by empirical evidence showing (among many other findings) it is a robust prognosticator of financial performance, regardless of age, education and gender (Ghazal, et al., 2014). The questions included estimates of the probabilities and frequencies that participants would solve individually (see BANT, Appendix 3). The test was part of the investigation when the knowledge of calculations of probabilities and frequencies can be a background variable that affects financial performance and decision making when trading. Participants could have 0-4 correct answers in the test.

3.5.4 Self-Reported Emotions

The self-reported emotions questionnaires were given to participants throughout the experiment. During the competition, subjects could interact with each other and exchange ideas, tips and information. To follow up and study induvial behaviour during the competition, 7 questionnaires forms were distributed to participants via SMS messages or on physical paper at 7 pre-specified times spots with 40 to 15 minute intervals. The first and last questions were sent or given to subjects before start (8.40) and after the end (11.40). This collection aimed to measure emotional stability as a variation of short-term emotions over time. The forms asked respondents "how do you feel right now?" on a scale of 1 (very unhappy/dissatisfied) to 7 (very happy/satisfied).

The pilot study conducted by (Andersson & Tour, 2005) confirmed both the possibility and feasibility of using experience sampling in a stock-trading context. In view of observing and analysing how research subjects feel and relate to market events emotionally in an ecological and realistic context (Ericsson, et al., 2005), a study resembling the experience sampling method (ESM) was chosen as most appropriate. In addition to financially related news databases offered on IG Market's trading portal, participants also enjoyed following Bloomberg TV live on a projector in the trading room in view of acquiring market information. In short, the stock simulation was designed to offer a realistic environment for all the research subjects. When asked how they found the event (on a 1-7 scale of realism) subjects showed a mean value of 5,79 which consolidates the assumption of a realistic environment (see Appendix 1, table 18). The basic assumption behind experience sampling is that individuals' behaviours and underlying psychological processes must be investigated in their natural environment. This has been used primarily in psychological research (e.g. Hogarth, 2005). The method has exciting potential for providing valuable and interesting research results in investigating traders, as shown by Andersson and Tour (2005).

3.5.5 Survey 2 – Measuring Judgmental Abilities

This survey was distributed after the experiment ended, with the objective to measure feeling, emotions, subjective judgments of performance and realism of the competition. Here, subjects were asked to subjectively evaluate their own performance, decisions and outcomes of their behaviour. This survey had a complementary function to the other surveys or data collections, as it served as a "control" to both Survey 1 and observed transactions data. For example, respondents were asked to give two reasons for their profitable trade outcomes, and two for

their trades that gave negative returns. Internal/personal reasons denotes brain work, personal experience and sense of knowing the stock market. External reasons included: unpredictability of the market, ambiguous information and riskiness of the security.

3.5.6 Transaction Data and Order History

The participants' transaction data and order history was also collected. This was sensitive information under secrecy and therefore required the consent of the participant. Transaction data enables analyses of the traders' strategies and their trading volumes. Here, net profits per transactions, commissions, market levels, market sector, time of purchase and selling, number of positions and conversion rates was retrieved for every buying and selling order participants had made. This enabled the analysis of psychological biases in their actual behaviours, such as overconfidence or the disposition effect. The collection of transaction data was thus mostly relevant when measuring their performance throughout the experiment. As the retrieved order history and transaction data could also be seen on a live-basis, it enabled measures at the same specific times that the participants' emotional self-reported were collected. Again, it should be noted that participants had a unique prerequisite where they could freely choose to trade among the different markets sectors and take as much risk and leverage as they liked.

3.6 Validity and Reliability

In quantitative research, and more specifically in the use of multiple indicator measures, Bryman and Bell (2007) put great weight on the validity and reliability. As the quality of data is primordial according to Bryman and Bell (2007), both aspects were considered when conducting the study. These two concepts can primarily seem like synonyms, but can be separable when relating them to the evaluation of the concept measures in a specific study (Bryman & Bell, 2007).

3.6.1 Validity

Validity denotes the degree of credibility and precision of the data. The concept can be divided into several dimensions, such as internal and external validity. Bryman and Bell (2007) argue that competition validity is appropriate for investigations using a criterion that is known to distinguish individuals (for example) and which is also relevant to the term in question. Generally, validity can be defined as the validity of the measurement performed. Internal

validity is conceptual validity and external validity is how generalizable measurements are, i.e. their universal function.

Regarding internal validity (Bryman & Bell, 2007) personality dimensions and emotional feedback data are appropriate examples. Firstly, personal factors (such as personality traits, experience and NFC) are considered to be causing factors to financial decision making (Fenton-O'Creevy, et al., 2011) , emotions in general (Bechara, 2004) and emotional reactions within financial contexts (Fenton-O'Creevy, et al., 2004). Emotions and decision-making are two aspects that can be associated in this study, but the causality of the two variables are not defined. Emotions can be measured using three main methods according to Mauss and Robinson,(2009) : I) survey questions that asks the subject to indicate on a scale of already established psychometric measures when experiencing different emotions; II) electronic sensors that measure the subject's physiological responses (such as body temperature, heart pulse, etc.); and III) functional magnetic field that registers which of the brain is activated when the subject performs a certain task. Naturally, the three methods associated with various advantages and disadvantages, but the first method is believed to be the least complicated to implement, and causes the least discomfort to subjects when performing. The reliability and validity of the results are therefore not inhibited (e.g.; Bennett & Miller, 2010). Therefore, the research in this paper opted for the latter survey method presented above. In addition, experience-sampling procedures, used in the continuous phase of the study, measure feelings and emotions the time they are being experienced. This reduces the likelihood of cognitive biases that can influence self-reports based on memory (Reis & Gable, 2000).

Further, personality-trait data collection was based on the ten claims of the Big Five Inventory 10 (BFI 10) have also been used by Fang, et al., (2017), when analysing how different personality individuals behave after acquiring financial information. Finally, performance on returns and predictions were conducted in line with Huisman, et al., (2010). In their study they asked experienced investors to forecast the Amsterdam Exchange (AEX) stock index level in two weeks time, and managed to deduce the presence of overconfidence within their sample. This experiment in this thesis, however, asked respondents to forecast the OMX30 in two days time. Barber and Odean's (2002) observations on traders' behaviour served as an inspiration when collecting data regarding decision-making through transactions and order history. For example, the time differences between losing trades and profitable trades were measured

External validity was also considered throughout the thesis. Regarding respondents included in the group sample observed, some research opinions would argue for not using students as appropriate proxies. However, within this study, scenario students were in fact relevant. Firstly, researchers in behavioural finance have established that trends and phenomena observed in laboratory sessions with students can be apply to experienced investors and traders in a real context (Barberis & Thaler ,2003). This has been confirmed through analysing stock data as well as thousands of trading accounts collected from stockbrokers. Further, previous studies such as Slovic (1969) found that students showed even better insights than stockbrokers in terms of understanding decision- making processes when presented with standardized decision-making tasks in a non-ecological context.

3.6.2 Reliability

This area covers the consistency, reliability and accuracy of measures used in this thesis. Bryman and Bell (2007) argue that stability is problematic when respondents' answers to an indicator affects their responses to other indicators. To minimize this effect during the study, the task of competing makes an appropriate example. Although, research subjects had little to lose, thus prompt to “gamble” on their investments, a competitive environment combined with their desire to learn, practise, apply strategies and perform better than others help in justifying a careful and professional behaviour when trading securities.

Further, Seo and Barrett’s (2007) research focused solely on exploring how people’s thoughts and feelings influence investment decisions. Their experiment took place during an investment simulation, where participants came from investment clubs in the United States. Regarding the realistic and so called ecological aspects of the study in this thesis, respondents judged the stock simulation to be rather realistic (see Appendix 1, table 18) . As reliablity can also be translated into the level of replicability of a study, this thesis proposes a number of arguments for and agaianst this. The young age and high level of education among participant may not be representative of non-professional traders in general (see Barber, et al., 2008). However, the participants’ performance encompasses three main outcomes that most traders face; large profits, little or no profit and large losses- which consolidates the reliability of the findings. Participants observed during a competition, and using trading demo accounts provided by many other online stockbrokerage firms, are the two main arguments that support the replicability of the experiement in the thesis.

3.7 Analytical Tools

In this study, IBM SPSS Statistics 23 was chosen for analysing data collected from the respondents' answers to Survey questions distributed via Qualtrics and physical paper formats, but was also used to analyse transaction data. Data from the initial survey (Survey 1), emotional responses and the final survey on judgments (Survey 2) were merged together in a common SPSS file, corresponding to each respondent's answer. Specifically, the primarily measure is the descriptive function to examine the background data surrounding the sample group; median, mean, standard deviation, minimum and maximum, to get an adequate overall picture of how the respondents were distributed.

Transaction data and order history of all participants was retrieved via Microsoft Excel at first, since the participants provided their own data and history via csv files. This allowed the filtering of non-relevant variables and values, such as time for each commission and spread fees charged by the broker. The relevant variables, such as trade outcome or time of disposal, were then further analysed in SPSS. Given that all participants started the competition with different amounts of starting capital[6]. It should be noted that financial performance was measured though a created index of the % returns on initial capital. In that way, the index eliminated the difference in starting capital and each participant started the competition with a budget of 100 (at index level). For example, if a participant had generated a 5% profit return on initial capital by the end of the stock-trading simulation time, the index value shows 105.

[6] This was due to some participants using IG markets platform in English, and received an initial capital of £10 000, while those participants who used the Swedish version of the platform started the competition with 100 000 SEK in initial capital.

3.8 Summary of Measures Variables

This thesis aims at conducting a study by collecting data before, during and after participants trade on financial markets. As result of the literature review explored in the previous section, and motivation for using valid measurements in the methodology section the four research questions of the master thesis have been more specifically sub-divided into specific measurable variables.

Table 3. An overview of the measured variables in view of explaining the research questions

	Research Questions	Used measurements
A	How are trading decisions made?	▪ Disposition of profits/losses over time. ▪ Subjective reasoning for trade outcomes ▪ Portfolio, security and market selection and specialisation ▪ General activity over time
B	How do predictive abilities relate to performance?	▪ Financial performance ▪ Market predictions ▪ Portfolio returns expectations
C	How do personal factors relate to trading decisions and performance?	▪ Personality ▪ Background (education, experience, demographics) ▪ Need for cognition ▪ Financial literacy ▪ Numeracy
D	How do emotions arise when trading securities?	▪ Level of emotional status from start to end of the simulation. ▪ Emotions and feelings related to trading decisions and performance.

4. RESULTS AND ANALYSIS

This section reviews results found when analysing the participants. The first part of this section presents the group sample and involves a general, and explorative approach in view of giving a broad image of all subjects and their backgrounds. The latter parts aim at answering the four research questions by combining group-level and individual-level analyses.

4.1 Group Sample

The sample group includes most men, n = 13 and then women, n = 1. The age median was 24 years. The youngest individuals who participated in the study was 21 years old and the oldest 27 years old. Participants scored high on Numeracy and Financial Literacy. The large majority of respondents (over 80%) had more than three correct answers on the BANT test (four questions in total). On the financial literacy test, almost all respondents gave correct answers (three questions in total), and only two respondents had one incorrect answer.

Table 4. Background data on all participants of the study. Percentages within brackets represent the portion number of participants.

m=13 w=1	Age	BANT score	Financial literacy score
Mean	23,79	3,29	2,86
Median	24,00	4,00	3,00
Std. Deviation	2,01	1,14	0,36
Minimum	21	1	2
Maximum	27	4 (64%)	3 (86%)

Notes: m= Men, w = Women

Figure 4 on the next page shows that 10 out of 14 participants indicated that they had a planned strategy before the competition took place. The data also shows that almost all participants (apart from two) have previous experience or are actively trading securities.

Figure 4. Further background variables on all participants. (N=14)

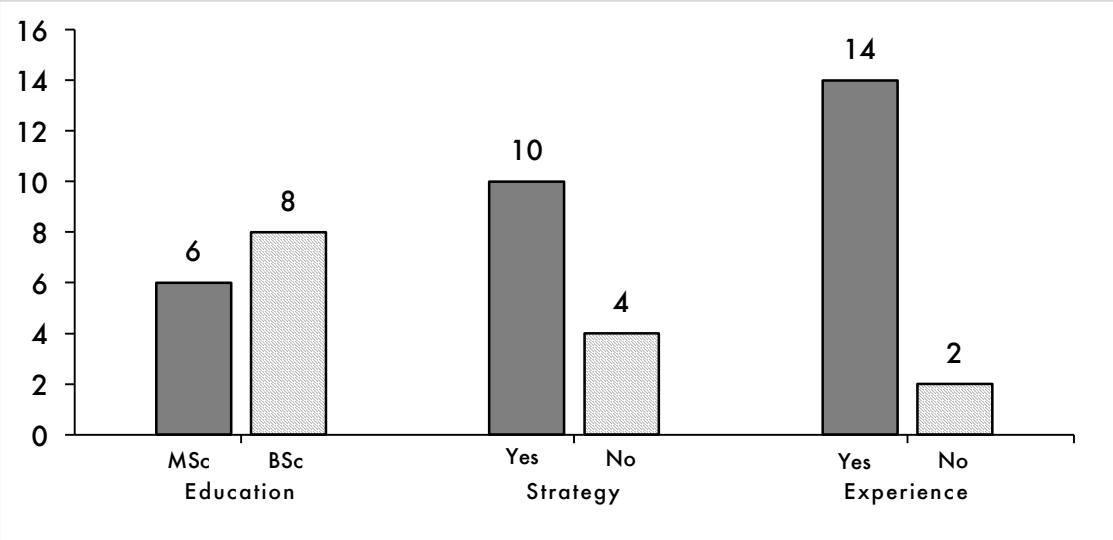


Table 5 on the following page presents the participants' attitudes towards risk and their beliefs about markets in general. The results show that, overall, respondents believe that fundamentals cause changes to asset prices in the long term. While in the short-run, prices are believed to be affected by psychological influences from actors in the markets. Many participants also refused to believe that private and official information fully reflects the prices of assets. There were no clear distinctions among participants regarding beliefs if historical prices can be used to predict future ones. The results in Table 5 also indicate that research subjects see themselves as risk taking in general, but also when they trade securities. When trading shares and stocks in companies, the majority indicated that they prefer focusing on a few firms, rather than many.

Table 5. Participants' market beliefs and risk attitudes.

Frequencies (in N)		1	2	3	4	5	6	7
Market Beliefs	In the long term, asset prices are driven more by psychological influences than fundamentals.	3	6	1	1	2	1	
	In the short-term, asset prices are driven more by psychological influences than fundamentals.				1	4	6	3
	Historical price patterns can be used to predict future price developments.	1	1	3	1	5	2	1
	Future asset prices cannot be predicted through analysis of historical prices.	1	2	3	1	1	2	4
	Asset prices reflect both all private and all the official information available.	1	6	3	1	2	2	
	Asset prices reflect all available public information, but not confidential information.	1	4	3	1	4		1
Risk attitudes	I'm generally very risk-taking			2	1	1	5	5
	I am very risk-taking in my trading.	2		1	1	2	6	2
	My trading is focused on shares/securities of a few companies.	1	2	1	1	3	3	3
	My trading is focused on securities in many companies	3	6	2		1	1	1

Note: The participants were asked to what extent they agree with the statements shown above. Results were measured on a scale of 1 (disagree) to 7 (agree). (N=14).

In summary, the presented data in this section shows that the group sample is composed by individuals of higher levels of financial literacy than results from studies made on larger Swedish and international samples, where only 30% answered correctly on all questions (see Almenberg & Säve-Söderbergh, 2011; Finansinspektionen, 2015) in some cases. The participants also possess a greater ability to understand and process numerical information compared to reported results in studies (see Dagens industri , 2015; Almenberg, 2011) conducted in Sweden. In addition, most the research subjects claim to have developed a strategy in view of the competition combined with their experience in trading. With regards to beliefs about market behaviour, fundamental views are believed to have a greater impact in the long run, while psychological factors affect the price of securities in the short run. These results are in line with previous research, such as Fröberg's (2016) findings on fund managers, with 15 to 30 years of experience in finance. However, compared to Fröberg, (2016) findings, the group sample showed higher preferences for risk taking than more experienced fund managers. Participants also prefer to focus on a few companies when trading shares. However, to not diversify risk in many companies could imply that participants prefer diversification in other sectors of trading.

4.2 Analysis of Findings

This part of the results and analysis section will strive at providing answers for the four main research questions of the thesis. Firstly, the participants' decision making and behaviour is investigated throughout the competition. Further, their financial performance and expectations will aim at answering how much they earn when day-trading, and how this relates to predictive abilities. The participants' personal traits and characteristics is described in the following section, preceding the final part illustrating the results of how participants feel emotionally when trading. The results of measured variables regarding the research questions of this thesis are further analysed and compared to previous studies conducted on professional and non-professional market individuals.

All participants were named 1-14, based on their performance (return on capital), where 1 denotes the highest return at the end of the virtual stock competition. The letters given before the number signifies what group of performers the participants belong to as B=best performers (N=5), M=Medium performers(N=4), W= worst performers(N=5). The two best performers, B1 and B2, shared market portfolio. However, their portfolio is considered as one and participant B1 and B2 are treated as two separate individuals in the results and analysis section. Transactions and order history of trades required the consent of the participant, and they provided this information on their own will. Therefore, some of the analysis based on this data included only nine to eleven participants.

4.2.1 How Are Trading Decisions Made?

Before investigating participant's predictive abilities, emotional reactions and personal factors relation to performance, the following results will describe the participants' decision making through the disposal and subjective reasoning of winning/losing trades, sector and market preferences and general activity. This part of the result and analysis section aims at answering the research question of how non-professional traders behave and how their decision-making looked like throughout the virtual stock simulation. This is done by illustrating the participants' behaviour when dealing with trades losing and gaining value (Table 6), the participants indicated reasons for winning/losing trades (Table 7), what their portfolios looked like and what sectors they chose to trade in (Figure 5), selected markets (Table 8), and general activity (Figure 6).

In Table 6 presented below, one can note that participants had a strong preference to hold non-profitable positions longer than trades with profitable outcomes. This indicates that the fatal disposition effect is present among all groups. Medium performers seemed more prompt to closing both positive and negative trades in a relatively short time period. On the other hand, best performers kept their losing trades for almost an hour on average. The three top performers generated a total of 59 transactions in total, where only 5 trades ended up losing them money.

Table 6. Distribution of time per position on different types of trade outcomes. The total number of transactions ending up in either profit or loss was 203.

Group	*Trade Outcome*	*Time mean (minutes)*	*Number of transactions*	*Mean Rank*	*Mann-Whitney U*
Best	Profit	09,13 (σ=09,03)	53	26,64	7,50***
	Loss	56,96 (σ=51.33)	5	53,50	
Medium	Profit	06,06 (σ=11,40)	79	51,21	940,50***
	Loss	19,25 (σ=29,01)	35	68,13	
Worst	Profit	30,17 (σ=35,61)	8	14,44	79,5
	Loss	44,12 (σ= 42,69)	23	16,54	

Notes: Time = time difference when holding the position, i.e. time of opening/buying the position minus time of closing/selling the position. Number of transactions exclude commissions and spread betting fees and only refers to closed positions (selling off the security at a profit or loss). Profit denotes returns > 0 SEK, Loss denotes returns <0 SEK for each transaction. *** significance level of p<0,001. Best performers (n=3), Medium performers (n=4), Worst performers (n=4).

The large time differences observed in table 6 between the two independent sample groups of profitable and unprofitable trades were further explored with the help of a non-parametric, Mann-Whitney U test for each group of performers respectively and one for all respondents in general. A time interval variable was therefore created, clustering the time difference of each trades within 3 time periods (0.5 to 10 minutes, 11 to 20 minutes and 21 to 140 minutes). The time variable served as test (a more dependent) variable, while profit or loss outcomes of transactions served as grouping (a more independent) variable, since profits or losses seemed

to cause time differences per disposed orders. For Best, Medium and Worst performers, results for profitable transactions show lower mean ranks, compared to losing transactions. The conducted tests suggest the presence of the disposition effect among best and medium performers. In other words, the mean time differences between profit and loss transactions were significant level of p<0,001. In addition, the test for all transactions made by participants showed equally interesting results (see Appendix 1, table 12&13), which consolidates the presence of the disposition effect on a more general level. Mean rank values here were 124.67 for losses and 89.39 for profits. Again, observed mean time differences between trade outcomes were significant on a level of p <0.001, as the Mann-Whitney U value was 2793.00.

As a complementary analysis, a cross-tabulation test was conducted on trade outcomes (Profit or Loss) and time intervals, in view of gaining deeper insights of the disposition effect. This is illustrated in appendix 1, table 16, where trade outcomes are columns and time are rows. This also provides statistics on how profits and loss transaction spread over time for the three groups. Based on frequencies of the data, the best group tended to behave according to the disposition effect (keep losses over time but sell winning trades early) but the same trend does not exist for the other two groups. Worst performers retained 14 of their 23 losses for a longer time, but only 3 out of 8 profitable trades in a brief period. For the medium group, only 9 of 35 losses and 5 out of 77 profits were according to the pattern predicted by the disposition effect.

In view of better understanding the participants' decision-making processes, subjects were asked to provide two reasons for their trades with positive returns and two for negative returns. In Table 7 on the next page, mean values (including all participants) show a tendency of blaming external factors as reasons for losses, but also that participants tend to credit their profits with internal reasons. Interestingly, both trends are shown among best performers. Blaming external reasons is also high among low performing participants. Medium performers' attributions seem to be more "rational" compared to other participants. They explained their profits to be equally due to internal as external reasons (on average). Compared to other groups, medium performers indicated fewer external reasons for losses. Thus, self-attribution biases appear to be less likely among medium performers compared to the two other groups. Mean values show a higher tendency among participants to indicate that internal or personal factors explain why profits occurs, while median values show that reasons were equally allocated for profits.

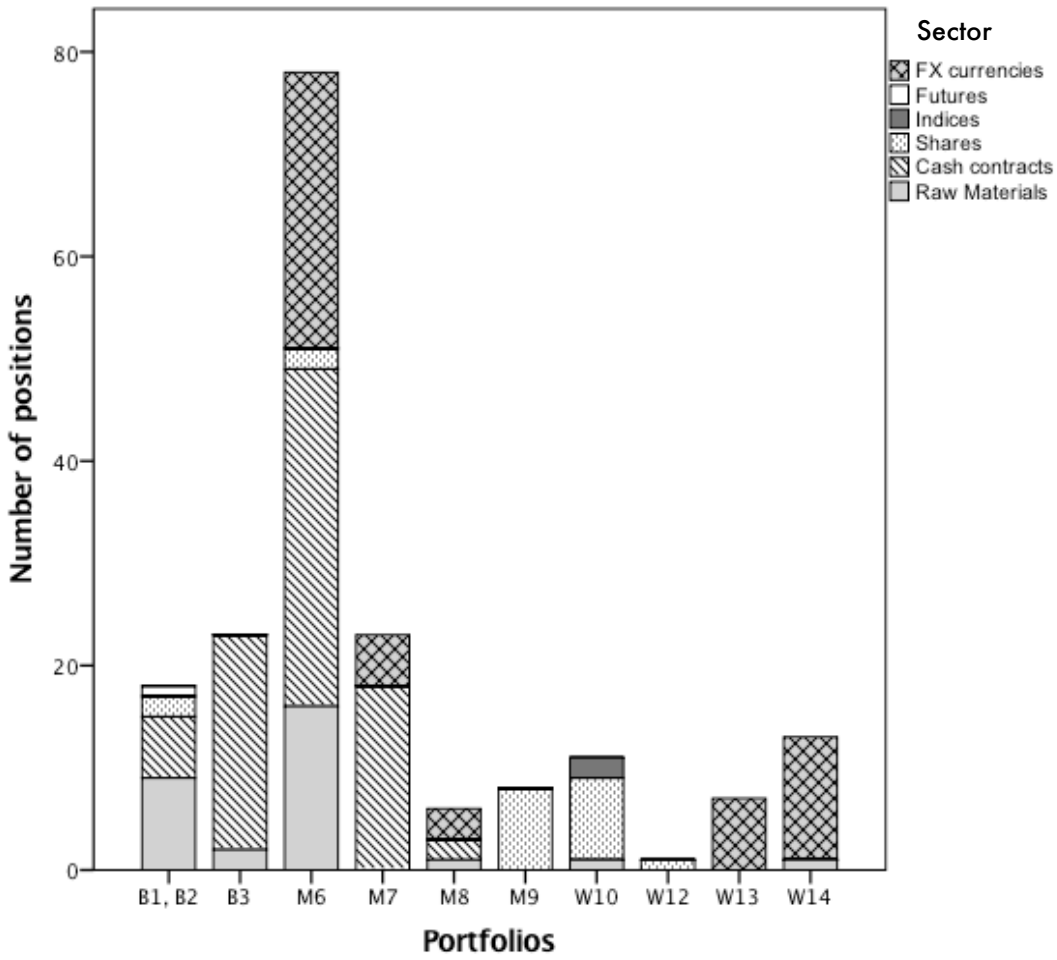
Table 7. Distribution of reasons for personal trade outcomes according to participants themselves. The table portrays the respondents' tendency to blame external factors as the reason for why their trades were non-profitable.

	Profitable trade outcomes		Unprofitable trade outcomes	
	Reasons		Reasons	
	Internal/Personal	*External*	*Internal/Personal*	*External*
Group				
Best	70%	30%	20%	80%
Medium	50%	50%	38%	63%
Worst	60%	40%	10%	90%
Mean	60,71%	39,29%	21,43%	78,57%
Median	50,00%	50,00%	0,00%	100,00%
Std. Dev.	34,96%	34,96%	32,31%	32,31%

Notes: Respondents were asked to give two reasons for their profitable trade outcomes, and two for their trades that gave negative returns. Values shows the distribution of their choices in percent. Profit denotes returns > 0 SEK, Loss denotes returns <0 SEK for each transaction.

Figure 5 on the next page demonstrates what the participants' portfolios looked like, by showing the distribution of their trades by sector. In this case, sector can be defined as category of the transaction. All observed positions are allocated to six different sectors (types of financial instruments). Although results show no clear distinction in terms of strategy between the three groups of performers, one can draw a few conclusions upon observed portfolios. Firstly, futures and indices are the least represented sectors, and appear to be an unpopular alternative. The two portfolios that belonged to the group of best participants consisted mainly of cash contracts and raw materials. Finally, and more interestingly, one can notice that none of the best performers observed chose to trade FX currencies, while many medium (M6, M7 and M8) and worst (W13 and W14) portfolios consisted of currency trades. Parallels can be drawn upon this with researchers such as Abbey & Doukas (2015), who observed that currency trading is one of the sectors implying the most risk.

Figure 5. Distribution of trades for each participant. The figure shows the number of positions per sector and illustrates how the participants' portfolios looked like.



Analysing in a more specific manner how each group of performers chose which markets to trade in, a list of the 9 most popular alternatives is illustrated in table 8 below. The table also aims at illuminating the various sectors, by exemplifying what markets are included for Cash contracts, currencies and raw materials (also known as commodities). The table confirms the high frequency portion of currency trading among medium and worst performers, as buying euro to U.S dollar contracts was the second most popular market. None of the best performers chose this alternative, as they preferred specialising by trading positions such as German Dax30 (55.9 %) of all their positions or in commodities such as Brent Oil (23.7%). Based on figure 5

and Table 8, one can note two rather relevant aspects regarding top performers. Firstly, their expert performance data appears to be specialised by sector. Secondly, the nature of their specialised behaviour is confirmed by their choice of trading within few markets.

Table 8. Distribution of trades per group of participants, based on type of markets. The table illustrates the degree of specialisation among best participants within the German and Oil markets.

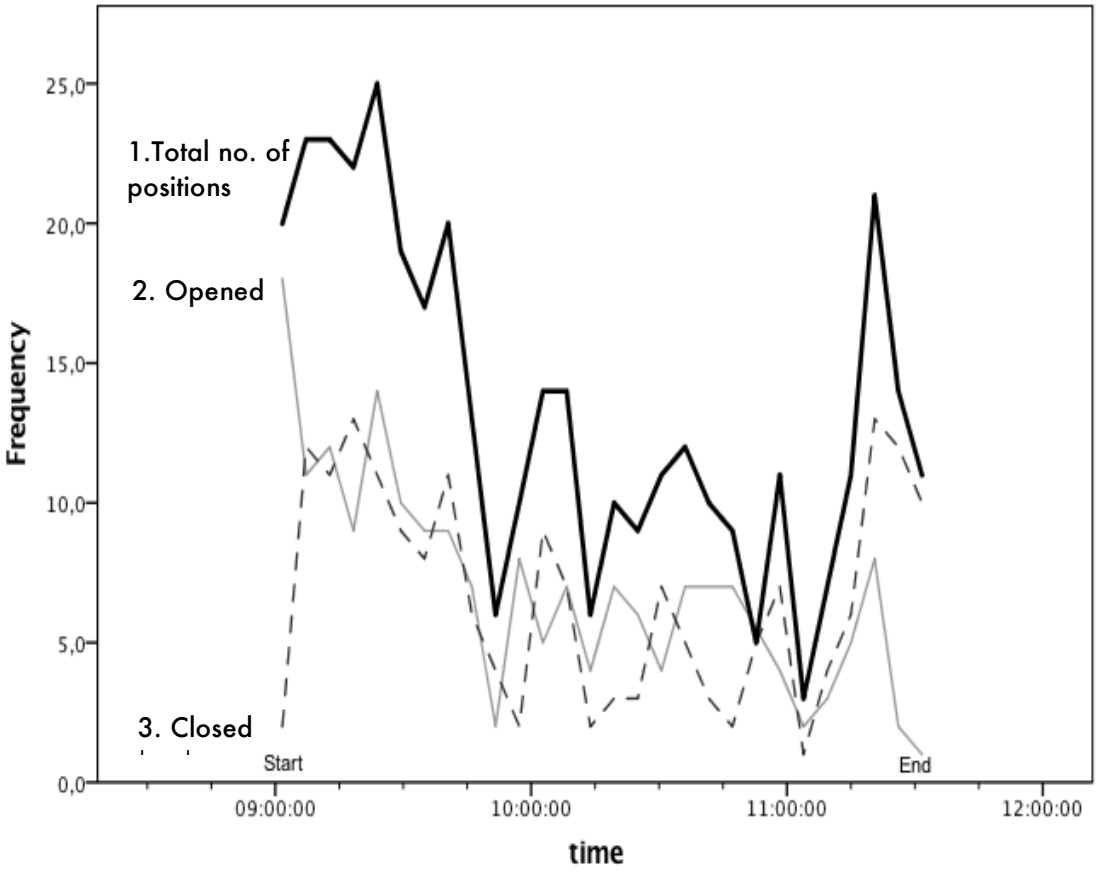
Frequencies			Groups		
Top 9 Markets	*Sector*	*All participants*	*Best*	*Medium*	*Worst*
Germany Dax30	Cash Contracts	62	33 (55,9%)	29 (25%)	-
EUR/USD	FX currencies	28	-	21 (18,1%)	7 (22,6%)
GBP/USD	FX currencies	16	-	11 (9,5%)	5 (16,1%)
Oil - Brent	Raw Materials	15	14 (23,7 %)	1 (0,9%)	-
FTSE 100	Cash Contracts	11	-	11 (9,5%)	-
Oil - US Crude	Raw Materials	11	2 (3,4 %)	8 (6,9%)	1 (3,2 %)
Spot Gold	Raw Materials	9	2 (3,4%)	7 (6,0%)	-
Italy FTSE MIB 40	Cash Contracts	6	-	6 (5,2%)	-
AUD/USD	FX currencies	5	-	-	5 (16,1%)

Notes: Percentages (%) given within brackets denotes the average portion within portfolios, i.e. % of total number of positions. Frequencies refer to the number of positions. Best performers (n=3), Medium performers (n=4), Worst performers (n=4).

Figure 6 on the next page portrays the aggregared level of acvitivity throughout the stock trading simulation. The total number of positions observed among 12 participants consists of opened positions of closed positions, and data is shown within a 5 minute interval. The first type refers to securities that were opened and bought in exchange for capital and/or leverage and the latter refers to securuties that were sold and thus closed positions. Each security had to be bought and sold, in veiw of obtaining returns, which explains the equal distribution between opened and closed positions. The graph below consolidates the presence of a common aspect of day-trading, namely to make profits on small market movements that occur around market openings. For both western european market openings (such as Swedish, German, Italian and French markets) at 09:00am and the British markets at 10:00am, one can observe clear increases in both types of positions. Market openings can provide traders with opportunities, as strategies can involve an active search for under or over-valued securuties that could rapidly change in value once the market opens. Comparing their activity to live performance shown in Figure 3,4 and 5, four of the nine oberved portfolios (B1&B2, B3, M6 and M7) had a positive

changes to their returns shortly after the first market openings at 09:30. Shortly after that the British markets opened at 10:15, only three portfoolios had positive changes to their returns on equity (B1&B2, B3, and M8).

Figure 6. Shows 12 participants' activity in terms of number of transactions and actions (opening and closing trades) over time. The figure illustrates, for example, increased activity during two major market openings (09:00 for many European markets and 10:00 for UK markets respectively). (N=12)



Notes: 1. Total number of positions (——), Mean=10:54, σ = 43,776 minutes, N= 376
2. Opened positions (—), Mean=09:56, σ = 50,256 minutes, N= 188
3. Closed positions (– – –), Mean=10:12, σ = 47, 664 minutes, N= 188

Moreover, the trend regarding both opened and closed positions shows that the genereral level of activity fluctuated, but was on a steady decrease over time. Slighly before the end of the trading simulation the drastic increase in the number of bought and sold positions between 11:00 and 11:25 can be interpreted as the participants' strive to make final gains before the end of the competition (11:30).

4.2.2 How Do Predictive Abilities Relate to Performance?

The results in this section indicate somewhat different and opposing trends to what has been found in previous literature regarding both professional and non-professional actors' earnings and predictions. In addition to analyse how much each participant in the study earned, it is equally relevant to inquire how much they expect to earn and how they believe that market fluctuations will evolve in the future. Table 9 on page 53 illustrates these three dimensions. The return index represents the return the participants had by the end of the competition. The index value was therefore 100 for all participants at the start of the competition. The results show that on average, participants managed to earn a 1.79% return on initial capital, net from commissions. The winner of the stock trading simulation managed to generate a 26.27% profit return on initial capital. The closing level of the Swedish stock index OMX30 on March 10th was 1587.93. The mean value gave an underestimation of 4.98 points under 1587.93. For example, the three participants with lowest returns overestimated the closing level of the stock index, while their forecasts were closer to zero, thus more accurate than many of the participants with highest returns.

Although the best participant (B1) forecasted accurately by only 0.57 points over the Index, further results show distinct trends in how accuracy relates to performance. As M8 respectively W12 where the two next best forecaster indicates that accuracy appears to be a poor indicator of how well participants perform in terms pf returns. When asked how much their returns will be at the end of the competition, respondents gave a mean value + 5.28% over 100 000 SEK. In other words, an average overestimation of + 5 280 SEK, assuming an initial capital of 100 000 SEK. The only participants who expected lower returns on capital than what occurred were the four best performers. In short, mean and median results indicate respondents' dominant tendency to underestimate the closing level of the OMX30, while they overestimated how much they were going to earn.

Table 9. The participants' actual returns on capital and precision of predictions. Results indicate an equal distribution of returns, combined with high number of overconfident forecasts on expected returns, while stock index predictions are underestimated.

Participant	*Actual Return* (Index)*	*Expected Return diff.** (in %)*	*OMX30 prediction*	*Points over/under current OMX30*	*OMX30 prediction diff.*** (in points)*
B1	126,27	-21,27	1588,5	10,27	0,57
B2	126,27	-16,27	1573,3	-4,93	-14,63
B3	125,27	-20,27	1570	-8,23	-17,93
B4	124,96	-9,96	1575	-3,23	-12,93
B5	107,60	7,40	1580	1,77	- 7,93
M6	103,04	6,96	1581	2,77	- 6,93
M7	101,07	13,93	1595	16,77	7,07
M8	99,69	5,31	1585	6,77	-2,96
M9	97,76	10,24	1579,5	1,27	-8,43
W10	93,94	7,06	1569	-9,23	-18,93
W11	89,72	17,28	1585	6,77	-2,90
W12	88,12	13,88	1591	12,77	3,07
W13	80,00	40,00	1597	18,77	9,07
W14	75,35	19,65	1593	14,77	5,07
Mean	101,79	5,28	1583,02	4,79	-4,98
Median	100,38	7,23	1582,50	4,77	-5,43
Std. Dev.	17,31	17,08	9,18	9,16	9,18

Notes: Current OMX30 closing level was 1578,23 (March 8th)
*Return Index denotes the return on initial capital at the end of the competition. For example, a value of 101 indicates and profit of 1% by the end of the simulation.
**Expected return difference can be described by the difference between expected return on capital minus actual return. Results >0 indicate an overestimation and vice versa.
*** OMX30 prediction difference represents the difference between forecasted (OMX30 prediction) and closing level of the OMX30 stock index on March 10th. Results >0 indicate an overestimation and vice versa.

On Wednesday March 8th, when these questions were collected from respondents, the denoted closing price of the OMX30 index given in the question was 1578.23. This was an increase of 2.46 points compared to Tuesday. Further, the OMX30 index closing level had risen by over 13,1 points in total for 8 consecutive days (since 27th of February 2017) which indicates a steady rise. Between March 8th and Friday 10th of March, the closing price of the OMX30 index rose

by 10,27 points from 1578.23 to 1587.93. Taking this trend into consideration, 10 out of 14 participants predicted the closing price to increase further, as these results show positive values over the current closing price of the OMX30 on March 8th. However, three of the four participants who predicted a decrease in the OMX30 level, were top performers.

4.2.3 How Do Personal Factors Relate to Trading Decisions and Performance?

The personality variables in this study primary function is to create a basic starting point in researching who the participants are. However, what are the background personal factors linked to better performance? Table 10 on the next page provides some relevant elements to see how results differ between performance groups. The sample of the study is divided in three separate groups based on the participants' return on capital. At the end of the stock market simulation, respondents were asked how they would describe their own decision making. Results show that the best performers' decision making was more analytical than intuitive compared to other groups. All respondents within the best performing group had all correct answers on the numerical test, and was also the oldest group on average in terms of age. The majority of the best performers were students at Master's level, which can indicate that that higher levels of education and experience could have an impact on returns when trading. Interestingly however, medium performers showed subsequently lower levels of numerical ability than the other two groups. This group was also the youngest and included the lowest number of students at Master's level. Results show that medium performers describe their own decision-making as more intuitive than analytical. In short, the observed trends of the measurements showed in Table 10 vary, as they indicate higher scores on all variables among the best performers, but shows an opposed trend when comparing medium to worst performers. As almost all participants gave correct answers on financial literacy, measurements to explain how this proficiency relates to performance and decision-making was ignored.

Table 10. Respondents' ability to understand probabilities in hand with their age, education and subjective decision making.

Groups	BANT score (mean)	Age (mean)	Decisions (mean)	Education MSc students
Best performers (N=5)	4,0	25,0	4,40	80%
Medium (N=4)	2,5	23,0	3,00	20%
Worst performers (N=5)	3,25	23,2	3,41	25%

Note: The BANT mean variable indicates the number of correct answers (1-4) respondents had on the tests. Subjective decision making is on a 1 to 7 range, where 7 is very analytical and 1 is intuitive. Education states the portion of MSc students, in percent, within each group of respondents.

The six variables in table 11 on the next page include five indices created on the "big five" personality questions and one index representing their Need for Cognition. The results show that all participants were inclined to both Need for Cognition traits, but also inclined to emotional stability. These two results are central findings in the table, as they are elementary and heavily linked with emotions and behaviour when taking financial decisions such as trading. Results regarding Extraversion were also interesting, as the only respondents (W10, 11 and 12) who were not implied to this trait had low returns on their portfolios. Extraversion was also the trait with the greatest variability between respondents. Being open to new experiences was the least common personality trait among participants, at least one participant in each group was not implied to this trait.

Table 11. The table illustrates each respondents' different personalities according to the Five-factor model's dimensions as well as Need for cognition.

Participant	Extraversion	Agreeable-ness	Conscient-iousness	Emotional Stability	OTE*	NFC*
B1	6,50	6,00	2,50	6,00	3,50	4,40
B2	6,00	5,50	5,00	6,50	4,00	4,20
B3	5,50	6,00	5,50	6,00	6,00	5,80
B4	4,00	5,00	6,00	7,00	4,00	5,60
B5	7,00	6,00	3,50	4,00	5,00	5,20
M6	6,50	2,50	6,00	4,50	2,50	5,80
M7	5,50	6,50	5,00	4,00	5,50	6,60
M8	6,00	4,00	4,00	5,00	4,50	5,60
M9	5,50	5,00	7,00	4,00	3,50	5,40
W10	2,50	4,50	5,50	5,00	3,00	4,40
W11	3,50	5,50	4,00	5,00	2,50	5,20
W12	3,00	6,00	5,50	6,00	6,00	6,60
W13	4,50	4,50	5,00	5,00	5,00	6,00
W14	4,50	4,50	4,00	6,50	6,50	4,80
Mean	5,04	5,01	4,89	5,32	4,11	5,40
Median	5,50	5,25	5,00	5,00	4,00	5,50
Std. Dev.	1,39	1,09	1,18	1,01	1,11	0,76

Notes: Each personality trait and variable is on a score scale of 1 (disagree) to 7 (agree). A score ≥ 4,00 indicates that a subject is inclined to the trait or variable. A score < 4,00 indicates that the subject is not inclined to the trait or variable. *OTE=Openness to Experience, **NFC=Need for Cognition.

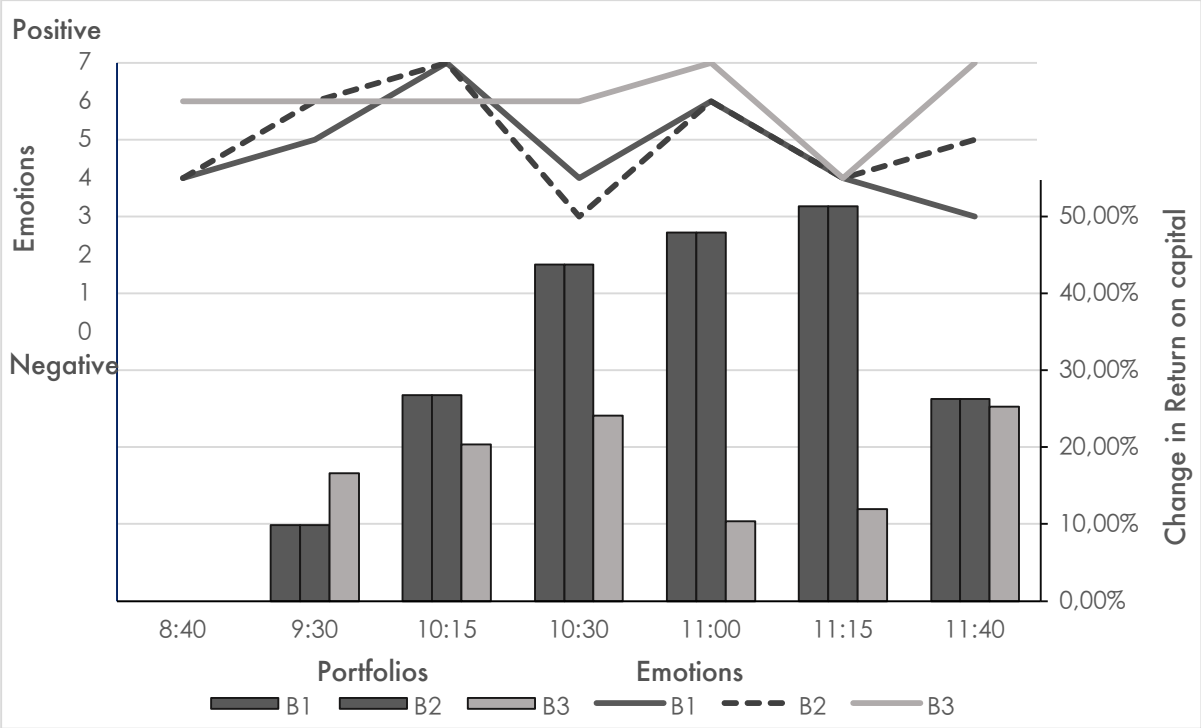
4.2.4 How Do Emotions Arise When Trading?

Building on the participants' various personality traits, and more specifically their elevated levels of emotional stability, results suggest that emotions should be relatively unvaried. While personality traits are in most cases affecting an individual's path to emotion (Fenton-O'Creevy, et al., 2011; Repin, et al., 2005), measuring self-reported emotions is therefore complementary. The following results in this part of the analysis will report emotional feedback gathered as well as observed returns on equity over time. The objective of this is to provide answers for how non-professional feel when trading, relate to market events and how this varies between groups and individuals. The three diagrams below illustrate self-reported emotion over time for nine participants. Each figure includes three different participants from each respective group of performants. Linked to this, their performance in terms of return on initial capital is also presented for each time their emotional feedback was collected. For emotions, the value 1 is

very dissatisfied and 7 is very satisfied / happy, while change in return on capital represents the change in % in returns on initial capital (100 000 SEK or £ 10 000)

The chart (Figure 7) on the next page illustrates how the 3 best performers had overall positive emotions (score ≥4) throughout the competition, while enjoying highly profitable returns on their trades. Do non-professional traders feel much happier when they make positive returns? The results in this study indicates that the answer is yes. However, the proportion of changes in returns is not reflected in their emotional feedback. For example, between 10:30am and 11:00am, B3's profit on initial capital dropped by almost 15%, while the respondent indicated more positive emotions in this period. All three participants enjoyed a rise in in return on capital between 11:00 and 11:15, however they all indicated to be less satisfied and happy. What is particularly central in this diagram is comparing B1 and B1, as they both shared the same portfolio but indicated their own emotional state separately. Here, differences in their emotional feedback show that (some) individuals relate differently to the same financial events. The trend suggests for example that participant B2 reacted more strongly to changes in return than B1. Compared to other participants, emotional variability was moderately high within this group. On the other hand, mean and median values for emotions were 5.24 and 5.0 respectively which is higher compared to other performance groups.

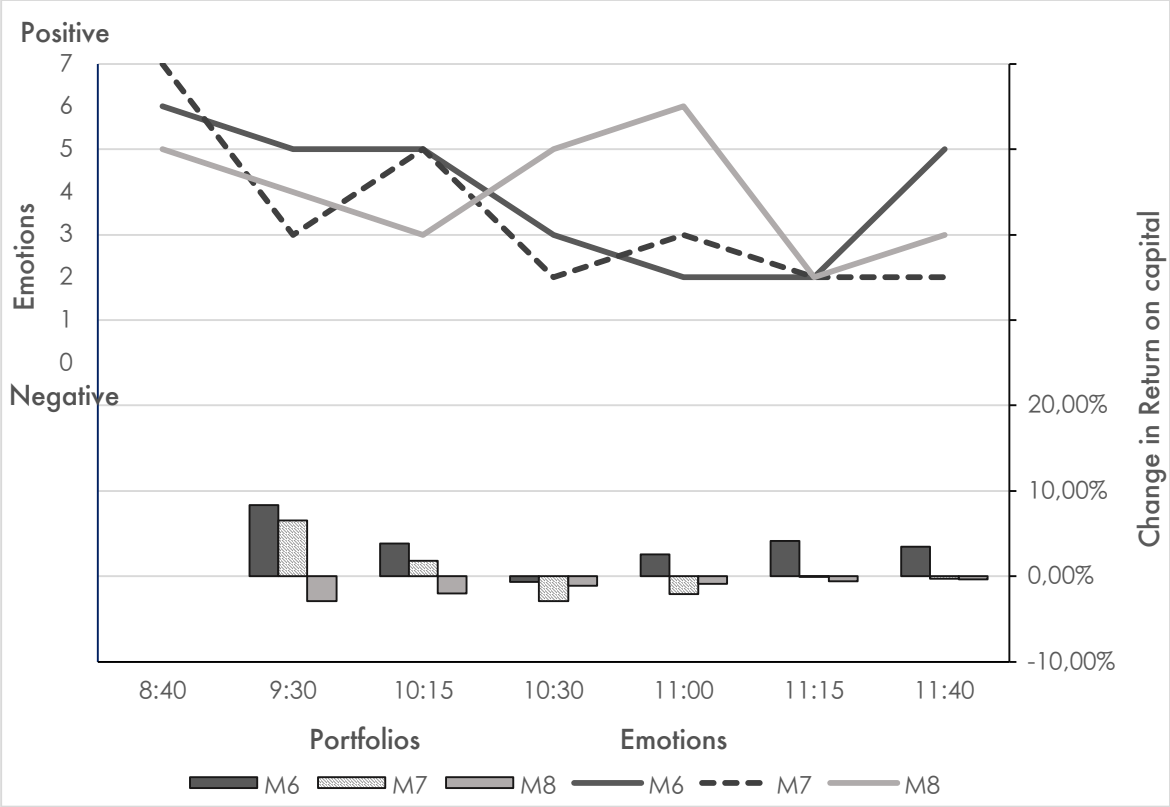
Figure 7. Best performers' emotions and return on equity (capital) over time. The figure illustrates that high returns and positive emotions can occur simultaneously, but also that these participants were happier and more satisfied on a general basis



Notes: Participant B1 and B2 shared their market portfolio, hence the exact same levels in returns on capital. Feedback on emotional state was answered separately. Lines show emotional state and bars illustrate financial performance.
Emotions: B1, σ=1,38. B2, σ=1,42. B3, σ=1,00

Medium performers had significantly lower returns throughout the competition, but showed surprisingly highly positive levels of self-reported emotional state. Although their portfolios showed small relatively small changes (compared to the two other groups), Figure 8 portrays higher levels of standard deviations of their emotions compared best and worst performers. Linked when observing best performants, a similar emotional trend on increased returns was observed among medium performants. For example, M8 reported increasing positive emotions experienced increased returns of -2.11% to -0.86% on initial capital between 10:15 and 11:00. On a general level, medium performers had a mean of 3.8 and median of 4 regarding their emotions, which indicates a slight satisfaction throughout the stock simulation. The emotional value trend followed returns - high at the initial stages of the competition, and slowly decreased towards the end. However, emotional variability among this group was the highest on average, compared to other groups.

Figure 8. Medium performers' emotions and return on equity (capital) over time. The figure illustrates that rapidly falling returns and negative emotions occur simultaneously.



Notes: Lines show emotional state and bars illustrate financial performance.
Emotions: M6, σ=1,63. M7, σ=1,90. M8, σ=1,41

The low performing individuals showed a rather similar trend, compared to best performers. Figure 9 on the following page shows negative returns throughout the virtual stock simulation for these participants, even at the earliest time point (09:30) of when emotional self-reports were collected during the competition. One should notice that all participants reported positive feelings before the competition took place, but the majority gave negative self-reports of their emotions further on. On average, this group of low performing individuals had low variance in feelings, which indicates relatively unchanged emotional states. Further, among all groups, this group had the lowest average emotional score of 3.05 (negative emotions) and median of 2.85 between 08:40 and 11:40. In short, early losses and difficulties in obtaining profits and ordering beneficial positions, had a mediating effect on emotional variability, but also indicates lower emotional status on average.

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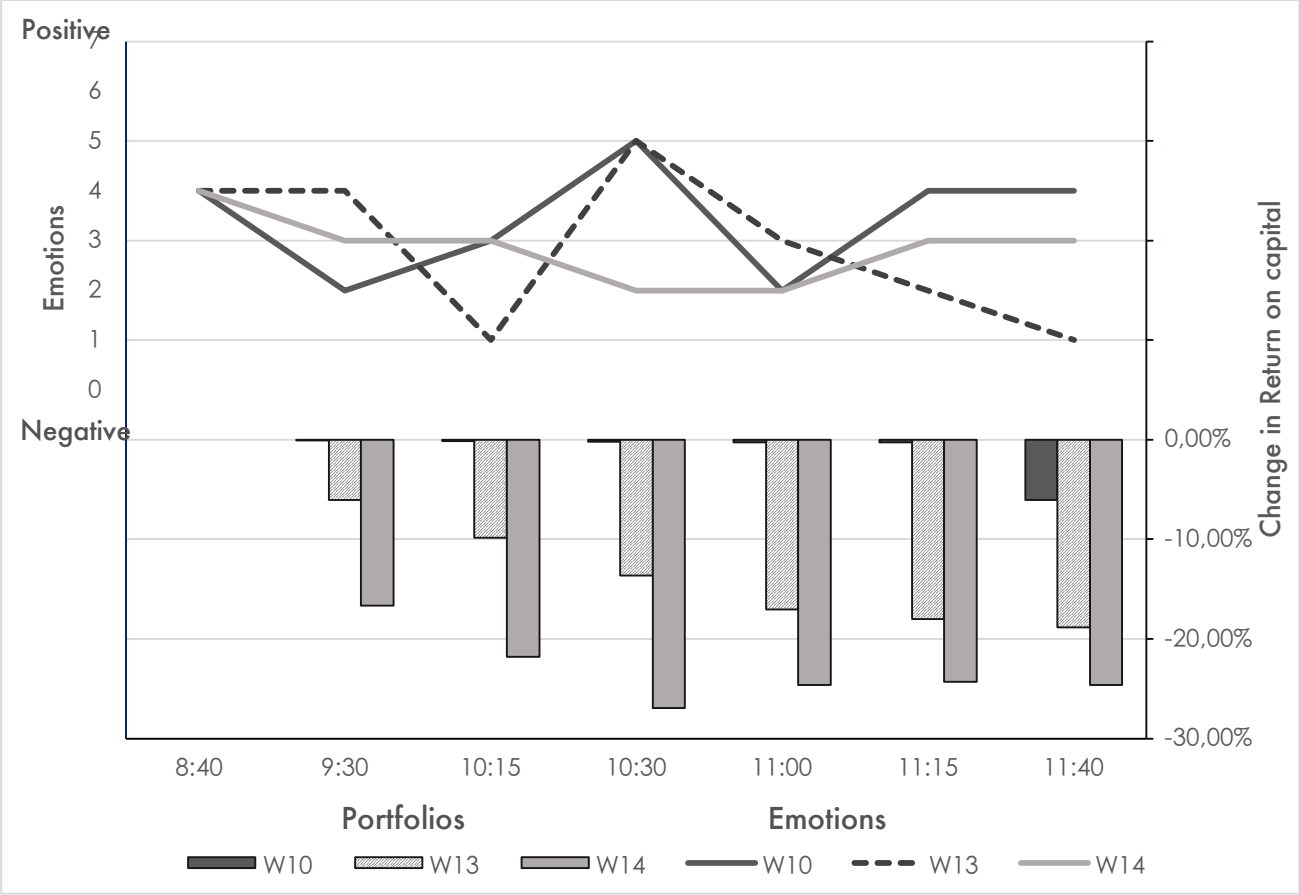
Figure 9. Worst performers' emotions and return on equity (capital) over time. The figure illustrates that lower levels of self-reported emotions



Notes: Lines show emotional state and bars illustrate financial performance.
Emotions: W10, σ=1,14. W13, σ=1,57. W14, σ=0,69

5. DISCUSSION AND IMPLICATION

This section is composed of a discussion regarding analysed results, the managerial implications and followed by limitations of the study. This paper has analysed and examined financial decision-making and behaviours on a sample group of business students in a day trading scenario. Moreover, the master thesis strives towards providing managerial implications on a general basis, but also attempts to contribute to behavioural finance related research on individual traders.

5.1 Discussion of Findings

5.1.1 How are Trading-Decisions Made?

The thesis found empirical support for the presence of the disposition effect. Results show that participants dispose profitable trading positions too soon and unprofitable positions too late. This was confirmed on statistically significant levels ($p<0.001$) when analysing the entire sample, and more surprisingly among top performers. This could explain why returns for best performers in some cases shrunk approximately from 55 to 27 percent on initial capital during the competition. There is no empirical support in this thesis to claim that medium and low performing individuals suffer from the disposition effect when trading. When participants looked back at the outcomes of their trading decisions, results show the tendency to explain the causes of profitable trade outcomes by internal reasons (such as brain work) and losses by external reasons (such as unpredictability of the market). This indicates the presence of attribution errors, such as self-attribution biases when participants reflect on causes for performance.

When investigating the general activity (frequency of placing orders) of all participants, results consolidates the presence of a common aspect of day-trading, namely to make profits on small market movements that occur around market openings. Moreover, prominent level of trading frequently (number of transactions) seems to be a prerequisite to not suffer from losses, but cannot explain high performance. However, what could characterise top performing participants' decision making is a higher level of specialisation. In other words, what differentiates top performers from others is their portfolio selection. Arguably, they appear to specialise by allocating nearly 80% of their positions within two types of markets. Although

top performants diversified their portfolios to a lesser extent than other participants, which could appear as risky decision-making, they refused to trade within markets that are more volatile and thus imply more risk, such as currency exchanges (Abbey & Doukas, 2015).

5.1.2 How Do Predictive Abilities Relate to Performance?

Firstly, results regarding this research question provides an overview of net earnings each participant had by the end of the competition. Earnings (actual returns) were equally distributed among performance, as half of the participants' portfolios generated positive returns on initial capital. The best performing portfolio generated a 26.27% profit on initial capital, while the worst portfolio generated a 24.65 % loss on initial capital. Returns and performance variables indicate that medium to low performers tend to be overconfident as they overestimate expected returns. Gervais and Barber (2001) expand this theory and determine, however, that overconfidence is greatest in the earliest part of a trader's career, decreasing with experience. In addition, Abbey and Doukas (2015) predict increased trading activity reduces overconfidence over time.

What differentiates top performants from the other groups are their three pessimistic predictions. Firstly, top performants underestimated how much they were going to earn by the end of the competition, while other participants tended to be overconfident about their future returns. Secondly, results indicate that low and medium performants are subjects to the anchoring effect when predicting the future closing level of the OMX30, as they expect the index price to continue to rise. The presence of the anchoring effect is less present among top performants. Thirdly, results indicate that top participants underestimated the closing level of the market index. This was also the case for all participants in the sample (on average). The findings indicate that top performers may overestimate how well other participants were going to perform, hence why their own expected returns were underestimated. In conclusion, the tendency to underestimate future events, seems to be associated with higher performance, which is in line with Dunning, et al.'s (2008) findings. Moreover, results suggest that the precision of predictions are not related to performance.

5.1.3 How Do Personal Factors Relate to Trading Decisions and Performance?

While not an unequivocal result, the findings of this study suggests that higher experience levels, numerical abilities and higher education levels indicate higher performance. Financial literacy does not seem to explain differences in performance, as almost all participants scored

high results on average. Further, top performers described their decision-making to be more analytical than intuitive, compared to other reaming participants. Personality traits, also, did not show unequivocal results. More specifically, many participants were implied to many traits included in the Big Five Model, as well as NFC. Being or not being inclined to a certain personality trait is thereby irrelevant and cannot explain differences in performance in this case. However, results regarding the degree of which participants were inclined to certain personality traits helps in clarifying how personal factors can relate to performance. Compared to other participants, top performers showed lower mean values regarding NFC and conscientiousness, but higher agreeableness and emotional stability. Low performance can especially be associated with low extraversion. Medium performers showed higher levels of NFC and extraversion, compared to other groups.

5.1.4 How Do Emotions Arise When Trading Securities?

The study in this thesis suggests that emotions among individuals arise and vary during a simulation, when trading with virtual money. Further, results show that positive emotions are, on average, related to positive returns and profits. Concluding the emotional self-report analysis, best performants do not have the highest emotional variability, but highest mean and median values. Given their high emotional stability, top performers engage in both positive and negative emotions. Although this might seem contradicting, the change of emotional status is more regular compared to other participants. In this case, emotional stability among top performers is interpreted as constant and regular changes in emotions. Medium performers on the other hand, slowly decrease their mood as returns fall, while worst performers do not seem to engage emotionally from an early stage, compared with other participants. An interesting aspect is that Medium performers feel better on average compared with the other groups at the beginning of the competition and almost as good as the ones performed best at the after the competition. Further, all respondents had positive self-reported emotions at 08:40 which indicates that having a positive mind-set before trading suggests to not have any effect on performance. One can also note that emotional fluctuations are sometimes linked to performance, but are in most cases subjective and differ on an individual level. The three tables also show cases where participants experiencing negative or falling returns show positive emotional feedback, and scenarios where participants experiencing positive or increasing returns feel sad and unsatisfied. In conclusion, emotions are not always mirrored in the performance of individuals.

5.2 Managerial Implications

The implications rendered in observed results can be relevant to management-related areas in two ways. Firstly, implications relate to the area of education and training. The findings show empirical evidence and trends supporting the presence of biases occurring when making decisions in a simulation.

The disposition effect, for example, can also occur in other professional settings. As this bias was even present among top performers, simulations could serve as "de-biasing" tools when used in training and education. This can be done by illustrating or incorporating tips of how to avoid making such decisions, in view of preparing individuals for realistic scenarios where biases are likely to occur. Since the results in this thesis show that emotions arise and vary during a simulation, individuals could receive feedback on what their emotional status is, in view of regulating their own emotions in a more efficient way. Fenton-O'Creevy, et al.'s (2004) study shows that in order to efficiently regulate emotions, emotions have to be appropriately identified while trading securities.

Further, the study finds that some medium to low performers are somewhat unable to recongise their lack of skill. "I lost a lot as a result of paying for the spread differences and investing in very stable stocks. It would be better to minimize loss and go for more volatile stocks, thus taking on the risk in order to win more" and "I believe that my strategy would work better in a volatile market. My strategy is to exploit differences in call and bid prices over short periods of time.". These two answers were given by a medium and a low performing participant, when asked if they would use the same startegy again. In short, low performing individuals fail to asses their own lack of skills, which can be linked to Dunning, et al.'s (2008) study. Simulations can thus provide an opportunity for individuals to test their knowledge and realise it for themselves. Further, simulations could be used as tools to teach individuals more about realism.

The second managerial implication addresses human resource management, and more specifically recruitment processes such as assessment schemes. Participants in the study are close to become entry-level professionals. Moreover, many companies and organisations consider personality factors as a major factor during the recruitment process (Meyers & Van Woerkom, 2014). This study found difficulties in explaining performance by personality factors during a simulation, but other suggests factors that can predict performance. For example, levels

of numerical abilities and overconfidence could be taken into consideration. Therefore, simulations could be integrated in assessment centres while recruiting. For example, it can provide insights in behaviour in a stressful environment or how individuals make decisions under risk.

5.3 Limitations

Respondents could possibly have been unused to trading together with peers, but also to competing in such circumstances when trading. Further, the environment of which the stock trading simulation took place in could be associated with other aspects. "Stora Salen" is for example primarily used for exams and conferences at the Stockholm School of Economics, thus participants might have felt "tested" or examined while performing. Moreover, a critical aspect regarding this matter is also that surveying and gathering data in a controlled environment is not ideal. The choice for an adequate date was discussed with SSIF in view of organising the trading competition. Even though the chosen date was during a non-exam week to recruit the maximum number of participants, another limitation is the choice of the date and time of when the experiment was conducted. Due to varying nature of markets on daily basis, a control experiment conducted during an additional date or time of day could eliminate this limitation.

The price reward for participation (scratch cards) and performance helped in generating competition. But asking subjects about their emotional experiences during the competition could have affected participants' emotions, behaviour, decision making and performance at the same time, thus influencing some of the results. Moreover, participants had no real monetary wealth to lose when trading, which in theory did prevent them from incurring any major losses. Participants could have been keener on rewards, hence experiencing more positive than negative emotions, due to the imbalance in potential rewards and losses. However, a potential "loss" could have been experienced by those performing poorly in the presence of peers.

Finally, a limitation to the study is the small number of participants (14 in total). Arguably, this can be explained by the selection process delimited through the scope of the study. Ostensibly, that is the inclusion of individuals with financial knowledge and interest in trading. That said, the thesis could have therefore been more grasping, by increasing the sample size. For example, collecting data solely through social media and similar channels. The reason for why this approach was not used is because of the difficulties in conducting experience-sampling based

experiments with the appropriate level of control. However, two limitations arose when doing this. Firstly, a selection error has been present in the sampling of data with respect to independent variables, such individual traits. As shown in the data, on could assume that individuals of low NFC or emotional stability would not apply to participate in a competition that involves cognitive elaborations. What is meant by this is that the data sampling has been constrained to a single set of participants, therefore lacking control groups to cross reference against to extrapolate more valid conclusions. Secondly, the selection has been systematically skewed as complete data has been impossible to obtain, which therefore has created the possibility of erroneous conclusive deduction. For example, the sample could have included non-professional traders that are clients to brokerage houses. Their account information is however protected by confidentiality, and the individuals themselves are difficult to get in touch with. Per tradition, management studies involving an individual scope on how traders make decision and behave (e.g. Fenton-O'Creevy, et al., 2004) are made on small group samples. Finally, market effects is a limitation regarding the validity of the results. The thesis has not encompassed market factors, such as volatility, and how this would have affected the participants' returns and their emotional status. In order to endorse the validity of a similar experiment, an exact measure of each market's volatility and effects on portfolios would be needed. However, in this particular study, it would be challenging to calculate or estimate all market volatilities, given the high number of different markets that participants chose to engage in and the very nature of the contracts (such as CFDs) bought and sold makes it even more complicated to estimate the precise effects of markets on returns.

5.4 Proposals for Future Research

Based on a self- critical point of view, the study in this thesis did not observe whether emotions are a result of financial decisions or whether decisions making are the end-products of emotions. This paper suggests that potential future research could be regarding this chicken-or-egg order dilemma, as this is a rather unexplored area within behavioural finance of non-institutional, individual traders. Further, future research can be built upon emotional self-reports, illustrated in Figures 3 to 5. There, some emotional trends might be unusual and surprising at first glance, and one should keep in mind that market fluctuations and portfolio returns changed rapidly within the time periods of each point in time given in the figures. For example, returns might have increased shortly before self-reports were collected, explaining positive bumps in emotions that were collected within relatively long intervals (varying from 15 to 50 mins). This

is not covered or reflected in the presented data of this paper. A more frequent and continuous collection of data on emotions could minimise the effect by collecting on a live-update basis.

Pointed out by Barber and Odean (1998), younger, less experienced, institutional and individual traders have shown to be more prone to overconfidence- and this thesis indicates a similar trend, as the group sample consisted young individuals. A suggestion for future research would be to explore confidence levels among more experienced and older individual traders. Further, the limitations regarding economic incitement could be minimised by involving a well-balanced system, for example via monetary deposits, for future studies on virtual stock simulations. On that note, based on the study's limitations, a recommended scenario for examining financial decision-making and behaviour when day trading would involve more participants and real trading accounts.

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7. APPENDICES

7.1 Appendix 1 – Data Descriptive and Tests

Table 12. Descriptive Statistics (all participants)

		N	Mean	Std. Deviation	Min	Max
Variable	Time interval	203	1,5567	0,79634	1,00	3,00
	Profit (1)/Loss (0)	203	0,6897	0,46378	0,00	1,00

Table 13. Mann-Whitney Test (all participants)

		N	Mean Rank	Sum of Ranks	Mann-Whitney U Asymp. Sig (2-tailed)	Wilcoxon W
Profit/Loss	Profit	137	89,39	12246,00	N.A.	N.A.
	Loss	63	124,67	7854,00	2793,000***	12246,000
	Total	200	N.A.	N.A.	N.A.	N.A.

*** significance level of p<0,001.

Table 14. Time Interval (All participants)

		Frequency (transactions)	%	Valid %	Cumulative %
Valid	0,5-10 min	129	62,6	63,5	63,5
	11-20 min	35	17,0	17,2	80,8
	21-140 min	39	18,9	19,2	100,0
	Total	203	98,5	100,0	N.A.
Missing	System	3	1,5	N.A.	N.A.
Total		206	100,0	N.A.	N.A.

Table 15. Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	%	N	%	N	%
time_interval	200	97,1	6	2,9	206	100,0
Profit/Loss	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Performance Group	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.

Note: 206 transactions in total, but 200 used in these tests. 3 trades gave neither losses or profits, and 3 trades were made within less than 0,5 minutes.

Table 16. Time-interval*Trade outcome*Performance Group Crosstabulation

Performance Group			Trade Outcome		Total
			Profit	Loss	
Worst Performers	time_interval	0,5-10 min	3	9	12
		11-20 min	2	0	2
		21-140 min	3	14	17
	Total		8	23	31
Medium Performers	time_interval	0,5-10 min	64	19	83
		11-20 min	8	7	15
		21-140 min	5	9	14
	Total		77	35	112
Best Performers	time_interval	0,5-10 min	31	0	31
		11-20 min	18	0	18
		21-140 min	3	5	8
	Total		52	5	57
Total	time_interval	0,5-10 min	98	28	126
		11-20 min	28	7	35
		21-140 min	11	28	39
	Total		137	63	200

Table 17. Chi-Square Tests

Performance Group		Value	df	Asymp. Sig (2-tailed)
Worst Performers	Pearson Chi-Square	6,345[b]	2	0,042
	Likelihood Ratio	6,063	2	0,048
	Linear-by-Linear Association	,298	1	0,585
	N of Valid Cases	31		
Medium Performers	Pearson Chi-Square	11,470[c]	2	0,003
	Likelihood Ratio	10,845	2	0,004
	Linear-by-Linear Association	11,318	1	0,001
	N of Valid Cases	112		
Best Performers	Pearson Chi-Square	33,570[d]	2	0,000
	Likelihood Ratio	23,299	2	0,000
	Linear-by-Linear Association	20,343	1	0,000
	N of Valid Cases	57		
Total	Pearson Chi-Square	36,519[a]	2	0,000
	Likelihood Ratio	34,302	2	0,000
	Linear-by-Linear Association	27,236	1	0,000
	N of Valid Cases	200		

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 11,03.
b. 4 cells (66,7%) have expected count less than 5. The minimum expected count is 0,52.
c. 2 cells (33,3%) have expected count less than 5. The minimum expected count is 4,38.
d. 3 cells (50,0%) have expected count less than 5. The minimum expected count is 0,70.

Table 18. Descriptive Statistics (Realism of the event)

	N	Minimum	Maximum	Mean	Std. Deviation
How realistic did you find the event today?	14	2	7	5,64	1,985
Valid N (listwise)	14	N.A.	N.A.	N.A.	N.A.

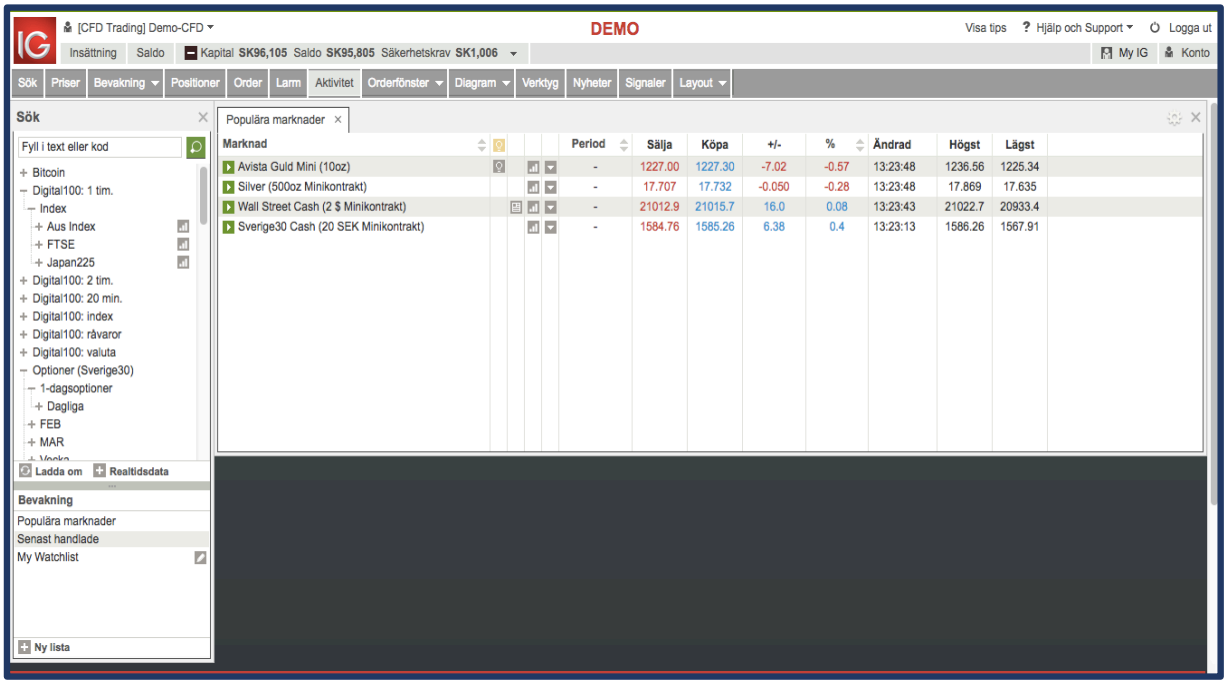
Table 19. Feedback for future implications

Participant	*In your opinion, was there something that lacked during the competition?*
B1	As it is not real money. The risk of losing is basically zero
B2	If one thing, bigger starting budgets would increase the chance of winning/losing more.
B3	No, it was well executed.
B4	no
B5	No
M6	no
M7	I think that less experienced would have liked a deeper go-through of the system
M8	no
M9	-
W10	NO
W11	Personally, I would have needed a better preparation
W12	no
W13	-
W14	-

7.2 The SSIF Trading Competition

7.2.1 Invitation to the SSIF Trading Competition

7.2.2 Illustration of IG Markets' trading platform (Homepage)



7.3 Appendix 3 – Surveys

7.3.1 Survey 1 – Personality Traits, Experience, Demography and Predictions

Today there is limited research on private traders. Knowledge of their decisions, strategies, attitudes and perceptions is therefore currently scarce. As a participant in the Trading Challenge SSE vs UA, we kindly ask you to answer this survey. The signed individuals below conduct a research project that aims to increase this knowledge by examining the decision-making and behavioural factors of Swedish active traders. The project is financed by Handelsbanken's Research foundations. This survey includes questions regarding securities trading, attitudes, perceptions and demographic issues. The survey takes about 10 minutes to answer. Do not think too long about the survey questions. If any question seems difficult to answer, try anyway. Even an uncertain answer is of interest to us and better than no response at all. Please answer them without looking back at previous answers or trying to remember previous answers. If you have questions about the research project and / or the survey, please contact us at 50242@student.hhs.se

Many thanks in advance for your participation!

Alexandre Jacob, MSc Student, Stockholm School of Economics

1. Which of the following alternatives describes you the best regarding trading securities?

- ❍ I have no experience of trading securities
- ❍ I have previous experience of trading securities
- ❍ I currently trade securities

2. Do you have a trading strategy for the upcoming trading challenge?

- ❍ Yes
- ❍ No

2b. Strategy II - If yes, how would you describe your trading strategy in your own words?

3. Some claims on financial markets are presented below. Please indicate how well they correspond/match to your beliefs.

	Strongly Disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
In the short-term, asset prices are driven more by psychological influences than fundamentals.	❍	❍	❍	❍	❍	❍	❍
Asset prices reflect both all private and all the official information available.	❍	❍	❍	❍	❍	❍	❍
Historical price patterns can be used to predict future price developments.	❍	❍	❍	❍	❍	❍	❍
In the long term, asset prices are driven more by psychological influences than fundamentals.	❍	❍	❍	❍	❍	❍	❍
Future asset prices cannot be predicted through analysis of historical prices.	❍	❍	❍	❍	❍	❍	❍
Asset prices reflect all available public information, but not private information.	❍	❍	❍	❍	❍	❍	❍

We would now like ask you to answer questions about your trading, that is, when and how you buy and/or sell securities.

4. Some strategies for trading securities are presented below. Please indicate how well they correspond/match with your own trading and your own situation.

	Strongly Disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
I often trade shares or derivatives.	❍	❍	❍	❍	❍	❍	❍
I often deal in fixed income securities or interest rate derivatives	❍	❍	❍	❍	❍	❍	❍
I often trade currencies or currency derivatives	❍	❍	❍	❍	❍	❍	❍
I often trade commodities or commodity derivatives.	❍	❍	❍	❍	❍	❍	❍
I often trade funds or fund derivatives.	❍	❍	❍	❍	❍	❍	❍
In my trading, I focus on trading in derivatives.	❍	❍	❍	❍	❍	❍	❍
In my trading, I focus on the Swedish securities.	❍	❍	❍	❍	❍	❍	❍

4b. Some strategies for trading securities are presented below. Please indicate how well they correspond/match with your own trading and your own situation.

	Strongly Disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
My trading mostly proceeds from my intuition.	❍	❍	❍	❍	❍	❍	❍
My trading is mainly based on the analysis of share price movements.	❍	❍	❍	❍	❍	❍	❍
After each profitable transaction, I analyse carefully the outcome and its causes.	❍	❍	❍	❍	❍	❍	❍
After each loss-making transaction, I analyse carefully the outcome and its causes.	❍	❍	❍	❍	❍	❍	❍
At the place where I trade securities, I use many computer screens.	❍	❍	❍	❍	❍	❍	❍
At the place where I trade securities, there are many other people who also trade.	❍	❍	❍	❍	❍	❍	❍
At the place where I trade securities there are tools to delay impulsive decisions.	❍	❍	❍	❍	❍	❍	❍

4c. Some strategies for trading securities are presented below. Please indicate how well they correspond/match with your own trading and your own situation.

	Strongly Disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
I make a living of trading securities	❍	❍	❍	❍	❍	❍	❍
I read books about successful investors / traders to get improve.	❍	❍	❍	❍	❍	❍	❍
I have developed a strategy that helps me in my trading.	❍	❍	❍	❍	❍	❍	❍
I use algorithmic trading to buy or sell securities.	❍	❍	❍	❍	❍	❍	❍
I'm generally very risk-taking	❍	❍	❍	❍	❍	❍	❍
I am very risk-taking in my trading.	❍	❍	❍	❍	❍	❍	❍
My trade is focused on the securities of a few companies.	❍	❍	❍	❍	❍	❍	❍
My trading focuses on securities in many companies	❍	❍	❍	❍	❍	❍	❍

4d. Some strategies for trading securities are presented below. Please indicate how well they correspond/match with your own trading and your own situation.

	Strongly Disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
My trading focuses mainly on companies listed on the Swedish stock exchange.	❍	❍	❍	❍	❍	❍	❍
My trading focuses mainly on companies listed on foreign stock exchanges.	❍	❍	❍	❍	❍	❍	❍
For every day that I trade, I set a goal of how much I will earn.	❍	❍	❍	❍	❍	❍	❍
I prefer to retain a security whose price has fallen below my purchase price in the hope that the trend will reverse.	❍	❍	❍	❍	❍	❍	❍
I prefer to retain a security whose price has risen above my purchase price in the hope that the trend will continue.	❍	❍	❍	❍	❍	❍	❍
I prefer to base my trading on recommendations of analysts.	❍	❍	❍	❍	❍	❍	❍
I prefer to base my trading on analyses of stock market information.	❍	❍	❍	❍	❍	❍	❍

Below are some questions about your background.

5. In what year were you born?

6. What is your highest level of education? Select the "highest" education that you have completed the certificate or graduation certificate.

- ❍ High school, junior secondary school, elementary school or similar
- ❍ Secondary school or equivalent
- ❍ University or college (Bachelor level)
- ❍ University or college (Master level)
- ❍ Doctorate, higher research or equivalent
- ❍ Vocational training or equivalent

7. What is your main job right now?

- ❑ Trade securities privately (without employment)
- ❑ Trade securities professionally (with employment)
- ❑ Work as an employee (other occupation than securities trading)
- ❑ Self-employed
- ❑ Student
- ❑ Pensioner
- ❑ On long-term illness (more than 3 months)
- ❑ On leave or parental leave
- ❑ Job seeker or in a labour market measure
- ❑ Home worker, managing the household
- ❑ Other _____

Thank you for answering our questions so far. Here are a few questions about your attitudes and perceptions. Note that the questions have no right or wrong answers. We want to know what you think.

8. (BIG 5) To what extent do the following statements apply to you? I see myself as someone who:

	Strongly Disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
is reserved	❍	❍	❍	❍	❍	❍	❍
is generally confident	❍	❍	❍	❍	❍	❍	❍
tends to be lazy	❍	❍	❍	❍	❍	❍	❍
is relaxed, I handle stress well	❍	❍	❍	❍	❍	❍	❍
has few artistic interests	❍	❍	❍	❍	❍	❍	❍
is outgoing, sociable	❍	❍	❍	❍	❍	❍	❍
tends to find fault with others	❍	❍	❍	❍	❍	❍	❍
does a thorough job	❍	❍	❍	❍	❍	❍	❍
becomes easily nervous	❍	❍	❍	❍	❍	❍	❍
has a vivid imagination	❍	❍	❍	❍	❍	❍	❍
has a forgiving disposition	❍	❍	❍	❍	❍	❍	❍

9. (NFC) Please specify to what extent you agree with each of the statements below.

	Strongly Disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
I prefer to do something that challenges my thinking rather than something that requires a bit of thought							
I prefer complex problems to simple ones							
I try to avoid situations that require deep thinking							
I don't like having to think much							
To think long and hard about something gives me little satisfaction							

Now some questions about your expected trading performance during the Trading Competition on Friday, March 10th.

10 Compared with other participants in the Trading Challenge, how well you will perform?

- Much worse
- Significantly worse
- Slightly worse
- Just as good
- Slightly better
- Significantly better
- Much better
- Can't tell

11. Assuming that your initial capital is 100 000 SEK that you can trade for at the start of the competition. How much capital do you expect remains at the end of the competition? Capital = your account net value (cash balance plus profits / losses) Total remaining amount (SEK)

11b Please specify a range (in SEK) of the capital you expect remains at the end of the competition

The lowest possible remaining amount

Highest possible remaining amount

12 On Wednesday 8th of March (2017-08-03) the OMXS30 stock market index (OMX STOCKHOLM 30 INDEX) closed at 1578.23. More info can be found here: http://www.nasdaqomxnordic.com/index/index_info?Instrument=SE0000337842 How do you think the OMXS30 will perform on Friday the 10th of March 2017 (2017-03-10)?

The OMXS30 will close at:

The lowest possible level at which the OMXS30 will close at

The highest possible level at which the OMXS30 will close at

13 How successful you will be during the competition?

- I will outperform the stock market index consistently.
- I might outperform the market index
- I will probably not outperform the market index
- I do not compare myself with the stock market index.

7.3.2 Survey 1 – Test for Understanding Financial Literacy

Below are three questions about basic financial concepts. Try to answer them.

14 (Interest rates) Suppose you have $100 in a savings account with 2 percent annual interest. How much do you think you would have in the account after 5 years if you let the money grow in your account?

- More than $102
- Exactly $102
- Less than $102

15 (Inflation) Suppose that the annual interest on your bank account is 1 per cent and inflation is 2 per cent. If you keep your money in the account for a year, will you be able to buy more, as much, or less at the end of the year?

- more
- as much
- less

16 (Risk) Do you think that the following statement is true or false? "Buying stock in a single company is usually safer than buying shares in a mutual fund"

- True
- False

7.3.3 Survey 1 – Test for Understanding Numerical Concepts (BANT)

An important capability for trading securities is to assess probabilities. Finally, here are four questions about the ability to make probability assessments. Try to answer them.

17. Of the 1000 people in a small town, 500 are members of a choir. Of these 500 choir members, 100 are men. Of the 500 residents who are not in a choir, 300 are men. What is the probability that a randomly drawn (selected) man is a member of the choir? Enter the probability in percent.

18. Imagine that we throw a fake die (which has 6 sides). The probability that the die shows 6 is twice as large as the probability of it showing each of the other numbers. Now imagine that we roll the die 70 times. Of these 70 times, how many times can one expect that the die shows the number 6?

19. Imagine that we throw a five-sided die 50 times. Of these 50 throws, what is the number of times that this five-sided die will show an odd number (1, 3 or 5)?

20 In a forest, 20% of the mushrooms are red, 50% are brown, and 30% are white. A red mushroom is toxic with a probability of 20%. A mushroom that isn't red is toxic with a probability of 5%. What is the probability that a toxic mushroom is red? Enter the probability in percent

7.3.4 Self-Reported Emotions

1. Based the last times you've traded, what are your expectations for your trading today? (Time: 08:40)

- 1. Much worse than last time
- 2
- 3
- 4. Just as good
- 5
- 6
- 7. Much better than last time

Emotions.

2.How do you feel right now? (Time: 08:40, 09:30, 10:15, 10:30, 11:00, 11:15, 11:40)

- 1 Extremely unhappy/dissatisfied/dejected
- 2
- 3
- 4. Neither happy nor unhappy
- 5
- 6
- 7. Extremely happy/satisfied/cheerful

3. How good / bad has your trading been today?

- Extremely bad
- Moderately bad
- Slightly bad
- Neither good nor bad
- Slightly good
- Moderately good
- Extremely good

4 How do you think your trading has been today, compared with the other individuals at the competition?

- ❍ 1. Much worse
- ❍ 2
- ❍ 3
- ❍ 4. Just as good
- ❍ 5
- ❍ 6
- ❍ 7. Much better

7.3.5 Survey 2 – Measuring Judgmental Abilities

1. Please describe your trading strategy today, in your own words

2.trade outcomes Think about the trades that gave positive returns. What were the reasons for the outcomes of those trades? Select two of the following six alternatives:

- ❑ 1) brain work
- ❑ 2) personal experience
- ❑ 3) sense of knowing the stock market
- ❑ 4) unpredictability of the stock market
- ❑ 5) ambiguous information
- ❑ 6) too risky

3. Think about the trades that gave negative returns. What were the reasons for the outcomes of those trades? Select two of the following six alternatives:

- ❑ 1) brain work
- ❑ 2) personal experience
- ❑ 3) sense of knowing the stock market
- ❑ 4) unpredictability of the stock market
- ❑ 5) ambiguous information
- ❑ 6) too risky

4. How did you feel throughout the competition?

- ❑ Stressed
- ❑ Indifferent
- ❑ Excited
- ❑ Emotionally unstable

5. How would you describe your decision-making regarding your trades in the competition?

- Very Intuitive
- 2
- 3
- 4
- 5
- 6
- Very analytical

6 If you were to participate in a similar competition again, would you use the same strategy?

- yes
- no