BEHAVIORAL BIASES OF INVESTMENT ADVISORS - The Effect of Overconfidence and Hindsight Bias

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PURPOSE OF THE STUDY

The objective of this thesis is to examine the effects of three behavioral biases on investment advisors. These biases are hindsight bias, overconfidence and self-attribution bias. A survey study is carried out to find out how the studied biases affect the investment advisors. The same survey study is also carried out for two control groups for comparative purposes. In addition, the effects of individual thinking style and cognitive abilities on the exposure to behavioral biases are studied.

DATA

The data in this study is collected in controlled field surveys. The surveys are carried for three separate groups of people; financial professionals, university students and employees of an engineering company The participants of the surveys answer a questionnaire that contains financial market related estimation tasks.

The main insight of the survey study is the two-pronged structure of the surveys. The ability to recollect answers and repeat the surveys enables the examination of the biases at issue. The biases are studied by comparing observations from different phases of the surveys to each other. Hindsight bias is observed by differences between initial answers and the recollections. Overconfidence is studied using initial answers and realized results. Analyses of self-attribution bias use initial answers from first and second round.

RESULTS

The main finding of this study is that people in general are exposed to the studied behavioral biases but the degree and impact are affected by experience and other characteristics. Investment advisors are generally less exposed to hindsight bias than other people. Moreover, professionals generally outperform other people with lower level of confidence, which indicates lower overconfidence. However, professionals are most exposed to self-attribution bias. The results indicate that in addition to expertise, individual thinking style explains behavioral biases. People with high faith in intuition are more exposed to behavioral biases. Overall, the results of this thesis provide valuable new information on behavioral biases and investment advisors.

KEYWORDS

Behavioral Finance, Investment advisors, overconfidence, hindsight bias, self-attribution bias

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1. Introduction

Investment advisors are professionals who assist their clients in financial decision making issues such as investing, insurance, borrowing, taxation and retirement planning. Thus investment advisors have a great impact on their clients' decisions. The advices and recommendations investment advisors give to their clients are naturally affected by the beliefs and conceptions they possess. Biases in these beliefs and conceptions can strongly affect the decision making of the clients and thus it is important to study investment advisors' behavioral biases.

1.2. Background and Motivation

Previous literature shows that psychological factors have a substantial effect on people's decision making. Tversky and Kahneman (1974) present that people rely on a limited number of heuristic principles which in general are quite useful, but sometimes lead to severe and systematic biases. This study focuses to examine three such biases; hindsight bias, overconfidence and self-attribution bias.

Hindsight bias refers to a tendency to perceive own performance better than it actually is, after learning the realization. Biais and Weber (2008) find that for hindsight biased agents the ex-post recollection of the initial belief will be closer to the realization than the true ex-ante expectation. According to Buksar and Conolly (1988) hindsight bias hinders learning from past experience. In a similar vein Biais and Weber (2008) present that hindsight biased agents also fail to remember how ignorant they were before observing outcomes and answers This leads agents to underestimate volatility, which again results in inefficient portfolio choice and poor risk management. One explanation of hindsight bias is the availability heuristic: the event that did occur is more salient in one's mind than the possible outcomes that did not.

Overconfidence refers to the habit of overestimating own ability to perform in given tasks. People tend to be overconfident about own capabilities and level of knowledge. Overconfidence has several forms, such as 'better than average', 'optimism bias' and 'setting too narrow confidence limits'. According to Barber and Odean (2000) overconfidence causes excess trading which can be risky to financial well being.

Self-attribution bias refers to a tendency to overestimate the degree to which people are responsible for their own success. Hastorf, Schneider, and Polifka (1970) write, "We are prone to attribute success to our own dispositions and failure to external forces". In a similar vein, Gervais and Odean (2001) find that success of traders leads to increased overconfidence. When a trader is successful, he attributes too much of his success to his own ability and revises his beliefs about his ability upward too much, which increases overconfidence.

However, the exposure to behavioral biases is not homogenous. Certain factors are reported to explain the level of exposure. Lewellen, Lease and Schlarbaum (1977) find that men have stronger tendency to overconfident behavior than woman have. Korniotis and Kumar (2007) show that overconfidence decreases with age. Kaustia, Alho, and Puttonen (2008) find that expertise reduces the degree of anchoring bias. Frederick (2005) presents that people with higher cognitive abilities make more optimal decisions. This study uses a rational-experiential test by Epstein et al (1996) to characterize individual cognitive ability and thinking style. The effect of these psychological information processing styles in behavioral biases is studied.

1.3. Research Questions

The fact that investment advisers are commonly used when it comes to saving and investing raises the question if their behavior is less exposed to behavioral biases than the behavior of their potential customers'. Investment advisors have a great impact on the decisions of their customers and if their judgment is biased, it will affect the way their customers act on financial markets (see e.g. Bluethgen et al., 2007). Irrational decision making can lead to e.g. suboptimal asset allocation and thus poor investment results.

To find out how these biases affect financial decision making, a field survey is conducted. The survey is designed to enable studying the three biases. The main insight is the two-phased structure of the survey. The biases are studied by comparing observations from different phases of the surveys to each other. Hindsight bias is observed by differences between initial answers and the recollections. Overconfidence is studied using initial answers and realized results. Analyses of self-attribution bias use initial answers from first and second round. The empirical study uses the data from the surveys and answers to the following questions:

1. How does the hindsight bias affect the ex-post conception of the ex-ante expectation?
   - Do investment advisors suffer from hindsight bias?
   - Does expertise reduce the hindsight bias?
   - What characteristics affect the severity of hindsight bias?

2. How does the overconfidence affect the setting of confidence limits?
   - Do investment advisors set too narrow confidence limits?
   - Does expertise reduce overconfidence?
   - What characteristics affect the severity of overconfidence?

3. How does the self-attribution bias affect confidence in repeated tasks?
   - Do investment advisors adjust their confidence based on the results?
   - Does expertise reduce the self-attribution bias?
   - What characteristics affect the severity of self-attribution bias?

The empirical research is conducted using Finnish investment advisors who can be classified as 'professionals' as the participants have passed a General Securities Examination organized by the Finnish Association of Securities Dealers (FASD). In addition to the professionals, the survey is also carried out for two control groups, university students and employees of an engineering company (laypeople).

In relation to the research questions, there are several hypotheses according to which the behavior of the respondents is expected to occur. The hypotheses make the manners that the behavioral biases suggest concrete. There are also hypothesis for the impacts of certain characteristics. The hypotheses of this study are:

- Hindsight biased people overestimate their initial ability to perform after learning the outcome
- Overconfident people overestimate their initial ability to perform before a task
- People suffering from self-attribution bias become more confident after a success
- Expertise and experience reduce behavioral biases
  - Professionals are least exposed to behavioral biases
  - Students are less exposed to behavioral biases than laypeople
- High cognitive ability decreases the exposure to behavioral biases

1.4. Contribution

In this thesis I study three behavioral biases of financial industry professionals using a field survey. Majority of behavioral finance articles focus on one bias only (e.g. Barber and Odean 2001). In addition, the use of experimental or survey method is still relatively infrequent in financial research. Typical experimental or survey studies on behavioral biases use samples that include only students (Buksar and Conolly 1988) or only professionals (Montier 2006). Studies comparing financial market professionals and other people are rare and typically concentrate on differences between two types of respondents (Kaustia et al 2008 and Törngren and Montgomery 2004). This thesis uses a sample consisting of three separate groups of people; financial professionals, university students and employees of an engineering company. In addition to the diversity, the data of this thesis is also rare due timing. The surveys of this thesis are conducted during the period of historically high uncertainty in financial markets, at the end of year 2008.

Some of the methods used in this thesis have not been used before. To demonstrate hindsight bias I developed the 'asset selection' and 'sign of return' methods. The main insight in the new methods is in the two-phased structure, which is rarely used (Biais and Weber 2008). The ability to recollect answers and repeat the surveys allows studying hindsight bias and self-attribution bias in this thesis. Both hindsight bias (Biais and Weber, 2008) and self-attribution bias (Gervais and Odean, 2001) are relatively infrequently studied in financial context. Overall, the results of this thesis provide valuable new information on behavioral biases and investment advisors.

1.5. Results summary

This section presents a brief summary on the results of this study. The results of this study are in line with following statements:

- People are exposed to hindsight bias
- Investment advisors are generally less exposed to hindsight bias than other people
- Investment advisors have a tendency to exaggerate their initial ability to predict asset returns, after learning the realization. The exaggeration reinforces with experience.

- People are overconfident
- Professionals generally outperform other people with lower level of confidence, which indicates lower overconfidence

- People suffer from self-attribution bias
- Investment advisors suffer more from self-attribution bias than other people

- Experience and expertise generally reduce exposure to behavioral biases
- Analytical thinking does not explain exposure to behavioral biases
- Faith in intuition explains exposure to behavioral biases

- Female professionals rank high in faith in intuition and bottom in analytical thinking
- Male professionals rank bottom in faith in intuition and top on analytical thinking

1.6. Structure of the Study

The structure of the thesis is the following: Section 2 discusses the theoretical background. Section 3 describes the data and methods used in the empirical test. Section 4 presents the results. Finally, section 5 summarizes the thesis and concludes the results.

2. Psychological factors in decision making

The purpose of this chapter is to provide background information for the empirical tests that are carried out. In this chapter I also describe the studied biases and discus the ways how psychological factors affect financial decision making. I also go through the existing literature about the issues that are related to this study.

Previous empirical evidence shows that psychological factors have a substantial effect on people's decision making in several fields, including finance. In their classic study, Tversky and Kahneman (1974) present that people rely on a limited number of heuristic principles in complex tasks involving uncertainty. In general, these heuristics are quite useful, but sometimes they lead to severe and systematic biases. Since Tversky and Kahneman (1974) academic research has reported numerous different biases. This study focuses on biases affecting individual conception of person's own ability to perform in given tasks. People have a tendency to be optimistic about the future and their own ability to make forecasts, which indicates overconfidence. Overconfidence leads people to i.e. take too much risk, which has severe consequences in financial decision making.

People also tend to overestimate their own performance to make forecasts after learning the outcome. Indeed, people remember their initial estimates to been better than those actually were, if asked afterwards. This is called hindsight bias. Hindsight bias and overconfidence are actually very close each other; both demonstrate such individual thinking where an agent sees himself better than he actually is. The existence of hindsight bias hinders the individual's composition of realistic assumptions about own capabilities and thus strengthens overconfidence. People fail to recognize their true capability if the conception of success is based on their own memory.

People have a tendency to attribute themselves about success but blame external issues for failure. This bias, also related to conception about own capabilities is known as self-attribution bias. Due to self-attribution bias people fail to recognize their true capability even if they learn their success from an unbiased source. Even though people are told about their failure, they keep overestimating their own capabilities as they do not attribute the failure for themselves. As a result of hindsight and self-attribution bias, it is difficult for people to learn to avoid overconfidence.

However, some previous studies show that with expertise and experience an individual is able to learn to avoid biases. Within financial decision making e.g. Kaustia et al (2008) and Alevy, Haigh, and List (2007) find that financial market professionals are less exposed to behavioral biases than students. However, contradicting results also exists; Haigh and List (2005) find that the behavior of traders is more biased than the behavior of students.

2.1. Hindsight bias

Hindsight bias refers to a tendency to perceive own performance better than it actually is, after learning the realization. The first studies of hindsight bias were Fischhoff (1975) and Fischhoff and Beyth (1975). Fischhoff (1975) finds that receipt of outcome knowledge affects subjects' judgments in the direction predicted by the tendency to perceive reported outcomes as having been relatively inevitable. This tendency was called as 'creeping determinism' but is nowadays better known as hindsight bias. Fischhoff (1975) concludes that unperceived creeping determinism can seriously impair our ability to judge the past or learn from it. In a more recent study Biais and Weber (2008) present that for hindsight biased agents the ex-post recollection of the initial belief will be closer to the realization than the true ex-ante expectation. Such agents also fail to remember how ignorant they were before observing outcomes and answers.

The effect of hindsight bias on learning has substantial consequences as hindered learning leads to increased overconfidence. Camerer et al (1989) suggest that hindsight bias narrows the gap between what occurred and what predictions are recalled, reducing valuable feedback and inhibiting learning. This in line with the results of Buksar and Conolly (1988), who present also that hindsight bias hinders learning from past experience. According to Biais and Weber (2008) hindsight bias hinders learning and lead agents to underestimate volatility, which again results in inefficient portfolio choice, loss making trades and poor risk management. In their study Biais and Weber (2008) arrange a two phase experiment to demonstrate hindsight bias. Their results show that people have a tendency to adjust their 2nd phase answers (i.e. the recollection of the initial estimates) based on the realization.

Hindsight bias is not affecting only in unconscious way, like in ex-post evaluation of ex-ante decision, but also when subject is aware of the bias. Buksar and Conolly (1988) find that student

subjects working on a strategic choice case, both alone and in groups, were unable to ignore what they had been told about the actual results of a choice. As a result, they distorted their evaluations of the original decision and the factors influencing it.

Behavior caused by Hindsight bias is also recognized in studies observing other biases. Camerer et al (1989), who study judgmental errors in economic settings, find that asymmetric information is not always beneficial for the better-informed agent, which violates the common assumption of economic analyses. This effect is known as curse of knowledge. According to Camerer et al (1989), the curse of knowledge may also influence individual decision making under uncertainty. Exaggerating the predictability of events intensifies the regret people feel when choices yield outcomes worse than those that would have resulted from forgone options. This is in line with hindsight bias as people thinking behind this goes like "I knew this would happen, why I didn't act correctly". In a similar vein Baron and Hershey (1988) present that the curse of knowledge suggests that outcome information will be overused; principals will tend to think that ex ante optimal decisions with unfavorable outcomes were nonoptimal and that nonoptimal decisions with favorable outcomes were optimal. Camerer et al (1989) continue that agents will be excessively penalized for negative outcomes and insufficiently rewarded for favorable results. Buksar and Conolly (1988) present that when outcomes are poor, then, people's evaluations of earlier decisions tend to be biased in an unflattering direction. "I should have known it all along" they feel, puzzled at their poor decision making.

Traditional way to justify market rationality is to state that even though some investors are irrational, markets in total are rational as the individual irrationalities are random and thus on average cancel each other out. Camerer et al (1989) found that hindsight bias in markets was half as large as bias in individual judgments. Their data suggest that the error-correcting power of markets derives not from the feedback they provide, but from the disproportionate activity of more rational traders.

Hindsight bias is also affecting performance evaluation in principal agent relation. Mangelsdorff and Weber (1998) and Madarasz (2008) show that, in a principal agent relation, the hindsight bias will prevent the principal from correctly evaluating the performance of the agent. According to Biais and Weber (2008), biased principals fail to remember what was known when the agent's decision was taken.

2.2. Overconfidence

People have a tendency to be overly confident about own capabilities and level of knowledge. Psychological research has discovered many ways how overconfidence affects human behavior in several fields. The effects of overconfidence are strongly present in difficult decisions that include uncertainty. Thus financial decision making is very likely affected by overconfidence. Overconfidence appears in several forms, such as 'better than average', 'optimism bias' and 'setting too narrow confidence limits'.

Studies of overconfidence have typically examined people's confidence in their ability to answer general knowledge questions, but similar results have also been found in financial settings. Results imply that people suffer from overconfidence also in financial decision making. The effects of overconfidence on financial decisions are serious and can be risky to financial well being. According to Lewellen et al (1977) overconfident investors trade more, believe returns to be highly predictable and expect higher returns than what less confident people do. In similar vein Odean (1998) finds that overconfident investors will overestimate the value of their private information, causing them to trade actively. However, active trading does not lead to better performance. Indeed, Barber and Odean (2000), who study trading behavior of households, find that households that trade frequently earn much lower net annualized geometric mean return than those that trade infrequently. Thus overconfidence can be hazardous to individual's wealth.

Overconfidence is not affecting only individual investors; also the professionals suffer from it. Montier (2006) finds that 74% of fund managers perceive themselves as above average at their jobs while only a small minority believes that they are below the average. Törngren and Montgomery (2004) find that professionals overestimate their probability to choose the better performing stock from two alternatives by over 20%. Olsen (1997) finds that professional investment managers tend to overestimate probabilities of outcomes that are positive to the respondent and to underestimate undesired outcomes.

2.3. Self-attribution bias

Self-attribution bias refers to a tendency to overestimate the degree to which people are responsible for their own success. According to Hastorf, Schneider, and Polifka (1970) people are

prone to attribute success to our own dispositions and failure to external forces. In a similar vein Gervais and Odean (2001) explain that people assess their own abilities not so much through introspection as by observing our successes and failures. Most people tend to take too much credit for our own successes.

Self-attribution bias affects the conception about own capabilities as it hinders the evaluation of past performance. This leads to overconfidence. Indeed, Gervais and Odean (2001), who studied the effects of past results in traders' behavior, find that success leads to increased overconfidence. When a trader is successful, he attributes too much of his success to his own ability and revises his beliefs about his ability upward too much, which increases overconfidence. Gervais and Odean (2001) also find that both volume and volatility increase with the degree of a trader's learning bias. As a result overconfident traders behave suboptimally, thereby lowering their expected profits

Deaves, Lüders, and Schröder (2005) study overconfidence in making stock market expectations among German financial professionals. They find that the professionals are not just overconfident but their level of overconfidence increases after a successful forecast measured by 90% confidence interval. In addition, the adjustment to wider confidence interval after failure is smaller than the adjustment to narrower interval after success. This results from psychological phenomenon of cognitive dissonance, which suggests that people prefer to forget their failures and rather remember their successes. Cognitive dissonance is closely related to self-attribution bias and also somewhat related to hindsight bias. Even though self-attribution bias aggravates overconfidence Gervais and Odean (2001) present that average levels of overconfidence are greatest in those who have been trading for a short time. With more experience, people develop better self-assessments.

2.4. Factors affecting exposure to behavioral biases

The exposure to behavioral biases is individual; however it is affected by demographic and socioeconomic factors. In this chapter I discuss how different characteristics have been found to affect behavioral biases. The two characteristics, experience and thinking style, that are in the focus of this study are discussed in separate sections 2.4.1 and 2.4.2.

The two most studied and natural demographic factors, gender and age, affect both to the degree of exposure to behavioral biases. Psychological research has established that men are more prone to overconfidence than women, particularly so in male-dominated realms such as finance. Indeed Lewellen et al (1977) find that men have stronger tendency to overconfident behavior than woman have. These findings are supported by Barber and Odean (2001), who find that men are more active traders, which serves as a proxy for overconfidence. Using the same database as Barber and Odean (2001), Korniotis and Kumar (2007) find that older investors have better knowledge about investing and hold less risky and more diversified portfolio. This implies that overconfidence decreases with age. Korniotis and Kumar (2007) also find that the negative age effect is less apparent in the group of individuals with higher education and higher income.

2.4.1. Expertise

In the economics literature it is commonly believed that more sophisticated subjects behave fundamentally differently, as they learn from experience to avoid biases and their behavior is also influenced by higher incentives. However, there is no fully coherent evidence in previous literature about the effects of expertise on behavioral biases.

Studies comparing the decision making of financial market professionals to other people find that whether or not professionals are less biased depends on the context. According to Bradley (1981), people with high degree of perceived expertise in the area of a general knowledge question are likely to have unrealistically high expectations of the probability of answering correctly. In a similar vein Törngren and Montgomery (2004), who study overconfidence of stock market professionals and laypeople, find that both laypeople and professionals were overconfident, but the professionals overestimated their ability by a greater margin. Their results suggest that the information-based predictions of the professionals do not outperform the simple heuristics used by laypeople, although the professionals expect that to happen. Haigh and List (2005) find that the floor traders at the Chicago Board of Trade (CBOT) demonstrate a greater degree of myopic loss aversion than students. Alevy, Haigh, and List (2007) find that students more closely follow Bayes' rule, whereas CBOT professionals are better at assessing the quality of public information, and thus earn higher profits. Kaustia et al (2008) study anchoring effect and find that the effect obtained with students is several times higher than the effect obtained

with professionals. Thus their results imply that expertise significantly attenuates behavioral biases. A series of field experiments utilizing the market for sports memorabilia reported in List (2003; 2004a; 2004b; 2006) supports the notion that experience attenuates behavioral biases in general. However, it seems that a limit to sophistication exists as Kaustia et al (2008) do not find difference among the professionals regardless of the level of experience.

The evidence among students implies that expertise reduces behavioral biases. Kaustia et al (2008) find less sophisticated students to anchor their return estimates more than the group of more sophisticated students. In the framing study of Glaser et al (2006) a further comparison between students who study finance and those who do not study finance shows that financial education decreases the effect of framing.

2.4.2. Cognitive ability and individual thinking style

Similarly to expertise, individual's cognitive ability is found to reduce behavioral biases. Lubinski and Humphreys (1997) explain that general intelligence or various more specific cognitive abilities are important causal determinants of decision making. Frederick (2005), who studied how the score of the cognitive reflection test (CRT)[1] explains individual's decision making, found that CRT scores are predictive of the types of choices that feature prominently in tests of decision-making theories, like expected utility theory and prospect theory.

In his tests of time preference Frederick (2005) found that people who scored higher on the CRT were generally more "patient"; their decisions implied lower discount rates. For short-term choices between monetary rewards, the high CRT group was much more inclined to choose the later larger reward. It appears that greater cognitive reflection fosters the recognition or appreciation of considerations favoring the later larger reward. In the test of risk preference Frederick (2005) found that in the domain of gains, the high CRT group was more willing to gamble, particularly when the gamble had higher expected value. For items involving losses, the

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[1] The cognitive reflection test (CRT) refers to a test which is designed to measure individual's cognitive ability using simple tasks for which intuition usually 'offers' wrong answer but which can be solved by systematic thinking. An example of such task is the "bat and ball" problem (see Nagin and Pogarsky, 2003). High CRT score refers to a tendency to think (rational system) whereas low CRT score refer to impulsive decision making (experiential system)

high CRT group was less risk seeking; they were more willing accept a sure loss to avoid playing a gamble with lower (more negative) expected value. Although discount rates and perceived utilities are individual, Frederick's (2005) findings are so strong[2] that they indicate that people with higher cognitive abilities are more capable in making optimal decisions.

In psychological literature it is commonly accepted that people process information by two parallel, interactive systems: a rational system and an experiential system (see i.e. Tversky and Kahneman, 1983 and Weinberger and McClelland, 1991). Based on cognitive-experiential self-theory (CEST, Epstein 1990, 1991, 1993, 1994), Epstein et al (1996) present a test for cognitive ability, called rational-experiential inventory (REI). The REI-test contains two dimensions, one measuring analytic-rational processing, and the other measuring intuitive-experiential processing.

The analytic-rational processing is measured using the need for cognition (NFC) scale of Cacioppo and Petty (1982). According to Cacioppo et al., (1996) people with higher NFC are found to do better on arithmetic problems, anagrams, trivia tests and college coursework, to be more knowledgeable, more influenced by the quality of an argument, to recall more of the information to which they are exposed, to generate more "task relevant thoughts" and to engage in greater "information-processing activity." Thus people with high NFC scores can be expected to be less exposed to behavioral biases.

The intuitive-experiential processing is measured using a scale called faith in intuition (FI). According to Epstein et al (1996) strong experientiality (high FI score) may interfere with logical thinking; that is, people who are strongly experiential tend to accept their heuristic thinking as rational. However, the use of heuristics does not necessarily lead to rational behavior (Tversky and Kahneman, 1974). Thus people with high FI scores are expected to be more exposed to behavioral biases.

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[2] For example Frederick (2005) found that only 31% of low CRT sample chose 15% change of $1.000.000 (expected value $150.000) over certain $500. The respective proportion of high CRT sample was 60%.

3. Data and methods

In order to find answers to the research questions an empirical study is conducted. In this section I present the data and methods used in the study. In section 3.1 I describe the characteristics of the data and the process of data collection. Section 3.1 also includes a short description of the unique period during the surveys. In section 3.2 I discuss the tests that are carried to measure the studied biases.

3.1. Data

The data section is divided into two subsections. The first subsection describes the process of how the data is collected. The first subsection also discusses the characteristics of the sample groups. The second subsection describes the events of the 2008 finance crisis, which was at its peak during the surveys of this study.

3.1.1. Collection of the data

Data for the empirical study is collected in several controlled field surveys. In these surveys the participants are asked to fill a questionnaire. The setting includes two phases for each group. Time between the phases is approximately three weeks, depending on group (see table 1). The first phase questionnaire contains questions for background information, a rational-experimental inventory and three return estimation tasks. The background information questions include sex, age and financial experience related questions. The rational-experimental inventory includes ten statements about individual thinking style. Based on the answers the thinking style of the respondent is charted. The answers for these statements are collected on a one to five scale. The complete list of statements can be found on section 3.2.4. In the return estimation tasks the respondents are shown a graph that contains the development of two assets' total return indices in last 12 months. The respondents are then asked to choose the better performing asset from the pair during an approximately three week period and classify the strength of their view (i.e. the certainty that their selection wins) on a one to five scale. In addition they are asked to give an estimate for the return of the better performing asset and set a 90% confidence interval limits for

this return. The asset pairs used are Russian vs. Brazilian shares, EUR-GBP vs. EUR-SEK, and oil vs. gold[3]. The complete phase one questionnaires can be found from the appendix 7.3.

In the second phase questionnaire the participants were asked to summon up their initial answers and estimates from the first phase. These answers and estimates were then recollected. The respondents were told that it is very important that they answer now even though they could not remember their initial answers very well. The respondents were also asked to classify how well they remember their initial answers. In addition to the recollection, the second phase questionnaire also included the same return estimation tasks than the first phase questionnaire, naturally with updated return periods. The complete phase two questionnaires can be found from the appendix 7.3. The timing of the survey dates and the lengths of the return estimation periods are shown in table 1. Phase 1 return estimation periods start on the survey date and end on the phase 2 survey date. Phase 2 return estimation periods start on the survey date and end at 31.12.2008.

Table 1 – Survey dates and return estimate periods

	Phase 1	Phase 2	Length 1	Length 2
Group 1 (professionals)	25.9.08	20.10.08	25	72
Group 2 (professionals)	29.9.08	30.10.08	31	62
Group 3 (professionals)	2.10.08	4.12.08	63	27
Group 4 (students)	17.10.08	14.11.08	28	47
Group 5 (laypeople)	30.10.08	27.11.08	28	34

3.1.2. Sample characteristics

The sample of the study includes five separate groups of controlled field survey participants. Three of the groups consist of investment advisors working in a Finnish bank, one of students at Helsinki School of Economics and one of people working at a large industrial engineering company. The three investment advisor groups are merged to a single group for analysis purposes. The groups are named as investment advisors, students and laypeople. Respectively the

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[3] The indices of the assets are: FTSE W Brazil Euro total return index, FTSE W Russia Euro total return index, UK £ to Euro (WMR&DS) exchange rate, Swedish Krona to Euro (WMR) exchange rate, MLCX Crude Oil (WTI) total return index (OFCL), and MLCX Gold total return index (OFCL). The indices are downloaded from Datastream.

sizes of the groups are: 56 investment advisors, 89 students, and 55 laypeople. Thus the total sample size is 200.

The overall sample includes 104 men, 95 women and 1 who did not want to reveal his/her sex. The respective distributions within the groups are 20 + 35 (+1) investment advisers, 61 + 28 students and 23 + 32 laypeople. Ages of respondents range between 18 and 65 years. Due to the fact that majority of students are 18 to 24 years the overall age distribution is relatively skewed. Table 2 presents the age distributions by groups.

Table 2 – Distribution of age

Age	Inv. adv.	Student	Laypeople	All
18-24	0 %	84 %	4 %	39 %
25-29	27 %	11 %	22 %	19 %
30-34	14 %	0 %	15 %	8 %
35-39	14 %	1 %	16 %	9 %
40-44	16 %	2 %	20 %	11 %
45-49	21 %	1 %	7 %	9 %
50-54	7 %	0 %	5 %	4 %
55-59	0 %	0 %	9 %	3 %
60-65	0 %	0 %	2 %	1 %

On average the investment advisors have over ten years of industry experience, the median experience is eight years. The distribution of experience is skewed. The majority of investment advisors in this study have experience less than ten years but on the other hand many have a long, over 20 years experience. Figure 1 shows the distribution of expertise. To demonstrate the proportion of inexperienced investment advisors a separate column is drawn for experience of 0 to 2 years. The investment advisors have passed the first level examination organized by FASD and were studying for the second level examination at the time of the data collection.

Figure 1 – Distribution of experience

Distribution of experience
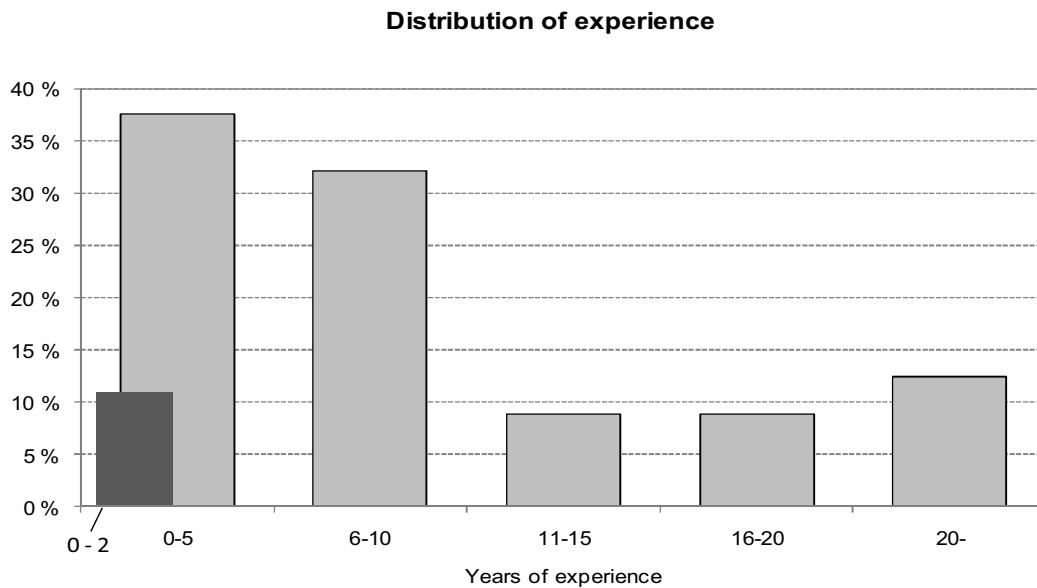
The surveys for the professionals' sample are held in context of FASD examination training sessions. The participants arrive to the first phase sessions without knowing in advance about the survey. At the beginning of the training session the participants are asked to voluntarily take part in a research.

The student sample consists of undergraduate students at Helsinki School of Economics. The survey is carried out in a corporate finance exercise session that these students attend. The course in mandatory for students majoring in finance or accounting, and it typically is their second course in finance. All students attend an elementary finance course and have thus been exposed to the basics of financial markets, including return and volatility. The students are at the beginning of their specialization in university business studies, and have limited work experience in financial markets. This student sample is very similar to what Kaustia et al (2008) had in their study.

The laypeople sample consists of employees of a large multinational engineering company. The participants are professionals on their own occupation but have limited knowledge on finance. The educational background of the participants is relatively typical: 23% of the respondents have a university level degree, 38% have college level degree and 39% have 2nd level or lower education. Majority of the respondents have either technical or commercial

education: 39% have commercial education, 36% have technical and only 25% have some other education. The sample includes participants from numerous organizational positions (e.g. senior vice president, customer service employee and product responsible engineer).

The collection of the student and laypeople samples differ a little from the collection of professional sample. Similarly to professional sample the participants arrive to the exercise session / monthly briefing without prior information about the survey. For practical reasons the questionnaires are dealt at the beginning of the session even though the actual time reserved for the survey is at the end of the session. At the beginning the participants are briefly told the purpose of the questionnaire and that there is time reserved for filling at the end of the session. The survey is conducted after the normal agenda. The participants are instructed for the questionnaire and told about the second phase. However the participants are not specifically asked to remember their answers for the second phase. The participants are also told that all are given a small reward for participating[4]. The setting for second phase is similar to the first phase, with the exception that the participants know about the coming survey.

The students and laypeople were asked if they have made stock market transactions themselves. In total 48% of non-professionals had made personal stock market transactions. There is no difference between students and laypeople. However, men have more personal experience in stock market investments; 56% of men have made transactions whereas only 35% of women have. Also the major (students) and education (laypeople) affects; 57% of students with finance major have personal experience but only 41% students with other major have. Within the laypeople sample 60% of respondents with technical education has personal investment experience. The respective proportion for respondents with commercial education is 45%. This rather surprising observation partly results from the fact that only 23% of commercial employees have university degree whereas 35% of technical employees have university degree. People with university degree generally are in higher positions in work organizations and thus have more funds to invest. Accordingly, 69% of respondents with university degree have personal investment experience. The respective proportion of people with lower level of education is 42%. Figure 2 presents the results in graphical form.

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[4] All participants receive a stock market related card game at the second phase session.

Figure 2 – Personal investment experience

Personal investment experience by group

Personal investment experience
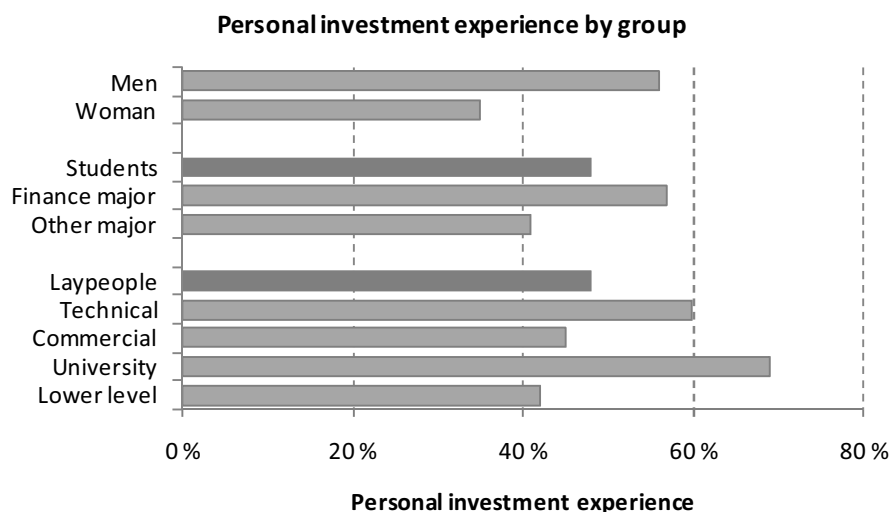
3.1.3. Finance crisis of 2008

The surveys for the data gathering were held between 25.9.2008 and 27.11.2008. This period included elusively violent events and exceptionally strong volatility on the financial markets. For example the wide-ranking bankruptcy of Lehman Brother took place only a few days prior to the first survey. This most likely affects the thinking of the survey participants, especially the professionals. As the reasons that caused the finance crisis of 2008 are wide and complex and thus out of the scope of this study, I discuss these issues only very briefly and in a simplifying manner.

The 2008 finance crisis stems from the problems with subprime mortgages that started to build up in July 2007. Between 2000 and 2003, the Federal Reserve lowered the federal funds rate target from 6.5% to 1.0%. The reason behind this was an attempt to soften the effects of the collapse of the dot-com bubble and of the September 2001 terrorist attacks. These actions lowered the cost of capital in the market and made the lending to customers with lower than normal refund ability profitable for banks. This resulted a high demand in houses as people who had not been able to buy own houses before were now able to do that. The high demand transmitted to house prices that increased strongly, eventually causing a bubble.

The mortgages granted to subprime debtors were mainly securitized and diversified to a wide range of financial market participants. These financial agreements known as mortgage-backed securities (MBS), which derive their value from mortgage payments and housing prices, became more and more common. The market for the MBS's worked properly as long the housing prices increased, however problems started to build up as prices started to decline and repayment failures increased. The values of MBS's started to deteriorate sharply and the holders had to report losses. The fact that MBS's are difficult to value and have low transparency caused a situation where the holders of MBS's were not able to explicitly report the value of their holdings. This caused a market wide lack of thrust and froze the interbank debt market. This resulted in a liquidity crisis.

Insufficient liquidity was the single most important reason behind the bankruptcies of e.g. Bear Stearns (March 2008), Lehman Brothers and AIG (September 2008). Even though financial institutions faced significant losses from subprime mortgages the lack of thrust and thus negligible liquidity was the reason that made those to collapse. The market wide shortage of liquidity increased the cost of capital dramatically and thus diminished the investments and activities of other than financial sector too. This made the international stock markets to plummet rapidly. The return and volatility for each combination of asset and respondent group in this study are shown in table 3. Table 3 is divided into two panels; panel A for phase 1 statistics and panel B for phase 2 statistics. Figure 3 shows the survey dates on a timeline with return development of each asset.

Table 3 – Return statistics

Panel A: phase 1		Professional 1	Professional 2	Professional 3	Student	"Engineer"
Brazil	Return	-33 %	-34 %	-22 %	-15 %	-17 %
	Volatility	143 %	145 %	115 %	112 %	89 %
Russia	Return	-45 %	-45 %	-30 %	6 %	-12 %
	Volatility	127 %	145 %	116 %	124 %	107 %
GBP	Return	1,7 %	-1,5 %	-5,9 %	-6,7 %	-7,6 %
	Volatility	12 %	14 %	16 %	16 %	17 %
SEK	Return	-3,0 %	-2,4 %	-5,4 %	-1,6 %	-3,7 %
	Volatility	10 %	11 %	13 %	10 %	14 %
Oil	Return	-34 %	-37 %	-41 %	-24 %	-25 %
	Volatility	74 %	74 %	77 %	79 %	84 %
Gold	Return	-9 %	-16 %	-2 %	-9 %	14 %
	Volatility	36 %	38 %	40 %	40 %	40 %

Panel B: phase 2		Professional 1	Professional 2	Professional 3	Student	"Engineer"
Brazil	Return	-13 %	-16 %	6 %	-4 %	-7 %
	Volatility	88 %	78 %	62 %	75 %	68 %
Russia	Return	-23 %	-33 %	-17 %	-16 %	-23 %
	Volatility	88 %	82 %	54 %	63 %	53 %
GBP	Return	-19,6 %	-18,8 %	-10,0 %	-12,7 %	-14,5 %
	Volatility	17 %	17 %	21 %	17 %	18 %
SEK	Return	-8,9 %	-10,1 %	-3,0 %	-8,4 %	-6,5 %
	Volatility	17 %	17 %	19 %	19 %	20 %
Oil	Return	-37 %	-33 %	3 %	-18 %	-17 %
	Volatility	86 %	88 %	75 %	90 %	92 %
Gold	Return	15 %	23 %	16 %	19 %	8 %
	Volatility	37 %	36 %	31 %	35 %	32 %

Figure 3 – Return development timeline
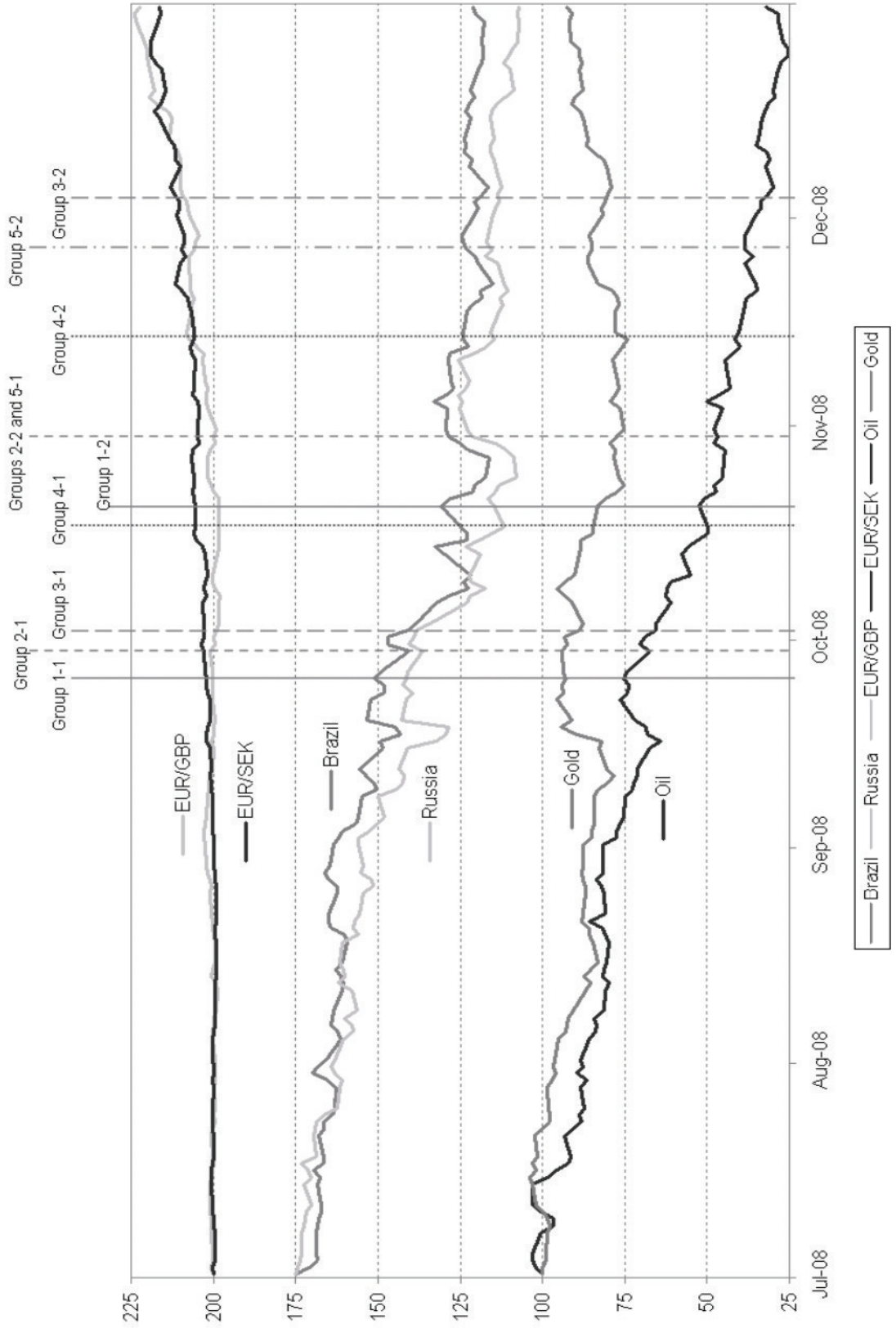
3.2. Methods

In this chapter I discuss the methods used in the empirical study. The data gathered in the controlled field surveys enables a wide range of analyses to be carried out. The structure of the survey makes it possible to study the three biases in question. The main insight in formulating the tests described in this section is to compare the observations from different phases of the surveys to each other. Hindsight bias is observed by differences between initial answers and the recollections. Overconfidence is studied using initial answers and realized results. Analyses of self-attribution bias use initial answers from first and second round.

3.2.1. Hindsight bias

In this study the effects of hindsight bias are examined in four aspects of behavior. The tests are designed to versatilely utilize the data collected in the survey. The underlying logic for all of the four tests is the main attribute of hindsight bias; people tend to percept their own initial behavior as more optimal than it actually is after learning the future.

3.2.1.1. Asset selection effect

The first aspect is to study if remembering own selection in a winner selection task is unbiased. This is called 'asset selection effect'. Asset selection effect refers to an attribute of hindsight bias where people tend to remember their initial selection incorrectly in a task where they are asked to select a winner from two alternatives. After learning the outcome hindsight biased agents remember that they chose the winning asset even though it may not be true.

The logic behind the asset selection test of this study is based to the effect where hindsight biased agents fail to recognize a failure in a winner selection task, like the one in this study. The tendency of overestimating own success is measured by comparing the actual proportion of correct answers and the respective remembered proportion. Thus this analysis uses the initial selections, the recollections of the initial selections and the realized results from the questionnaire. Naturally some proportion of the recollections is incorrect simply because the respondent has forgotten his/her initial selection. However, these falsely remembered answers

should distribute randomly and irrespective of the outcome and thus should not affect the results related to hindsight bias.

The statistical significance of the difference between true and remembered proportions of successful answers is tested using a difference in proportions z-test. The z-score is calculated using equation 1. In the equation p_1 refers to the true proportion of successful answers, p_2 refers to the proportion of respondents who believe they answered correctly, n_1 and n_2 refer to the sizes of the samples.

$$z = \frac{p_1 - p_2}{s_{p_1 - p_2}} \tag{1}$$

Where,

$$s_{p_1 - p_2} = \sqrt{\frac{p(1-p)}{n_1} + \frac{p(1-p)}{n_2}} \tag{2}$$

Where,

$$p = \frac{n_1 p_1 + n_2 p_2}{n_1 + n_2} \tag{3}$$

3.2.1.2. Sign of return effect

The second aspect is to study if remembering the sign of own return estimate in return estimation task is unbiased. This is called 'sign of return effect'. The logic of this analysis is an attribute of hindsight bias where people tend to remember the sign of their initial return estimate incorrectly. After learning the realized return hindsight biased agents remember that they estimated the sign of return correctly even though it may not be true. The method and logic in this test are similar to the assets selection test. The only difference is that hindsight bias is measured from the sign of a return estimate instead of asset selection. The tendency of overestimating own success is measured by comparing the actual proportion of correctly estimated sign of return and the respective remembered proportion. The statistical significance of

the difference between true and remembered proportions of correct sign of return is tested using the exact same difference in proportions z-test as in asset selection test.

3.2.1.3. Drift of return effect

The third aspect is to study a tendency of remembering own initial estimates to be closer to the realized figures than they actually are (i.e. moving closer to realized). This is done by comparing the actual return estimates, the recollections of the actual estimates, and the realized returns. In this design the subjects are first asked to report their ex-ante expectations at the first phase of the survey. Then, they learn the realization of the return at the second phase. Finally they are asked to report their ex-post recollection of their ex-ante expectations.

The difference between the initial return estimate and the recollection is calculated for each respondent. To demonstrate hindsight bias the sample is divided into two groups based on the initial answer – realization relationship. Such answers in which the initial estimate is higher than the realized result form the first group. Answers in which the initial estimate is lower than the realized result form the other group. The logic in this structure is to separate the answers based on which direction the 'drift' is likely to affect.

To test the statistical significance of the differences between initial answers and the recollections a paired t-test is used. The t-stat is calculated using equation 4. In the equation x_1 refers to the initial return estimate, x_2 to the recollected version, s_D refers to the standard deviation in the group of x_2-x_1, and N is the sample size.

$$ t \ = \ \frac{\overline{x}_2 \ - \ \overline{x}_1}{s_D \ / \ \sqrt{N}} \tag{4}$$

3.2.1.4. Strength of view effect

The fourth aspect studied is the change of confidence, which in this study is represented by the strength of the view score. This aspect is studied by comparing the initial strengths of the view, their recollections, and realized returns. The main interest is in the alteration between the

initial strength of view and the recollection, not in the actual level of confidence. To demonstrate hindsight bias the sample is divided into two groups based on success of the asset selection task. The other group is the ones with believed correct answer and the other is the ones with believed incorrect answer. The logic behind this is an attribute of hindsight bias according to which people that believe they answered correctly may overestimate their initial certainty and people that believe they answered incorrectly may underestimate it. The difference between the initial strength of view and the recollection is tested and the statistical significance is determined using the same paired t-test method as in drift of return test.

3.2.2. Overconfidence

Overconfidence is studied in two sets of tests. The first set of tests observes the 'setting too narrow limits' –effect by examining how the respondents estimate volatility. The second set of tests observes the relation between perceived confidence and actual ability to success in asset selection task.

The first aspect of overconfidence, 'setting too narrow limits' effect, is studied by collecting 90% confidence boundaries for return in the return estimation tasks. In the simplest analysis overconfidence is measured as the difference between the actual hit rate and 90%. This simple hit rate comparison test is however vulnerable to extraordinary market conditions (see section 3.1.3) and thus overconfidence is also measured by observing the estimated volatilities. The 90 % confidence boundaries are converted to volatility estimates using the following equation 5:

$$\sigma \;=\; \frac{\dfrac{s/2}{N\,(0\,,9\,)}}{\sqrt{T/250}} \tag{5}$$

Where,

      s = width of the spread (upper limit – lower limit)

      N = Probability as standard deviations in standardized normal distribution (z)

      T = duration of the estimation period (days)

The fact that the surveys were held on different dates and the estimation periods were unequally lengthy makes accurate volatilities difficult to calculate. Also the sample sizes for separate asset – return period combinations would be very small. For these reasons a simplified analysis is carried out. In this analysis the three investment advisor groups are pooled together and the volatilities for each asset class are calculated by averaging the individual volatilities of an asset-time combination. Student and laypeople samples are issued separately but the volatilities for each asset class are also calculated with the same method. These converted and averaged volatility estimates are compared to realized and previous volatilities.

The second set of overconfidence analyses uses a logit-regression to forecast success in picking the better performing asset. Logit-regression is a convenient way to demonstrate the effects of certain variables on a probability to succeed in a binary task. For the purpose of this study logit-regression is appropriate method to study which factors contribute to the probability that a respondent chooses the better performing asset from the two alternatives. The regression uses the binary variable of success as the response (dependent) variable. The used explanatory (independent) variables for the regression are determined based on the collected background information. In addition to background information the strength of view score is used in the regression. The main interest in the regression analysis is to study the effect of confidence (strength of view score) on performance. A negative impact on the probability to succeed would be a strong sign of overconfidence. Also the independency of success from strength of view is interpreted as overconfidence.

The statistical significance of the regression coefficients is tested using a Wald test. The Wald score is calculated using equation 6. The score is compared against a chi-square distribution.

$$w = \frac{(\hat{\theta} - \theta_0)^2}{Var(\hat{\theta})} \qquad (6)$$

Where,

$\hat{\theta}$ = the maximum likelihood estimate of an variable

θ_0 = Proposed value of the variable (0)

As the relation of confidence and success is studied and existence of overconfidence is determined based on this relation, it is important to study factors affecting confidence. For this reason an ordinary least square regression is carried. The purpose of this regression is to discover factors affecting confidence. An increase in confidence for some variable while the same variable lowers performance, indicate overconfidence. Thus the results of this OLS-regression are compared to results of the logit-regression. The regression uses the strength of view score as the response (dependent) variable for confidence. The used explanatory (independent) variables are gender, profession and the thinking style scores NFC and FI. The significance of the results is demonstrated using standard t-test.

3.2.3. Self-attribution bias

The effects self-attribution bias of are studied in two tests. Both tests measure self-attribution bias by the change in perceived certainty of success between first and second rounds. The difference is in the determination of success. First test uses individual answers whereas second test uses pooled answers for a single person.

In the first test a respondent's recollected certainty (strength of view score) of an individual task at phase 1 is compared to the given certainty to the repetition of the same task. Self-attribution bias is determined by the difference between these scores. The analysis uses recollection instead of initial strength of view score to eliminate effects of hindsight bias to this analysis. To demonstrate self-attribution bias the sample is divided into two, based on the perceived correctness of the initial answer. The logic in this is an attribute of self-attribution bias according to which people that believe to be successful attribute themselves on the success and thus increase their confidence on a repetition of the task. On the contrary people who believe to be unsuccessful may decrease their confidence on a repetition of the task. The statistical significance of these differences is calculated using a similar paired t-test as with hindsight bias analyses.

The second test is similar to the first test with exception that the respondents are categorized into four groups based on how many correct answers they believe they had on the first round. The change of confidence in each group is observed using the same method of calculating the

difference in the strength of view score between phase 1 (recollection) and phase 2. Also similarly to other tests in this study, the significance of the differences is calculated using a paired t-test.

3.2.4. Rational-experiential inventory

This section presents the rational-experiential inventory and the calculation of Need for Cognition (NFC) and Faith in Intuition (FI) scores. The calculation of the scores is based on the inventory consisting of ten statements. The answers for these statements are collected on a one to five scale. The following list shows the statements. The score to which the statement is related is reported in parenthesis after the statement. The order of the statements is randomized. The marking of (R) after the statement refers to the reverse nature of the statement.

1. Thinking hard and for a long time about something gives me little satisfaction (NFC) (R)
2. I trust my initial feelings about people (FI)
3. I prefer to do something that challenges my thinking abilities rather than something that requires little thought (NFC)
4. I believe in trusting my hunches (FI)
5. I prefer complex to simple problems (NFC)
6. I try to avoid situations that require thinking in depth about something (NFC) (R)
7. When it comes to trusting people, I can usually rely on my "gut feelings" (FI)
8. My initial impressions of people are almost always right (FI)
9. I don't like to have to do a lot of thinking (NFR) (R)
10. I can usually feel when a person is right or wrong even if I can't explain how I know (FI)

The scores are calculated using the equations 7 and 8 (subscript number refers to the question). Reversed questions naturally have negative impact on the total score. To transform the answers on a scale from -2 to +2, three is deducted from all the actual scores. The reason for this is to create a scale distributed evenly around zero.

$$NFC = -(score_1 - 3) + (score_3 - 3) + (score_5 - 3) - (score_6 - 3) - (score_9 - 3) \qquad (7)$$

$$FI = (score_2 - 3) + (score_4 - 3) + (score_7 - 3) + (score_8 - 3) + (score_{10} - 3) \qquad (8)$$

4. Results

The results section presents the results from the tests described in section 3.2. In addition to the plain presentation of the result I discuss the possible reasons behind the results and the consequences. The interconnection between the biases and possibly explanatory characteristics is also discussed. The first three subsections discuss the actual behavioral biases observed in this study. These sections are considered as the main contribution of this study. In addition the results from the psychological test are presented in the last subsection.

As investment advisors are the most important sample of this study and stock market estimates are most usual for investment advisors, separate analyses on investment advisors' stock market estimates are carried. For several of the tests, there are such extra analyses after the actual results discussion. These analyses use the same methods as the actual tests but focus on the impacts of professionals' biases on their occupation.

4.1. Hindsight bias

The effects of hindsight bias are studied in four different tests. The results of the first two tests, 'asset selection' and 'sign of return', are considered as main contribution of the hindsight bias section of this study. However results from the latter two tests, drift of return and strength of view also support the analysis of hindsight bias. The techniques used are discussed in more detail in section 3.2.1.

4.1.1. Asset selection effect

Asset selection effect refers to an attribute of hindsight bias where people remember their initial selection incorrectly in a task where they are asked to select a winner from two alternatives. Hindsight biased agents remember that they chose the winning asset even though it may not be true. In this study asset selection effect is tested by comparing the true and remembered proportions of correct answers in the asset selection tasks. Table 4 shows the results from the test. The purpose of table 4 is to show the initial selections in relation to recollected versions of the selections. Thus both true and remembered proportions of successful answers in

the asset selection tasks are shown, as well as the difference. To discover the statistical significance of the results a difference on proportions z-test is carried out. 'True' sample consists of all answers that included the selection of asset and the 'remembered' sample consists of all answers that included the selection of asset and the recollection. Thus the total sample sizes are 588 and 367. The sizes of the subsamples may vary depending on the number of rejected answers sheets.

Table 4 – Hindsight bias, asset selection effect 1/3

Table 4 reports both True and Remembered proportions of successful answers in the asset selection tasks. True refers to the actual percentage of correct answers whereas Remembered refers to the percentage of answers perceived correct in the recollection. Diff. indicates the difference between the two proportions, Remembered less True. The score of a difference on proportions z-test is reported in parentheses. The table is divided in four panels, A, B, C, and D, in which the results of partitioned sample are shown.

Panel A: Sample Partitioned Based on Profession

	Success %		Diff.
	True	Remembered	
Professionals	63 %	67 %	4 %
	(N = 166)	(N = 158)	(0,72)
Students	44 %	59 %	15 %***
	(N = 258)	(N = 107)	(2,62)
Laypeople	45 %	55 %	10 %*
	(N = 164)	(N = 102)	(1,65)

Panel B: Sample Partitioned Based on Need for Cognition Score

	Success %		Diff.
	True	Remembered	
NFC ≤ 2 (low)	52 %	65 %	14 %**
	(N = 190)	(N = 106)	(2,25)
2 < NFC < 6	51 %	59 %	8 %
	(N = 231)	(N = 165)	(1,60)
NFC ≥ 6 (high)	45 %	61 %	17 %***
	(N = 161)	(N = 96)	(2,60)

Panel C: Sample Partitioned Based on Faith in Intuition Score

	Success %		Diff.
	True	Remembered	
FI ≤ 1 (low)	53 %	56 %	3 %
	(N = 160)	(N = 111)	(0,54)
1 < FI < 5	48 %	60 %	12 %**
	(N = 229)	(N = 148)	(2,22)
FI ≥ 5 (high)	48 %	69 %	21 %***
	(N = 193)	(N = 108)	(3,49)

Panel D: Sample Partitioned Based on Gender

	Success %		Diff.
	True	Remembered	
Female	50 %	65 %	16 %***
	(N = 273)	(N = 188)	(3,32)
Male	49 %	57 %	8 %*
	(N = 312)	(N = 176)	(1,70)

Statistical significance levels: * = 10%, ** = 5%, *** = 1%

All partitions of the sample show a positive effect in change between remembered and true rate of success. However, for some partitions the difference is not statistically significant. Panel A shows the results for each respondent group. The professionals sample shows only a 4 % difference which is not statistically significant even at 10 percent significance level ($z = 0.72$). Students sample shows a 15 percent difference that is highly significant ($z = 2.62$, $p < 0.01$). Laypeople sample shows a 10 percent difference that is significant at 10 percent significance level ($z = 1.65$). Based on these results professionals seem to be the least exposed and student the most exposed group, laypeople lay in between. The fact that professionals are least exposed to asset selection effect supports the hypothesis that expertise reduces behavioral biases. However, the support is only weak as students show stronger exposure than laypeople, although the hypothesis that students possess more expertise than so called laypeople is not a strong one.

The effect of individual thinking style on asset selection effect is not unambiguous. The Need for Cognition (NFC) score, that represents analytical thinking, does not explain asset selection effect linearly. Panel B presents that both high and low NFC-score partitions show statistically significant difference between true and remembered success rates but not for the middle partition. The low 30 percent NFC sample shows a 14 percent difference that is significant at 5 percent significance level ($z = 2.25$). The middle 40 percent sample shows an 8 percent difference ($z = 1.60$). The high 30 percent sample shows a 17 percent difference that is highly significance ($z = 2.60$, $p < 0.01$). These results do not support the hypothesis that analytical thinking reduces behavioral biases.

Unlike analytical thinking, faith in intuition shows a straightforward relationship between asset selection effect and individual thinking style. Faith in Intuition (FI) score seems to explain asset selection effect linearly. Panel C shows the results from tests on sample partitioned based on FI-score. The low 30 percent FI sample shows only a 3 percent difference between true and remembered success rates. The difference is not significant even at 10 percent significance level ($z = 0.54$). The middle 40 percent sample shows a 12 percent difference that is significant at 5 percent level ($z = 2.22$). Finally the high 30 percent sample shows up to 21 percent difference that is highly significant ($z = 3.49$, $p < 0.01$). The results in panel C imply that there is a strong relationship between faith in intuition and behavioral biases.

Also a gender-effect seems to exist. Panel D shows the results partitioned by gender. The female sample shows a 16 percent difference between true and remembered success rates. The difference is highly significant ($z = 3.32$, $p < 0.01$). The respective difference for men is 8 percent which is significant at 10 percent significance level ($z = 1.70$).

Overall the results in table 4 indicate that people find themselves succeeding more often they actually do. This supports the evidence that people suffer from hindsight bias. I find that this effect represents a strong form of hindsight bias. It requires more 'I knew it all along' kind of thinking to alter one's binary choice of selection than simply adjust a linear estimate to meet the realization. The chosen asset is also more concrete and thus easier to remember than a return estimate in a number format. In a binary selection task the subject can only make a right or wrong choice.

Another issue that can be seen from table 4 is the performance of each group. The performance is measured as the percentage of total correct answers not depending whether it is correctly remembered. The professionals are correct in 63 % of tasks, students 44 % and laypeople 45 %. As simple coin toss is correct 50% of times, the only group outperforming pure randomness is the professionals group.

The results in panel A of table 4 support the hypothesis that expertise reduces behavioral biases. However the fact that students, that are hypothesized to posses more expertise than laypeople, seem to be the most exposed group raises a question on the sub-profession differences on expertise. To answer this question a further analysis on experience is also carried out. Table 5 reports the same difference between true and remembered success rates as table 4, with the exception that each of the profession samples are further partitioned based on expertise related variables.

Table 5 – Hindsight bias, asset selection effect 2/3

Table 5 reports both True and Remembered proportions of successful answers in the asset selection tasks. True refers to the actual percentage of correct answers whereas Remembered refers to the percentage of answers perceived correct in the recollection. Diff. indicates the difference between the two proportions, Remembered less True. The score of a difference on proportions z-test is reported in parentheses.

	Success %		Diff.
	True	Remembered	
Professionals			
Experience ≤ 5 years	65 %	68 %	3 %
	(N = 63)	(N = 57)	(0,39)
Experience > 5 years	62 %	66 %	4 %
	(N = 103)	(N = 101)	(0,63)
Training	69 %	69 %	-1 %
	(N = 39)	(N = 35)	(-0,06)
No Training	61 %	67 %	5 %
	(N = 127)	(N = 123)	(0,86)
Students			
Finance Major	50 %	57 %	7 %
	(N = 105)	(N = 51)	(0,86)
Own Experience	50 %	57 %	7 %
	(N = 60)	(N = 30)	(0,60)
No Own Exp.	49 %	57 %	8%
	(N = 45)	(N = 21)	(0,62)
Other Major	40 %	61 %	21 %***
	(N = 153)	(N = 56)	(2,68)
Own Experience	49 %	62 %	12 %
	(N = 65)	(N = 26)	(1,06)
No Own Exp.	33 %	60 %	27%***
	(N = 88)	(N = 30)	(2,61)
Own Experience	50 %	59 %	9 %
	(N = 125)	(N = 56)	(1,16)
No Own Experience	38 %	59 %	20 %**
	(N = 133)	(N = 51)	(2,50)
Laypeople			
Own Experience	43 %	49 %	6 %
	(N = 81)	(N = 59)	(0,70)
No Own Experience	46 %	63 %	17 %*
	(N = 83)	(N = 43)	(1,81)

Statistical significance levels: * = 10%, ** = 5%, *** = 1%

The sub-profession results of the professional sample are somewhat equal with each other and in line with the total professional sample results. The difference between true and remembered success rates for any of the four sub-groups is not statistically significant even at 10 percent significance level. A minor difference is in training variable. Those professionals who have participated in a behavioral finance seminar (prior to the survey session), show a practically 0 percent difference between true and remembered success rates ($z = -0.06$). However, the respective difference for professionals who have not participated in such seminar is 5 percent which is not significant ($z = 0.86$). Even though the observation is weak, it supports the hypothesis that expertise reduces behavioral biases.

The sub-profession results of the student and laypeople samples seem to be rather volatile for segregation based on expertise. In the student sample major of the respondent and personal investment experience seem to explain the exposure to asset selection effect well. Students studying finance as their major have a 7 percent difference between true and remembered success rates, which is not significant ($z = 0.86$). On the contrary students with other than finance major show a 21 percent difference, which is highly significant ($z = 2.68$, $p < 0.01$). In a similar vein students that have personal investment experience show a 9 percent difference, which is not significant ($z = 1.16$). Students who do not have personal investment experience show a 20 percent difference, which is significant at 5 percent significance level ($z = 2.50$). These results support the hypothesis that expertise and experience reduce behavioral biases.

Similarly to the student sample, the sub-profession results of the laypeople sample are affected by personal investment experience. Respondents that have personal investment experience show only a 6 percent difference between true and remembered success rates. This difference is not significant even at ten percent significance level ($z = 0.70$). On the contrary respondents that do not have personal investment experience show a 17 percent difference, which is significant at 10 percent significance level ($z = 1.81$). Also these results support the hypothesis that experience reduces behavioral biases.

Overall the results in table 5 support the hypothesis that expertise reduces behavioral biases. However, if expertise truly reduces behavioral biases, the hypothesis that students posses more expertise that so called laypeople cannot be accepted per se. The results in table 5 show that there are significant differences inside student and laypeople samples. This suggests that considering

exposure to behavioral biases it is meaningful if a person truly is familiar with financial context through personal investment experience or education. The group a person is otherwise categorized to is not important. Both inexperienced laypeople and students (no personal investment experience or finance major) are most exposed to asset selection effect, students being even more exposed than laypeople. To further analyze this observation the student and laypeople samples are pooled together and then divided based on personal experience. Table 6 presents these results.

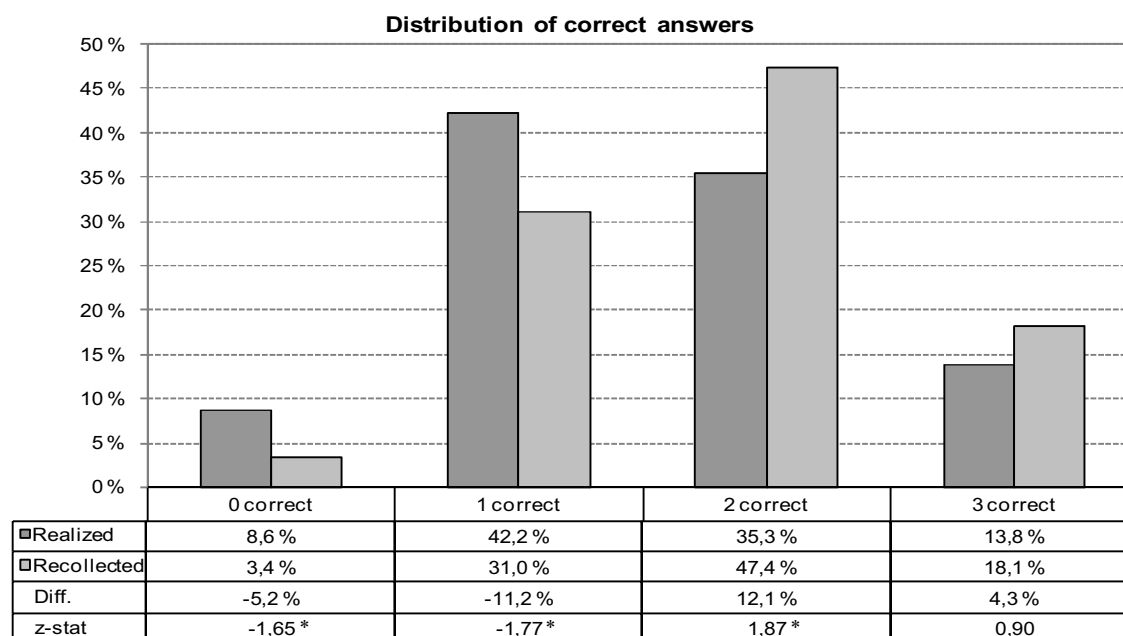**Table 6 – Hindsight bias – asset selection effect 3/3**

Table 6 reports both True and Remembered proportions of successful answers in the asset selection tasks. True refers to the actual percentage of correct answers whereas Remembered refers to the percentage of answers perceived correct in the recollection. Diff. indicates the difference between the two proportions, Remembered less True. The score of a difference on proportions z-test is reported in parentheses. The table is divided in two panels, A and B in which the results of partitioned sample are shown. To demonstrate the effects of expertise in more detail, professionals are excluded from the sample in both panels. Finance students are excluded in panel B.

Panel A: Students and Laypeople

| | Success % | | |
	True	Remembered	Diff.
Own Experience	47 %	54 %	7 %
	(N = 206)	(N = 115)	(1,17)
No Own Experience	41 %	61 %	19 %***
	(N = 216)	(N = 94)	(3,15)

Panel B: Students less finance majors and Laypeople

| | Success % | | |
	True	Remembered	Diff.
Own Experience	46 %	53 %	7 %
	(N = 146)	(N = 85)	(1,03)
No Own Experience	39 %	62 %	22 %***
	(N = 171)	(N = 73)	(3,22)

Statistical significance levels: * = 10%, ** = 5%, *** = 1%

The results of the pooled sample of students and laypeople (Panel A) present further explanation on the impact of experience on behavioral biases. People with personal investment experience show a 7 percent difference between true and remembered success rates. The

difference not significant at 10 percent significance level ($z = 1.17$). The respective difference for people without personal investment experience is 19 percent which is highly significant ($z = 3.15$, $p < 0.01$). The evidence on experience's bias reducing tendency is strong. The results in Panel B, which excludes answers of finance major students, present even stronger influence of experience. People with personal investment experience show also a 7 percent difference between true and remembered success rates. The difference not significant at 10 percent significance level ($z = 1.03$). However, people without personal investment experience show a 22 percent difference. The difference is highly significant ($z = 3.22$, $p < 0.01$). This strengthens the evidence that experience reduces behavioral biases.

Another way to observe asset selection effect is to compare the realized and recollected distributions of the total number of correct answers of an individual. The logic is that hindsight bias may affect the perceived number of correct answers and thus the recollected distribution may deviate from the realized. According to the hindsight bias hypothesis the distribution should be more tilted towards high number of correct answers. Due to the relatively low number of respondents in separate groups, this analysis is done to a pooled sample, including all respondents with all three initial answers and their recollections. 'Realized' refers to the proportion of respondents who had the respective number of correct answers. 'Recollected' refers to the proportion of respondents who perceived to have the respective number of correct answers. 'Diff.' indicates the difference between 'Realized' and 'Recollected (Recollected less Realized). To demonstrate statistical significance a difference in proportions z-test score is calculated. Figure 4 shows the results of this test.

Figure 4 – Hindsight bias, asset selection effect

Distribution of correct answers

	0 correct	1 correct	2 correct	3 correct
▫Realized	8,6 %	42,2 %	35,3 %	13,8 %
▫Recollected	3,4 %	31,0 %	47,4 %	18,1 %
Diff.	-5,2 %	-11,2 %	12,1 %	4,3 %
z-stat	-1,65 *	-1,77 *	1,87 *	0,90

As can be seen from figure 4 people tend to report a higher number of correct answers in the recollection than they actually got right. This is in line with the hypothesis and also with the results discussed above. There seems to be a verge of good and bad result between one and two correct answers. People are reluctant to recognize the fact that they have only zero or one correct answer and rather believe that they have two or three correct answers. Difference between true and believed proportions for zero correct answers is -5.2%, which is significant at ten percent significance level (z = -1.65). The respective difference for one correct answer is -11.2%, which is also significant at ten percent significance level (z = -1.77). For two correct answers the difference is positive, 12.1%. The difference is significant at ten percent level (z = 1.87). For three correct answers the difference is 4.3%, which however is not significant (z = 0.90).

4.1.2. Sign of return effect

Sign of return effect refers to an attribute of hindsight bias where people remember the sign of their initial return estimate incorrectly in a task where they are asked to predict the return of an asset. Hindsight biased agents remember that they were able to predict the sign of the return correctly even though it may not be true. Sign of return effect is tested by comparing the true proportion of correctly estimated signs of return ('True') and remembered proportion of correct sign of return ('Remembered') in return estimation task. Table 7 shows the results from the test. The purpose of table 7 is to demonstrate the difference between 'True' and 'Remembered' proportions of correctly estimated signs of return. To discover the statistical significance of the differences a difference on proportions z-test is carried out. The approach to this analysis is similar to the asset selection analysis in section 4.1.1.

The conditions for answers to be included in sign of return sample are: firstly it contains the selection of asset and the recollection; secondly it contains the return estimate and recollection in correct format; and thirdly the recollection of asset selection is equal to the initial selection. The reasons for first and second conditions are obvious, the reason for the third condition is in eliminating the asset selection effect. Thus the sample size in the first phase is 428 and 264 in the second phase. The sample consists of answers by 145 respondents.

Table 7 – Hindsight bias, sign of return effect 1/2

Table 7 reports both 'True' and 'Remembered' proportions of correct signs in the return estimation tasks. True refers to the actual percentage of correct signs of return whereas Remembered refers to the percentage of signs of return perceived correct in the recollection. Diff. indicates the difference between the two proportions, Remembered less True. The score of a difference on proportions z-test is reported in parentheses. The table is divided in four panels, A, B, C, and D, in which the results of partitioned sample are shown.

Panel A: Sample Partitioned Based on Profession

	Predicted correctly %		
	True	Remembered	Diff.
Professionals	11 %	23 %	12 %***
	(N = 166)	(N = 121)	(2,64)
Students	19 %	26 %	7 %
	(N = 145)	(N = 65)	(1,12)
Laypeople	24 %	23 %	-1 %
	(N = 117)	(N = 78)	(-0,14)

Panel B: Sample Partitioned Based on Need for Cognition Score

	Predicted correctly %		
	True	Remembered	Diff.
NFC ≤ 2 (low)	16 %	24 %	8 %
	(N = 128)	(N = 72)	(1,40)
2 < NFC < 6	18 %	22 %	4 %
	(N = 183)	(N = 129)	(0,97)
NFC ≥ 6 (high)	19 %	27 %	8 %
	(N = 113)	(N = 63)	(1,30)

Panel C: Sample Partitioned Based on Faith in Intuition Score

	Predicted correctly %		
	True	Remembered	Diff.
FI ≤ 1 (low)	16 %	17 %	1 %
	(N = 126)	(N = 87)	(0,26)
1 < FI < 5	19 %	27 %	8 %
	(N = 162)	(N = 97)	(1,44)
FI ≥ 5 (high)	17 %	28 %	11 %*
	(N = 136)	(N = 80)	(1,85)

Panel D: Sample Partitioned Based on Gender

	Predicted correctly %		
	True	Remembered	Diff.
Female	17 %	25 %	8 %*
	(N = 214)	(N = 141)	(1,84)
Male	18 %	23 %	4 %
	(N = 211)	(N = 123)	(0,94)

Statistical significance levels: * = 10%, ** = 5%, *** = 1%

All partitions of the sample, excluding laypeople, show a positive effect in change between remembered and true rate of success in estimating the sign of return. However, the differences are statistically significant only for three subsamples. Panel A shows the results for each respondent group. Interestingly professionals show the greatest difference between true and remembered success rates. The professionals sample shows a 12 % difference which is statistically highly significant ($z = 2.64$, $p < 0.01$). Students sample shows a 7 percent difference that is not significant at 10 percent significance level ($z = 1.12$). Laypeople sample shows a -1 percent difference that is not significant at 10 percent significance level ($z = -0.14$). The slightly negative difference on laypeople can be interpreted as zero. The fact that professionals seem to be the most exposed group can be partly explained by the timing of the surveys. As described in section 3.1 the market conditions were somewhat abnormal during the surveys, especially during the professionals' surveys. The realized returns of the assets in the professionals' surveys were negative in 17 out of 18 cases. The respective proportion for both students and laypeople is 1/6. This combined to the fact that most of the estimates had a positive sign (92% of professionals, 80% of students, and 91% of laypeople) makes the comparison between respondent groups difficult. The large proportion of positive signs under the prevailed market conditions is interesting itself. It most likely results from optimism bias which however is not discussed here. The incomparability of the groups does not however reduce the reliability of the finding that investment advisors seem to have a tendency to perceive themselves being able to predict signs of asset returns even though it might not be realistic.

The level of analytical thinking, measured by the Need for Cognition (NFC) score, does not explain sign of return effect linearly. Panel B shows that both high and low NFC-score partitions show higher difference between true and remembered success rates than the middle partition. However, the difference is not significant for any of the groups. The low 30 percent NFC sample shows an 8 percent difference ($z = 1.40$). The middle 40 percent sample shows a 4 percent difference ($z = 0.97$). The high 30 percent sample shows an 8 percent difference ($z = 1.30$). These results are in line with the results from the asset selection test and thus do not support the hypothesis that analytical thinking reduces behavioral biases.

In contrast to analytical thinking, faith in intuition (FI) score seems to explain sign of return effect linearly. Panel C shows the results from tests on sample partitioned based on FI-score. The

low 30 percent FI sample shows only a 1 percent difference between true and remembered success rates. The difference is not significant even at 10 percent significance level ($z = 0.26$). The middle 40 percent sample shows an 8 percent difference that is not significant at 10 percent level ($z = 1.44$). The high 30 percent sample shows an 11 percent difference that is significant at 10 percent significance level ($z = 3.49$). Even though the differences are not very significant the results in panel C support the relationship between faith in intuition and behavioral biases. The results are also in line with the results in asset selection test.

Gender seems to affect also in sign of return effect. Panel D shows the results partitioned by gender. The female sample shows an 8 percent difference between true and remembered success rates. The difference is significant at 10 percent significance level ($z = 1.84$). The respective difference for men is 4 percent which is not significant at 10 percent significance level ($z = 0.94$).

Similarly to asset selection, the results from sign of return tests indicate that people find themselves succeeding more often they actually do which supports the evidence that people suffer from hindsight bias. However, the significance is not as high as it is for asset selection effect. The surprising observation on professionals' exposure to sign of return effect is a valuable finding.

Due to the unequal timing of the surveys (described above) the effects of expertise and experience cannot be observed reliably by comparing the results of separate groups. In order to find how expertise and experience affect sign of return effect a further analysis is carried out. Table 8 reports the same difference between true and remembered success rates as table 7, with the exception that each of the profession samples are further partitioned based on expertise related variables.

Table 8 – Hindsight bias, sign of return effect 2/2

Table 8 reports both True and Remembered proportions of correct signs in the return estimation tasks. True refers to the actual percentage of correct signs of return whereas Remembered refers to the percentage of signs of return perceived correct in the recollection. Diff. indicates the difference between the two proportions, Remembered less True. The score of a difference on proportions z-test is reported in parentheses.

	Predicted correctly %		
	True	Remembered	Diff.
Professionals			
Experience $\leq$ 5 years	14 %	18 %	4 %
	(N = 63)	(N = 50)	(0,54)
Experience > 5 years	10 %	27 %	17 %***
	(N = 103)	(N = 71)	(2,97)
Training	5 %	14 %	9 %
	(N = 39)	(N = 21)	(1,22)
No Training	13 %	25 %	12 %**
	(N = 127)	(N = 100)	(2,24)
Students			
Finance Major	24 %	31 %	7 %
	(N = 72)	(N = 36)	(0,78)
Other Major	15 %	21 %	6 %
	(N = 73)	(N = 29)	(0,69)
Own Experience	22 %	24 %	3 %
	(N = 74)	(N = 29)	(0,28)
No Own Experience	17 %	28 %	11 %
	(N = 71)	(N = 36)	(1,32)
Laypeople			
Own Experience	25 %	21 %	-4 %
	(N = 64)	(N = 47)	(-0,46)
No Own Experience	23 %	26 %	3 %
	(N = 53)	(N = 31)	(0,33)

Statistical significance levels: * = 10%, ** = 5%, *** = 1%

Further analysis on experience of the professionals reveals that 'experienced' (over five year work history) investment advisors are more exposed to sign of return effect than 'inexperienced' (five years or less). The 'inexperienced' investment advisors show a 4 percent difference between true and remembered success rates, which is not significant (z = 0.54). The respective difference for 'experienced' investment advisors 17 percent, which is highly significant (z = 2.97, p < 0.01).

This is opposite to what the hypothesis suggests and due to high significance does probably not result purely from coincidence. The logic behind this finding is unclear and requires further analysis. Unfortunately, the data of this study does not enable further analysis on this issue.

The other expertise variable for investment advisors is training. Those professionals who have participated in a behavioral finance seminar (prior to the survey session), show a 9 percent difference between true and remembered success rates, which is not significant ($z = 1.22$). The respective difference for professionals who have not participated in such seminar is 12 percent which is significant at 5 percent significance level ($z = 0.86$). This supports the hypothesis that expertise reduces behavioral biases.

In the student sample major of the respondent does not explain exposure to sign of return effect. Both finance and other major students show practically similar difference between true and remembered success rates. Neither of the differences is significant. Personal investment experience seems to explain the exposure to sign of return effect moderately. Students that have personal investment experience show a 3 percent difference, which is not significant ($z = 0.28$). Students who do not have personal investment experience show an 11 percent difference, which however is not significant ($z = 1.32$). As the differences are not significant, the support of these results to the hypothesis that expertise and experience reduce behavioral biases is only weak.

The sub-profession results of the laypeople sample are weakly affected by personal investment experience. Respondents that have personal investment experience show a negative -4 percent difference between true and remembered success rates. This difference is not statistically significant ($z = -0.46$). Respondents that do not have personal investment experience show a 3 percent difference, which also is not significant ($z = 0.33$). Both differences are very close to zero and the interpretation of the negative difference is dubious. Thus the support of these results to the hypothesis that experience reduces behavioral biases is negligible.

As the professionals sample is the most important part of this study and stock market return estimation task was the most interesting for the respondents a separate analysis for these results is done. Figure 5 shows the proportions of market movement estimates from the initial estimates and from the recollection. The results in figure 5 are comparable as for all professional groups the returns of both stock markets in this study were negative.

Figure 5 – Hindsight bias, sign of return effect

Initial vs. Recollected market movement estimate
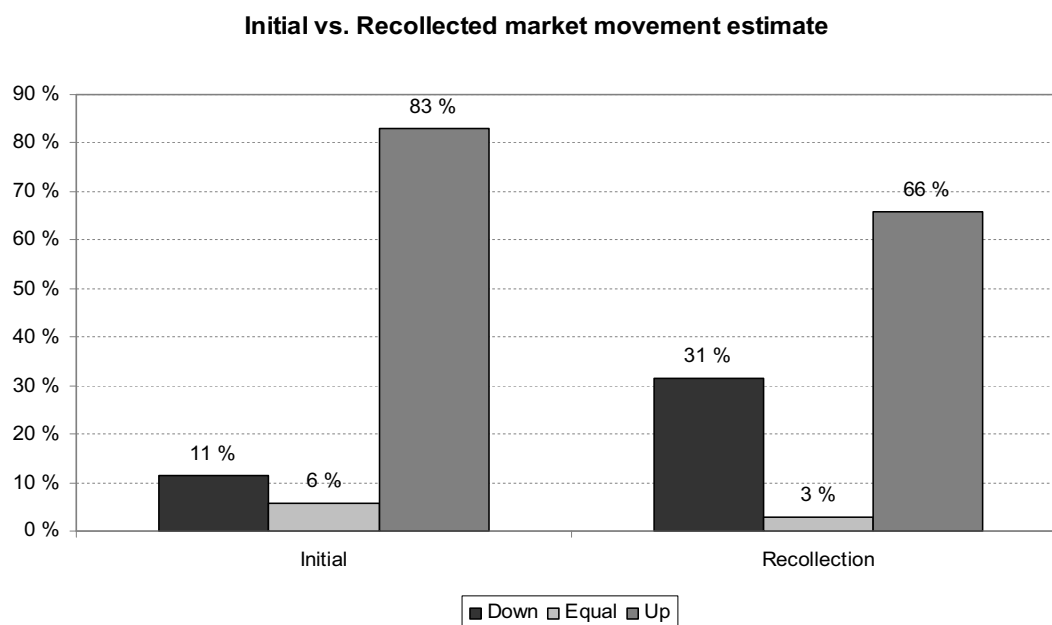
As can be seen from figure 5 only 11% of the professionals initially estimated a drop in share prices during the first return period. However, when recalled after the return period up to 31% of the professionals reported that they were able to predict the drop. Thus 20% of professionals remember that they estimated negative returns even though they actually estimated positive returns. This supports the hypothesis of hindsight bias strongly. The result is interesting; a part of investment advisors are unable to recognize that they were wrong in such a relevant issue for their profession as stock market return. This enhances their belief about their own capabilities and leads to personal overvaluation. This is very close to overconfidence and self-attribution bias. Investment advisors' false perception of themselves as good stock market predictors affects also their clients. It is easier for the clients to be convinced on the talents of the professionals if they are confident on their selves. A confidently behaving investment advisor appears more talented, which can lead the client to take too big risks based on the advices of the professional. Taking major risks most likely has serious impact on an individual's wealth.

Another interesting observation that can be made from figure 5 is the level of optimism among investment advisors. The fact that the estimates were collected during the hardest

'turbulence' in financial markets for a several years backwards makes the collection of investment advisors' optimism a valuable finding. Even in a situation that prevailed at the end of September 2008, financial market professionals report such high optimism. From the professionals 83% expected that the return of an emerging stock market (Russia or Brazil) would be positive during the next couple weeks. The realization turned out to be something else; the Russian shares dropped 45% and Brazilian 33%. Listening to an investment advisor can be hazardous to individual's wealth.

4.1.3. Drift of return

Drift of return refers to an attribution of hindsight bias which suggests that people tend to adjust their initial return estimate closer to the realization after learning the outcome. People that have estimated higher returns than actually realize tend to underestimate their initial answer when asked after revealing the realization. Similarly people who have estimated lower returns than actually realize tend overestimate their initial answer after learning the outcome. Such people are exposed to hindsight bias. To discover the exposure of the sample in this study the answers to the return estimation tasks and their recollections are observed. The sample is divided on two based on the relation between initial answers and realized return. Table 9 shows the results of this test. Both initial and recollected versions of the return estimate are reported. The exposure to hindsight bias is observed on the difference between these two figures. To demonstrate the statistical significance a paired t-test is carried out.

Table 9 – Hindsight bias, drift of return effect

Table 9 reports both initial and recollected versions of the return estimates. Hindsight bias is demonstrated as the difference between initial and recollected estimates (Recollection less Initial). The score of a paired t-test is reported in parentheses.

Panel A: Initial estimate higher than realized return

	Return estimate		
	Initial	Recollection	Diff.
Professionals	6,5%	4,8%	-1,7%*
		(N = 95)	(-1,643)
Students	7,6%	5,1%	-2,5%**
		(N = 48)	(-2,174)
Laypeople	9,3%	6,7%	-2,6%***
		(N = 46)	(-2,682)

Panel B: Initial estimate lower than realized return

	Return estimate		
	Initial	Recollection	Diff.
Professionals	-4,8%	5,8%	10,5%
		(N = 2)	(1,105)
Students	-2,0%	3,8%	5,8%*
		(N = 5)	(1,985)
Laypeople	5,2%	4,5%	-0,7%
		(N = 10)	(-0,349)

Statistical significance levels: * = 10%, ** = 5%, *** = 1%

The results in table 9 indicate that people suffer from hindsight bias. All respondent groups in panel A show statistically significant negative drift of return. This is line with the hypothesis of hindsight bias; people who have given too high estimates downgrade their perception about their initial estimate. For professionals the difference between initial and recollected return estimates (drift) is 1.7%, which is significant at 10 percent significance level ($z = -1.643$). Students show a -2.5% drift, which is significant at 5 percent significance level ($z = -2.174$). Finally laypeople show a -2.6% drift, which is highly significant ($z = -2.682$, $p < 0.01$). Also according to hindsight bias hypothesis, results in panel B are positive (or practically zero for laypeople). However the sample sizes are too small for any solid conclusions.

Similarly to sign of return analysis, the stock market estimates of investment advisor gain extra attention. To demonstrate hindsight bias the initial stock market return estimates and recollections of professionals' are observed. The results are comparable as for all professional groups the returns of both stock markets in this study were negative. Figure 6 shows the distributions of initial return estimates and recollected versions of those.

Figure 6 – Hindsight bias, drift of return effect
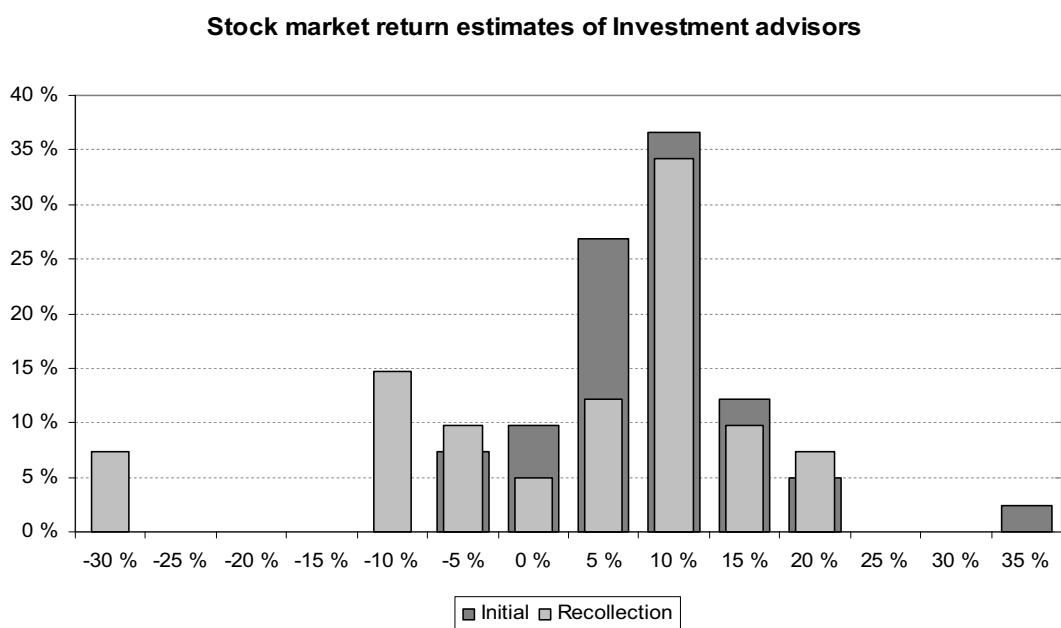

Stock market return estimates of Investment advisors

Figure 6 shows that the distribution of initial answers has positive mean (+6.9%) and is relatively concentrated around the mean (standard deviation 7.7%). Distribution of recollected answers has mean of 2.4% and standard deviation of 13.0%. Comparison between the distributions reveals that the mean of the recollected distribution is lower and the difference statistically significant (t-stat 1.92). This supports the evidence that also investment advisors suffer from hindsight bias. There are also few outliers that support hindsight bias. In initial distribution observations on high returns (+35%) exist, but not in recollection. Moreover, in recollected distribution observations on low returns (-30%) exists even though the lowest observations in initial distribution are in -5% category. The impacts of the return drift effect on the advices of the investment advisors are similar to the impacts of sign of return effect.

Investment advisors' false perceptions of stock market estimation abilities may cause their clients to take too large risks.

4.1.4. Strength of view

Another way to observe hindsight bias is to study how learning the outcome affects the perceived certainty in an estimation task. In the framework of this study this is done by asking the respondents to classify their initial confidence in selecting the better performing asset at phase 1 and also recollecting their initial level of confidence at phase 2. The change between the initial and recollected confidence is studied. To demonstrate hindsight bias the sample is divided into two groups; the ones who believe they answered correctly and the ones who believe they answered incorrectly. According to hindsight bias people who believe they answered correctly may overestimate the initial certainty and people who believe they answered incorrectly may underestimate it.

Table 10 presents initial and recollected average strength of view scores for each respondent group. The difference between panels A and B is that in panel A the sample is limited to answers where the respondent believed he/she had answered correctly whereas in panel B the sample is limited to answers where the respondent believed he/she had answered incorrectly. As described the logic in this is that the recollection may be affected by the realization of the result. The reason for using the believed answers is to eliminate the effect of falsely remembering own selection.

Table 10 – Hindsight bias, strength of view effect

Table 10 reports both initial and recollected versions of the strength of view scores. Hindsight bias is measured as the difference between initial and recollected estimates (Recollection less Initial). The score of a paired t-test is reported in parentheses. The sample is divided on two panels, A and B. Panel A includes the answers in which case the respondent believes the answer to be correct. Panel B includes the answers in which case the respondent believes the answer to be correct. The reason for the separation is in the hypothesized direction of effect.

Panel A: Asset selection believed correct

	Strength of view		Diff.
	Initial	Recollection	
Professionals	2,50	2,56	0,06
		(N = 90)	(0,52)
Students	2,95	2,77	-0,18
		(N = 56)	(-1,15)
Laypeople	2,11	2,13	0,02
		(N = 47)	(0,12)

Panel B: Asset selection believed incorrect

	Strength of view		Diff.
	Initial	Recollection	
Professionals	2,34	2,11	-0,23*
		(N = 47)	(-1,80)
Students	2,55	2,26	-0,29**
		(N = 42)	(-2,14)
Laypeople	2,39	1,79	-0,61***
		(N = 38)	(-4,07)

Statistical significance levels: * = 10%, ** = 5%, *** = 1%

As can be seen from Panel A people who find their initial selection to be correct do not show a clear tendency to overestimate the initial certainty. The results in Panel A are controversial; for professional and laypeople samples the recollected average strength of view is higher than the initial but for student sample it is lower than the initial. All of the differences are relatively close to zero and insignificant. Thus no strong conclusions can be made based on this sample. The evidence does not support the hypothesis that people who find themselves succeeding in a task increase their belief about their initial confidence in succeeding.

More interestingly people who find their initial selection to be incorrect refuse to acknowledge how confident they actually were. Unlike in Panel A the results in Panel B are not controversial. All three subsamples show a negative change in strength of view. For professionals the difference is -0.23, which is significant at 10 percent significance level (t = -1.80). For Students the difference is -0.29, significant at 5 percent level (t = -2.14). For laypeople the difference is -0.61, which is highly significant (t = -4.07, p < 0.01). The results imply that people tend to underestimate the level of certainty they showed in first phase if their selection turns out to be wrong. They are not willing to face the unpleasant truth of being wrong. The failure is easier to accept if one thinks "I just guessed" rather than if "I made a real mistake".

4.2. Overconfidence

Overconfidence is studied in two sets of tests. The first set of tests observes the 'setting too narrow limits' –effect by examining how the respondents estimate volatility. The second set of tests observes the relation between perceived confidence and actual ability to success in asset selection task. These techniques are discussed in more detail in section 3.2.2.

In the first test the exposure to overconfidence is studied by comparing the average width of the 90% confidence bounds (spread) and the rate of success in bounds setting (hit%). Table 11 presents the results of such comparison based on phase 1 answers and realized returns.

Table 11 – Overconfidence, confidence boundaries 1/2

Table 11 reports the average width of the 90% confidence bounds and the rate of success in bounds setting. The results are grouped based on asset and respondent group. The results are calculated for the answers of the first phase.

Phase 1 results	Professionals		Laypeople		Students	
	Spread	Hit %	Spread	Hit %	Spread	Hit %
Stocks	21,1 %	2,0 %	9,3 %	0,0 %	29,1 %	50,0 %
Currencies	7,2 %	26,0 %	7,4 %	12,0 %	17,9 %	35,0 %
Commodities	15,1 %	17,3 %	8,4 %	25,0 %	20,2 %	20,0 %

As the respondents were asked to set 90% confidence levels, rational answers should set the hit% close to 90%. The evidence from phase 1 is indisputable; none of the hit percentages is even close to 90%, the highest being 50%. However, the unique market condition which prevailed

during the tests must be kept in mind. For example a 45% drop in Russian stock market during about three weeks can surely be considered to belong to the unlikely 10%. Difference in market condition affects also the comparison of results between respondent groups. The returns during the professionals' surveys were much more negative than during the student survey, which explains the difference in great deal. To reduce the effect of market condition a similar analysis is carried also with phase 2 answers. Table 12 shows the same figures as table 11 from phase 2.

Table 12 – Overconfidence, confidence boundaries 1/2

Table 12 reports the average width of the 90% confidence bounds and the rate of success in bounds setting. The results are grouped based on asset and respondent group. The results are calculated for the answers of the second phase.

Phase 2 results	Professionals		Laypeople		Students	
	Spread	Hit %	Spread	Hit %	Spread	Hit %
Stocks	28,5 %	42,3 %	10,8 %	7,7 %	21,1 %	40,0 %
Currencies	8,1 %	11,5 %	8,9 %	11,5 %	14,3 %	19,0 %
Commodities	18,8 %	17,3 %	11,4 %	46,2 %	19,8 %	14,3 %

The results in table 12 are similar to table 11. The level of hit% has increased, but is still not close to 90%. A slight increase in average spread can be seen, which indicates learning. However, the change in spread is relative small for professionals and laypeople, for students it is negative. For this reason the increase results probably more from normalization of market conditions than from improved spread estimates. These results raise the question whether the low levels of hit% result from poor volatility estimation or from abnormal market condition. To answer this question, a more in-depth comparison test of volatility estimation is carried out.

In the volatility comparison test the spreads collected from the respondents are converted into volatility estimates. These converted volatility estimates are compared to different volatilities. This test uses a simplifying method of averaging volatilities, which is described in more detail in section 3.2.2. The comparison of includes seven different averaged volatility figures for each asset. These figures include two respondent estimates of volatility (return periods 1 and 2), one recollection (return period 1) and four actual volatilities for comparison purposes (return periods 1 and 2, 100 days prior to survey and long-term average). Table 13 presents the results of this comparison test.

Table 13 – Overconfidence, volatility estimation

Table 13 reports volatility estimates, recollections and actual volatilities from different phases of this study. The reported volatilities are segmented by asset (in panels A, B and C), respondent group and description. The descriptions used are: 'Normal' that refers to average long term volatility, '100d before' that refers to the volatility calculated on a 100 days period prior to the surveys, 'Estimated 1' that refers to the respondents' estimate at phase 1, 'Realized 1' is realized volatility at phase 1, 'Recollected 1' is the recollection of 'Estimate 1', 'Estimate 2' the phase 2 estimate, and 'Realized 2' realized volatility at phase 2

Panel A: Stocks

	'Normal'	100d before	Estimated 1	Realized 1	Recollected 1	Estimated 2	Realized 2
Professionals	47%	53%	21%	132%	25%	25%	75%
Students	47%	73%	34%	118%	20%	15%	69%
Laypeople	47%	83%	10%	98%	11%	12%	61%

Panel B: Currencies

	'Normal'	100d before	Estimated 1	Realized 1	Recollected 1	Estimated 2	Realized 2
Professionals	7%	6%	7%	13%	9%	7%	18%
Students	7%	7%	19%	13%	15%	11%	18%
Laypeople	7%	8%	8%	16%	11%	9%	19%

Panel C: Commodities

	'Normal'	100d before	Estimated 1	Realized 1	Recollected 1	Estimated 2	Realized 2
Professionals	24%	36%	15%	56%	18%	16%	59%
Students	24%	41%	23%	59%	17%	16%	63%
Laypeople	24%	43%	10%	62%	11%	12%	62%

As can be seen from table 13 estimated volatilities are generally lower than actual volatilities. For certain combinations of asset and respondent group the gap between estimated and realized volatility is wide. Professionals, who most likely are most involved with volatility in real life, underestimate the volatilities of stocks and commodities compared to the 'normal' volatilities. Only with currency return estimates professionals estimate volatility close to the 'normal' volatility. The results of the professionals' support overconfidence and the 'setting too narrow confidence limits' effect. The fact that volatilities prior to the surveys ('100d before')

were above their normal level strengthens the support of volatility underestimation of professionals. Even though professionals are aware of increased volatility, they are unable to give realistic volatility estimates compared even to normal, not prevailing, volatility.

Volatility learning of professionals is almost negligible. After learning the realized volatility, and the insufficiency of their phase 1 estimates, professionals generally do not increase their estimated volatility, and may in fact lower it ('Estimated 2' is compared to 'Recollected 1' to exclude possible effect of hindsight bias). Results in tables 11 and 12 show that professionals increase their spread estimated from phase 1 to phase 2 by a small margin. However, they are unable to recognize the increased length of estimation period (see table 1) and thus the estimated volatilities remain at same or even at lower level. Professionals also have a slight tendency to overestimate their initial volatility estimates at the recollection ('Estimated 1' compared to 'Recollected 1'). This is interpreted to be in line with the hypothesis of hindsight bias as the estimated volatilities were too low compared to the realized ones.

Although underestimating volatility professionals are still able to adjust their volatility estimates based on the asset. This separates them from the other respondents. The volatility estimates of students at phase 1 are relatively high for all assets. This is rational for stocks and commodities but not for currencies. The fact that all volatility estimates of students are relatively high indicates that students have apprehended that volatility estimates ought to be high but are not able to indentify normal volatilities of separate assets. The adjustment of volatility of students between phase 1 and phase 2 is irrational. Students lower their volatility estimates from phase 1 to phase 2, even though the phase 1 estimates were generally insufficient. In other words, the somewhat realistic estimates of phase 1 are not carried along to phase 2 and thus phase 2 estimates of students are underestimated. Conversely to professionals, students underestimate their initial volatility estimates at the recollection. This is opposite to the hypothesis of hindsight bias. Overall, results of the student sample do not make much sense. This might indicate that students actually are not very familiar with volatility and thus behave in an inconsistent manor with volatility.

Laypeople systematically report too low volatility estimates and are also poor to adjust their estimates based on asset. Even though volatility underestimation is usually considered to indicate overconfidence, this might not be the case here. Majority of the laypeople in this study are not

very familiar with volatility and confidence boundaries. Thus it is likely that their too low volatility estimates result from poor understanding rather than overconfidence. Despite of this, the finding that laypeople underestimate volatility is valuable. Underestimation of volatility leads to poor investment decision regardless of the source of it. Learning of laypeople is negligible; the is practically no difference between believed initial (i.e. recollected) phase 1 and phase 2 estimates. Also the difference between true initial and recollected estimates is almost nonexistent. These observations support the explanation that most laypeople do not understand volatility and confidence boundaries very well and thus are unable to process questions including those.[5]

The overall conclusion on the results of table 13 is that people in general are unable to give realistic volatility estimates by setting 90% confidence boundaries. The estimates given are systematically too low. Learning of volatility is also weak; after learning the insufficiency of their prior estimates, people tend to increase their estimates, but almost invariably not enough. The results also imply that the professionals are the only that truly understand volatility; students and laypeople (as a group) report such results that indicate poor knowledge on volatility. Results in table 12 are in line with the results in tables 11 and 12.

Also for volatility estimation analysis, the professionals' stock market estimates are highlighted. The ability of investment advisors to estimate volatility is studied by comparing their estimated volatilities with realized ones. This analysis uses a similar structure than table 13, but presents the results in a graphic form.

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[5] The intuition of the author is in line with this.

Figure 7 – Overconfidence, volatility estimation

Professionals' stock market volatility estimation
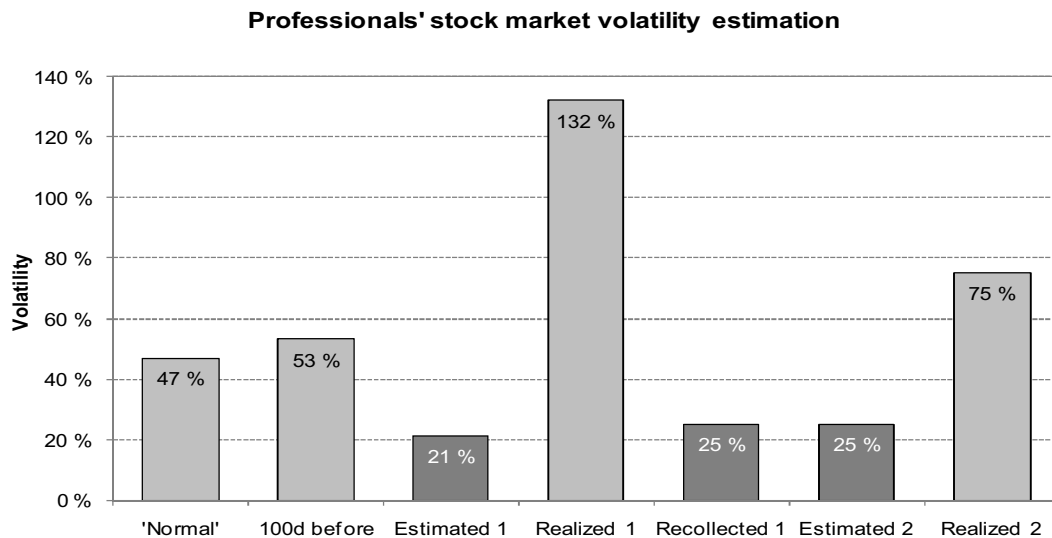
Results in figure 7 are in line with the results in table 13; investment advisors underestimate volatility by a wide margin. The estimated volatility for return period 1 is significantly lower than 'normal' or prevailing (100d before) volatility. Volatility learning is also poor; estimated volatility for return period 2 is equal to the respondents' perceived period 1 volatility (i.e. recollected). The difference between the initial and recollected volatility is slightly positive, which is line with the hypothesis of hindsight bias.

When interpreting the results of figure 7, it should be noticed that the 'normal' refers to the average volatilities of Brazilian and Russian stock market. The 'normal' annual long term volatility of U.S. stock market is significantly lower, about 15%[6]. It might be that investment advisors are simply unable to devolve the information that emerging markets are riskier than developed markets, which they surely agree on, to their volatility estimates. Even so, the finding that investment advisors underestimate volatility and are unable to learn is valuable. The fact that it holds also for stock market estimates affects the quality of investment advisors' advices to their customers. As even the professionals are not able to assess risk in proper way, it is almost impossible for the clients who have faith in the abilities of their advisors. The fact that investment advisor are unaware of their tendency to underestimate volatility prevents them from controlling

[6] Dow Jones Industrials Average Price Index between 2.1.1951 and 6.8.2009

their advices. As a result, clients of investment advisors are not able to realize the prevailing risks of their investments and take too much risk compared to their true risk profile.

The second aspect of overconfidence studied is the relation between confidence and performance. To measure overconfidence the average strength of view score and the percentage of successful answers are reported. To compare overconfidence between groups, the results are grouped based on background information. According to the hypothesis of overconfidence the groups with high strength of view score relative to success% suffer from overconfidence. These respondents have overestimated their confidence of selecting the better performing asset compared to their true ability to do that. Table 14 shows the results of this comparison test.

Table 14 – Overconfidence, confidence-performance 1/3

Group	Strength of view	Success%
Investment advisor	2,44	63 %
Investment advisor, women	2,40	70 %
Investment advisor, men	2,54	53 %
Investment advisor, <=5 exp	2,27	65 %
Investment advisor, >5 exp	2,55	62 %
Investment advisor, training	2,28	69 %
Investment advisor, no training	2,49	61 %
Laypeople	2,12	45 %
Laypeople, women	1,99	37 %
Laypeople, men	2,30	55 %
Laypeople, commercial	2,15	41 %
Laypeople, technical	2,14	42 %
Student	2,92	44 %
Student, women	2,83	39 %
Student, men	2,96	46 %
Student, finance major	2,75	50 %
Student, other major	3,03	40 %
Women	2,38	50 %
Men	2,73	49 %
NFC Q1	2,50	47 %
NFC Q2	2,61	60 %
NFC Q3	2,49	47 %
NFC Q4	2,68	45 %
FI Q1	2,37	53 %
FI Q2	2,85	49 %
FI Q3	2,43	48 %
FI Q4	2,73	46 %
All	**2,56**	**49 %**

As can be seen from table 14, there are significant differences between respondent groups both in strength of view and success. In this simplified analysis overconfidence is measured by the relation of confidence (strength of view) and success. Combination of high confidence and low success indicates overconfidence. The group with highest degree of overconfidence with this measure is students with a major other than finance (3.03 / 40%). The lowest degree is on investment advisors who have participated in behavioral finance training before (2.28 / 61%). In order to find out the relation between confidence and performance, the individual groups of table 14 are charted on a two dimensional graph with success rate on y-axis and strength of view on x-axis. To demonstrate the relation a regression slope is also drawn. Figure 8 shows the results.

Figure 8 – overconfidence, confidence-performance 1/2

Confidence & Succes rate by group
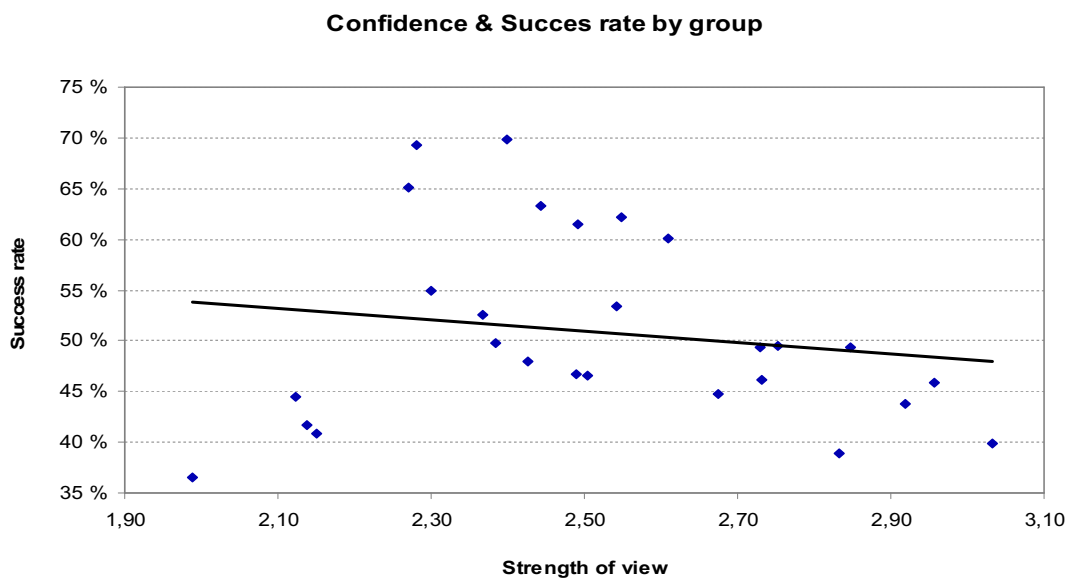
The fact that there seems to be negative correlation between strength of view and success rate, for grouped results at least, implies strong overconfidence. A reliable observation that people who are more confident are more prone to fail would be highly valuable. As the results in figure 7 are for groups of people, it does not necessarily mean that the correlation of confidence and success for individual people would be negative. The results in figure 8 may also indicate that certain groups on average are more overconfident than others. Even so, it is a valuable finding to discover which groups of people are more overconfident than others. The fact that
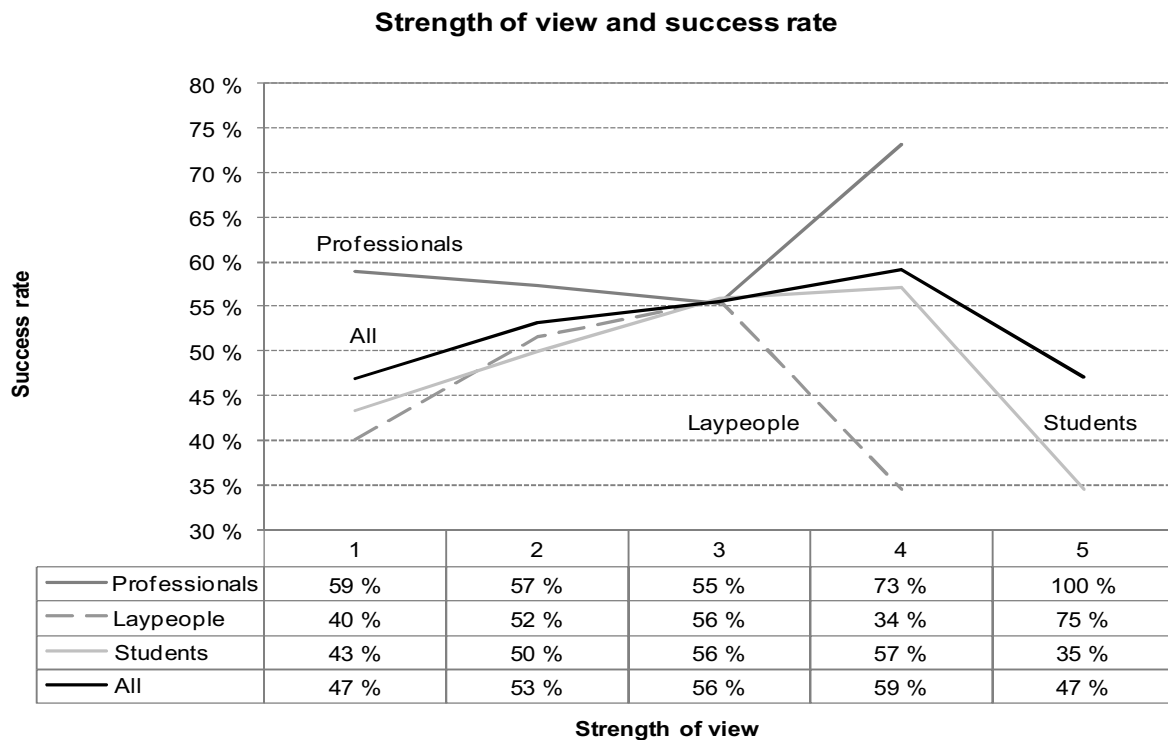
results in figure 8 allow the possibility that confidence might be negatively correlated with success, calls for more analysis on the relation of confidence and success rate. For this purpose the sample of asset selection answers is divided into five subgroups based on the announced strength of view. The performance of each subgroup is then studied. Table 15 shows the rate of correct answers grouped by the strength of view. Figure 9 shows the same information than table 15 in graphical form.

Table 15 – Overconfidence, confidence-performance 2/3

Table 15 reports the proportion of correct answers within the sample in question. The sample is divided based on the reported strength of view score (1-5). The results are reported for the whole sample ('All') as well as for separate respondent groups. Figures in parentheses are the numbers of answers, n

Strength of view	Professionals	Laypeople	Students	All
1	59% (78)	40% (95)	43% (83)	47% (256)
2	57% (87)	52% (91)	50% (70)	53% (248)
3	55% (83)	56% (43)	56% (77)	56% (203)
4	73% (67)	34% (29)	57% (105)	59% (201)
5	100% (4)	75% (4)	35% (26)	47% (34)

Figure 9 – overconfidence, confidence-performance 2/2

Strength of view and success rate

	1	2	3	4	5
Professionals	59 %	57 %	55 %	73 %	100 %
Laypeople	40 %	52 %	56 %	34 %	75 %
Students	43 %	50 %	56 %	57 %	35 %
All	47 %	53 %	56 %	59 %	47 %

The results in table 15 and figure 9 are somewhat incoherent; there is no clear relation between strength of view and success rate. For all respondents the correlation between confidence and success rate there seems to be positive between strength of view score one to four. People that have been the most confident, strength of view score five, have equally low success rate than people with the lowest confidence, strength of view score one. Thus the shape of the 'confidence-success curve' seems to be concave. However, there are differences between respondent groups in the shape of the curve. For students the shape is similar to the all respondents' curve. Also the shape of the laypeople curve is similar to the all respondents' curve but with the exception that success decreases already at strength of view score four. Laypeople with strength of view score five are not included in the analysis due to the low n (4). For professionals the shape of the 'confidence-success curve' is opposite to the other groups; it seems to be convex. Success of professionals slightly decreases from strength of view score one to three but increases strongly in strength of view score four (and five). Strength of view score five is however not included in the analysis due to the low n (4). The differences between respondent groups imply that the relation of confidence and performance might be unequal for different groups of people.

As the results in table 15 and figure 9 do not offer reliable general explanation on the relation of confidence and performance more analysis is required. In order to discover the true relation between confidence and performance a more sophisticated test is carried out. Table 16 shows the results of the logit-regression described in section 3.2.2. The purpose of the regression is to forecast success in picking the better performing asset. Main interest in the regression is to study the effect of confidence (strength of view score) on performance. A negative impact on the probability to succeed would be a strong sign of overconfidence. Also the independency of success from strength of view is interpreted as overconfidence. In addition to the full sample regression, each respondent group is studied separately to observe the possibly different relation of confidence and performance.

Table 16 – Overconfidence, confidence-performance 3/3

Table 16 reports the results from the logit-regression. The regression uses the binary variable of success as the response variable. The explanatory variables are based on the collected background data and are different for each sample. Marking (d) after the name of a variable means that the variable is a dummy. The table is divided into four panels, each for separate sample. Panel A reports the results of the full sample, panel B of professional sample, panel C of student sample and panel D of laypeople sample. 'Estimate' refers to the estimate of maximum likelihood, and 'Pr > ChiSq' to the statistical significance of the estimate.

Panel A: Full sample

	Estimate θ	Wald Chi-Square	Pr > ChiSq
Strength of View	0,12	4,61	0,03**
Faith in Intuition	-0,03	1,33	0,25
Need for Cognition	-0,01	0,06	0,80
Male (d)	-0,10	0,51	0,48
Professional (d)	0,46	7,80	<0,01***
Laypeople (d)	-0,08	0,20	0,65

Panel B: Professionals

	Estimate	Wald Chi-Square	Pr > ChiSq
Strength of View	0,24	4,52	0,03**
Faith in Intuition	-0,05	1,24	0,27
Need for Cognition	0,01	0,02	0,89
Experience	0,00	0,02	0,88
Male (d)	-0,90	10,94	<0,01***
Training (d)	0,14	0,24	0,62

Panel C: Students

	Estimate	Wald Chi-Square	Pr > ChiSq
Strength of View	0,07	0,59	0,44
Faith in Intuition	-0,04	0,90	0,34
Need for Cognition	0,02	0,32	0,57
Male (d)	0,09	0,13	0,71
Investment experience (d)	0,31	1,85	0,17
Finance major (d)	0,05	0,04	0,83

Panel D: Laypeople

	Estimate	Wald Chi-Square	Pr > ChiSq
Strength of View	0,10	0,52	0,47
Faith in Intuition	-0,03	0,40	0,52
Need for Cognition	-0,01	0,05	0,83
Male (d)	0,34	1,68	0,19
Investment experience (d)	0,14	0,27	0,60
Believed expertise	-0,11	0,33	0,56

Statistical significance levels: * = 10%, ** = 5%, *** = 1%

Despite the findings in earlier sections of this study, there seems to be positive correlation between confidence and performance. Individual people that are more confident are more likely to succeed. In the whole sample regression an increase in the strength of view score increases the probability of success (θ = 0.12). The increase is significant at five percent significance level (w = 4.61). Another significant variable affecting the probability of success is the professional dummy variable; being a professional increases the probability of success (θ = 0.46). The increase is highly significant (w = 7.80, p < 0.01). This implies that professionals outperform other people in financial market related winner selection tasks. The impact of faith in intuition (FI) score on success seems to be negative; increase in FI-score decreases the probability of success (θ = -0.03). The decrease, however, is not significant (w = 1.33).

In the sub-sample regressions strength of view has a positive impact on the probability of success for all respondent groups. The impact for professionals is highest (θ = 0.24), significant at the five percent significance level (w = 4.52). For students (θ = 0.07) and for laypeople (θ = 0.10), the impact is lower, neither being significant. This implies that the effect of confidence in success is higher for professionals than other people. Thus investment advisors seem to be less overconfident that other people.

In addition to strength of view there was only a few other factors affecting the probability of success that have any explanatory power. The most important of these factors is gender of a professional; being a male investment advisor decreases the probability of success compared to the female colleagues (θ = -0.90). The difference is highly significant (w = 10.94, p < 0.01). Gender plays role for laypeople also, but on the opposite direction. Male laypeople have higher probability to succeed (θ = 0.34), the difference however is not significant (w = 1.68). For students, personal investment experience has a positive impact on success. Students that have made personal stock market investments have higher probability of success than students that have not made such investments (θ = 0.31). The difference is not significant (w = 1.87).

Even though the relation between confidence and performance seems to be positive, factors affecting confidence are important. An increase in confidence for some variable might indicate overconfidence. This holds if the same variable decreases probability of success (table 16). To further investigate overconfidence an ordinary least square regression explaining strength of view

is conducted. The purpose of the regression is to discover factors affecting confidence. Table 17 shows the results of the regression. The results are compared to the results of table 16.

Table 17 – overconfidence, confidence

Table 17 reports the results from the OLS-regression. The regression uses the strength of view score as the response (dependent) variable for confidence. The used explanatory (independent) variables are gender, profession and the thinking style scores NFC and FI. The significance of the results is demonstrated using standard t-test.. Marking (d) after the name of a variable means that the variable is a dummy. 'Estimate' refers to the estimate of regression coefficient, and 'Pr > t-stat' to the statistical significance of the estimate.

	Estimate β	t-stat	Pr > t-stat
Faith in Intuition	0,06	3,54	<0,01***
Need for Cognition	0,00	0,12	0,91
Male (d)	0,24	2,29	0,02**
Professional (d)	-0,40	-3,31	<0,01***
Laypeople (d)	-0,79	-6,39	<0,01***

Statistical significance levels: * = 10%, ** = 5%, *** = 1%

Results in table 17 show that several variables have significant impact on confidence. Higher faith in intuition (FI-score) increases confidence ($\beta = 0.06$). The increase is highly significant, (t = 3.54, p < 0.01). This combined with the fact that the impact of FI-score on success is negative, although not significant (table 16), indicates that people with high FI-score are overconfident. As the effect of analytical thinking is not significant either for confidence or success, no conclusion on that can be made. Males report higher confidence than woman ($\beta = 0.24$), the difference is also significant at 5 percent significance level (t = 2.29). In addition men report lower success than women, which indicates that men are more overconfident than women. However, the success variable (in table 16) is not significant, and thus no strong conclusions can be made.

The impact of the professional dummy variable on confidence is strong ($\beta = -0.40$). Professionals are less confident than the base group, students. The difference is highly significant (t = -3.31, p < 0.01). Moreover, the impact of the professional dummy on success is strong ($\theta = 0.46$) and highly significant (w = 7.80, p < 0.01). This indicates strongly that the difference is overconfidence between professionals and students is wide. Professionals are much less overconfident than students. The effect of the laypeople dummy on confidence is also strong ($\beta = -0.79$) and highly significant (t = -6.39, p < 0.01). Laypeople are less confident than students. The

effect of laypeople dummy on success is slightly negative (θ = -0.08), but not significant. Thus the results indicate that laypeople are less overconfident than students. The difference, however, is not as significant as between professionals and students.

4.3. Self-attribution bias

Self-attribution bias is studied in two tests. Both tests measure self-attribution bias by the change in perceived certainty of success between first and second rounds. The difference is in the determination of success. First test uses individual answers whereas second test uses pooled answers for a single person. The techniques used are discussed in more detail in section 3.2.3.

The first test bases on an attribution of self-attribution bias according to which people who believe they have succeeded in a winner selection task attribute themselves on the success. As a result of this, such people overestimate their own capability and become more confident. Similarly people who believe they failed in a winner selection task attribute themselves on the failure and become less confident. To demonstrate self-attribution bias the sample of asset selection answers of this study is divided into two sub-samples based on the believed correctness. Self-attribution bias is measured by the change in strength of view score between the rounds. Table 18 presents the results. To demonstrate the statistical significance a paired t-test is carried.

Table 18 – Self-attribution bias, individual answers test

Table 18 reports both the recollected phase 1 and phase 2 strength of view scores. Self-attribution bias is measured by the difference between these (Phase 2 less Phase 1). The score of a paired t-test is reported in parentheses. The sample is divided on two panels, A and B. Panel A includes the answers in which case the respondent believes the answer to be correct. Panel B includes the answers in which case the respondent believes the answer to be correct. The reason for the separation is in the hypothesized direction of effect.

Panel A: Asset selection believed correct

	Strength of view		
	Phase 1 (recollection)	Phase 2	Diff.
Professionals	2,50	2,68	0,18*
	(N = 90)		(1,666)
Students	2,74	2,80	0,06
	(N = 50)		(0,401)
Laypeople	2,09	2,14	0,05
	(N = 44)		(0,443)

Panel B: Asset selection believed incorrect

	Strength of view		
	Phase 1 (recollection)	Phase 2	Diff.
Professionals	2,07	2,11	0,04
	(N = 45)		(0,350)
Students	2,21	2,10	-0,10
	(N = 39)		(-1,071)
Laypeople	1,90	1,90	-
	(N = 39)		(-)

Statistical significance levels: * = 10%, ** = 5%, *** = 1%

Results in table 18 indicate that people suffer from self-attribution bias. People who believe they have succeeded do increase their confidence after learning the outcome. This holds especially for professionals, who show a 0.18 points increase in strength of view (measured on scale 1 to 5). The difference is statistically significant at ten percent significance level ($t = 1.67$). Also students and laypeople show an increase in confidence but these differences are not significant at the ten percent significance level. Overall results in panel A are in line with the hypothesis. These results also suggest that professionals suffer the most of self-attribution bias, which is against the hypothesis that expertise reduces behavioral biases.

The other test of self-attribution bias uses the overall success of a respondent. The test is based on an attribution of self-attribution bias that people who have successful in the past attribute themselves on success. As a result successful people overestimate their own capability and become more confident. To observe hindsight bias the sample is divided into four sub-samples based on the perceived number of correct answers at phase 1. The change in strength of view is studied. Table 19 presents the results. To demonstrate the statistical significance a paired t-test is carried. Figure 10 shows the same information as table 19 but in graphical form.

Table 19 – Self-attribution bias, person level test

Table 17 reports both the recollected phase 1 and phase 2 strength of view scores. Self-attribution bias is measured by the difference between these (Phase 2 less Phase 1). The score of a paired t-test is reported in parentheses. The sample is divided by the perceived number of correct answers at phase 1. The reason for the separation is in the hypothesized direction of effect.

	Strength of view		
	Phase 1 (recollection)	Phase 2	Diff.
No. of Correct Answers = 0	1,67	1,89	0,22
	(N = 3)		(1,000)
No. of Correct Answers = 1	2,26	2,06	-0,19*
	(N = 31)		(-1,871)
No. of Correct Answers = 2	2,28	2,47	0,19*
	(N = 40)		(1,831)
No. of Correct Answers = 3	2,62	2,82	0,20
	(N = 15)		(0,731)
Statistical significance levels: * = 10%, ** = 5%, *** = 1%			

Figure 10 – Self-attribution bias, person level test

Change in streght of view between rounds
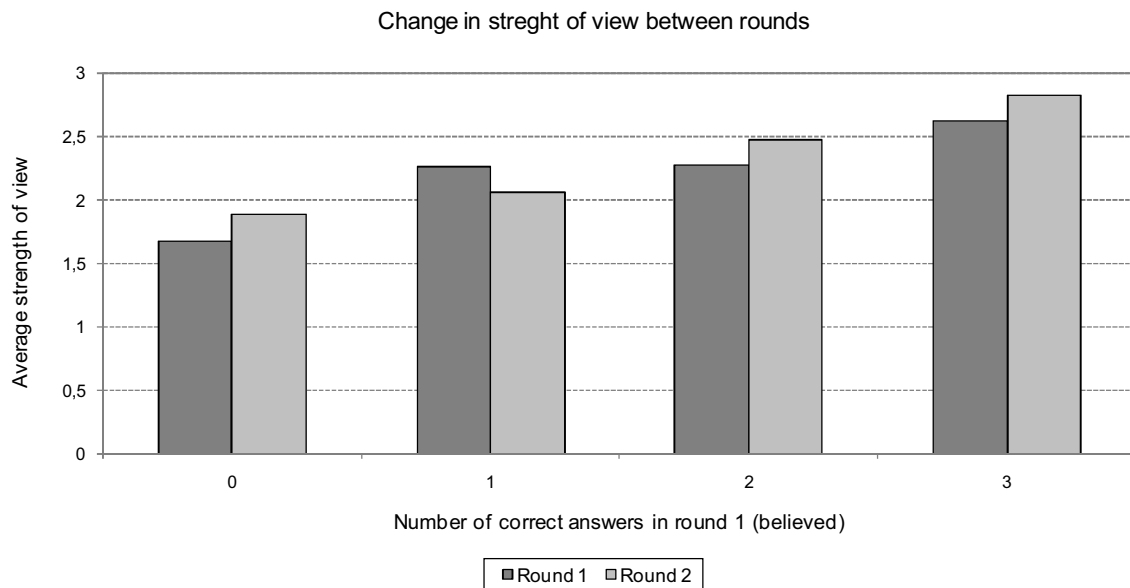
The results in table 19 and figure 10 imply that people suffer from self-attribution bias. Similarly to the analysis of hindsight bias (see figure 4) there seems to be a verge of good and bad result between one and two correct answers. Reflecting to this the changes in confidence are in line with the hypothesis for all sub-samples, besides zero correct answers. Moreover, the n for zero correct answers is too small (3) for any reliable analysis. People who believe they had only one correct answer decrease their strength of view score by 0.19. The decrease is significant at ten percent significance level (t = -1.87). Likewise, people who believe they have two correct answers increase their strength of view by 0.19, which is also significant at ten percent significance level (t = 1.83). People who believe they have all three correct, increase their strength of view by 0.20. This increase, however, is not significant (t = 0.73). Overall, the results in table 19 and figure 10 support the existence of self-attribution bias; people who are successful in the past become more confident.

4.4. Cognitive-experiential self-theory

The last section of the results section discusses the answers collected in the rational-experiential inventory. The main reason to include a test of individual thinking in the survey was to provide explanatory data for the tests of behavioral biases. However, the results of the rational-experiential inventory are interesting per se. The purpose here is to compare individual thinking styles of the different respondent groups of this study. For this purpose the sample is divided into several sub-samples based on the background variables collected in the surveys. Table 20 presents the average scores of the rational-experimental test. Need for Cognition (NFC) refers to the level of analytical thinking (higher NFC score, more analytical way to think). Faith in Intuition (FI) naturally refers to the faith in intuition (higher FI score, more faith that own intuition is correct).

Table 20 – Individual thinking

Group	NFC	FI	n
Investment advisor	3,16	2,79	56
Investment advisor, women	2,57	3,43	35
Investment advisor, men	4,30	1,70	20
Laypeople	4,11	3,87	53
Laypeople, women	3,81	3,77	31
Laypeople, men	4,38	3,95	21
Laypeople, commercial	3,82	4,05	22
Laypeople, technical	4,25	3,75	20
Student	3,75	2,53	89
Student, women	3,29	2,79	28
Student, men	3,97	2,41	61
Student, finance major	4,71	1,86	35
Student, other major	3,13	2,96	54
Women	3,19	3,35	94
Men	4,12	2,59	102
All	**3,68**	**2,96**	**198**

As can be seen from table 20, there are significant differences between respondent groups in individual thinking. Probably the most interesting finding is that investment advisors on average are the least analytical people of the sample. However, there is a severe gender effect in analytical thinking of the professionals; male professionals rank third of all subgroups whereas female professionals rank last. Overall men are more analytical than woman but the difference for other respondent groups is not as strong. Within the student sample, major of the respondent seems to affect analytical thinking strongly. Finance students are the most analytical subgroup whereas students with other major rank second last in analytical thinking. Male students are somewhat more analytical than female students. Differences within the laypeople sample are not as strong as within professional and student samples. Men seem to be more analytical than women and people with technical education seem to be more analytical than people with commercial education.

Differences in faith in intuition are generally in line with the analytical thinking results and thus with the hypothesis. People that have high analytical thinking are expected to have low faith in intuition. This hypothesis holds for professionals and students but not for laypeople. Laypeople report high scores both in analytical thinking and faith in intuition. A two dimensional graph (Figure 11) demonstrate this effect; faith in intuition is in y-axis and analytical thinking in x-axis.
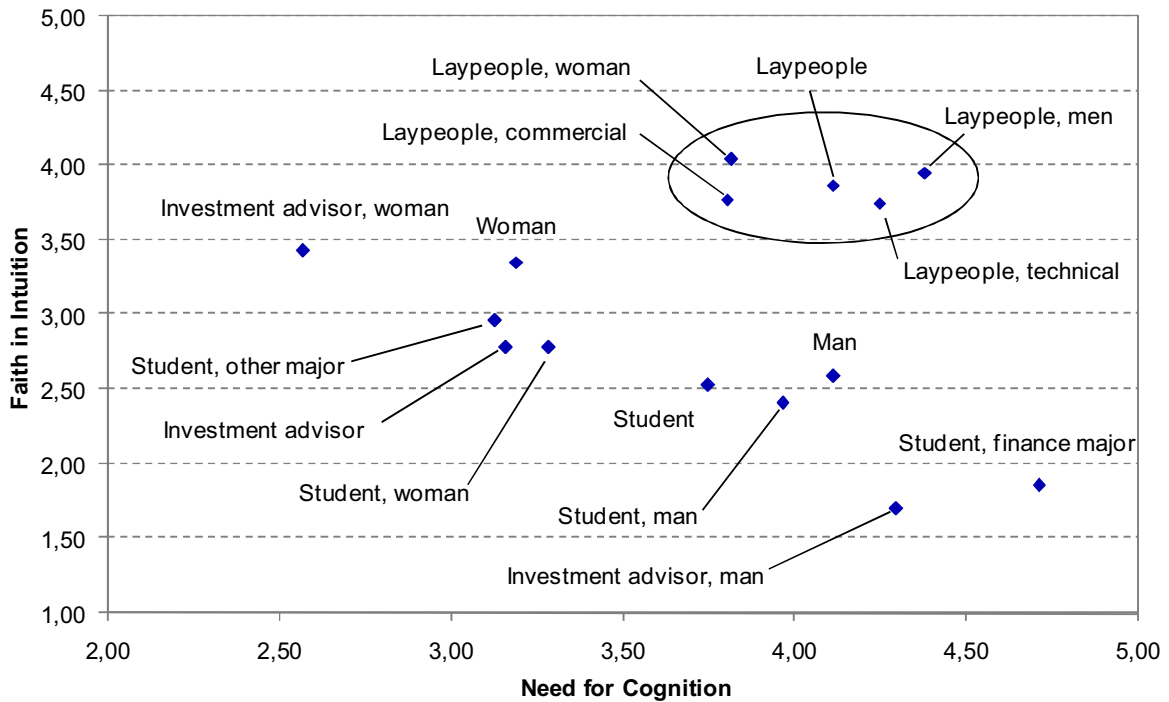
Figure 11 – Individual thinking

Figure 11 clearly shows the incoherence of laypeople thinking measures compared to other people. Laypeople report higher faith in intuition scores than any other subgroup even though this is not justified with low analytical thinking. One possible explanation for the effect could link to overconfidence. The questions in the rational-experiential inventory are composed in a way that if a respondent for some reason believes that performance is measured based on those answers, he/she might overestimate own performance by skewing own answers towards the perceived good performance. An example is better to clarify this logic; in the question of statement: "My initial impressions of people are almost always right", it is relatively easy to mentally connect good performance to a high score. Thus overconfident people, that believe to be good performers, tend to report high scores. The statements measuring faith in intuition, like the one above, could follow this logic. However, tests of overconfidence in this study do not support this; laypeople are generally not reported to have the highest degree of overconfidence. For this reason no strong conclusions about the high faith in intuition of laypeople can be made.

5. Conclusions

This section summarizes the empirical study of this thesis and concludes the results. In addition, this section discusses the implications of the results. The purpose of the thesis is to study three behavioral biases; hindsight bias, overconfidence, and self-attribution bias. To study these biases an empirical study is carried out. The purpose of the empirical study is to answer the following research questions:

1. How does the hindsight bias affect the ex-post conception of the ex-ante expectation?
   - Do investment advisors suffer from hindsight bias?
   - Does expertise reduce the hindsight bias?
   - What characteristics affect the severity of hindsight bias?

2. How does the overconfidence affect the setting of confidence limits?
   - Do investment advisors set too narrow confidence limits?
   - Does expertise reduce overconfidence?
   - What characteristics affect the severity of overconfidence?

3. How does the self-attribution bias affect confidence in repeated tasks?
   - Do investment advisors adjust their confidence based on the results?
   - Does expertise reduce the self-attribution bias?
   - What characteristics affect the severity of self-attribution bias?

The empirical study of this thesis uses a controlled field survey to collect data for the tests. The survey is carried for three separate groups of people; financial professionals, university students and employees of an engineering company. The structure of the survey is two-phased, which enables studying the three biases. The biases are studied by comparing observations from different phases of the surveys to each other. Hindsight bias is observed by differences between initial answers and the recollections. Overconfidence is studied using initial answers and realized results. Analyses of self-attribution bias use initial answers from first and second round.

The results on hindsight bias suggest that all people, including investment advisors, suffer from it. People tend to perceive their initial performance better than it actually is, after learning the outcome. The tests of this study show that people tend to overestimate their initial capability to choose the better performing asset from two alternatives or estimate the return of an asset, after learning the realization. People tend to underestimate their initial confidence if they find out they have been unsuccessful. Investment advisors are in general less exposed to hindsight bias than other people. Thus expertise is interpreted to reduce hindsight bias. However, investment advisors have the strongest tendency to exaggerate their initial ability to predict asset returns, after learning the realization. The exaggeration reinforces with experience.

The results on overconfidence imply that people are overconfident. The evidence on the 'setting too narrow limits' effect is strong. All respondent groups on average report much lower success percentages than the required confidence boundaries. This indicates overconfidence. Moreover, the results imply that people systematically underestimate volatility and the learning of volatility is poor. The differences on overconfidence are significant between groups of people. In general people with more expertise are less confident compared to their true capabilities. Professionals outperform other people with lower level of confidence, which indicates lower overconfidence.

The results on self-attribution bias indicate that people suffer from it. People who believe they have been successful in a task on initial round increase their confidence to the second round. Thus they attribute their selves on the success, which is in line with self-attribution bias. Opposite to the hypothesis that expertise reduces behavioral biases, investment advisors are the most exposed to self-attribution bias.

The results of individual thinking style indicate that certain characteristics affect the exposure to behavioral biases. The results show that people with high faith in intuition are in general more exposed to behavioral biases. However, people with high level of analytical thinking are not less exposed. This is against the hypothesis that people with high cognitive abilities are less exposed. The analytical thinking and faith in intuition scores of the professional are generally relatively close to whole sample averages. However, there is significant difference in thinking styles between male and female investment advisors. Female professionals have high faith in intuition and low analytical thinking. Male professionals on the contrary have low faith in

intuition and high analytical thinking. The gender effect for the professionals is stronger than for other people.

The exposure to any of the studied biases alone deteriorates decision making. However, the biases are not independent to each other. The exposure to either hindsight or self-attribution bias is likely to increase overconfidence. This results from the hindering of learning both these biases cause. Moreover, hindsight and self-attribution bias also reinforce each other. Thus the joint impact of hindsight and self-attribution bias on overconfidence is strong. Firstly, hindsight bias leads people to perceive their behavior as optimal and secondly self-attribution bias excessively enforces their confidence due to the perception of optimal behavior. As a result, people that have actually performed poorly become overconfident as they falsely attribute themselves on good performance. The fact that both hindsight bias and self-attribution bias lead to overconfidence has serious impacts on the financial decisions of clients depending on the advices of investment advisors. As investment advisors are exposed to these biases, their advices for their clients are not optimal. As a result, their clients end up making decisions that might be hazardous to their wealth. However, knowledge about behavioral biases seems to reduce investment advisors biases. This highlights the importance of training.

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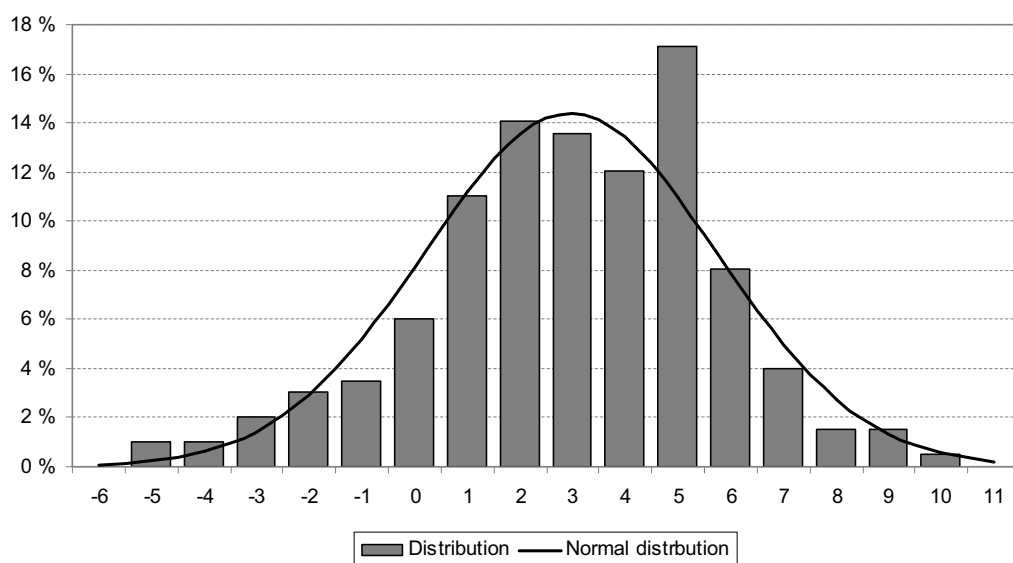
7. Exhibits

7.1. Distributions of thinking style scores

This section includes the distributions of the individual thinking style scores, NFC and FI.

Distribution of Need for Cognition Score
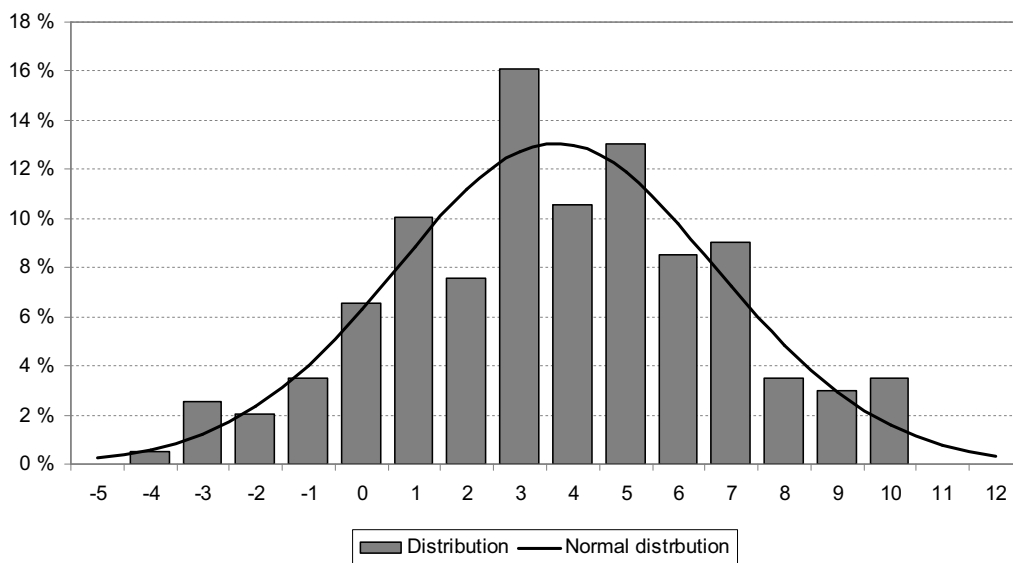
Distribution of Faith in Intuition Score

7.2. Regression statistics

This section includes the statistics of the regressions on this thesis.

7.2.1. Logit-regression, full sample

Model Fit Statistics		
Criterion	**Intercept Only**	**Intercept and Covariates**
AIC	1284.599	1276.241
SC	1289.432	1310.072
-2 Log L	1282.599	1262.241

Analysis of Maximum Likelihood Estimates					
Parameter	**DF**	**Estimate**	**Standard Error**	**Wald Chi-Square**	**Pr > ChiSq**
Intercept	1	-0.1537	0.2241	0.4705	0.4928
Strenght of view	1	0.1248	0.0581	4.6125	0.0317
NFC	1	-0.00577	0.0227	0.0644	0.7997
FI	1	-0.0291	0.0252	1.3297	0.2489
Male	1	-0.1031	0.1444	0.5104	0.4750
Professional	1	0.4613	0.1652	7.7984	0.0052
Laypeople	1	-0.0803	0.1783	0.2027	0.6526

7.2.2. Logit-regression, professionals sample

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	418.727	414.703
SC	422.473	440.926
-2 Log L	416.727	400.703

Analysis of Maximum Likelihood Estimates					
Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	0.3586	0.4004	0.8021	0.3705
Male	1	-0.9011	0.2724	10.9443	0.0009
Strength of view	1	0.2397	0.1126	4.5291	0.0333
Experience	1	-0.00252	0.0170	0.0219	0.8823
Training	1	0.1442	0.2930	0.2421	0.6227
NFC	1	0.00608	0.0428	0.0202	0.8870
FI	1	-0.0527	0.0474	1.2368	0.2661

7.2.3. Logit-regression, students sample

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	500.966	507.994
SC	504.852	535.196
-2 Log L	498.966	493.994

Analysis of Maximum Likelihood Estimates					
Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	-0.3853	0.3234	1.4192	0.2335
Strength of view	1	0.0663	0.0865	0.5886	0.4430
Finance major	1	0.0485	0.2366	0.0420	0.8377
Male	1	0.0933	0.2544	0.1343	0.7140
Inv. Experience	1	0.3082	0.2268	1.8474	0.1741
NFC	1	0.0219	0.0388	0.3173	0.5732
FI	1	-0.0370	0.0390	0.9017	0.3423

7.2.4. Logit-regression, laypeople sample

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	354.088	362.313
SC	357.629	387.102
-2 Log L	352.088	348.313

Analysis of Maximum Likelihood Estimates					
Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	-0.1758	0.4176	0.1771	0.6739
Strength of view	1	0.0964	0.1342	0.5161	0.4725
Male	1	0.3449	0.2660	1.6821	0.1946
Expertise	1	-0.1120	0.1942	0.3324	0.5642
Inv. Experience	1	0.1410	0.2711	0.2704	0.6031
NFC	1	-0.00973	0.0445	0.0477	0.8272
FI	1	-0.0332	0.0526	0.3973	0.5285

7.2.5. OLS-regression

Regression Statistics	
Multiple R	0,31277622
R Square	0,09782896
Adjusted R Square	0,08997033
Standard Error	1,17047615
Observations	580

ANOVA

	df	SS	MS	F	Significance F
Regression	5	85,274	17,055	12,449	0,000
Residual	574	786,388	1,370		
Total	579	871,662			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	2,584	0,125	20,722	0,000	2,339	2,829
Professional (d)	-0,404	0,122	-3,314	0,001	-0,643	-0,165
Laypeople (d)	-0,794	0,124	-6,385	0,000	-1,038	-0,550
Male (d)	0,239	0,104	2,286	0,023	0,034	0,444
NFC	0,002	0,016	0,115	0,908	-0,030	0,034
FI	0,063	0,018	3,537	0,000	0,028	0,099

7.3. Questionnaire sheets

This section includes the questionnaire sheets used in the field surveys. The order of the questionnaires is:

1. professional group 1, phase 1
2. professional group 1, phase 2
3. professional group 2, phase 1
4. professional group 2, phase 2
5. professional group 3, phase 1
6. professional group 3, phase 2
7. student group, phase 1
8. student group phase 2
9. laypeople group, phase 1
10. laypeople group, phase 2

HSE

Sukupuoli: Nainen ☐ Mies ☐

Ikä: 18-24 ☐ 25-29 ☐ 30-34 ☐ 35-39 ☐ 40-44 ☐ 45-49 ☐ 50-54 ☐ 55-59 ☐ 60-65 ☐

Kuinka monta vuotta olet ollut töissä tekemisissä rahoitus/sijoitusasioiden kanssa? _____

Tunniste (puhelinnumeron 4 viimeistä numeroa): _____

Olen osallistunut aiemmin Markku Kaustian pitämään koulutukseen/esitykseen? Kyllä ☐   Ei ☐

Vastaa seuraaviin väittämiin ympyröimällä parhaiten itseäsi kuvaava vaihtoehto asteikolla täysin eri mieltä (1) – täysin samaa mieltä (5)

Jonkin asian ajatteleminen pitkään ja hartaasti tuottaa minulle vain vähän tyydytystä	1 2 3 4 5
Luotan alkuperäisiin tunteisiini ihmisistä	1 2 3 4 5
Teen mieluummin ajatteluani haastavia asioita kuin jotain vain vähän ajattelua vaativaa	1 2 3 4 5
Luotan omiin vaistoihini	1 2 3 4 5
Pidän enemmän monimutkaisista kuin yksinkertaisista ongelmista	1 2 3 4 5
Yritän välttää tilanteita, jotka vaativat syvällistä ajattelua	1 2 3 4 5
Ihmisten luotettavuuden arvioinnissa voin yleensä luottaa omaan intuitiooni	1 2 3 4 5
Ihmisistä muodostamani ensivaikutelmat ovat lähes aina oikeita	1 2 3 4 5
En halua joutua tekemään paljoa ajatustyötä	1 2 3 4 5
Voin yleensä tuntea jos joku on oikeassa tai väärässä, vaikka en voikaan selittää sitä	1 2 3 4 5

Seuraavassa osiossa esitetään kolmen kohdeparin kehitys viimeiseltä 12 kuukaudelta. Tehtäväsi on valita parista periodilla 26.9 – 17.10 paremmin menestyvä kohde, luokitella näkemyksesi voimakkuus, ennustaa paremmin kehittyvän kohteen tuotto periodilla sekä asettaa sellaiset raja-arvot, millä välillä kohteen tuotto periodilla on 90% todennäköisyydellä.

Venäläiset vs. Brasilialaiset osakkeet

Loppuperiodilla paremmin menestyy, ympyröi

Venäjä   Brasilia

Varmuus ennusteen osumisesta, ympyröi

Puhdas arvaus   1 2 3 4 5   Vahva näkemys

Ennuste voittajan tuotosta, %   _____

Yläraja voittajan tuotolle, %   _____

Alaraja voittajan tuotolle, %   _____

EUR-SEK vs. EUR-GBP

Loppuperiodilla paremmin menestyy, ympyröi

EUR-SEK   EUR-GBP

Varmuus ennusteen osumisesta, ympyröi

Puhdas arvaus   1 2 3 4 5   Vahva näkemys

Ennuste voittajan tuotosta, %   _____

Yläraja voittajan tuotolle, %   _____

Alaraja voittajan tuotolle, %   _____

Öljy vs. Kulta

Loppuperiodilla paremmin menestyy, ympyröi

Öljy   Kulta

Varmuus ennusteen osumisesta, ympyröi

Puhdas arvaus   1 2 3 4 5   Vahva näkemys

Ennuste voittajan tuotosta, %   _____

Yläraja voittajan tuotolle, %   _____

Alaraja voittajan tuotolle, %   _____

Kiitos osallistumisestasi!

HSE

Tutkimuksen ensimmäisessä vaiheessa pyysimme teitä valitsemaan periodilla 26.9.2008 – 17.10.2008 paremmin menestyvät kohteet kolmesta parista, ennustamaan paremmin kehittyvien kohteiden tuotot periodilla sekä asettamaan tuotoille 90% varmuutta vastaavat raja-arvot. Alla näet kohteiden toteutuneet tuotot (paremmin menestynyt kohde ympyröity).

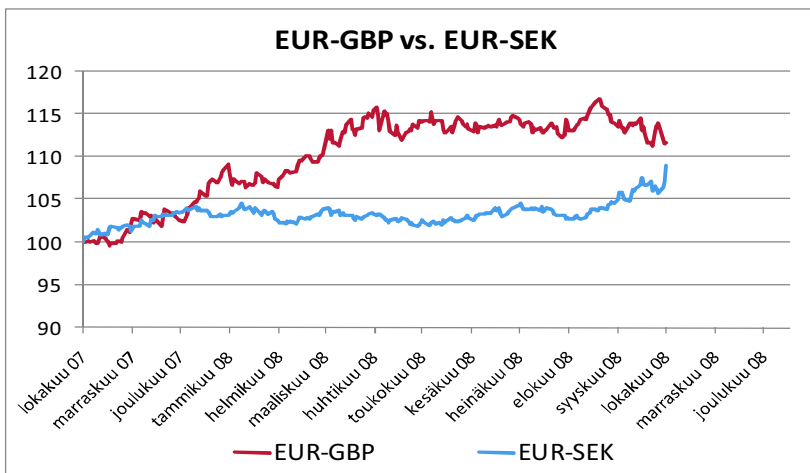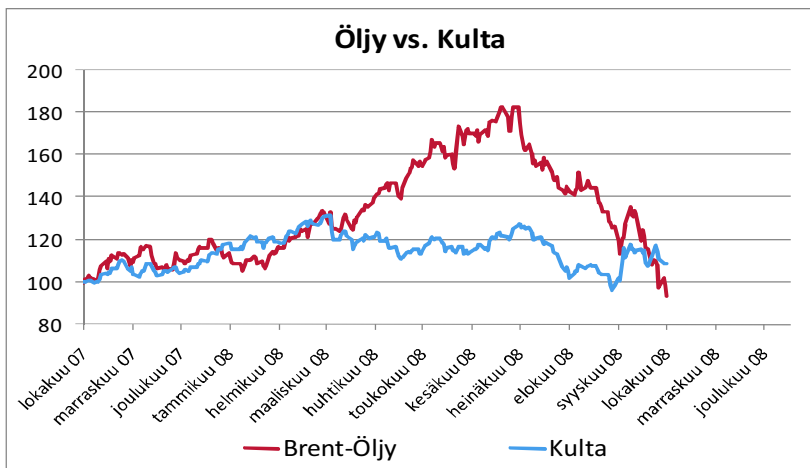Venäläiset osakkeet, tuotto: Brasilialaiset osakkeet, tuotto:

SEK, tuotto: GBP, tuotto:

Öljy, tuotto: Kulta, tuotto:

Palauta nyt mieleesi edellisellä kerralla tekemäsi valinnat sekä antamasi arviot. Tehtäväsi on täyttää edellisellä kerralla antamasi vastaukset alla oleviin laatikoihin.

Valintani paremmin menestyväksi kohteesta, ympyröi	Venäjä Brasilia
Varmuus ennusteen osumisesta, ympyröi	Puhdas arvaus 1 2 3 4 5 Vahva näkemys
Ennuste voittajan tuotosta, % _____	
Yläraja voittajan tuotolle, % _____	Alaraja voittajan tuotolle, % _____

Valintani paremmin menestyväksi kohteesta, ympyröi	SEK GBP
Varmuus ennusteen osumisesta, ympyröi	Puhdas arvaus 1 2 3 4 5 Vahva näkemys
Ennuste voittajan tuotosta, % _____	
Yläraja voittajan tuotolle, % _____	Alaraja voittajan tuotolle, % _____

Valintani paremmin menestyväksi kohteesta, ympyröi	Öljy Kulta
Varmuus ennusteen osumisesta, ympyröi	Puhdas arvaus 1 2 3 4 5 Vahva näkemys
Ennuste voittajan tuotosta, % _____	
Yläraja voittajan tuotolle, % _____	Alaraja voittajan tuotolle, % _____

Seuraavassa osiossa esitetään kolmen kohdeparin kehitys viimeiseltä 12 kuukaudelta. Tehtäväsi on valita parista periodilla 21.10.2008 – 31.12.2008 paremmin menestyvä kohde, luokitella näkemyksesi voimakkuus, ennustaa paremmin kehittyvän kohteen tuotto periodilla sekä asettaa sellaiset raja-arvot, millä välillä kohteen tuotto periodilla on 90% todennäköisyydellä.

Venäläiset vs. Brasilialaiset osakkeet

Loppuperiodilla paremmin menestyy, ympyröi

Venäjä   Brasilia

Varmuus ennusteen osumisesta, ympyröi

Puhdas arvaus   1 2 3 4 5   Vahva näkemys

Ennuste voittajan tuotosta, %   _____

Yläraja voittajan tuotolle, %   _____

Alaraja voittajan tuotolle, %   _____

EUR-GBP vs. EUR-SEK

Loppuperiodilla paremmin menestyy, ympyröi

SEK   GBP

Varmuus ennusteen osumisesta, ympyröi

Puhdas arvaus   1 2 3 4 5   Vahva näkemys

Ennuste voittajan tuotosta, %   _____

Yläraja voittajan tuotolle, %   _____

Alaraja voittajan tuotolle, %   _____

Öljy vs. Kulta

Loppuperiodilla paremmin menestyy, ympyröi
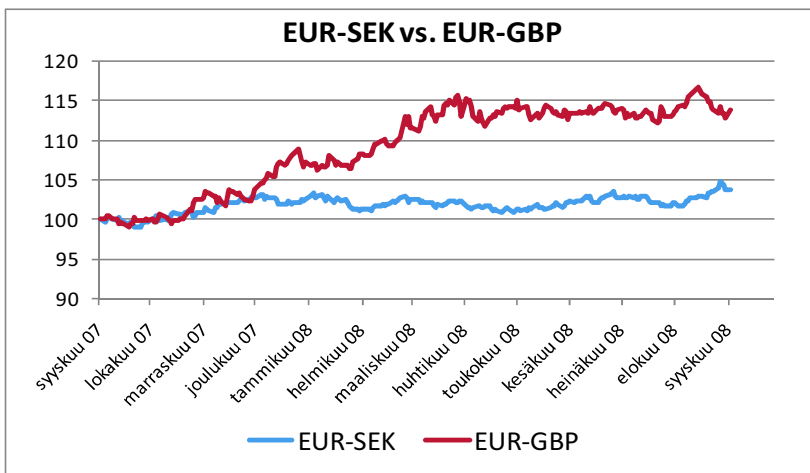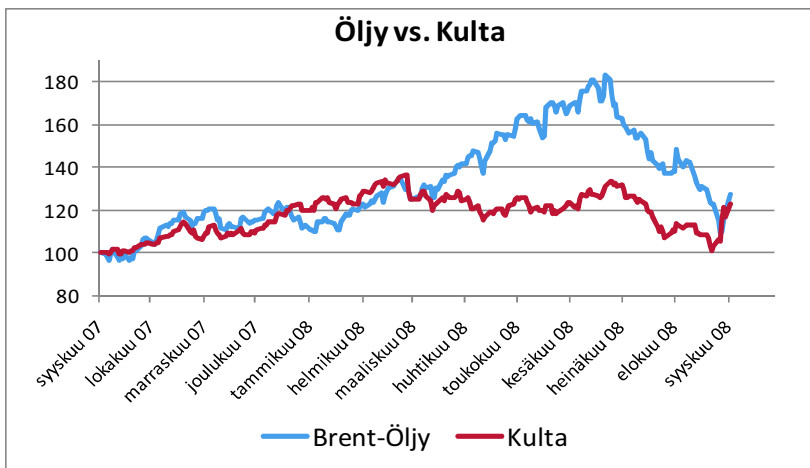
Öljy   Kulta

Varmuus ennusteen osumisesta, ympyröi

Puhdas arvaus   1 2 3 4 5   Vahva näkemys

Ennuste voittajan tuotosta, %   _____

Yläraja voittajan tuotolle, %   _____

Alaraja voittajan tuotolle, %   _____

Kiitos osallistumisestasi!

Sukupuoli: Nainen ☐   Mies ☐

Ikä: 18-24 ☐   25-29 ☐   30-34 ☐   35-39 ☐   40-44 ☐   45-49 ☐   50-54 ☐   55-59 ☐   60-65 ☐

Kuinka monta vuotta olet ollut töissä tekemisissä rahoitus/sijoitusasioiden kanssa? _____

Tunniste (puhelinnumeron 4 viimeistä numeroa): _____

Olen osallistunut aiemmin Markku Kaustian pitämään koulutukseen/esitykseen?   Kyllä ☐   Ei ☐

Vastaa seuraaviin väittämiin ympyröimällä parhaiten itseäsi kuvaava vaihtoehto asteikolla täysin eri mieltä (1) – täysin samaa mieltä (5)

Jonkin asian ajatteleminen pitkään ja hartaasti tuottaa minulle vain vähän tyydytystä	1 2 3 4 5
Luotan alkuperäisiin tunteisiini ihmisistä	1 2 3 4 5
Teen mieluummin ajatteluani haastavia asioita kuin jotain vain vähän ajattelua vaativaa	1 2 3 4 5
Luotan omiin vaistoihini	1 2 3 4 5
Pidän enemmän monimutkaisista kuin yksinkertaisista ongelmista	1 2 3 4 5
Yritän välttää tilanteita, jotka vaativat syvällistä ajattelua	1 2 3 4 5
Ihmisten luotettavuuden arvioinnissa voin yleensä luottaa omaan intuitiooni	1 2 3 4 5
Ihmisistä muodostamani ensivaikutelmat ovat lähes aina oikeita	1 2 3 4 5
En halua joutua tekemään paljoa ajatustyötä	1 2 3 4 5
Voin yleensä tuntea jos joku on oikeassa tai väärässä, vaikka en voikaan selittää sitä	1 2 3 4 5

Seuraavassa osiossa esitetään kolmen kohdeparin kehitys viimeiseltä 12 kuukaudelta. Tehtäväsi on valita parista periodilla 30.9 – 28.10 paremmin menestyvä kohde, luokitella näkemyksesi voimakkuus, ennustaa paremmin kehittyvän kohteen tuotto periodilla sekä asettaa sellaiset raja-arvot, millä välillä kohteen tuotto periodilla on 90% todennäköisyydellä.

Venäläiset vs. Brasilialaiset osakkeet

Loppuperiodilla paremmin menestyy, ympyröi

Venäjä   Brasilia

Varmuus ennusteen osumisesta, ympyröi

Puhdas arvaus   1 2 3 4 5   Vahva näkemys

Ennuste voittajan tuotosta, %   _____

Yläraja voittajan tuotolle, %   _____

Alaraja voittajan tuotolle, %   _____

EUR-SEK vs. EUR-GBP

Loppuperiodilla paremmin menestyy, ympyröi

EUR-SEK   EUR-GBP

Varmuus ennusteen osumisesta, ympyröi

Puhdas arvaus   1 2 3 4 5   Vahva näkemys

Ennuste voittajan tuotosta, %   _____

Yläraja voittajan tuotolle, %   _____

Alaraja voittajan tuotolle, %   _____

Öljy vs. Kulta

Loppuperiodilla paremmin menestyy, ympyröi

Öljy   Kulta

Varmuus ennusteen osumisesta, ympyröi

Puhdas arvaus   1 2 3 4 5   Vahva näkemys

Ennuste voittajan tuotosta, %   _____

Yläraja voittajan tuotolle, %   _____

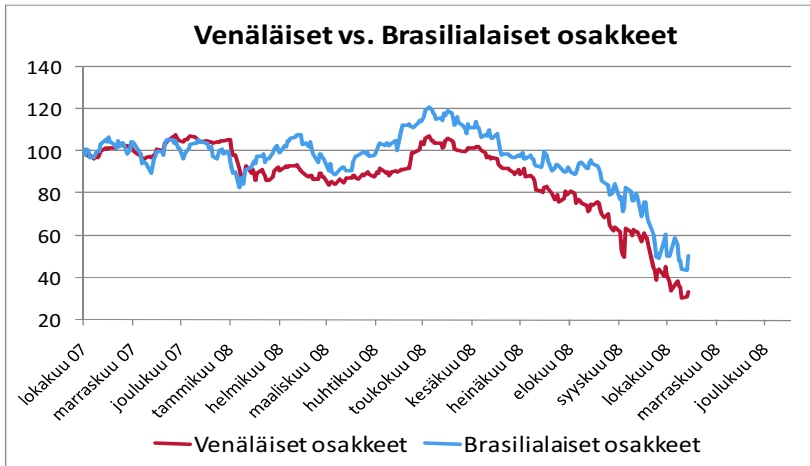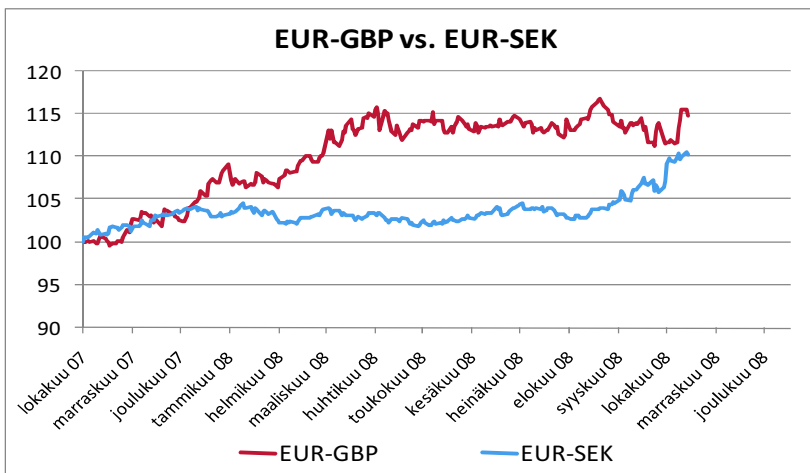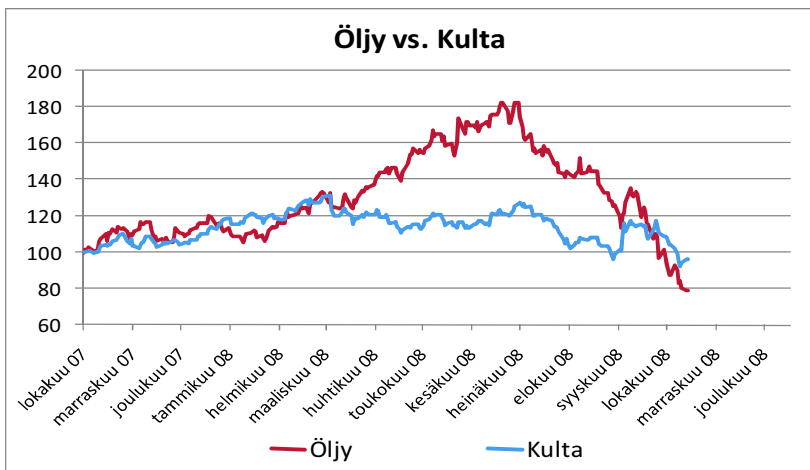Alaraja voittajan tuotolle, %   _____

Kiitos osallistumisestasi!

HSE

Tunniste (puhelinnumeron 4 viimeistä numeroa): _____

Tutkimuksen ensimmäisessä vaiheessa pyysimme teitä valitsemaan periodilla 30.9.2008 – 28.10.2008 paremmin menestyvät kohteet kolmesta parista, ennustamaan paremmin kehittyvien kohteiden tuotot periodilla sekä asettamaan tuotoille 90% varmuutta vastaavat raja-arvot. Alla näet kohteiden toteutuneet tuotot (paremmin menestynyt kohde ympyröity).

Venäläiset osakkeet, tuotto: -45%   Brasilialaiset osakkeet, tuotto: -34%

SEK, tuotto: -2,4%   GBP, tuotto: -1,5%

Öljy, tuotto: -37%   Kulta, tuotto: -16%

Palauta nyt mieleesi edellisellä kerralla tekemäsi valinnat sekä antamasi arviot. Tehtäväsi on täyttää edellisellä kerralla antamasi vastaukset alla oleviin laatikoihin. On tärkeää, että vastaat vaikka et tarkasti muistaisikaan omia vastauksiasi. Tarvittaessa arvioi/päättele omat aiemmat vastauksesi. Luokittele myös se, kuinka hyvin muistat vastauksesi.

Valintani paremmin menestyväksi kohteesta, ympyröi	Venäjä Brasilia
Varmuus ennusteen osumisesta, ympyröi	Puhdas arvaus 1 2 3 4 5 Vahva näkemys
Ennuste voittajan tuotosta, % _____	
Yläraja voittajan tuotolle, % _____	Alaraja voittajan tuotolle, % _____

Valintani paremmin menestyväksi kohteesta, ympyröi	SEK GBP
Varmuus ennusteen osumisesta, ympyröi	Puhdas arvaus 1 2 3 4 5 Vahva näkemys
Ennuste voittajan tuotosta, % _____	
Yläraja voittajan tuotolle, % _____	Alaraja voittajan tuotolle, % _____

Valintani paremmin menestyväksi kohteesta, ympyröi	Öljy Kulta
Varmuus ennusteen osumisesta, ympyröi	Puhdas arvaus 1 2 3 4 5 Vahva näkemys
Ennuste voittajan tuotosta, % _____	
Yläraja voittajan tuotolle, % _____	Alaraja voittajan tuotolle, % _____

Muistan hyvin huonosti   1 2 3 4 5   Muistan erittäin tarkasti

Seuraavassa osiossa esitetään kolmen kohdeparin kehitys viimeiseltä 12 kuukaudelta. Tehtäväsi on valita parista periodilla 31.10.2008 – 31.12.2008 paremmin menestyvä kohde, luokitella näkemyksesi voimakkuus, ennustaa paremmin kehittyvän kohteen tuotto periodilla sekä asettaa sellaiset raja-arvot, millä välillä kohteen tuotto periodilla on 90% todennäköisyydellä.

Venäläiset vs. Brasilialaiset osakkeet

— Venäläiset osakkeet   — Brasilialaiset osakkeet

Loppuperiodilla paremmin menestyy, ympyröi

Venäjä   Brasilia

Varmuus ennusteen osumisesta, ympyröi

Puhdas arvaus   1 2 3 4 5   Vahva näkemys

Ennuste voittajan tuotosta, %   _____

Yläraja voittajan tuotolle, %   _____

Alaraja voittajan tuotolle, %   _____

EUR-GBP vs. EUR-SEK

— EUR-GBP   — EUR-SEK

Loppuperiodilla paremmin menestyy, ympyröi

SEK   GBP

Varmuus ennusteen osumisesta, ympyröi

Puhdas arvaus   1 2 3 4 5   Vahva näkemys

Ennuste voittajan tuotosta, %   _____

Yläraja voittajan tuotolle, %   _____

Alaraja voittajan tuotolle, %   _____

Öljy vs. Kulta

— Öljy   — Kulta

Loppuperiodilla paremmin menestyy, ympyröi

Öljy   Kulta

Varmuus ennusteen osumisesta, ympyröi

Puhdas arvaus   1 2 3 4 5   Vahva näkemys

Ennuste voittajan tuotosta, %   _____

Yläraja voittajan tuotolle, %   _____

Alaraja voittajan tuotolle, %   _____

Kiitos osallistumisestasi!

Sukupuoli: Nainen [ ]   Mies [ ]

Ikä: 18-24 [ ]   25-29 [ ]   30-34 [ ]   35-39 [ ]   40-44 [ ]   45-49 [ ]   50-54 [ ]   55-59 [ ]   60-65 [ ]

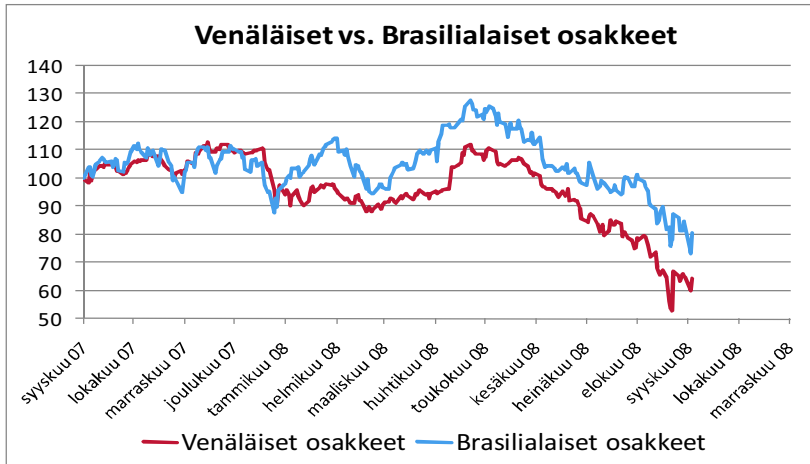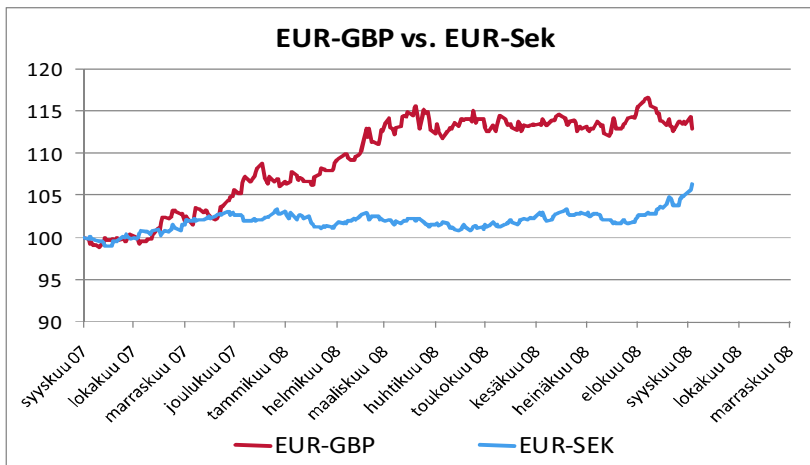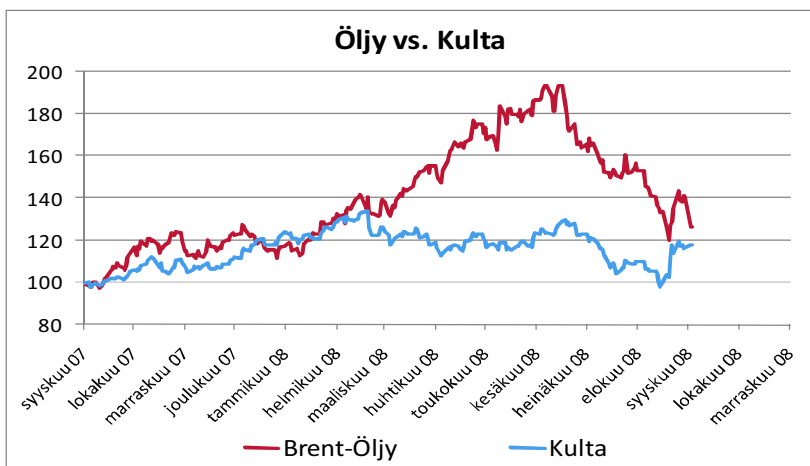Kuinka monta vuotta olet ollut töissä tekemisissä rahoitus/sijoitusasioiden kanssa? _____

Tunniste (puhelinnumeron 4 viimeistä numeroa): _____

Olen osallistunut aiemmin Markku Kaustian pitämään koulutukseen/esitykseen?   Kyllä [ ]   Ei [ ]

Vastaa seuraaviin väittämiin ympyröimällä parhaiten itseäsi kuvaava vaihtoehto asteikolla täysin eri mieltä (1) – täysin samaa mieltä (5)

Jonkin asian ajatteleminen pitkään ja hartaasti tuottaa minulle vain vähän tyydytystä   1 2 3 4 5

Luotan alkuperäisiin tunteisiini ihmisistä   1 2 3 4 5

Teen mieluummin ajatteluani haastavia asioita kuin jotain vain vähän ajattelua vaativaa   1 2 3 4 5

Luotan omiin vaistoihini   1 2 3 4 5

Pidän enemmän monimutkaisista kuin yksinkertaisista ongelmista   1 2 3 4 5

Yritän välttää tilanteita, jotka vaativat syvällistä ajattelua   1 2 3 4 5

Ihmisten luotettavuuden arvioinnissa voin yleensä luottaa omaan intuitiooni   1 2 3 4 5

Ihmisistä muodostamani ensivaikutelmat ovat lähes aina oikeita   1 2 3 4 5

En halua joutua tekemään paljoa ajatustyötä   1 2 3 4 5

Voin yleensä tuntea jos joku on oikeassa tai väärässä, vaikka en voikaan selittää sitä   1 2 3 4 5

Seuraavassa osiossa esitetään kolmen kohdeparin kehitys viimeiseltä 12 kuukaudelta. Tehtäväsi on valita parista periodilla 3.10.2008 – 28.11.2008 paremmin menestyvä kohde, luokitella näkemyksesi voimakkuus, ennustaa paremmin kehittyvän kohteen tuotto periodilla sekä asettaa sellaiset raja-arvot, millä välillä kohteen tuotto periodilla on 90% todennäköisyydellä.

Venäläiset vs. Brasilialaiset osakkeet

Loppuperiodilla paremmin menestyy, ympyröi

Venäjä   Brasilia

Varmuus ennusteen osumisesta, ympyröi

Puhdas arvaus   1 2 3 4 5   Vahva näkemys

Ennuste voittajan tuotosta, %   _____

Yläraja voittajan tuotolle, %   _____

Alaraja voittajan tuotolle, %   _____

EUR-GBP vs. EUR-Sek

Loppuperiodilla paremmin menestyy, ympyröi

EUR-SEK   EUR-GBP

Varmuus ennusteen osumisesta, ympyröi

Puhdas arvaus   1 2 3 4 5   Vahva näkemys

Ennuste voittajan tuotosta, %   _____

Yläraja voittajan tuotolle, %   _____

Alaraja voittajan tuotolle, %   _____

Öljy vs. Kulta

Loppuperiodilla paremmin menestyy, ympyröi

Öljy   Kulta

Varmuus ennusteen osumisesta, ympyröi

Puhdas arvaus   1 2 3 4 5   Vahva näkemys

Ennuste voittajan tuotosta, %   _____

Yläraja voittajan tuotolle, %   _____

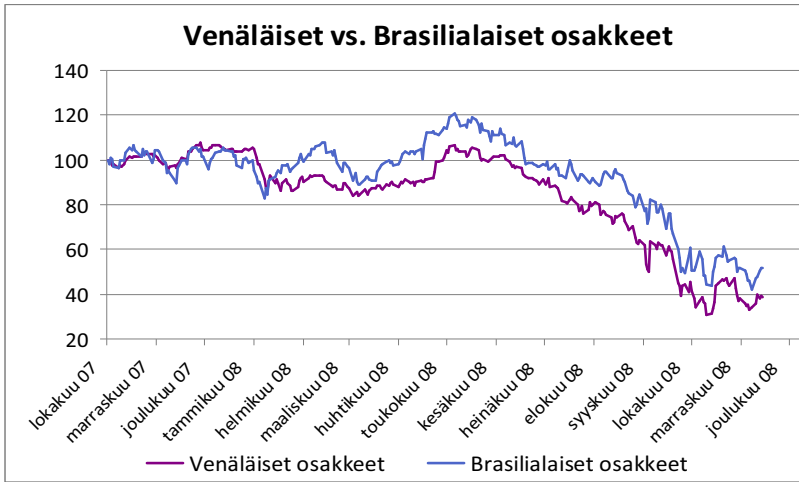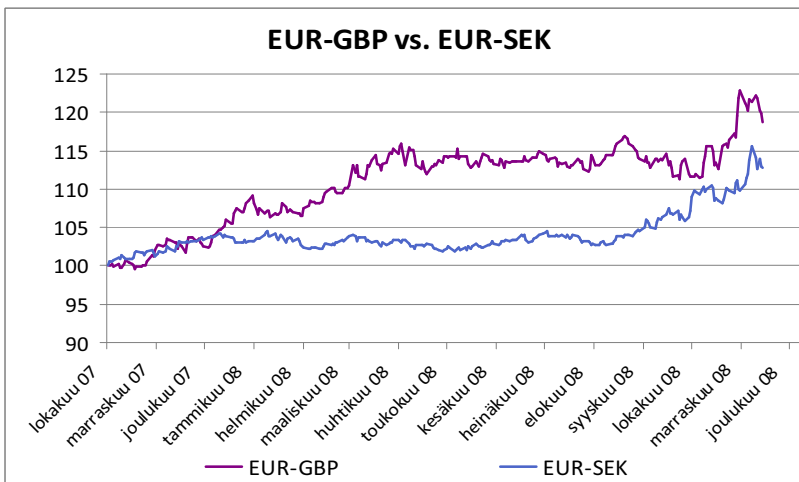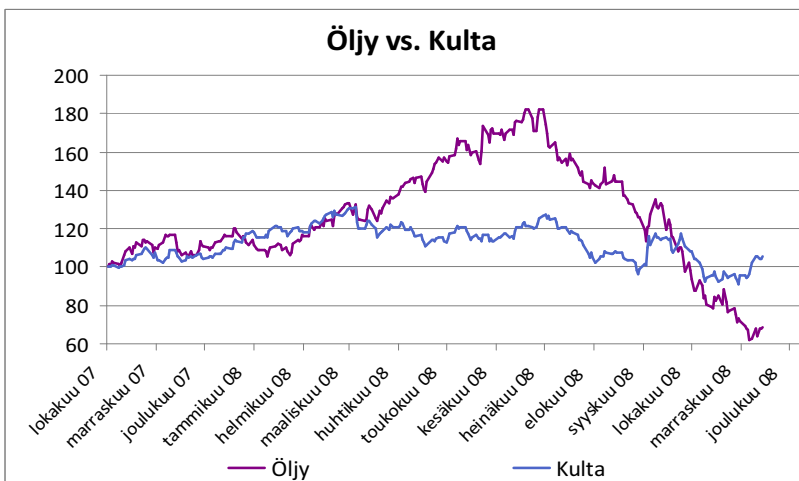Alaraja voittajan tuotolle, %   _____

Kiitos osallistumisestasi!

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Tunniste (puhelinnumeron 4 viimeistä numeroa): _____

Tutkimuksen ensimmäisessä vaiheessa pyysimme teitä valitsemaan periodilla 3.10.2008 – 28.11.2008 paremmin menestyvät kohteet kolmesta parista, ennustamaan paremmin kehittyvien kohteiden tuotot periodilla sekä asettamaan tuotoille 90% varmuutta vastaavat raja-arvot. Alla näet kohteiden toteutuneet tuotot (paremmin menestynyt kohde ympyröity).

Venäläiset osakkeet, tuotto: -30%   Brasilialaiset osakkeet, tuotto: -22%

SEK, tuotto: -5,4%   GBP, tuotto: -5,9%

Öljy, tuotto: -41%   Kulta, tuotto: -2%

Palauta nyt mieleesi edellisellä kerralla tekemäsi valinnat sekä antamasi arviot. Tehtäväsi on täyttää edellisellä kerralla antamasi vastaukset alla oleviin laatikoihin. On tärkeää, että vastaat vaikka et tarkasti muistaisikaan omia vastauksiasi. Tarvittaessa arvioi/päättele omat aiemmat vastauksesi. Luokittele myös se, kuinka hyvin muistat vastauksesi.

Valintani paremmin menestyväksi kohteesta, ympyröi	Venäjä Brasilia
Varmuus ennusteen osumisesta, ympyröi	Puhdas arvaus 1 2 3 4 5 Vahva näkemys
Ennuste voittajan tuotosta, % _____	
Yläraja voittajan tuotolle, % _____	Alaraja voittajan tuotolle, % _____

Valintani paremmin menestyväksi kohteesta, ympyröi	SEK GBP
Varmuus ennusteen osumisesta, ympyröi	Puhdas arvaus 1 2 3 4 5 Vahva näkemys
Ennuste voittajan tuotosta, % _____	
Yläraja voittajan tuotolle, % _____	Alaraja voittajan tuotolle, % _____

Valintani paremmin menestyväksi kohteesta, ympyröi	Öljy Kulta
Varmuus ennusteen osumisesta, ympyröi	Puhdas arvaus 1 2 3 4 5 Vahva näkemys
Ennuste voittajan tuotosta, % _____	
Yläraja voittajan tuotolle, % _____	Alaraja voittajan tuotolle, % _____

Muistan hyvin huonosti   1 2 3 4 5   Muistan erittäin tarkasti

Seuraavassa osiossa esitetään kolmen kohdeparin kehitys viimeiseltä 12 kuukaudelta. Tehtäväsi on valita parista periodilla 5.12.2008 – 31.12.2008 paremmin menestyvä kohde, luokitella näkemyksesi voimakkuus, ennustaa paremmin kehittyvän kohteen tuotto periodilla sekä asettaa sellaiset raja-arvot, millä välillä kohteen tuotto periodilla on 90% todennäköisyydellä.

Venäläiset vs. Brasilialaiset osakkeet

— Venäläiset osakkeet   — Brasilialaiset osakkeet

Loppuperiodilla paremmin menestyy, ympyröi

Venäjä   Brasilia

Varmuus ennusteen osumisesta, ympyröi

Puhdas arvaus   1 2 3 4 5   Vahva näkemys

Ennuste voittajan tuotosta, %   _____

Yläraja voittajan tuotolle, %   _____

Alaraja voittajan tuotolle, %   _____

EUR-GBP vs. EUR-SEK

— EUR-GBP   — EUR-SEK

Loppuperiodilla paremmin menestyy, ympyröi

SEK   GBP

Varmuus ennusteen osumisesta, ympyröi

Puhdas arvaus   1 2 3 4 5   Vahva näkemys

Ennuste voittajan tuotosta, %   _____

Yläraja voittajan tuotolle, %   _____

Alaraja voittajan tuotolle, %   _____

Öljy vs. Kulta

— Öljy   — Kulta

Loppuperiodilla paremmin menestyy, ympyröi

Öljy   Kulta

Varmuus ennusteen osumisesta, ympyröi

Puhdas arvaus   1 2 3 4 5   Vahva näkemys

Ennuste voittajan tuotosta, %   _____

Yläraja voittajan tuotolle, %   _____

Alaraja voittajan tuotolle, %   _____

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This questionnaire is part of a Master's Thesis study at HSE. The questionnaire contains two sides. The first side asks for background information. The second side contains investment related questions. ***Please make sure you answer all questions on both sides of the paper***, otherwise your answers can not be used. If you are unsure about some answers, make a guess anyway. The study has two phases, the first one today and the second one on 14.11.2008 (also a CoFi exercise session). It is important to participate in both phases – there will be *a reward for everyone* participating in the second phase. However, please answer now even if you can't participate in the second phase.

Sex: Female ☐ Male ☐

Age: 18-24 ☐ 25-29 ☐ 30-34 ☐ 35-39 ☐ 40-44 ☐ 45-49 ☐ 50-54 ☐ 55-59 ☐ 60-65 ☐

Major: _____

Have you made any stock market investments yourself?   Yes ☐   No ☐

Do you have any work experience in the field of finance? If yes, how many years? _____

Matching code (= last 4 digits of your phone number): _____ (needed to match your 2nd phase answers)

Answer the following statements by circulating the choice that best describes yourself on the scale totally disagree (1) – totally agree (5)

Thinking hard and for a long time about something gives me little satisfaction	1 2 3 4 5
I trust my initial feelings about people	1 2 3 4 5
I prefer to do something that challenges my thinking abilities rather than something that requires little thought	1 2 3 4 5
I believe in trusting my hunches	1 2 3 4 5
I prefer complex to simple problems	1 2 3 4 5
I try to avoid situations that require thinking in depth about something	1 2 3 4 5
When it comes to trusting people, I can usually rely on my "gut feelings"	1 2 3 4 5
My initial impressions of people are almost always right	1 2 3 4 5
I don't like to have to do a lot of thinking	1 2 3 4 5
I can usually feel when a person is right or wrong even if I can't explain how I know	1 2 3 4 5

The following section shows the development of three asset pairs from the past 12 months. Your task is to choose the better performing asset from the pair during the period of 20.10.2008 to 12.11.2008 and classify the strength of your view. In addition you are asked to give an estimate for the return of the better performing asset and set a 90% confidence interval limits for the return (i.e. limits between which the return is with 90% probability).

Russian vs. Brazilian shares

— Russian shares   — Brazilian shares

Better performing asset on the period, circulate

Russia   Brazil
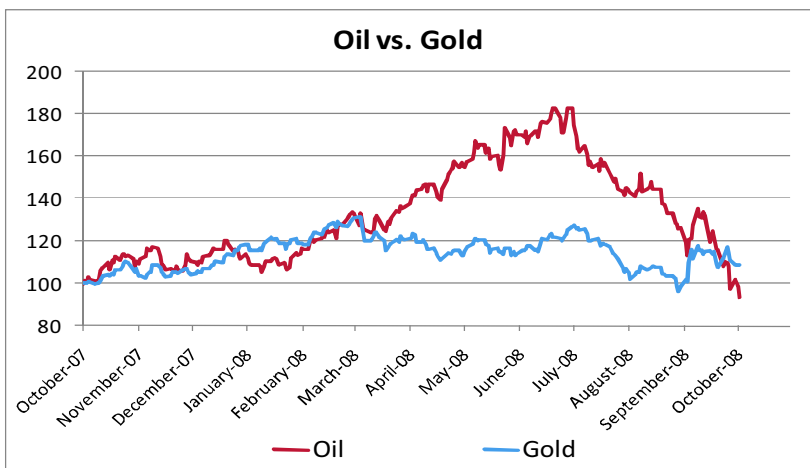
Strength of your view, circulate

Pure guess   1 2 3 4 5   Strong view

Estimated return of the winner, %   _____

Upper limit for the return, %   _____

Lower limit for the return, %   _____

EUR-GBP vs. EUR-SEK

— EUR-GBP   — EUR-SEK

Note: The currency graphs are inverted, i.e., when the graph goes up, investment value goes down.

Better performing asset on the period, circulate

SEK   GBP

Strength of your view, circulate

Pure guess   1 2 3 4 5   Strong view

Estimated return of the winner, %   _____

Upper limit for the return, %   _____

Lower limit for the return, %   _____

Oil vs. Gold

— Oil   — Gold

Better performing asset on the period, circulate

Oil   Gold

Strength of your view, circulate

Pure guess   1 2 3 4 5   Strong view

Estimated return of the winner, %   _____

Upper limit for the return, %   _____

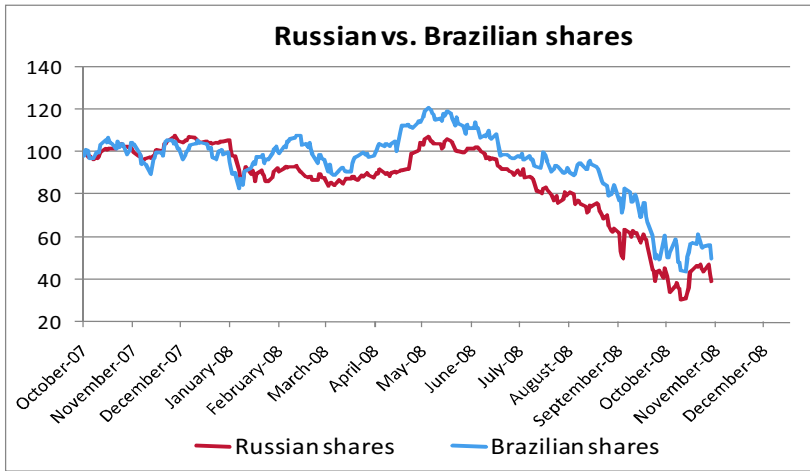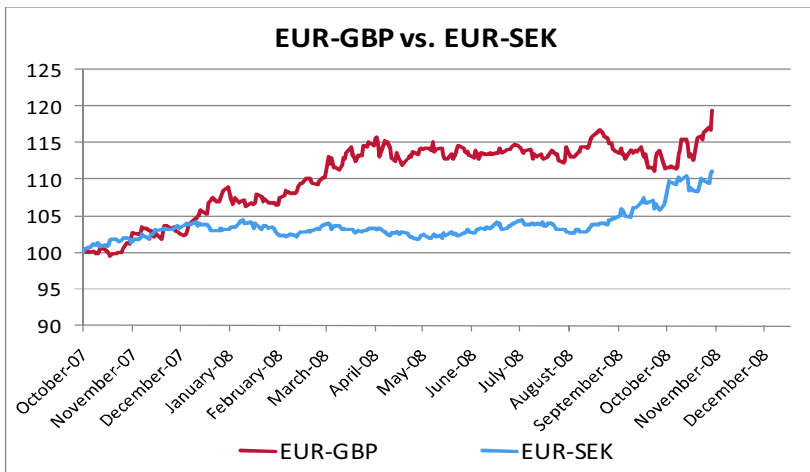Lower limit for the return, %   _____

Thank you for participating!

HSE

In first phase of the study you were asked to choose the better performing assets from the three pairs on 20.10.2008 to 12.11.2008 period. In addition you were asked to estimate the return of the better performing asset and set 90% confidence interval limits for the return. Here you can see the realized returns (asset with higher return is circulated, i.e. the winner).

Russian shares, return: **+6%**   Brazilian shares, return: **-15%**

SEK, return: **-1.6%**   GBP, return: **-6.7%**

Oil, return: **-24%**   Gold, return: **-9%**

Now try to remember the answers and estimates you gave last time. Your task now is to fill the answers from the first phase to the boxes below. **It is very important that you answer now even though you could not remember you initial answers.** If so, please estimate/conclude your initial answers. Classify also how well you can remember your initial answers.

My selection for the better performing asset, circulate	Russia Brazil
Strength of your view, circulate	Pure guess 1 2 3 4 5 Strong view
Estimated return of the winner, % _____	
Upper limit for the return, % _____	Lower limit for the return, % _____

My selection for the better performing asset, circulate	SEK GBP
Strength of your view, circulate	Pure guess 1 2 3 4 5 Strong view
Estimated return of the winner, % _____	
Upper limit for the return, % _____	Lower limit for the return, % _____

My selection for the better performing asset, circulate	Oil Gold
Strength of your view, circulate	Pure guess 1 2 3 4 5 Strong view
Estimated return of the winner, % _____	
Upper limit for the return, % _____	Lower limit for the return, % _____

I remember poorly   1 2 3 4 5   I remember clearly

The following section shows the development of three asset pairs from the past 12 months. Your task is to choose the better performing asset from the pair during the period of 17.11.2008 to 31.12.2008 and classify the strength of your view. In addition you are asked to give an estimate for the return of the better performing asset and set a 90% confidence interval limits for the return (i.e. limits between which the return is with 90% probability).

Better performing asset on the period, circulate

      Russia   Brazil

Strength of your view, circulate

Pure guess   1 2 3 4 5   Strong view

Estimated return of the winner, %   _____

Upper limit for the return, %   _____

Lower limit for the return, %   _____

Better performing asset on the period, circulate

      SEK   GBP
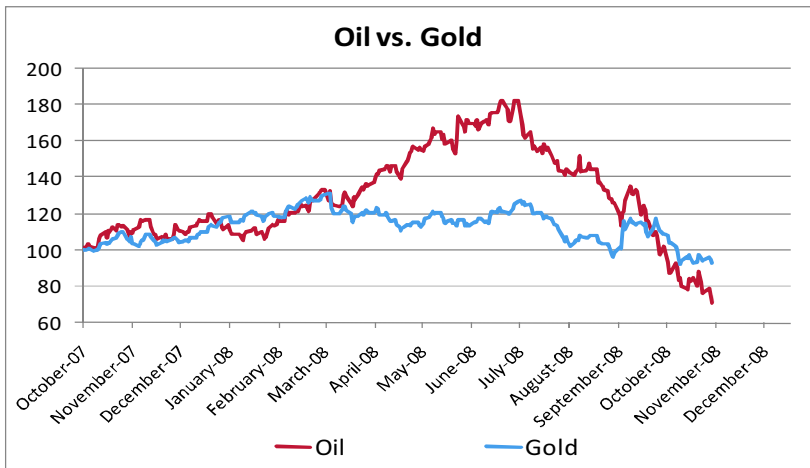
Strength of your view, circulate

Pure guess   1 2 3 4 5   Strong view

Estimated return of the winner, %   _____

Upper limit for the return, %   _____

Lower limit for the return, %   _____

Note: The currency graphs are inverted, i.e., when the graph goes up, investment value goes down.

Better performing asset on the period, circulate

      Oil   Gold

Strength of your view, circulate

Pure guess   1 2 3 4 5   Strong view

Estimated return of the winner, %   _____

Upper limit for the return, %   _____

Lower limit for the return, %   _____

Thank you for participating!

HSE

Sukupuoli: Nainen ☐   Mies ☐

Ikä: 18-24 ☐   25-29 ☐   30-34 ☐   35-39 ☐   40-44 ☐   45-49 ☐   50-54 ☐   55-59 ☐   60-65 ☐

Koulutus:_____

Arvioi kuinka hyvin tunnet rahoitusmarkkinoita: Hyvin vähän   1 2 3 4 5   Erittäin hyvin
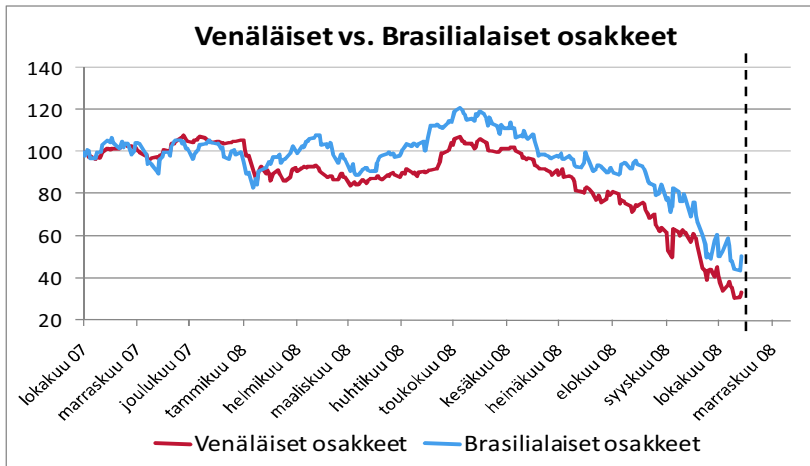
Oletko itse tehnyt osakesijoituksia?   Kyllä ☐   Ei ☐

Tunniste (puhelinnumeron 4 viimeistä numeroa): _____

Vastaa seuraaviin väittämiin ympyröimällä parhaiten itseäsi kuvaava vaihtoehto asteikolla täysin eri mieltä (1) – täysin samaa mieltä (5)

Jonkin asian ajatteleminen pitkään ja hartaasti tuottaa minulle vain vähän tyydytystä	1 2 3 4 5
Luotan alkuperäisiin tunteisiini ihmisistä	1 2 3 4 5
Teen mieluummin ajatteluani haastavia asioita kuin jotain vain vähän ajattelua vaativaa	1 2 3 4 5
Luotan omiin vaistoihini	1 2 3 4 5
Pidän enemmän monimutkaisista kuin yksinkertaisista ongelmista	1 2 3 4 5
Yritän välttää tilanteita, jotka vaativat syvällistä ajattelua	1 2 3 4 5
Ihmisten luotettavuuden arvioinnissa voin yleensä luottaa omaan intuitiooni	1 2 3 4 5
Ihmisistä muodostamani ensivaikutelmat ovat lähes aina oikeita	1 2 3 4 5
En halua joutua tekemään paljoa ajatustyötä	1 2 3 4 5
Voin yleensä tuntea jos joku on oikeassa tai väärässä, vaikka en voikaan selittää sitä	1 2 3 4 5

Seuraavassa osiossa esitetään kolmen kohdeparin kehitys viimeiseltä 12 kuukaudelta. Tehtäväsi on valita parista periodilla 31.10.2008 – 25.11.2008 paremmin menestyvä kohde, luokitella näkemyksesi voimakkuus, ennustaa paremmin kehittyvän kohteen tuotto periodilla sekä asettaa sellaiset raja-arvot, millä välillä kohteen tuotto periodilla on 90% todennäköisyydellä.

Venäläiset vs. Brasilialaiset osakkeet

— Venäläiset osakkeet   — Brasilialaiset osakkeet

Loppuperiodilla paremmin menestyy, ympyröi
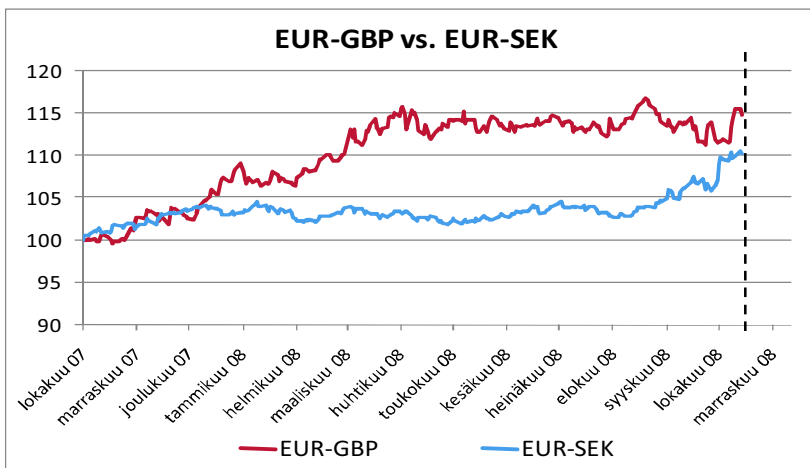
Venäjä   Brasilia
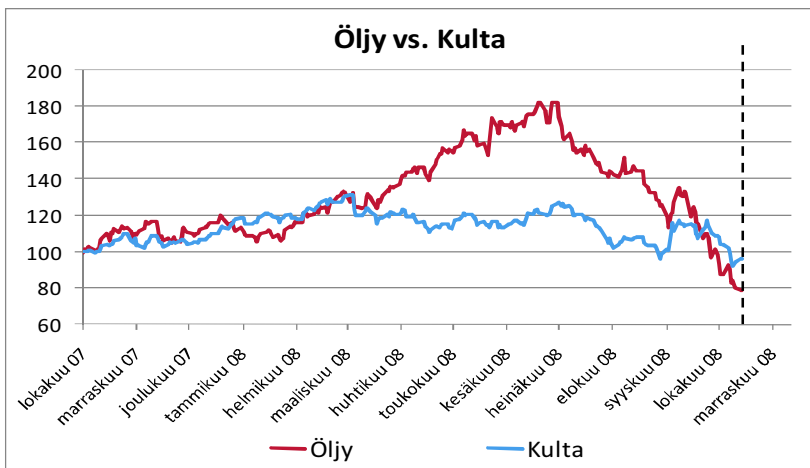
Varmuus ennusteen osumisesta, ympyröi

Puhdas arvaus   1 2 3 4 5   Vahva näkemys

Ennuste voittajan tuotosta, %   _____

Yläraja voittajan tuotolle, %   _____

Alaraja voittajan tuotolle, %   _____

EUR-GBP vs. EUR-SEK

— EUR-GBP   — EUR-SEK

Kuvaaja euron arvona ko. valuutassa (ts. kuvaajan mennessä ylös ko. valuutan arvo heikkenee)

Loppuperiodilla paremmin menestyy, ympyröi

SEK   GBP

Varmuus ennusteen osumisesta, ympyröi

Puhdas arvaus   1 2 3 4 5   Vahva näkemys

Ennuste voittajan tuotosta, %   _____

Yläraja voittajan tuotolle, %   _____

Alaraja voittajan tuotolle, %   _____

Öljy vs. Kulta

— Öljy   — Kulta

Loppuperiodilla paremmin menestyy, ympyröi

Öljy   Kulta

Varmuus ennusteen osumisesta, ympyröi

Puhdas arvaus   1 2 3 4 5   Vahva näkemys

Ennuste voittajan tuotosta, %   _____

Yläraja voittajan tuotolle, %   _____

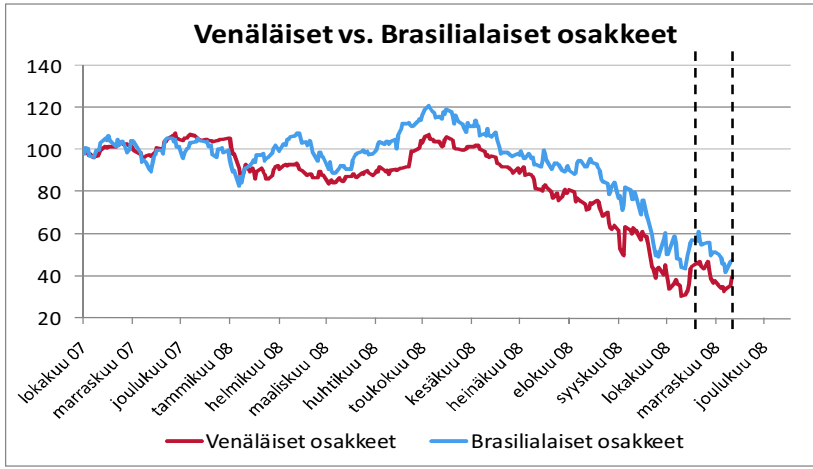Alaraja voittajan tuotolle, %   _____

Kiitos osallistumisestasi!

Tunniste (puhelinnumeron 4 viimeistä numeroa): _____

Tutkimuksen ensimmäisessä vaiheessa pyysimme teitä valitsemaan periodilla 31.10.2008 – 25.11.2008 paremmin menestyvät kohteet kolmesta parista, ennustamaan paremmin kehittyvien kohteiden tuotot periodilla sekä asettamaan tuotoille 90% varmuutta vastaavat raja-arvot. Alla näet kohteiden toteutuneet tuotot (paremmin menestynyt kohde ympyröity).

Venäläiset osakkeet, tuotto: -12%   Brasilialaiset osakkeet, tuotto: -17%

SEK, tuotto: -3,7%   GBP, tuotto: -7,6%

Öljy, tuotto: -25%   Kulta, tuotto: +14%

Palauta nyt mieleesi edellisellä kerralla tekemäsi valinnat sekä antamasi arviot. Tehtäväsi on täyttää edellisellä kerralla antamasi vastaukset alla oleviin laatikoihin. On tärkeää, että vastaat vaikka et tarkasti muistaisikaan omia vastauksiasi. Tarvittaessa arvioi/päättele omat aiemmat vastauksesi. Luokittele myös se, kuinka hyvin muistat vastauksesi.

Valintani paremmin menestyväksi kohteesta, ympyröi	Venäjä Brasilia
Varmuus ennusteen osumisesta, ympyröi	Puhdas arvaus 1 2 3 4 5 Vahva näkemys
Ennuste voittajan tuotosta, % _____	
Yläraja voittajan tuotolle, % _____	Alaraja voittajan tuotolle, % _____

Valintani paremmin menestyväksi kohteesta, ympyröi	SEK GBP
Varmuus ennusteen osumisesta, ympyröi	Puhdas arvaus 1 2 3 4 5 Vahva näkemys
Ennuste voittajan tuotosta, % _____	
Yläraja voittajan tuotolle, % _____	Alaraja voittajan tuotolle, % _____

Valintani paremmin menestyväksi kohteesta, ympyröi	Öljy Kulta
Varmuus ennusteen osumisesta, ympyröi	Puhdas arvaus 1 2 3 4 5 Vahva näkemys
Ennuste voittajan tuotosta, % _____	
Yläraja voittajan tuotolle, % _____	Alaraja voittajan tuotolle, % _____

Muistan hyvin huonosti   1 2 3 4 5   Muistan erittäin tarkasti

Seuraavassa osiossa esitetään kolmen kohdeparin kehitys viimeiseltä 12 kuukaudelta. Tehtäväsi on valita parista periodilla 28.11.2008 – 31.12.2008 paremmin menestyvä kohde, luokitella näkemyksesi voimakkuus, ennustaa paremmin kehittyvän kohteen tuotto periodilla sekä asettaa sellaiset raja-arvot, millä välillä kohteen tuotto periodilla on 90% todennäköisyydellä.

Venäläiset vs. Brasilialaiset osakkeet

Loppuperiodilla paremmin menestyy, ympyröi

Venäjä   Brasilia
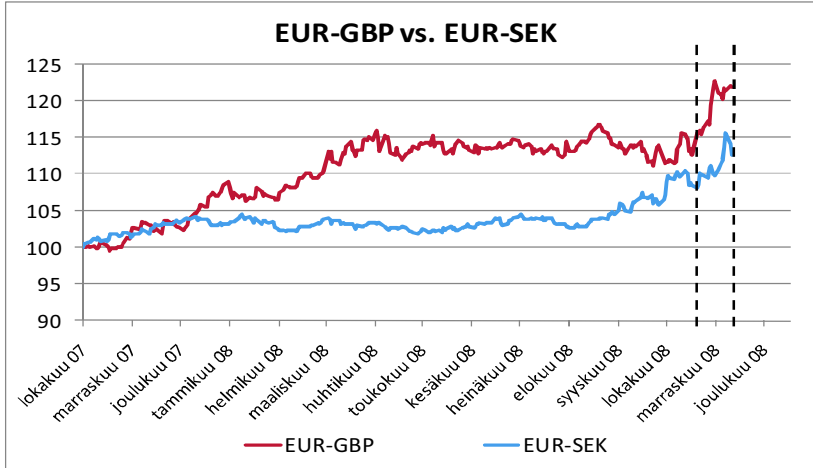
Varmuus ennusteen osumisesta, ympyröi

Puhdas arvaus   1 2 3 4 5   Vahva näkemys

Ennuste voittajan tuotosta, %   _____

Yläraja voittajan tuotolle, %   _____

Alaraja voittajan tuotolle, %   _____

EUR-GBP vs. EUR-SEK

Loppuperiodilla paremmin menestyy, ympyröi

SEK   GBP

Varmuus ennusteen osumisesta, ympyröi
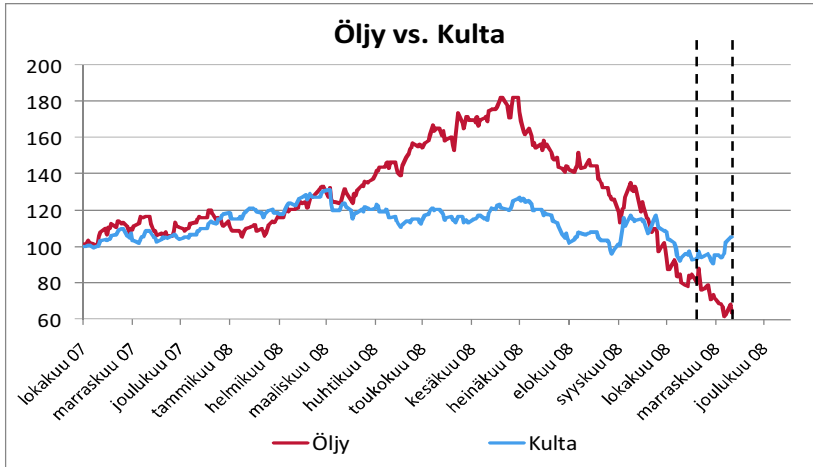
Puhdas arvaus   1 2 3 4 5   Vahva näkemys

Ennuste voittajan tuotosta, %   _____

Yläraja voittajan tuotolle, %   _____

Alaraja voittajan tuotolle, %   _____

Kuvaaja euron arvona ko. valuutassa (ts. kuvaajan mennessä ylös ko. valuutan arvo heikkenee)

Öljy vs. Kulta

Loppuperiodilla paremmin menestyy, ympyröi

Öljy   Kulta

Varmuus ennusteen osumisesta, ympyröi

Puhdas arvaus   1 2 3 4 5   Vahva näkemys

Ennuste voittajan tuotosta, %   _____

Yläraja voittajan tuotolle, %   _____

Alaraja voittajan tuotolle, %   _____

Kiitos osallistumisestasi!