Risk tolerance and myopic behavior - evidence from Finnish retail investors

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RISK TOLERANCE AND MYOPIC BEHAVIOR – EVIDENCE FROM FINNISH RETAIL
INVESTORS

PURPOSE OF THE STUDY

   The objective of this paper is to investigate whether investors actually follow the
   investment advice given by their bank. The bank here is a major Finnish retail bank
   which gives investment advice to its private clients based on the data it gathers in its
   investment profile tool, as required by MiFID. The study focuses on comparing the
   asset allocations suggested by the bank to the ones chosen by the investors.

   This paper adds new important evidence about the behavior of investors and the
   functioning of the banks' risk profiling methods under the MiFID regulations. The
   study provides a new dimension of investment horizon into the research and also
   includes longitude in the data for the first time regarding this topic.

DATA

   The focus of the study is on private retail customers who have completed the
   Investment profile in the last quarter of 2008. The data set covers the true
   compositions of the customers' investment portfolios at two dates: Dec 31, 2008 and
   Oct 31, 2009. The total amount of investors in the sample is 910.

   In addition to the information about the investment profiles and asset allocations the
   data includes demographic statistics such as age, gender and wealth. The trading
   activity of the investors is also studied.

RESULTS

   The main finding of this study is that investors seem to clearly ignore the length of the
   investment horizon in their allocation decisions. Investors overweight equities in short
   horizons and underweight them in long horizons. The finding supports previous
   research on the myopic behavior of investors. Previous research finds that investors
   make investment decisions on much shorter intervals than their investment horizon
   would suggest.

   I also find evidence of disposition effect and market timing attempts by the investors.
   The results indicate that investors actively increased the weight of equities in their
   portfolios during the period. Some of the investors appeared to have increased the
   share of risky assets considerably more than others. The main characteristics of those
   investors included risk-averse risk profile and high trading activity.

KEYWORDS

   Risk profile, risk tolerance, investment horizon, myopic behavior, disposition
   effect, MiFID

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1 Introduction

The aim of this study is to investigate the behavior of Finnish private investors by examining how well they follow the investment advice given by their bank and whether this behavior changes over time. I compare the asset allocations suggested by the bank to the ones chosen by the investors. I also examine the differences in the allocations at the time of taking the bank's investment profile and in the situation ten months later. The bank's advice about the allocation is based on two main variables: the investor's individual investment horizon and risk profile. I first investigate how the investors' initial allocations match those suggested by the bank and then test whether the allocations have changed in ten months time. In addition to the investment horizon and risks profile I focus on explaining the differences in the allocations by the following demographic variables: age, gender and wealth. I will also study the significance of trading activity in explaining the results.

According to the MIFID regulations banks have to identify each investor's risk appetite, risk tolerance and the purpose of the investment before giving any investment advice. This is done by conducting a questionnaire that maps the investor's main goals in investing as well as the individual's ability and willingness to take risk (the questionnaire in Appendix B). As a result the customer is categorized into one of the three different risk profile categories. The bank then suggests an investment plan that suits the investor's risk profile and future investment goals. However, there are no studies yet that would have investigated with real customer data how well investors actually follow these investment plans. It is unclear whether investors actually adopt the bank's proposal or just discard it.

I use a sample of 910 Finnish bank customers who had taken the investment profile of a major Finnish bank during the last quarter of 2008. Firstly, I study whether these investors' portfolio compositions match the allocation given by the bank's investment profile tool at year-end 2008. Secondly, I compare the composition of the investors' portfolio on 31st of October 2009 to the composition at year-end 2008 to find out whether they have deviated from the initial plan. Then I test again how closely the allocations at the end of the period match those suggested by the bank in the beginning.

The major deficiency in the previous research has been the lack of longitude, i.e. the fact that the investors' tolerance of risk has not been tested at separate points in time. My study will also provide new evidence and specific data about the meaning of investment horizon to the

individuals' allocation decisions. An extensive study on investors' risk profiles by Alanko (2009) builds on aggregate data and assumes investors to stick with their investment plans in the long term but in reality there is no guarantee of this. The portfolio allocation in one period only reveals the investor's current perception of risk at the time of study. However, during the investment period the investor may deviate from the initial allocation because of changes in the attitude toward risk, in the valuation of the assets or due to actively re-weighting the portfolio by trading as the market conditions change. The change of attitude toward risk can be caused by a number of reasons. A sudden change in the market conditions is the most obvious one. Benartzi and Thaler (1995) call the behavior in which investors' perception of risk varies depending on how often they monitor their investments as myopic loss aversion. Myopic loss aversion is a combination of two common behavioral biases of investors. Firstly, investors are loss averse, which means that they are much more sensitive to losses than to gains. Secondly, even long-term investors tend to evaluate their investments frequently. This study investigates the investors' true tolerance of risk and myopia by comparing the changes in their portfolio compositions over a period of ten months after making the long-term investment plan.

The period during which the study was conducted was very challenging time for investors. Many asset classes saw remarkable rise and falls in both volatility and market values. According to many behavioral finance theories these are typically times when people fail to stick with their long term investment plans but instead fall victims of behavioral biases and make potentially bad decisions about their savings. And indeed, as I later report this clearly had an impact on the investors' portfolios and behavior. Therefore it is particularly interesting time period for this kind of research.

By studying the data I find evidence of investors deviating significantly from the allocations suggested by the bank both at the beginning of the period as well as at the end of it. My results strongly suggest that investors fail to consider the length of the investment period as an important factor in determining the share of equities in their portfolios. I also find evidence of the most risk-averse investors being most aggressive in increasing the share of equities over the studied period. The increases in the share of equities in their portfolios can be explained by active trading rather than simply rise in the value of the assets.

The study is structured in the following way. In the first section, I introduce the previous literature on the topic that has relevance for this research. In the literature part I have the main focus on theories that explain investor behavior and risky decision-making as well as the most common demographic determinants of risk. In the third section, after the literature review I present my hypotheses. The fourth part of the study focuses on explaining in detail the data and the methods used in conducting the research. The fifth section includes an extensive analysis of the data by using descriptive and statistical methods. Finally, I report my results and summarize the conclusions in the last section of the study.

2   Literature Review

In this section I introduce the main theories that have relevance for this study. I first explain the theory behind saving motives. Then I move on to discuss the main relevant topics in the field of behavioral finance. The last part of the literature review focuses on the determinants of risk for investors.

2.1   Saving Motives Hierarchy

In order to be able to analyze the saving behavior of the customers I will introduce some of the findings in the field of saving motives research. In regard to this study it is important to know the different reasons that people might be saving for.

Keynes was the pioneer in the field of studying the saving behavior of people (Keynes 1936). He identified as many as eight different motives for saving. The list starts from precautionary saving and includes motives such as improvement of living standards and the feeling of independence to do things. His list was later replenished by Browning and Lusardi (1996) who added the down-payment motive, which means accumulation of assets to buy something expensive, such as a house or a car.

Today economic psychology distinguishes four main reasons for households saving. These are called saving motives and they are normally followed by each other in a hierarchical order. The four motives can be broadly defined as follows, starting from the basic level: cash management, precautionary motive (saving for unexpected expenditures), down-payment motive (building-up assets for buying a house or a car etc.) and fourth wealth management. In this study the individuals mainly fall into the last three categories. So the primary reasons

why they invest are that they are either saving small amounts of money for precautionary purposes, or saving up for some major purchases, or that they have already accumulated surplus wealth that needs to be managed.

Numerous studies have examined the importance of different motives to save after Keynes (1936). Katona (1975) find that in 1960's in the U.S. people mainly saved to have buffer in case of sudden expenditures or emergencies, for retirement, for their children and to buy a house or durable goods. Interestingly, only few said they were saving to earn additional income or to leave an inheritance. Kotlikoff (1989) later find that approximately 30% of household saving in the U.S. can be explained by precautionary saving motives, particularly for old age.

Among the first ones to propose a hierarchical structure of saving motives was Lindqvist (1981). He suggested a structure that has the need to have cash to deal with short-term financial goals at the first level. At the second level is the need to build up a reserve for precautionary reasons. At the third level is the need to accumulate assets for expensive purchases (down-payment motive) and finally at the top level is the need to manage the wealth accumulated.

Xiao and Anderson (1993) incorporated Maslow's (1954) theory of the hierarchy of needs and the behavioral life cycle hypothesis to their model and find that saving motivations vary between families and that they save according to different categories of mental accounting, which supports Thaler and Sefrin's (1988) findings. Xiao and Noring (1994) find that families with little resources save primarily to survive from daily expenses. When the family's resources increase, the motivation to save for emergencies also increases. At the highest income levels, motivations concerning retirement, children and improvement in the standard of living become important.

Wärneryd (1995, 1999) continued the investigation of household saving behavior and was able to distinguish four different motives although Wärneryd stressed that people can be saving for several different reasons at the same time. The four motives are similar to the ones, proposed by Lindqvist (1981). At the first level, saving is just a continuous habit with no any specific goal. The second motive is a precautionary one, caused by the uncertainty about the future. At the third level is the bequest motive, i.e. accumulating wealth for the family and

inheritance. The fourth motive is the profit motive, which means that the person is expecting to get additional income from the investments in the future.

Among the more recent literature on the topic is a paper written by Canova, Rattazzi and Webley (2005) who studied the saving behavior of British adults. They analyzed the persons' goals that motivated them to save and identified altogether fifteen most important ones. They were able to find hierarchical structure between these goals. At the bottom of the hierarchy are the most concrete goals such as having a buffer in case of unexpected expenditures and saving for a better house or a vacation. At the higher levels, the goals are more of a psychological nature such as self-gratification and self-esteem. Unlike previous studies (Xiao & Noring, 1994; Lindqvist et al., 1978), Canova et al. find evidence that the structure of saving motives might not depend entirely on socio-economic variables.

2.2 Behavioral Finance and Decision Making Theories

When a person is making decisions about consuming, saving and investing, her decision making process is influenced by several different factors that the traditional economics does not take into account. Behavioral economics investigates human and social, cognitive and emotional factors to better comprehend the economic decisions that consumers and investors make. I will introduce here some of the most important behavioral finance models that play a role in the decision making process of investors.

2.2.1 Mental accounting

Mental accounting (Thaler, 1980) assumes that people categorize and frame their assets into separate groups depending on the source and use of assets. Ritter (2003) studied mental accounting and found that people tend to separate their decision-making when they should rather combine the different aspects in order to maximize their utility. According to the traditional expected utility theory people maximize their wealth and utility as a whole. However, in their everyday life people and investors like to separate their money according to what it is spent on and where it has come from. For example, people might save money by buying cheap food and avoiding higher quality ingredients when at grocery store but then go and spend much more on the same ingredients when eating at a restaurant.

According to Thaler and Shefrin (1988) the main categories of mental accounting are current income, current wealth and future income. All of these are treated and valued in a different

way in people's minds. For example, people often avoid spending their future income in beforehand even if the income was certain. Mental accounting can explain the tendency of people to on one hand keep their money on deposit accounts and on the other hand use credit for consumption at the same time. According to Shefrin and Statman (1984), also the popularity of dividends among investors can be explained with mental accounting. Investors like to use dividends in consumption rather than investing the money back to the stock market and thus receiving higher cumulative returns in the future.

Narrow framing (Hirshleifer, 2001) is a phenomenon closely related to mental accounting. Narrow framing causes investors to be unable to see their investments as a portfolio but rather as a collection of different investments. Investors consider their investments as separate articles and the gains and losses incurred from the investments are considered independent of each other. This can explain the strong feelings of regret in case of a bad investment. Because of the mental separation of assets, investors fail to take into consideration the correlation between the different investments. This in turn may affect the way investors perceive the total risk level of their wealth.

Rabin and Thaler (2001) describe mental accounting as a tendency for people to follow and estimate their financial transactions. Therefore investors observe the return and risk involved with the different parts of their wealth as separate matters, independent of each other. Thus high correlations between different assets can be easily left out of notice. Rabin and Thaler (2001) also notice that mental accounting affects the investors' attitude towards risk. According to the traditional utility theory people are risk-neutral in small scale gambles because a rational person considers the risk from the perspective of her total utility. From this perspective the gamble is relatively small considering the total utility. However, empirical research has found that people do care about small gambles and act irrationally in such situations. If the person does not understand the magnitude of the risk relative to the weighted risk of her total wealth, taking the small gamble may seem like a bigger risk than it really is.

2.2.2 Prospect Theory

Prospect theory was first introduced by Kahneman and Tversky (1979) as an alternative to the traditional expected utility theory when explaining the human behavior. According to the traditional utility theory people always maximize their own total utility. This means that in situations when a person has to choose between different alternatives he chooses the option

that gives him the greatest utility. One of the key principals in the theory is that utility maximization always takes place in the future and past events or experiences do not play part in it. However, several papers in behavioral finance have found (e.g. Grinblatt and Keloharju 2001a; Odean 1999) that past experiences and for instance past gains and losses do affect investors' future preferences.

Tversky and Kahneman (1981) introduce the *decision frame*. It portrays the decision making situation when there are several different alternatives all with different outcomes, actions and possibilities. The person making the decision has to form a picture of all of them. The theory has two decision making stages: (1) editing and (2) evaluation. People analyze the situation and the alternatives by identifying which options are identical and set a reference point. They consider the outcomes that are lower than this reference point as losses and the ones that are higher as gains. In the evaluation stage they evaluate the options that have been modified in their minds and then choose the one that gives the highest utility.

2.2.2.1 Framing

De Bondt (1998) find that the outcome of the decision is greatly affected by the actual decision making process. In decision making process the opinions and assumptions of the decision maker play a major role. Framing problem is closely related to the decision making process and it means that depending on how the option in a decision making situation is presented the answer can be completely different. So by presenting the same option in different ways can alter the decision the person makes. Tversky and Kahneman (1981) find that when presented with two problems with different options people separate the problems even when the outcomes of the problems might be interconnected. But if the problems were combined and presented at the same time the order of preference would be different.

Classical example of the framing problem is to present alternatives to problems framed as either losses or gains. For example, a financial loss can be seen as it is without any compensation or it can be considered as an expense that one has to take in order to receive higher gains in the future (Tversky and Kahneman 1981). Another famous example by Tversky and Kahneman (1981) is the Asian disease problem where presenting the same situation in two different ways (saving people or letting people die) gives dramatically different responses. In general, framing can take place whenever and wherever. For instance, depending on whether a payment that will be raised after some period, is called either as

discounted price at the moment (positive framing) or as a penalty fee if not paid quick enough (negative framing), has an effect on human behavior. (Gächer et al. 2009) The power of negative framing relates to the utility function of the prospect theory and the risk aversive behavior of people.

Framing has at least two important implications for an investor. Firstly, as explained earlier, when two decisions are framed as separate matters the person making the decision may fail to see the combined effect of them. Therefore, investor can be persuaded to buy some fancy financial instrument that seems perfect when observed independently. However, when considered as part of the investor's whole portfolio the product can turn out to be a bad investment due to high correlation with other assets in the portfolio or for some other reason. Secondly, investors can be very prone to the opinions and advice given by their advisors. Investors like all humans are susceptible to the way the matters are presented to them. Thus if the advisor does not bring up in the conversation some risks or fees that are related to the product, the investor may end up doing a worse decision than without the advice. Advisors can choose to present material, for example past performance charts that have been chosen in a self-serving manner, in order to convince the investor of some product. Also investors who decide intuitively rather than analytically are more vulnerable to framing (Steul 2006).

2.2.3   Other Decision Making Theories

Individuals have been found to create ways to facilitate decision-making in difficult situations. Benartzi and Thaler (2001) discovered that individuals often use the "1/n" rule of thumb when allocating their assets into different investments. This takes place when investors are given alternatives and they cannot decide the optimal allocation. The easiest way to allocate the money then is to just divide it evenly between the options. This is when framing and the role of the investment advisor is emphasized. Investment advisor can deliberately limit the product universe to few different products that are presented to the customer. Knowing that the customer cannot decide the allocation the money is likely to be divided evenly between the products that were already chosen by the advisor.

Heuristics are also certain kinds of rules of thumb. Next I introduce the two most relevant heuristics in this research: representativeness heuristic and availability heuristic.

2.2.3.1 Representativeness Heuristic

Tversky and Kahneman (1974) found that people tend to generalize matters and make assumptions often on very little grounds. Representativeness heuristic means that individuals expect small samples to represent a larger population (Sample size neglect). People make decisions based on the available data and the estimated probability of the hypothesis. Probabilities are based on their previous experiences and knowledge about the matter. One of the main cognitive biases that is caused by this heuristic is the neglect of base rates. It means that people tend to focus on the evidence that seem important but considering true probabilities of events it is not. Thus individuals let certain matters that stick out to stray them away from rational thinking. For investors this may become relevant for instance in situations when they focus on the short-term historical returns of an investment product and fail to consider the long-term returns. Therefore, investors may regard a six-month performance of an investment product to represent also the expected future risk-return relationship.

2.2.3.2 Availability Heuristic

The availability heuristic was also discovered by Tversky and Kahneman (1974) in their research about individuals' tendencies to form assumptions when making decisions. Availability heuristic means that people assume some event to be more probable than some other when the event has taken place quite recently or is just more easily brought to mind. People also fall victims of presumed association, which means that they tend to assess wrongly the likelihood of two events occurring together. Overall, when the event is in fresh memory it seems like it is more probable to take place than some other event, even if this was not true. Kahneman and Tversky (1983) tested this heuristic by asking people to recall English words that end with "ing" and words that have the letter "n" as the second last in a word. When people were asked to estimate which kind of words were more common they would say that the ones that end with "ing". However, there are of course a lot more of those words that have "n" as the second last because all the "ing" words are also included in this group. The point is that those ones with just the "n" are a lot harder to bring to mind. Also investors are more certain that a downward trend can take place in the market if they have experienced it by themselves before. This may appear as pessimistic expectations about future returns and risk aversive behavior. This is why older people who have seen several ups and downs in the market may display more risk aversion than younger investors.

2.2.3.3 Life cycle investing

According to the life cycle investing theory the allocation of assets between more risky and less risky assets should depend on the investor's age as well as on her financial and human capital. The total wealth of a person is considered to be the sum of her current financial wealth and the discounted future value of her human capital. Also the flexibility of the investor's human capital or working possibilities affects the allocation decision. I will investigate in this study whether the individuals display a tendency towards life cycle investing.

According to the traditional portfolio theory developed by Harry Markowitz in 1952, investors make decisions in a static single-period framework. The main idea in life cycle investing is that the investor's decision-making framework consists of several distinct time horizons. For example, a 25-year-old investor who expects to live to age 85, the retirement planning horizon is 60 years. As the investor ages, the planning horizon also gets shorter. (Bodie, 2003)

The general approach to life cycle investing suggests that the optimal share invested in equities should decrease over life because labor income is considered to substitute riskless asset holdings. The most famous rule of thumb has been presented by Malkiel (1996) who suggests an investment of a fraction in equities equal to 100 minus the investor's age. Thus, the 25-year-old investor should invest 75% of her wealth in equities or other instruments with similar risk-characteristics.

Cocco, Gomes & Maenhout 2005 conclude that with increase in age, labor income becomes less important part of the total wealth of the investor and hence it lowers the implicit risk-free asset holdings represented by it. The investor reacts to this by shifting his financial portfolio weighting towards the risk-free asset. However, age is not the only variable determining the optimal asset allocation for the investor. They also found that the probability of a disastrous labor income result substantially decreases the average allocation to equities. This emphasizes the fact that demographics and labor income affect the optimal asset allocation.

As was mentioned before, also the level of total financial wealth and flexibility of working possibilities affect the allocation decision. By working more people can increase the share of risky assets in their financial portfolio. This is because the labor income can be considered as

a less-risky asset with bond-like characteristics. The flexibility of work means that people can adjust the amount of labor income by working more to cover the losses caused by riskier assets. This is often easier for young people who can affect their income level more easily than already retired investors. (Bodie, 2003) (Hichman et al. 2001)

Life cycle investing implies that the individual must have reached such a phase in her life cycle that she is able to take financial risk. As explained earlier, the saving motives hierarchy aims to elaborate the different reasons for people to save, once they have reached a stage when they have liquidity surplus to invest.

2.2.4   Loss aversion

Loss aversion refers to the finding made by several researchers (e.g. Tversky and Kahneman, 1992; Kahneman, Knetsch and Thaler, 1990) in empirical tests that people are more sensitive to decreases in their wealth than to increases. These studies have found that losses are weighted about twice as strongly as gains. Therefore, the disutility of losing 100€ is about twice the utility of gaining 100€ This effect is depicted in the Prospect theory by the curvilinear shape of the utility graph.
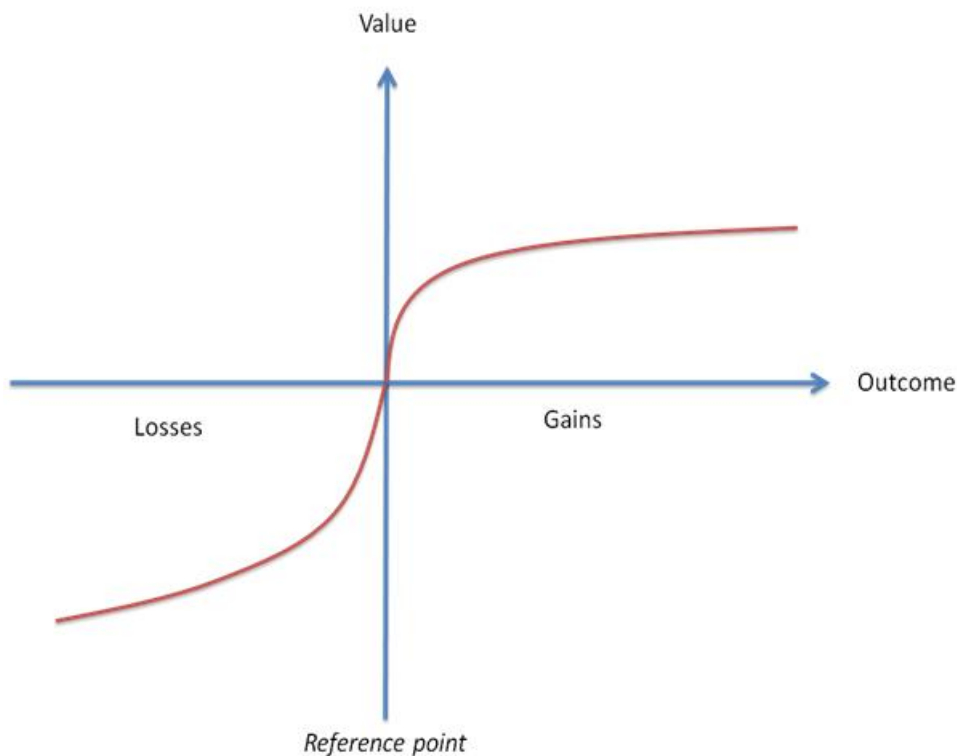
Figure 1. The prospect theory value function (Kahneman & Tversky, 1979)

The main difference to the traditional Expected Utility Theory is that the value function measures gains and losses, not absolute wealth. People estimate their losses and gains based on some reference value, which is often not the same as zero. Reference point can be any value that the individual uses as a benchmark when trying to find out whether he has gained or lost something. As can be seen in the Figure 1, there is a kink at the origin of the curve making the curve convex in the domain of losses and concave in the domain of gains. When moved to the left in the curve, the loss of value is higher than a similar move to the right would give as a gain. The curve becomes almost flat at both ends when the losses or gains get large enough. When the losses become large enough individuals tend to become more risk seeking and try to break even. The same happens in the domain of gains. When the gains become large enough the marginal utility of additional gain decreases.

Individuals have also been found to overweight events with small probabilities and this also affects the experienced utility. For instance, people may buy lottery tickets and insurances where the probability of event is extremely low, but at the same time they are very conservative with their investments. Interestingly, people are risk-averse with moderate probability gains and small probability losses whereas with moderate probability losses and small probability gains they are more risk seeking.

2.2.4.1 Myopic Loss Aversion

Benartzi & Thaler (1995) and Thaler, Tversky, Kahneman & Schwartz (1997) have investigated a phenomenon called myopic loss aversion. Benartzi and Thaler (1995) offer this as an explanation to the famous Mehra and Prescott's (1985) equity premium puzzle. The equity premium puzzle refers to the historical difference in the returns between equities and a risk-free asset, such as T-bills in the US. The puzzle about the equity premium is that it has been very large historically. Myopic loss aversion is a combination of investors' high sensitivity to losses and tendency to evaluate their wealth frequently. Investors are said to have distinguished between the actual investment horizon and the frequency that the wealth is being monitored. Therefore, an investor who evaluates the value of his investments on a yearly basis behaves as if the investment horizon was only one year, regardless of the initial length of the investment horizon. Because of this, individuals tend to focus more on the returns than on the consumption and therefore the return variability plays a larger role in their minds than it should. According to Benartzi and Thaler (1995) investors are not willing to

accept the variability of the returns even if the short-run returns had not any effect on consumption. To compensate the return variability they require higher premium from equities.

Thaler et al. (1997) tested the myopic loss aversion with investors and made some interesting findings. In their experiments, individuals who displayed myopic loss aversion were more willing to accept risks if they evaluated their investments less often. Investors who received most frequently feedback about their investments took least risk and earned the least money. Thaler et al (1997) stress that as the defined contribution pension plans are becoming more popular and people are pushed to take responsibility of allocating their pension savings by themselves, myopic loss aversion may affect these decisions significantly. They show that the decisions made by these investors may vary considerably depending on how their investment opportunities are described and the manner and frequency with which they receive feedback of their returns. This is a current topic also in Finland at the moment. There is strong pressure to give individuals more responsibility about their own retirement savings. Myopic loss aversion is also particularly important topic for this research because it may explain some of the results of this study.

2.2.4.2 Regret Avoidance

Loss aversion is also connected to behavioral bias called regret avoidance. Regret avoidance refers to a fact that individuals who make decisions that turn out badly have more regret when the decision has been more unconventional. For instance, buying a portfolio of stocks that turns down is not as painful when the stocks were blue-chip companies' than when the stocks were some unknown star-up firm's. This is because the losses on the blue-chip stocks can be blamed on bad luck rather than bad decision-making and cause less regret. (Bodie, Kane & Marcus, 2005)

2.2.5 Omission bias

Omission bias refers to a tendency of individuals to consider unwanted results of actions as more negative than unwanted results of inaction (omission). People would rather let things happen than be an active decision maker in a difficult situation, even when the result will be worse if no decision is made. Omission bias could be described as maintaining the status quo, an irrational barrier to change. It is a situation of omission against commission. Bazerman, Baron & Shonk (2001) argue that in the United States alone, twice the amount of lives could be saved out of those waiting for an organ donation, if the donation was considered as a

default for those eligible to donate. Johnson and Goldstein (2003) find that countries that consider the organ donation as a default have donation rates of 86 to 100 percent, as opposed to the figures in the U.S. of 4 to 28 percent.

However, omission bias can also be a positive thing for an investor. It can protect the investor from making bad decisions in times of strong uncertainty about the future and help to stick to the initial investment plan. This is what may explain the popularity of regular saving agreements. It is much easier to sleep at nights when the individual does not have to make the decision about investing every month but can let the automatic subscriptions keep rolling regularly. This way the investor not only takes care of the diversification over time but also decreases the potential amount of regret that might occur in case the investment performed badly. This kind of timing strategy where the person invests some fixed amount periodically is also called dollar cost-averaging.

2.2.6 Anchoring

Anchoring refers to the tendency of individuals to anchor on some piece of information when faced with a decision-making situation. People develop estimates by starting from this piece of information, an anchor, and adjusting from it to yield a final answer (Epley & Gilovich, 2001; Epley 2004). However, people do not adjust enough their answer away from the initial anchor. This happens when the anchor is developed by the decision maker himself. According to Mussweiler & Strack (1999) the existence of an anchor leads people to consider information that is consistent with the anchor instead of considering information that is inconsistent with the anchor. This happens eve though the inconsistent information may be more relevant for the decision-making situation. This kind of behavior where people try to look for information that is consistent with the anchor, takes place when the anchor is set externally instead of developing it by the decision maker him self.

Tversky & Kahneman (1974) tested the bias with people and found that even when the test persons knew that the anchor was totally random and unrelated to the actual question it still had a dramatic effect on the decisions of these persons. Bazerman (2006) considers yearly salary increases that are based on some growth percentage as a good example of the anchoring effect. The anchor here is the last year's salary. So even though all the employees were treated fairly by giving everyone an increase of 5% it does not mean that the relative levels of salaries are fair. The level of the new salary depends on last year's salary.

For investors the anchoring bias may be particularly difficult to handle. It is a bias that is present in all decision-making situations. People may discard rational thinking when making investment decisions and rely too heavily on past information that is not relevant considering the future performance of an investment. Therefore it may feel tempting to consider the past performance of investments as a prediction of the future. Ritter (2003) found evidence of stock investors estimating the future performance of stock market based on the performance of the market during the last 100 days. The more conservative the investors are, the slower their opinions and estimates change. Anchoring may also explain why investors like to set some technical target prices for their investments. It is quite often that you hear someone saying that when a certain stock drops under or breaks through a certain price level the person says to buy or sell the stock. This of course does not make any sense unless there is some more in depth valuation related reason behind for the action. However, it is easier to anchor the price to some exact number and then adjust the decision making according to that. One case where anchoring effect may also occur is when at the time of making the investment, the investor has been shown the estimated average future return for the asset class. This is considered as an anchor that the investor compares the return of the investment to. When it comes to decisions concerning portfolio allocations, the allocation suggested by the bank may act as an anchor that the investor relates to.

Anchoring is closely related to a phenomenon called reference dependency, which was introduced earlier in the chapter about Prospect theory. Reference dependency is the tendency of people to compare their current status to some reference point. For investors some clear reference points may be the purchase price of an investment or the price that has prevailed for a long time for some investment. Kaustia (2003) found evidence of investors considering the break-even price of a stock after direct and indirect fees as the reference point. However, there may be situations where the reference point is set based on the expected return or the return hoped for.

2.2.7 Disposition effect

Disposition effect is a behavioral bias found by Shefrin and Statman (1985). It refers to the tendency of investors selling too quickly shares whose prices have increased and hold on for too long to shares that have dropped in value. The reason for this is that people do not want to recognize the losses but do want to recognize the gains they have made. By selling the shares

whose value has dropped the investor would have to admit that he made a bad investment. As long as the losses are not recognized they exist only in theory.

However, this kind of behavior is not very rational. It is much more tax efficient for the investor to sell the shares that have dropped in value because then those losses can be deducted from the gains that are possibly made later on. According to Constantinides (1983, 1984) the volume of the recognized losses should increase towards the year-end. Also gains should be recognized when they have been made with shares that have high volatility and the gains are believed to be long-term.

The effect can be explained with many of the previously introduced concepts in behavioral finance. The purchase price is often considered as the reference point for the investment. When the share price then drops below this level it causes a lot of regret and bad feeling for the investor. He becomes loss aversive and does not want to admit the bad investment decision. Shefrin & Statman (1985) explain the disposition effect with mental accounting. People find it uncomfortable to "close the account" in negative. It causes feelings of regret to them.

There is evidence of strong variation in the trading volumes of stocks (Grinblatt & Keloharju, 2001), mutual funds (Quill, 2001), and certain derivatives (Heath et al. 1999) that is caused by the disposition effect. These studies find that the trading volumes increase in bull market and decrease in bear market. In bull market, investors are more likely to sell their shares with gain relative to their reference point (e.g. purchase price or previously prevailed price level). In bear market the shares are more likely to be at a lower price level than the reference value and so investors do not want to realize their losses.

2.2.8 Overconfidence

Odean & Barber (2001) among others studied the tendency of investors to be overconfident when investing in stock market. They stress that overconfidence is particularly important to recognize when investing because the tendency has been found to come up in decision-making situations that are particularly challenging and when it is hard to get proper feedback. Males especially tend to be more confident than females in these kinds of situations (Lundberg et al. 1994; Prince, 1993). Overconfidence has been also considered to explain the trading activity of investors. Odean & Barber (2001) find males to be a lot more active in

trading even though this did not help them achieve higher returns in the end. Several studies have found overconfidence to be harmful to investors because it is likely to lead to badly diversified portfolios and decrease the expected return due to trading.

Overall, investors tend to be overconfident about their ability to predict future market movements. Investors also interpret the information differently depending on their point of view. For instance Daniel et. al (1998) find that on average investors overreact on information signals produced by themselves and under react on signals coming from the market. It has also been suggested that investors do not learn from their mistakes because they take the credit on successions but blame it on outside effect when they do not succeed (Taylor & Brown, 1988). This again only strengthens the overconfidence. Overconfidence may show as a tendency of certain investors to trade more actively and deviate more from the bank's allocation than others. Past successes also may reinforce the behavior, making these investors take more risk in their investments that is recommended.

2.2.9 Hyperbolic discounting

Hyperbolic discounting is a concept introduced to behavioral economics by Laibson (1997) and Laibson & Harris (2001). In the traditional life cycle hypothesis people are assumed to make rational decisions about their consumption at different periods in their life, independently of their current status. According to the hyperbolic discounting concept, people who can be considered as hyperbolic discounters do not consistently rank their consumption at different periods of life, independently of their current status, but change their conceptions of each period depending on what their current position is. Future period payoffs have much higher discount placed on them than today's payoffs. However, when the same payoffs are more distant in time, they are discounted more sensibly than the not-so-far-off payoffs. Green et al. (1994) find that the discount rate used in discounting for monetary rewards varies among other things across different age groups.

The result of this is that people may seem to behave irrationally when making decisions about saving. They are happy to start saving for retirement, as long as it does not start today. This is supported by biological evidence that emotions affect more strongly immediate choices and calculation dominates for more distant ones. The concept of hyperbolic discounting can thus explain why for example people often wait too long to get started on saving for retirement.

2.3 Determinants of risk

I will introduce here the literature concerning the typical variables that are used in determining individual risk attitudes.

According to the findings of the latest study on Finnish investors' risk tolerance by Alanko (2009) the risk tolerance of investors increases wealth and decreases with age. Also men were found to tolerate more risk than women.

2.3.1 Age

The evidence from most research papers on age and risk tolerance suggest that older people are on average more risk averse than younger people (e.g. McInish, 1982; Alanko, 2009). This is supported by the concept of life cycle investing which was introduced earlier in this study. According to the principles of life cycle investing people should gradually decrease the riskiness of their investment portfolio toward retirement because the saved money is meant to be used to provide extra income on top of the public pension. The tolerance for higher return and value variability is mitigated by shifting the allocation to safer asset classes.

Donkers et al. (2001) studied risk aversion in a large survey with Dutch households and found that age affects negatively the willingness to take risk. Dohmen et al. (2005) studied the relation of age and willingness to take risk with a German sample group. They also found evidence for risk aversion increasing with age. However, the effect was stronger in sports and leisure than in financial matters. Riley and Chow (1992) suggest that risk aversion decreases with age until 65 years is reached and starts decreasing again after that. Hallahan et al. (2004) also find support for the non-linear relationship between age and risk tolerance by adding age squared as an independent variable into their regressions.

Very recent studies about Finnish investors' risk tolerance also support the view that risk aversion increases with age. This finding has been made by Haarala (2008) in her study with 10.000 Finnish investors and Alanko (2009) in his very extensive study including risk profiles and true asset allocations of over 85.063 Finnish bank customers. Halko and Kaustia (2009) also find evidence for negative correlation between age and willingness to take risk in their Finnish sample.

2.3.2 Gender

Gender and the willingness to take risk are linked together through overconfidence. Overconfidence has been found to be more common among men (Lundberg et al. 1994) and it leads men to take more risk in financial matters (Prince, 1993). Several studies have found similar results and most of the research on the topic support the hypothesis that males tend to take more risks than women. Hallahan et al. (2004) conclude that among a group of explanatory variables such as age, gender, marital status, education, income and wealth), gender has the most prediction power on risk tolerance.

Also in Finland men have been found to be more willing to take risk with their invested assets than women (Haarala, 2008; Alanko, 2009). Kaustia and Halko (2009) find that men are generally more willing to take risks but when faced with a hypothetical investment decision, the difference between men and women respondents narrowed substantially.

2.3.3 Wealth

According to Friedman (1974) and Cohn et al. (1975) wealth and income are expected to correlate positively with individuals' risk taking. A study by Riley and Chow (1992) with American households finds that an increase in income and wealth decreases the average risk aversion of households. As was already mentioned in the chapter about the Saving motive theory wealth may have an effect on the saving behavior. The higher the wealth the more versatile the purposes for saving are. Thus wealth is also expected to potentially affect the investment objective and horizon. Also Hallahan et al. (2004) report of strong positive relation between wealth and risk tolerance.

Both Haarala (2008) and Alanko (2009) also find supporting evidence of this with Finnish sample groups. They also note that debt seems to have a clear positive effect on the investors' risk attitudes.

2.3.4 Trading Activity

Trading activity is strongly linked to the concept of overconfidence. As was mentioned before, overconfidence can be considered as the main reason for investors to trade actively (Odean & Barber, 2001). On average it only causes investors to lose money on trading fees and not increase their returns relative to others. Trading activity is affected by the investors' personal opinions about the near future market performance. Therefore, trading activity

increases in bull market and decreases in bear market. In effect, investors adopt a kind of a momentum strategy without necessarily knowing it. This was discussed more in the chapter about the Disposition effect. Not only internationally (Odean & Barber, 2001; Lundberg et al. 1994; Prince, 1993) but also in Finland trading activity has been found to be highest among young male investors (Westerholm & Ollilla, 2003).

3 Hypotheses

The aim of this study is to investigate the behavior of Finnish private investors by examining how well they follow the investment advice given by their bank and whether this behavior changes over time. The bank has mapped each investor's risk attitude and purpose of the investment in order to form a picture of the most suitable asset allocation for the individuals. Based on the information about the bank's suggestions and the investors' true portfolio allocations I try to identify characteristics of those investors not following the bank's advice and find out patterns in the investors' behavior. I address the question by forming six hypotheses, which are analyzed in a dataset of 910 individuals.

Previous studies by Alanko (2009) and Haarala (2008) have shown with extensive datasets of Finnish private investors that investors' risk taking behavior can be predicted by their individual risk attitudes. Investors who are willing and able to take higher risk should also be more likely to hold more equities than those that are not willing or able to take risk.

Hypothesis 1: Risk taking behavior can be predicted by individual risk attitude

The traditional life cycle hypothesis and life cycle investing theory suggest that as the investment horizon decreases with age, so should the share of equities in investors' portfolios. However, according to research on myopic loss aversion, investors distinguish between the actual investment horizon and the frequency that the wealth is being monitored (Benartzi & Thaler, 1995; Thaler, Tversky, Kahneman & Schwartz, 1997 and Benartzi and Thaler, 1995). These studies suggest the frequency with which the investments are evaluated determines the investor behavior more than the actual investment horizon. Despite this, I assume that the share of risky assets in the investors' portfolios increases with investment horizon, as suggested by the bank.

Hypothesis 2: Risk taking behavior can be predicted by investment horizon

Most of the existing research concerning age and risk tolerance indicates that these two are negatively correlated (Hallahan et al., 2004; Dohmen et al., 2005; Haarala, 2008; Halko & Kaustia, 2009; Alanko, 2009), although there is also some contradictory evidence from Riley & Chow (1992). I assume that as the risk tolerance is expected to decrease with age, this should be reflected also to the deviations from the bank's allocation recommendations. Thus younger investors are expected to have higher share of assets in equities than suggested and older investors lower share than suggested. Therefore my hypothesis is following:

Hypothesis 3: Risk tolerance decreases with age

Previous studies about the effect of gender and wealth (Hallahan et al., 2004; Dohmen et al., 2005; Haarala, 2008; Halko & Kaustia, 2009; Alanko, 2009) have been unanimous about their effects on individuals' risk tolerance. Here I also expect these tendencies to be reflected in the differences between the investors' true allocations and the ones suggested by the bank. Thus the two following hypotheses:

Hypothesis 4: Men are more risk tolerant than women

Hypothesis 5: Higher wealth implies increased risk tolerance

Studies by Thaler et al. (1997) on myopic loss aversion with investors suggest that individuals who display myopic loss aversion are more willing to accept risks if they evaluate their investments less often. On the other hand, investors who receive most frequently feedback about their investments take least risk. Also several studies on disposition effect (Grinblatt & Keloharju, 2001; Shefrin & Statman, 1985; Quill, 2001; Heath et al. 1999) and overconfidence (Odean & Barber, 2001; Lundberg et al. 1994; Prince, 1993) have shown that investors' perceptions of risks may change over time. Therefore my last hypothesis is following:

Hypothesis 6: Risk taking behavior may change over time

4 Data and Methods

In this section I present the data set used for the study in more detail. I first describe the main data characteristics and how it was retrieved. Then I introduce the descriptive and statistical methods I use in doing the research.

4.1 Data

The data used in the study was obtained from the databases and an investor-profiling tool that is being used by a major Finnish bank. The investor-profiling tool is based on the Markets in Financial Instruments Directive (MiFID) regulations by European Parliament (2004). The directive requires financial institutions to understand the essential facts about their customers and to find out the customers' preferences regarding their willingness and ability to take risk as well as the purpose of the investment. The tool is used by the bank's investment advisors before giving advice on the customers' investments and selling the bank's investment products. Customer is asked to answer a series of questions concerning his or her attitude towards risk taking. The purpose of this is to find out the investor's ability and willingness to take risk. The tool is set up in such a way that the investment profile is determined by the lower of the two values (ability and willingness to take risk). The full set of investment profile questions is reported in the Appendix A. There are three different risk profiles that the questionnaire can result to; Risk focused, Value driven and Safety first. A Risk focused investor accepts high risks in search for high returns. Investor who puts Safety first does not accept or is not financially able to handle variability in the returns. A Value minded customer is between these two risk-taker-profiles.

After completing the questionnaire the customers are proposed an investment plan with a certain allocation of assets into different asset classes. I aim to find out whether the investors have chosen their initial allocation of assets according to the bank's proposal. At year-end 2008 this bank's proposals for their customers' investment plans depended on two main variables; investor risk profile and investment time horizon. There were four different categories of investment horizons and three different risk profile categories. The allocation was determined based on them so that there were altogether twelve different allocation proposals with varying equity shares.

Figure 2 illustrates the different allocation proposals based on the two aforementioned variables. The share of equities in the suggested portfolio can vary significantly not only

because of the investment profile but especially due to the investment time horizon. The share of equities can vary in the Safety first group from 0% to 50%, in Value minded group from 0% to 75%, and in the Return focused group from 0% to 100%.

If the investor is going to need her invested money in less than two years the investment profile tool will automatically exclude any risky investments that could decrease significantly in value in a short period of time. This means that the share of equities will be 0% regardless of the investment profile. When the investor's investment horizon is over 15 years the suggested share of equities is minimum 50% when the investor is in the Safety first category and 100% if the customer is in the Return focused category. This is the only situation that the investor is suggested to invest 100% of the assets to a risky asset class.
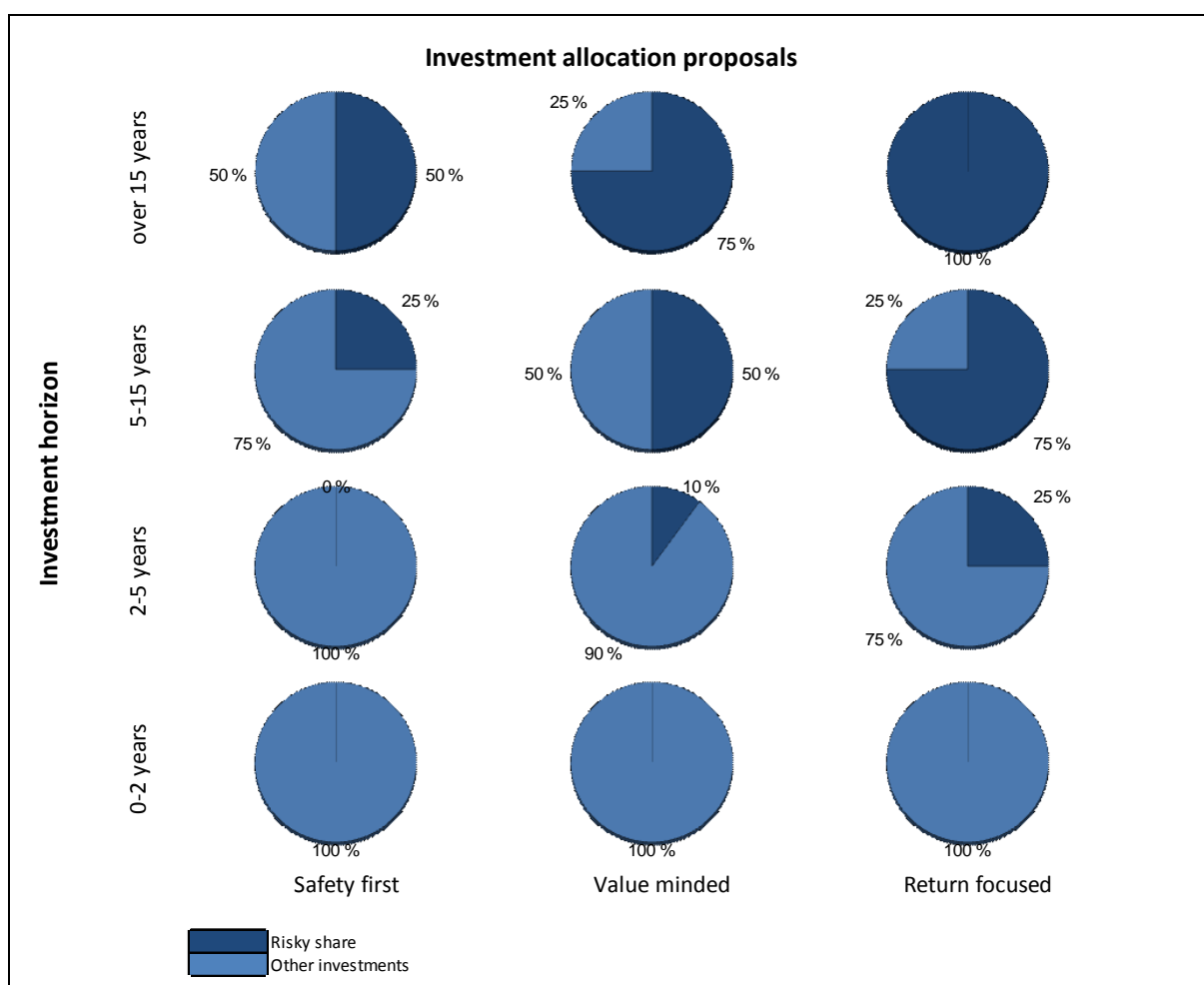
Figure 2. The allocation proposals of the bank. The allocation depends on two variables: investment time horizon and the personal investment profile.

Investors can have several investment objectives and thus several investment horizons for separate assets. This is how the bank takes into account the tendency of investors for mental accounting. For example, investor in the Value minded category might have two investment objectives: retirement saving (with long horizon) and saving for a new house (shorter horizon). I have tried to tackle the problem with mental accounting in this study by discarding investors with different investment horizons from the sample. Thus, the data includes only individuals with one or more investment objectives that all have the same investment horizon.

In my study I focus on private retail customers who have completed the Investment profile in the last quarter of 2008, i.e. between October 2008 and December 2008. I have gathered data about the compositions of the customers' investment portfolios at two dates: on 31st Dec 2008 and 31st Oct 2009. I call the former as the initial allocation and the latter as the final allocation. Corporations are excluded from the data set, which makes it consistent with previous studies. The total amount of investors in the sample is thus 910.

In addition to the information from the investment profile the data includes demographic statistics such as age, gender and wealth. As a proxy for the wealth I use each investor's average investment wealth during the period. Furthermore, I have gathered data about the trading activity of these customers during the studied period. I calculate portfolio turnover ratios for each investor and use the figure as a proxy for the investor's trading activity.

The bank is a large retail bank in the Finnish market with representation around the country and customers in all age and social classes. In addition to the traditional bank services such as credits, accounts, credit cards etc. the bank also offers an extensive range of different investment products at a competitive price. The data used in the analysis covers all the customers' investment assets in the bank. The data includes the following products: mutual funds, straight investments such as bonds and equities, cash investments, insurance products, and structured products such as index loans. The data does not cover other possible assets in different banks or investment vehicles that are not bought through the bank studied in this paper. Also certain deposits and cash accounts are not included in the data. These are mainly so-called liquidity accounts that are used for daily cash management rather than for long-term investment purposes.

The setup in this study differs from the previous studies on Finnish investors' risk attitudes mainly in three ways. First of all, I am the first one to have some longitude in my study. The period is not very long but enough to reveal patterns in the investors' behavior. Furthermore, I also have a unique set of data that includes information about the investment horizons of the investors. This is particularly interesting because I am here able to combine the data about the investors' true risk-taking with their long-term investment objectives and make comparisons between those figures. Thirdly, I focus on this study to explaining the differences in the risk-taking suggested by the bank and the actual actions of the investors.

I only use aggregated data in the study and do it so that no individual is identifiable from the figures.

4.2 Methods

I study the data set by testing whether the customers' initial portfolio compositions match the allocations recommended by the Investment profile tool. Then I compare the allocations of the customers' assets between the two dates, Dec 31, 2008 and Oct 31, 2009. I also test again how the true allocations differ from the bank's suggestions at the end of the period. Then by adding in the exogenous variables I am able to analyze which factors have explanatory power regarding the deviations in the asset allocations.

In the first part of the analysis I focus on confirming in descriptive methods that the results are consistent with the previous studies by Haarala (2008) and Alanko (2009) who had a lot bigger samples in their use and were able to make convincing statistical tests. After explaining the findings in descriptive methods I move on to making regression analysis with the variables. In the regression analysis I aim to find which variables actually explain statistically the differences in the allocations.

In order to study the risk-taking behavior of the investors I calculate the risky share (RS) for each investor's portfolio. Risky share was introduced by Riley and Chow (1992) as a factor in their Relative Risk Aversion Index (RRAI). The RS statistic is simply the ratio of risky assets to wealth, as used in the Arrow-Pratt coefficient for relative risk aversion. The RS statistic was also used in a study by Alanko (2009) to measure the risk aversive behavior of Finnish investors. For simplicity and due to the limitations of the available data I define the risky assets as equity holdings. Equity holdings will comprise of both direct and indirect equity

investments. As a proxy for the wealth I use the average investment wealth of each individual during the period. The total investment wealth includes all customers' known equity, fixed income, money market and other holdings of investment assets. This method is also in line with previous research on the topic.

Risky share defined:

$$Risky\_Share = \frac{Risky\_Assets}{Average\_Investment\_Wealth}$$

Equation 1. Risky share (RS statistic)

Where,

$$Average\_Investment\_Wealth = \frac{Total\_Assets\_2008 + Total\_Assets\_2009}{2}$$

Equation 2. Average Investment Wealth

The share of risky assets implies the risk-aversiveness of the investor. The higher the RS, the more risk-tolerant the investor is, and vice versa. The change in the share of risky assets between the initial allocation and the final allocation indicates whether the investor has increased or decreased the riskiness of the portfolio after setting the initial allocation. As a result of the analysis I aim to identify the characteristics of those investors who are most likely to deviate from the bank's suggestion and also from the initial allocation by either decreasing or increasing the riskiness of their portfolios. Positive change in the risky share indicates that the investor considers himself/herself being better able to tolerate the risk than estimated earlier and therefore is willing to increase the riskiness of his/her portfolio.

I will also investigate the trading activity of each investor by measuring it with portfolio turnover ratios. This way I can estimate whether the changes in the allocations are caused by market movements or active participation of the investor.

Portfolio turnover defined:

$$Turnover = \frac{max\{Total\_Purcases; Total\_Sales\}}{Average\_Investment\_Wealth}$$

Equation 3. Portfolio turnover ratio

Where Total purchases are the overall value of security purchases in Euros during the period January1 to October 31 in 2009. Respectively, Total sales are the overall value of security sales in Euros during the period January1 to October 31 in 2009

In order to find out how independent the variables are from each other, I analyze them by taking correlations between each other. Later, I run a regression analysis of the variables in order to test statistically the significance of the different factors explaining investor behavior. I use linear regressions with ordinary least squares method in doing this. This method is used because the dependent variables can be expected to be random, normally distributed and possible to sort by values linearly.

I use the following dependent variables in the regressions:

- Difference in the risky share between the initial allocation and the bank's suggestion:

$$dRS_{2008-bank} = RS_{2008} - RS_{bank}$$

Equation 4. Difference in the risky share between the initial allocation and the bank's suggestion

- Difference in the risky share between the final allocation and the initial allocation:

$$dRS_{2009-2008} = RS_{2009} - RS_{2008}$$

Equation 5. Difference in the risky share between the final allocation and the initial allocation

- Difference in the risky share between the final allocation and the bank's suggestion:

$$dRS_{2009-bank} = RS_{2009} - RS_{bank}$$

Equation 6. Difference in the risky share between the initial allocation and the bank's suggestion

Where,

- RS_{2008} is the true risky share in investor's portfolio in the beginning of the period
- RS_{bank} is the risky share suggested by the bank
- RS_{2009} is the true risky share in investor's portfolio at the end of the period

The independent variables used in the regressions are following:

- Age is investor's age in years
- Age squared is quadratic age term

- Gender is a dummy variable which takes the value of one if the person is male

- Risk profile captures the risk attitude of the investor (1: Safety first, 2: Value minded, 3: Return focused)

- Investment horizon captures the length of the investment period as estimated by the investor (1: from 0 to 2 years, 2: from 2 to 5 years, 3: from 5 to 15 years, 4: over 15 years)

- Wealth is the total amount of investment wealth of the investor in EUR

- Wealth (logarithmic) is a natural logarithm of wealth and used as a control method for the distribution of wealth

- Turnover ratio is the portfolio turnover ratio of the investor during the studied time period and it is used as a proxy for the investor's trading activity

5 Data Analysis

In this section of the study I analyze the data set by using quantitative and descriptive methods to find out evidence for or against the hypotheses. I will investigate the possible statistical dependencies between the chosen variables and present figures in graphs and tables to elaborate the key results of the analysis. I first examine the descriptive statistics to determine whether the sample group can be considered as a representative sample of a larger investor population. I investigate the true allocations of the investors in the beginning of the studied period, December 31, 2008 and at the end of the period, October 31, 2009. I also extend my study to regression analysis to investigate the statistical significance of the variables in explaining the differences between the investors' allocations.

5.1 Descriptive Statistics

The general statistics of the sample group confirm that the group can be considered as a representative sample of a larger investor population. The main statistics match findings of the previous research. Tables 1, 2, 3 and 4 report the main demographic statistics of the investors. Table 1 includes data of all the investors and tables 2 to 4 present the same information by Investment profile categories.

Table 1. Demographic statistics of the sample group. Gender statistic, Males=1 and Females=0. In risk profile the categories Safety first, Value minded and Return focused are measured with figures 1, 2 and 3 respectively. Investment horizon has a statistic from 1 to 4 that increases with the time period.

All (n=910)

	Mean	StDev	Median	Min	Max
Age	54,7	15,0	56,5	16,7	89,6
Gender	0,49	0,50	0,00	0,00	1,00
Risk profile	1,92	0,61	2,00	1,00	3,00
Investment horizon	2,65	0,85	3,00	1,00	4,00
Average investment wealth	165 528	1 298 011	22 030	25	36 252 142
Average equity investments	54 185	249 063	5 675	0	4 332 134
Average other investments	111 342	1 223 633	12 878	0	35 853 460
Turnover	37 017	211 307	500	0	3 695 112

The data suggests that average investor has an investment wealth of €165.528 and the person's investment horizon is between 2 and 5 years. However, the median investment wealth is merely €22.030 euros. The average figures are distorted due to the fact that the data includes some investors with very large assets, for instance the maximum average investment wealth of over €36 million. Average investor holds most of his/her investments in other than equities (€5.675 versus €12.878), mainly in short-term fixed income investments. The gender distribution is fairly even with a slight majority (51%) being females.

These figures are mainly in line with Alanko's (2009) findings of average Finnish retail investors. There are some differences in the amount of investment wealth. In Alanko's sample the average investment wealth was a little lower (€101.942) than in this study. On the other hand the median investment wealth was clearly higher (€37.000). I suspect this is because Alanko's figures also include assets on liquidity accounts for daily cash management.

As expected, customers in the sample group are reasonably old. The average age is 54,7 years and median 56,5. The youngest person is 17 years old and the oldest one almost 90 years. Figure 3 presents the age distribution by age groups. The age distribution is a similar to the overall age pyramid in Finland. It also resembles the distribution found by Alanko (2009).
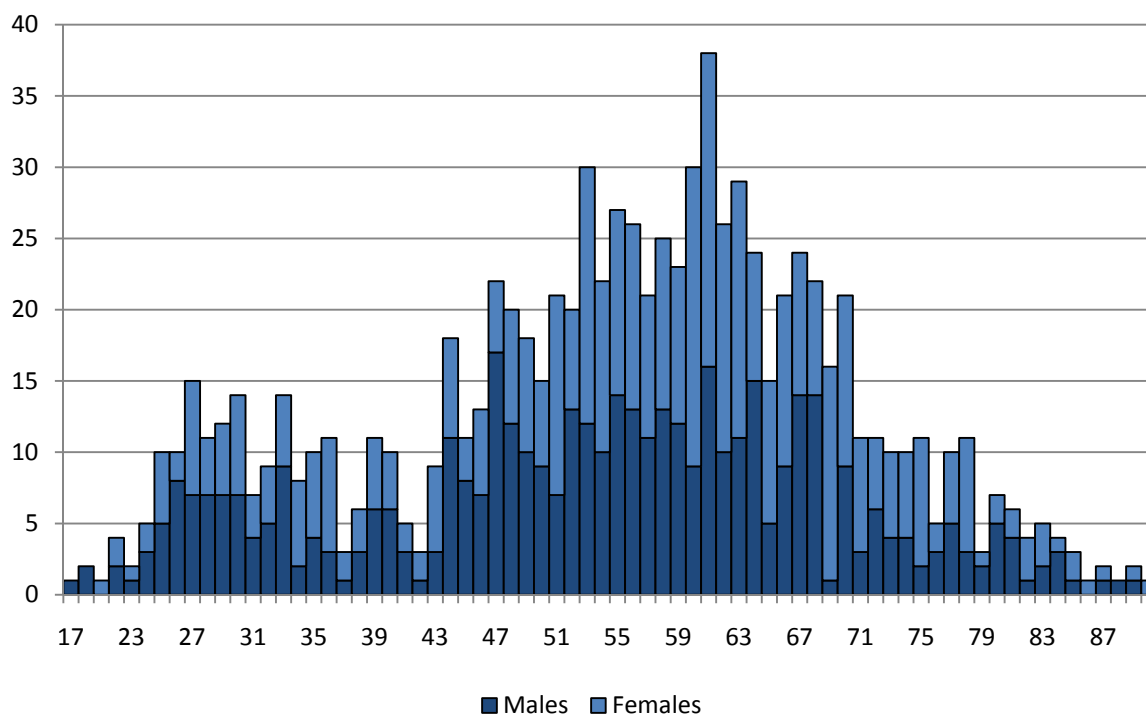
Figure 3. Age distribution with a breakdown by gender.

Tables 2, 3 and 4 report the same demographic information as Table 1 by Investment profile categories. The data suggests that most investors in the Safety First category are older than average (60 years). On the other hand the category Return focused seems to consist of clearly younger investors (49 years) than the average. Also the average investment wealth is lowest in the Return focused category. Despite the lower investment wealth, the portfolio turnover of assets is higher in this group than in the other two. Turnover relative to the average investment wealth seems to increase with the risk attitude in all of the investment profile categories. So does the estimated investment period for the assets. Furthermore, the results suggest that the average equity holdings relative to the avg. investment wealth behave in the same way.

Table 2. General statistics of investors in the Investment profile category: Safety First. Gender statistic, Males=1 and Females=0. In risk profile the categories Safety first, Value minded and Return focused are measured with figures 1, 2 and 3 respectively. Investment horizon has a statistic from 1 to 4 that increases with the time period.

Investment profile: Safety First (n=208)					
	Mean	StDev	Median	Min	Max
Age	59,5	14,6	61,5	19,5	89,4
Gender	0,42	0,50	0,00	0,00	1,00
Risk profile	1,00	0,00	1,00	1,00	1,00
Investment horizon	2,12	0,88	2,00	1,00	4,00
Average investment wealth	100 713	439 891	22 030	82	5 099 578
Average equity investments	27 180	132 689	3 269	0	1 448 823
Average other investments	73 533	362 625	18 206	0	4 694 025
Turnover	14 125	65 646	300	0	816 562

Table 3. General statistics of investors in the Investment profile category: Value Minded. Gender statistic, Males=1 and Females=0. In risk profile the categories Safety first, Value minded and Return focused are measured with figures 1, 2 and 3 respectively. Investment horizon has a statistic from 1 to 4 that increases with the time period.

Investment profile: Value Minded (n=567)					
	Mean	StDev	Median	Min	Max
Age	54,3	14,8	55,9	16,7	89,6
Gender	0,48	0,50	0,00	0,00	1,00
Risk profile	2,00	0,00	2,00	2,00	2,00
Investment horizon	2,74	0,79	3,00	1,00	4,00
Average investment wealth	211 092	1 618 801	24 338	25	36 252 142
Average equity investments	65 391	296 646	7 295	0	4 332 134
Average other investments	145 700	1 533 454	14 009	0	35 853 460
Turnover	41 867	230 414	500	0	3 695 112

Table 4. General statistics of investors in the Investment profile category: Return Focused. Gender statistic, Males=1 and Females=0. In risk profile the categories Safety first, Value minded and Return focused are measured with figures 1, 2 and 3 respectively. Investment horizon has a statistic from 1 to 4 that increases with the time period.

Investment profile: Return Focused (n=135)					
	Mean	StDev	Median	Min	Max
Age	49,4	14,3	50,6	22,1	84,2
Gender	0,63	0,48	1,00	0,00	1,00
Risk profile	3,00	0,00	3,00	3,00	3,00
Investment horizon	3,04	0,68	3,00	1,00	4,00
Average investment wealth	74 020	194 394	13 487	72	1 303 286
Average equity investments	48 729	142 181	6 991	0	1 037 467
Average other investments	25 291	81 957	3 578	0	713 589
Turnover	51 914	266 176	1 220	0	2 813 871

Most of the investors (62%) in the sample group are categorized into the Value minded group (n=567). The second largest group (24%) is Safety First (n=208) and the smallest one Return focused (n=135). The numbers are illustrated in Figure 4. The distribution is slightly skewed to the risk-averse direction. This is investigated in more detail in later but the aggregate

figures already indicate that the investors consider themselves as quite risk averse. This is in line with the existing research about Finnish investors (e.g. Alanko, 2009; Halko & Kaustia, 2009; Haarala, 2008)
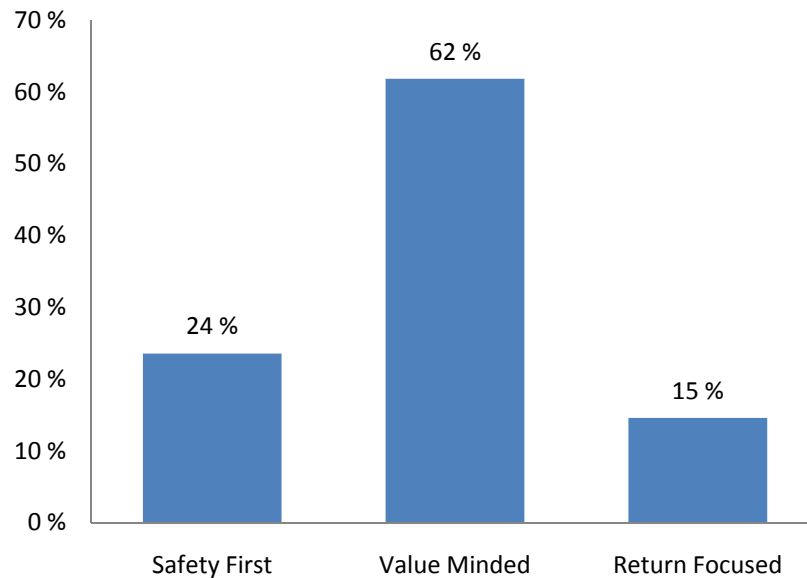
Figure 4. Distribution of investors in different Investment profile categories, n=910

Figure 5 reports the share of investors in each investment profile category by age. It is noteworthy that there are clear differences in the distributions depending on the age. The pattern suggests that the older the investors are the more risk averse they appear to be. The share of investors in the Return focused category declines with age. At the same time the share of investors in the Safety first category increases with age while the Value minded category dominates across the age groups. The results support many of the existing studies about the negative attitude towards risk increasing with age (Hallahan et al., 2004; Dohmen et al., 2005; Haarala, 2008; Alanko, 2009). Due to the smaller sample size the evidence is not as profound as in Alanko's (2009) study although the results are consistent with their findings.
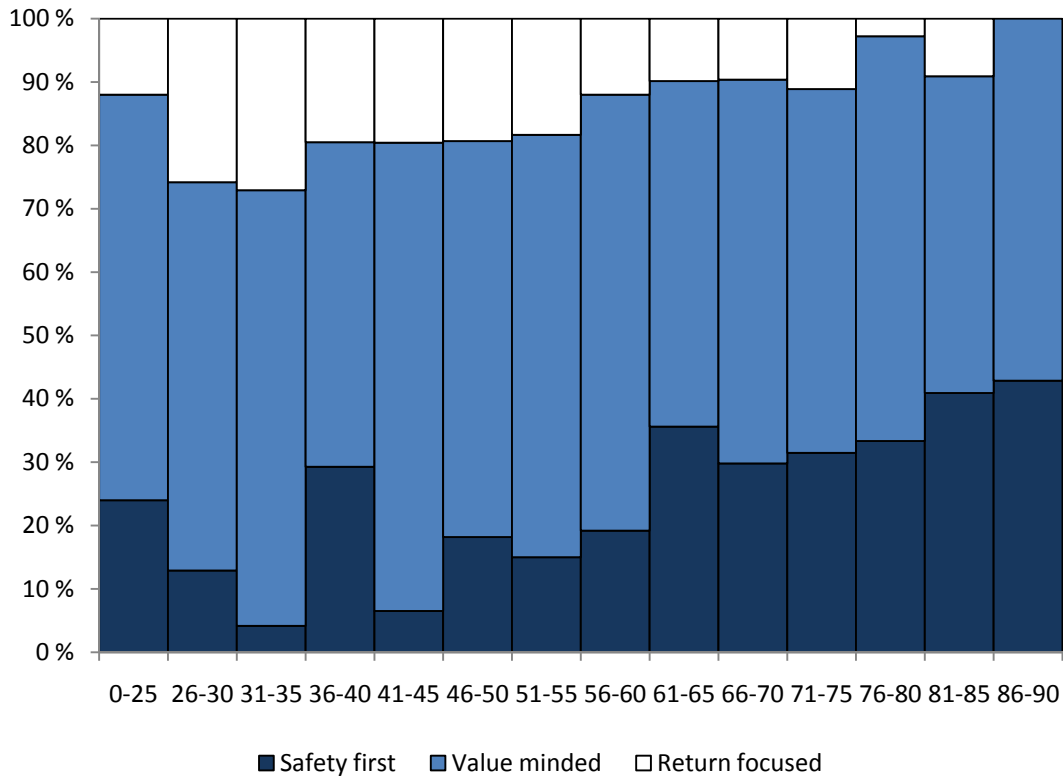
Figure 5. Percentages of investors in the different risk profile categories

There are also some noticeable gender differences between the risk profile groups. Figure 6 depicts the share of females and males in the different risk profile categories. Overall, the distribution is even with 51 % females and 49 % males. However, when observing the distributions in the different risk profile categories there are apparent differences between the groups. In the Return focused group a clear majority of the investors are male. The distribution is even again in the Value minded category but then changes in the Safety first category. Safety first category has close to the same majority of females as was with males in the Return focused category. In this sample group females thus appear to be more risk averse than males and males more risk seeking than females. This supports the findings made in numerous previous studies on the topic (Hallahan et al., 2004; Dohmen et al., 2005; Haarala, 2008; Alanko, 2009). Those studies have found similar differences in the risk attitudes of males and females, i.e. females being more risk averse than males.
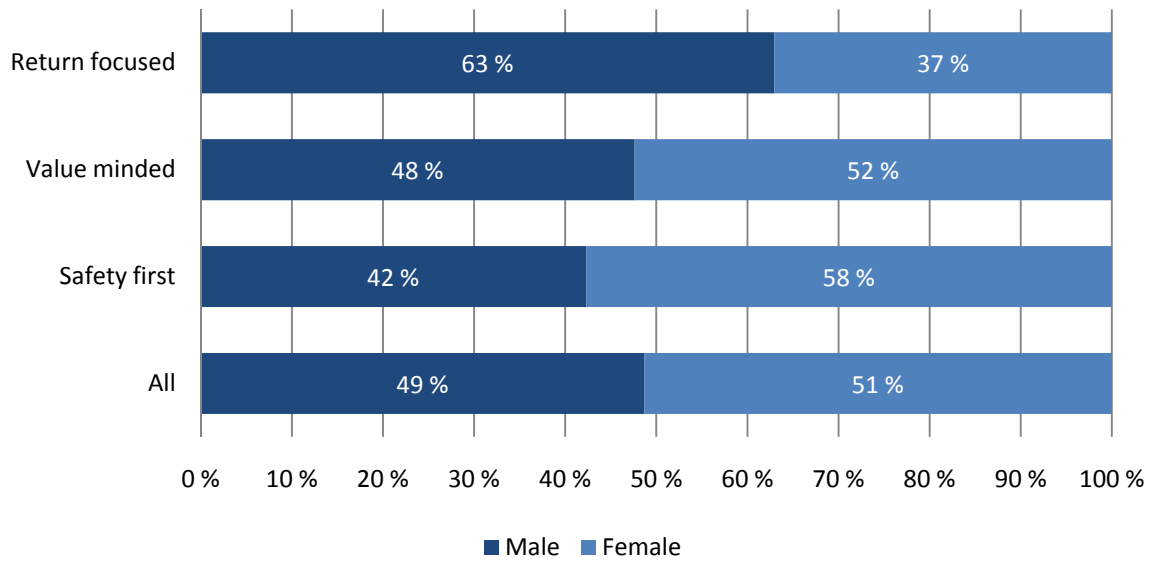
Figure 6. Gender allocation in the different risk profile categories.

5.2 Correlations Between Variables

In order to investigate how the different variables are dependent of each other I have gathered a correlation matrix in Table 5. In addition, to the correlations between age, gender, risk profile and investment horizon I have included the following variables: turnover ratio, average investment wealth, risky share suggested by the bank, risky share in 2008, risky share in 2009, the difference between risky share in 2008 and the bank's suggestion, the difference between risky share in 2009 and the bank's suggestion and finally the change in the risky share from 2008 to 2009.

There appears to be a fairly strong negative correlation between age and the risk profile. This means that the older the person is the higher the probability that he/she is in a more risk-averse investment profile category. This is also reflected in the negative correlation between age and the risky share suggested by the bank. There is also a relation between gender and risk profile. The positive correlation means that males are more likely to be in the more risk-tolerant risk profile category. Therefore, the share of females is higher in the Safety first group and lower in the return focused category.

An interesting figure is the high positive correlation between risk profile category and investment horizon. This indicates that the longer the time horizon for the investments the

higher the probability that the investor belongs to a higher risk investment category. This is intriguing because the investment profile and the time horizon for the investments should be independent variables. Investment profiling aims to map the investor's general appetite and tolerance towards risk. The investment horizon is dictated by the investment objectives, i.e. purpose of the investment. However, it seems based on these figures that the two variables appear to be strongly interdependent. It is possible that the investment purpose affects the way the investors consider they can tolerate the risk.

Some of the most significant observations are the correlations between risk profile and risky shares, and investment horizon and risky shares. The risky share suggested by the bank correlates more highly with the investment horizon than with the risk profile. This means that the bank considers the time period of the investment as a more important factor in determining the risky share than the personal risk profile. However, when observing the correlations of the actual risky share chosen by the investors it seems that the risk profile has a lot higher correlation than the investment horizon. In effect, the investors discard the purpose and expected length of the investment and rely more on their personal risk attitude when determining the risk level of their portfolio.

When it comes to the difference between the true allocation of assets and those suggested by the bank it seems that there is a high negative correlation with the investment horizon as well as with the risk profile. This suggests that the larger the difference between the true allocation and the one suggested by the bank, the shorter the investment horizon. In other words, investors with short investment horizons have higher share of investment in risky assets than suggested by the bank and vice versa with investors in the long horizon categories. Also risk profile has a significant negative correlation with the difference to the bank's suggestion. This indicates that investors in the more risk-averse risk profile categories have higher risky share than suggested by the bank.

Table 5. Correlations between variables. The table presents the correlation coefficients between the main demographic statistics and investment wealth figures. Coefficients above 0,1 are highlighted in the table. Gender statistic, Males=1 and Females=0. In risk profile the categories Safety first, Value minded and Return focused are measured with figures 1, 2 and 3 respectively. Investment horizon has a statistic from 1 to 4 that increases with the time period.

The Correlation matrix

	Age	Gender	Risk profile	Investment horizon	Turnover ratio	Average investment wealth	Risky share suggested by the bank	Risky share 2008	Risky share 2009	Difference in RS, 2008-bank	Difference in RS, 2009-bank	Change in RS, 2009-2008
Age	1	-0,086	-0,207	-0,181	-0,080	0,054	-0,223	-0,027	-0,138	0,162	0,084	-0,126
Gender	-0,086	1	0,118	0,075	0,018	0,019	0,111	0,078	0,125	-0,028	0,003	0,047
Risk profile	-0,207	0,118	1	0,345	0,061	0,002	0,627	0,363	0,365	-0,219	-0,255	-0,032
Investment horizon	-0,181	0,075	0,345	1	0,043	0,030	0,892	0,151	0,198	-0,615	-0,624	0,041
Turnover ratio	-0,080	0,018	0,061	0,043	1	-0,011	0,064	-0,036	0,050	-0,083	-0,015	0,103
Average investment wealth	0,054	0,019	0,002	0,030	-0,011	1	0,022	-0,021	-0,027	-0,036	-0,041	-0,005
Risky share suggested by the bank	-0,223	0,111	0,627	0,892	0,064	0,022	1	0,268	0,301	-0,606	-0,635	0,013
Risky share 2008	-0,027	0,078	0,363	0,151	-0,036	-0,021	0,268	1	0,656	0,603	0,296	-0,491
Risky share 2009	-0,138	0,125	0,365	0,198	0,050	-0,027	0,301	0,656	1	0,292	0,546	0,336
Difference in RS, 2008-bank	0,162	-0,028	-0,219	-0,615	-0,083	-0,036	-0,606	0,603	0,292	1	0,769	-0,416
Difference in RS, 2009-bank	0,084	0,003	-0,255	-0,624	-0,015	-0,041	-0,635	0,296	0,546	0,769	1	0,261
Change in RS, 2009-2008	-0,126	0,047	-0,032	0,041	0,103	-0,005	0,013	-0,491	0,336	-0,416	0,261	1

5.3 Analysis of the Allocations

In this part of the Analysis section I investigate the different variables in more detail by measuring investment allocations of the investors first at the beginning of the studied period and then at the end of the period. I also compare these figures to the allocation suggested by the bank and see if I can find systematic patterns in the results.

5.3.1 Risk profiles and investment horizons

At year-end 2008 the investors held on average 32% of their investment assets in a risky asset class. As expected, the risky share depended on the individual's risk profile. In the Safety first category the figure for risky share was on average 18% whereas in the Value minded group it was 32% and in the Return focused category 55%. Figure 7 illustrates these differences. This supports the findings in previous studies, namely by Alanko (2009) and Haarala (2008) that Finnish investors tend to allocate their money in low-risk assets. Also the evidence that the risky share increases with risk profile was suggested by the two earlier studies as well.
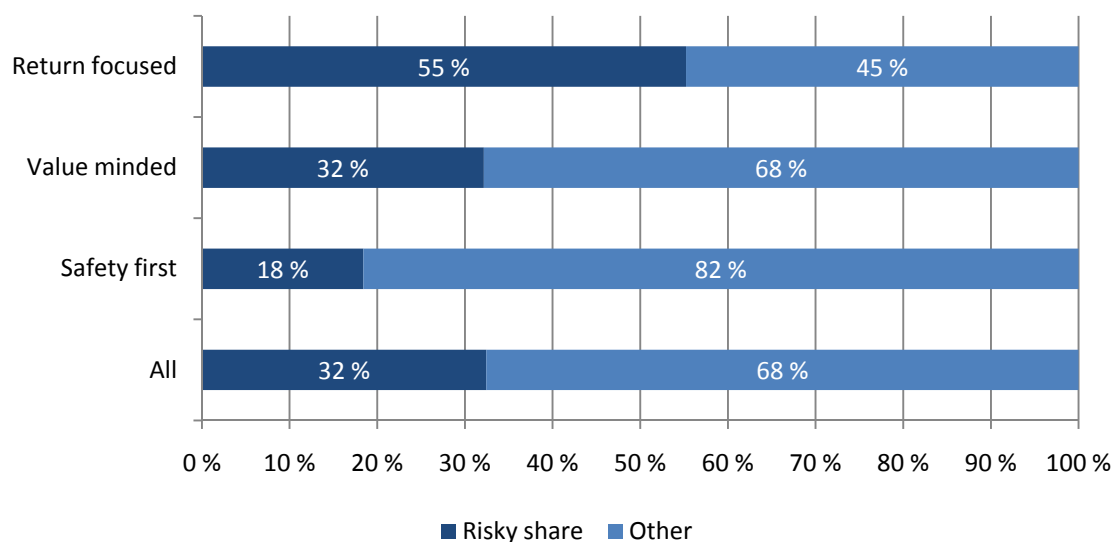
Figure 7. Average risky shares in the three different risk profile categories on December 31, 2008.

Figure 8 shows the differences in the risky share by investment horizon and risk profile categories. The risky share seems to be relatively constant across the investment horizons in each risk profile category. In the Safety first and Return focused categories the risky share is actually lower when the intended investment period is over 15 years than when the investment horizon is from zero to two years. However, the sample size in the latter one is only 2 individuals, which makes it statistically unreliable figure. The differences between the

highest and lowest figure for risky share in Safety first group is 11 percentage points, in the Value minded group 20 percentage points and in the Return focused group 12 percentage points when the figures for RF, 0-2 years are discarded.
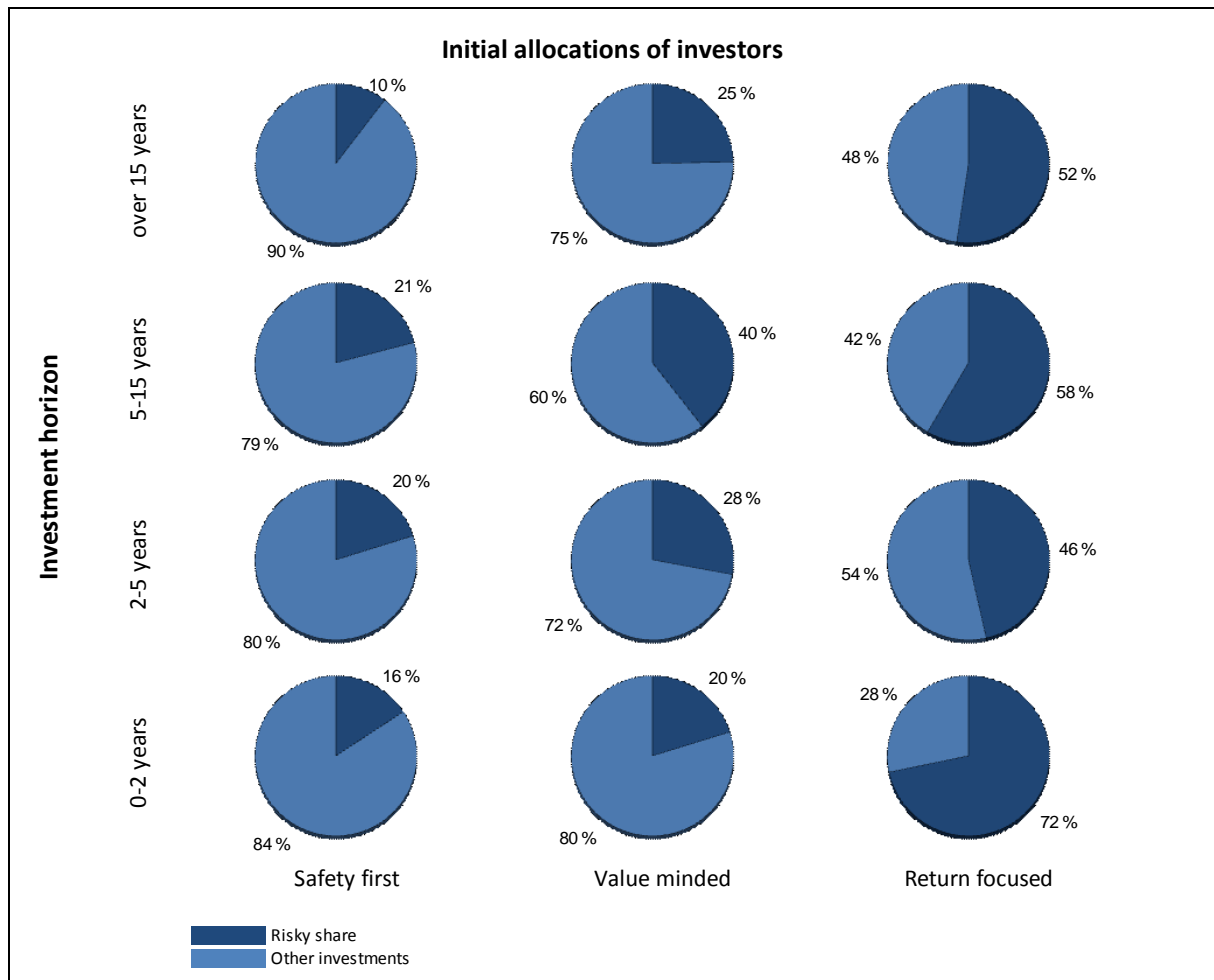
Figure 8. Average allocations of the investors' portfolios by risk profile categories and investment horizons on December 31, 2008.

Allocations at the end of the studied period on October 31, 2009 reveal that at this point investors held on average 42% of their investments in risky assets. The average share of risky assets in the different risk profile categories were 28% for Satefy first, 43% for Value minded and 61% for Return focused investors. Figure 9 illustrates the differences. The share of risky assets in the portfolios has increased by almost one third in a relatively short time period of 10 months. Even though the phenomenon is apparent in each of the risk profile categories there

are significant differences between the groups. As the Table 7 reports, the risky share has increased in relative terms the most in the Safety first group and the least in the Return focused group.
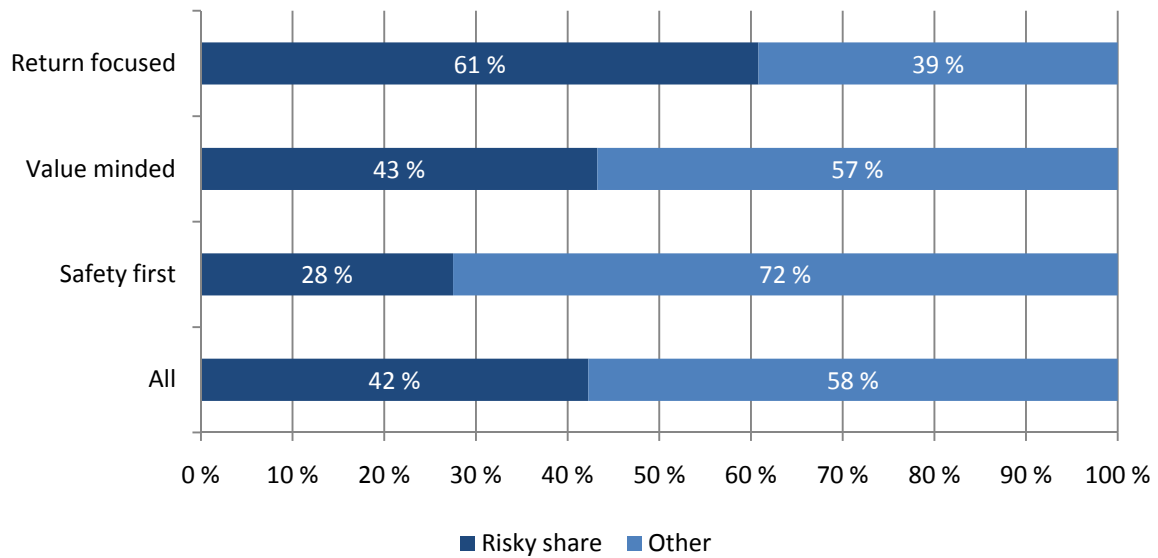
Figure 9. The average risky share of assets in different risk profile categories on October 31, 2009.

Figure 10 shows the average share of risky assets by risk profile categories and investment horizons. The pattern is very similar to the one presented in figure 8. Even though the risky shares have increased in all of the groups there are no great differences between the investment horizons in each risk profile category. I discard the group with Return focused risk profile and investment period of zero to two years due to the small sample size (n=2). The largest differences in the RS figures in each risk profile category are: Safety first 6 percentage points, Value minded 16 percentage points and Return focused 7 percentage points.
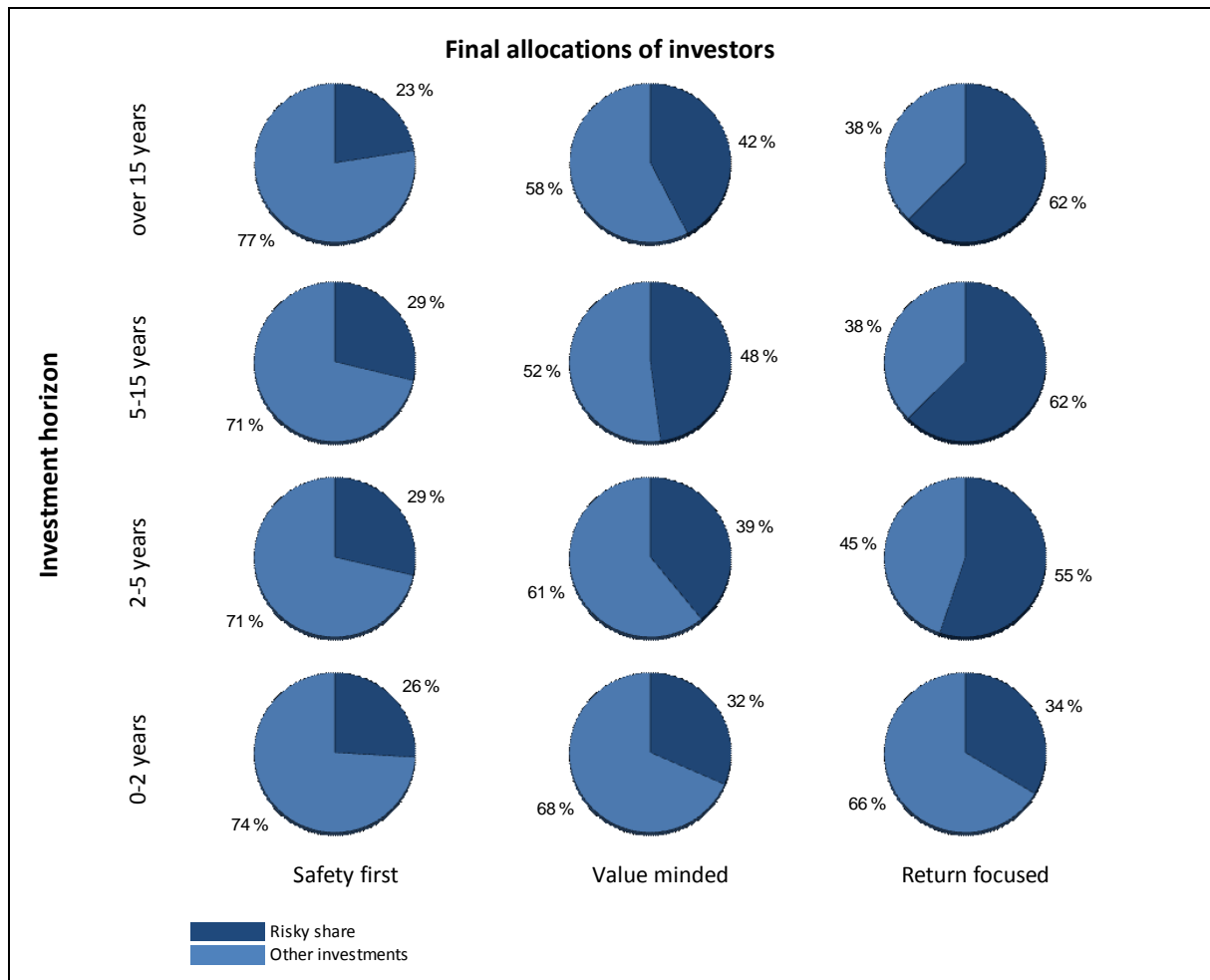
Figure 10. Average allocations of the investors' portfolios by risk profile categories and investment horizons on October 31, 2009.

In Table 6 I have summarized the sample groups' individuals' risky shares of their portfolios on December 31, 2008 (Initial allocation) and October 31, 2009 (Final allocation). The table also includes comparisons to the allocation suggested by the bank's investment profile tool in each group.

Table 6. Summary of the RS statistics and the differences in the figures across risk profile categories and investment horizons. The changes are reported both in percentage points and percentages. Columns 'Initial-Bank' report the differences in the risky share between investors' initial portfolios and bank's suggestions. Similarly columns 'Final-Bank' report the differences between final allocation and bank's suggestion as well as 'Final-Initial' report the difference between final allocations and initial allocations.

| | | | | | | Risky share of investments | | | | | |
| | | | | | | Initial - Bank | | Final - Bank | | Final - Initial | |
Inv. Profile	Inv. Horizon	Sample size	Bank's proposal	Initial allocation	Final allocation	Absolute difference	Relative difference	Absolute difference	Relative difference	Absolute difference	Relative difference
Safety first	0-2 years	54	0 %	16 %	26 %	16 %		26 %		10 %	65 %
	2-5 years	91	0 %	20 %	29 %	20 %		29 %		9 %	42 %
	5-15 years	47	25 %	21 %	29 %	-4 %	-16 %	4 %	15 %	8 %	38 %
	over 15 years	16	50 %	10 %	23 %	-40 %	-79 %	-27 %	-55 %	12 %	118 %
Value minded	0-2 years	26	0 %	20 %	32 %	20 %		32 %		11 %	56 %
	2-5 years	192	10 %	28 %	39 %	18 %	179 %	29 %	291 %	11 %	40 %
	5-15 years	251	50 %	40 %	48 %	-10 %	-21 %	-2 %	-4 %	8 %	21 %
	over 15 years	98	75 %	25 %	42 %	-50 %	-67 %	-33 %	-44 %	18 %	71 %
Return focused	0-2 years	2	0 %	72 %	34 %	72 %		34 %		-38 %	-53 %
	2-5 years	22	25 %	46 %	55 %	21 %	86 %	30 %	120 %	9 %	19 %
	5-15 years	79	75 %	58 %	62 %	-17 %	-22 %	-13 %	-17 %	4 %	7 %
	over 15 years	32	100 %	52 %	62 %	-48 %	-48 %	-38 %	-38 %	10 %	19 %

Comparisons between the allocations proposed by the bank, allocation chosen at the beginning of the investment period and the allocation at the end of the studied period show considerable variations in the RS statistics. There are some noticeable patterns in the studied figures. Comparison between the allocations proposed by the bank and the ones initially chosen by the customers reveal that the investors categorically overweight risky assets in short investment periods and underweight them in the domain of longer investment periods. The same appears to occur also with the final allocations. Overall, the risky share has increased in all of the sample groups substantially. The only exception is the group of two Return focused investors with an investment horizon of 0-2 years.

Table 7 reports summarized information about the investors' holdings on an aggregate level. Altogether the investors have increased the risky share of investments in their portfolios by 30% in relative terms from the end of year 2008 to the end of October 2009. The largest relative increases in the RS figure have taken place among the supposedly most risk averse investors, namely in the Safety first risk profile category (49%). The second largest change has taken place among the Value minded investors (34%) and perhaps surprisingly the smallest change in relative terms was in the Return focused category (10%). The statistics also show that there seems to be clear overweighting of risky assets among the supposedly most risk-averse investors when compared to the suggestion by bank. Then again the supposedly least risk-averse investors in the Return focused group underweight risky assets in their portfolios. Overall, the difference in the RS statistic to the bank's suggested risky share

has increased from -4% to 5%. The total investment wealth increased from 126M€ to 175M€ which almost entirely came from the increase in risky assets.

Table 7. Summary of the investors' holdings in each risk profile category. Avg. difference in RS, 2008-bank reports the average difference in the share of equities between investors' portfolios and the bank's allocation suggestions (percentage points). The figure 2008 reports the situation at the beginning of the period and 2009 at the end of the period. Relative increase reports the percentage increase in the share of equities.

		Investment wealth			
		All (n=910)	Safety First (n=208)	Value Minded (n=567)	Return Focused (n=135)
December 31, 2008	Total assets, Dec 31 2008	126 361 518	15 614 892	104 094 658	6 651 968
	Risky assets, Dec 31 2008	29 532 955	3 027 074	22 760 408	3 745 473
	Other assets, Dec 31 2008	96 828 563	12 587 818	81 334 250	2 906 495
	Average risky share, Dec31 2008	0,32	0,18	0,32	0,55
October 31, 2009	Total assets, Oct 31 2009	174 898 567	26 281 833	135 283 217	13 333 517
	Risky assets, Oct 31 2009	69 084 542	8 279 820	51 393 413	9 411 309
	Other assets, Oct 31 2009	105 814 025	18 002 013	83 889 804	3 922 208
	Average risky share, Oct 31 2009	0,42	0,28	0,43	0,61
	Avg. difference in RS, 2008-bank	**-4 %**	**9 %**	**-6 %**	**-16 %**
	Avg. difference in RS, 2009-bank	**5 %**	**18 %**	**5 %**	**-11 %**
	Relative increase in the risky share from 2008 to 2009	**30 %**	**49 %**	**34 %**	**10 %**

Table 8 presents the same information as Table 7 by grouping the investors according to their investment horizons. The differences across the groups are evident. Individuals in the categories 1 and 2 have strong overweighting of risky assets in their portfolios whereas investors with longer investments objectives clearly underweight the risky share suggested by the bank. The relative change in the risky share from the year-end 2008 to the end of October 2009 appears to be strongest among those investing for the shortest and the longest time periods. This indicates that the investors in those groups may be more aggressive in adjusting their portfolio weights than the other investors on average. The risky share should increase with investment horizon, of which I find only weak evidence. The smallest RS statistic can be found in Investment horizon 1, followed by Investment horizon 2. However, the figure for Investment horizon 3 is higher than for Investment horizon 4. The order is same in 2008 and 2009.

Table 8. Summary of the investors' holdings. Grouped by investment horizons. Avg. difference in RS, 2008-bank reports the average difference in the share of equities between investors' portfolios and the bank's allocation suggestions (percentage points). The figure 2008 reports the situation at the beginning of the period and 2009 at the end of the period. Relative increase reports the percentage increase in the share of equities.

| | | Investment wealth | | | |
		Investment horizon 1	Investment horizon 2	Investment horizon 3	Investment horizon 4
December 31, 2008	Total assets, Dec 31 2008	2 516 588	22 889 586	93 528 238	7 935 816
	Risky assets, Dec 31 2008	375 214	7 131 555	19 574 575	2 554 856
	Other assets, Dec 31 2008	2 141 374	15 758 030	73 953 663	5 380 960
	Average risky share, Dec31 2008	0,18	0,27	0,41	0,29
October 31, 2009	Total assets, Oct 31 2009	3 532 960	34 879 664	122 040 633	15 457 607
	Risky assets, Oct 31 2009	867 952	16 863 192	43 518 308	8 211 521
	Other assets, Oct 31 2009	2 665 008	18 016 473	78 522 325	7 246 086
	Average risky share, Oct 31 2009	0,28	0,37	0,49	0,45
	Avg. difference in RS, 2008-bank	**18 %**	**19 %**	**-11 %**	**-49 %**
	Avg. difference in RS, 2009-bank	**28 %**	**29 %**	**-4 %**	**-33 %**
	Relative increase in the risky share from 2008 to 2009	**51 %**	**38 %**	**19 %**	**53 %**

5.3.2 Trading activity

There are two factors affecting the increase in the risky share: increase in the valuations of risky assets relative to other assets and the investors' active participation in the increase of risky share by trading. It is out of scope of this study to calculate the true time-weighted return figures for each investor's entire portfolio based on their holdings during the year and taking into account the money paid in and out of their custody accounts. However, as a proxy of the magnitude of the effect that the general positive trend in the stock market has had on the investors' portfolios I have summarized the performance of the main equity indexes during the period in Table 9 and Figure 11. Overall, the valuations in the stock market increased by 13,2% in the developed countries and by 51,9% in the emerging countries. In Finland the increase was relatively high (25,2%). Also the US market performed better (15,5%) than the European (12,9%) and Japanese (10,6%).

Table 9. Performance of the main world equity indexes between December 31, 2008 and October 31, 2009. Increase in the value of the index points in percentages.

| | Index performance | | | | |
MSCI EM	OMXH Cap	S&P 500	MSCI World	DAX	NIKKEI225
51,9 %	25,2 %	15,5 %	13,2 %	12,9 %	10,6 %
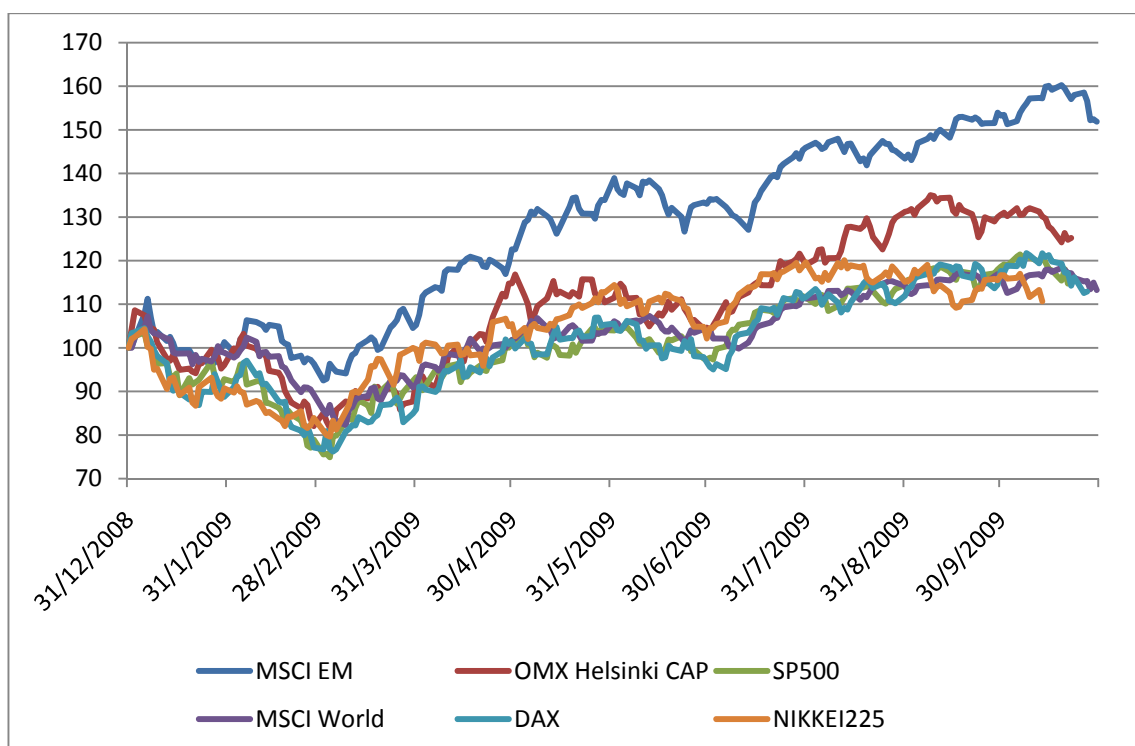
Figure 11. Performance chart for the main world equity indexes between December 31, 2008 and October 31, 2009.

I listed the different equity categories by regions and included the weights of the investors' holdings on December 31, 2008. I also calculated a rough estimate of the total weighted return of the different markets. Assuming that the investors had kept the same regional allocations throughout the period, the return would have been 23,7 % (Table 16, Appendix A).

In order to investigate whether the investors have actively increased the share of risky assets in their portfolios by trading I have summarized data about their trading activity between January 1, 2009 and October 31, 2009 in Table 11. The aggregated data suggests that during this period investors bought 57,2% more equities than sold (€15,2M bought, €9,6M sold). They also sold 3,9% more other investments than bought them during the period (€12,8M bought, €13,4M sold). Based on the median figures the most common way of trading was buying equities. The figures suggest that investors actively allocated more funds into risky assets during the ten months although most of the increase in the risky assets has come from the increase in the valuations of stocks. Also the difference between the purchases and sales of equities cannot be solely explained by the sale of other assets. It is likely that investors have financed the purchases of equities with funds that come outside of this data. The

possible sources for the money include salary income, money held in short-term deposits and liquidity accounts as well as assets in other banks.

Table 10. Summary of the investors' trading activity during the studied period.

Trades (n=620)				
	Total	Mean	Median	StDev
Equity purchases	15 160 199	24 452	300	114 770
Other purchases	12 864 486	20 749	90	82 402
Total purchases	28 024 684	45 201	1 075	166 093
Equity sales	9 643 869	15 555	0	92 986
Other sales	13 369 107	21 563	0	175 538
Total sales	23 012 976	37 118	496	175 538

Based on the information about the aggregate regional allocations and the investors' trading activity I conclude that there is still some unexplained growth in the assets that does not show in the data. The most likely explanation is that the investors have invested into equities that have grown in value by more than the market indexes would suggest.

5.3.3 Age

As was mentioned in the earlier chapters, there seems to be a negative correlation between age and risk profiles. Figure 4 illustrated this tendency. According to the results there is also a negative correlation between age and investment horizon. This means that the older the investor is the shorter the expected time period for the investments. This is shown graphically in Figure 12. The pattern is not quite as clear as with the risk profiles but still noticeable. This provides support for the concept of life cycle investing. In life cycle investing investors' decision-making framework consists of several time horizons. According to the theory the investment horizon depends on the investor's age. As the investor ages, the planning horizon also gets shorter, which is quite logical because the person gets closer to the retirement age and probably wants to decrease the riskiness of the portfolio along the way. In my sample the younger investors are much more likely to say their investment horizon to be over 15 years than the older investors. Most of the investors fall into the two middle categories: 2-5 years and 5-15 years. It might be that most of the investors do not pay much time thinking about the length of their investment horizon and choose one of the middle groups on average.
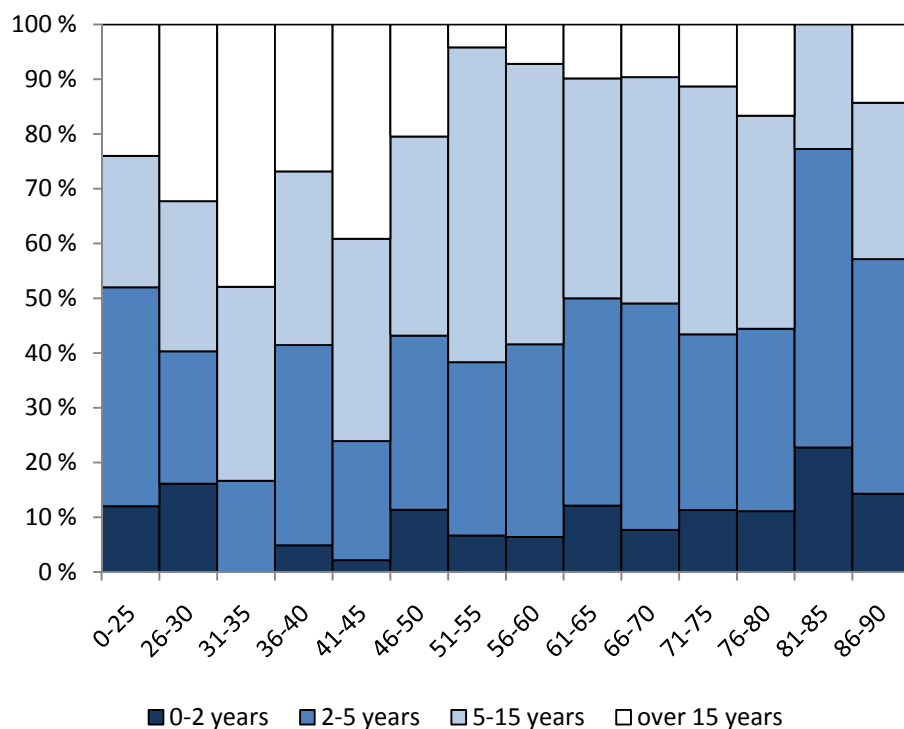
Figure 12. Percentages of investors in different investment horizons.

In Figure 13 I have presented the average investment wealth of the investors by age groups. Investors under the age of 40 have considerably less investable assets than the older generations. However, the trend turns downward again after around the age of 60. This is very close to the general retirement age in Finland. The data would thus suggest that the assets of these investors start decreasing after they have reached the retirement age that probably many of them have been saving for. This discovery also supports the life cycle investing theory. The investors seem to truly accumulate investment assets from 40 years onwards, until their retirement. After this they start using the savings to provide for income.
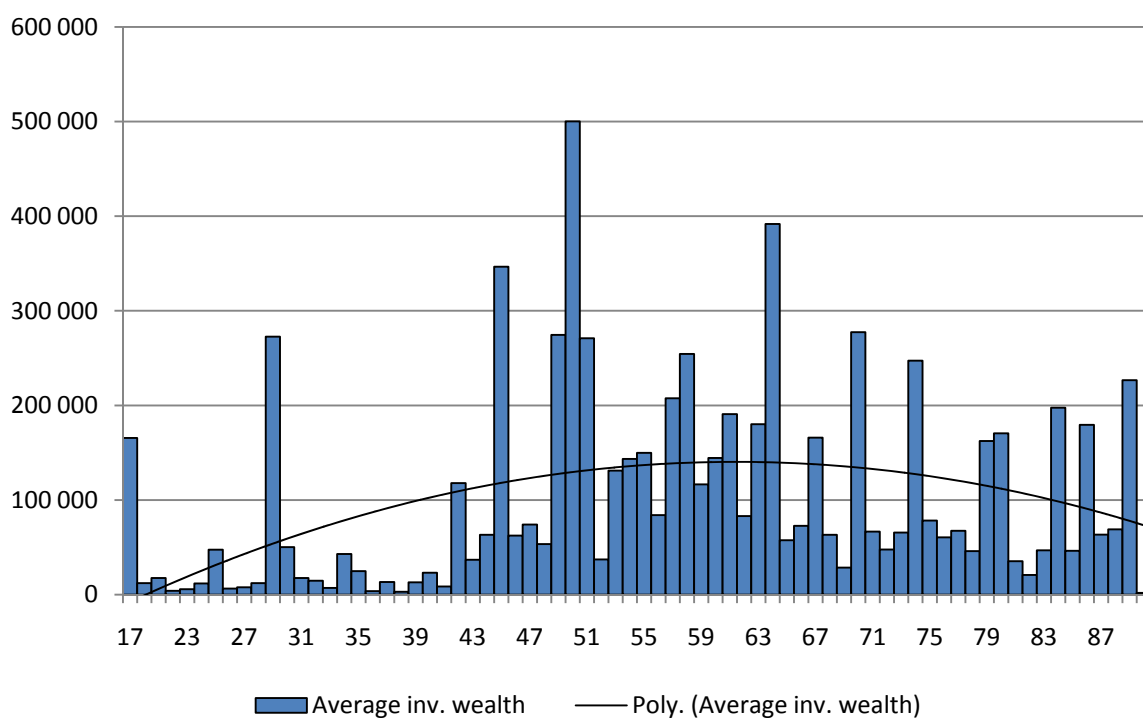
Figure 13. The distribution of average investment wealth of the investors at different ages.

When examining the true risk taken by the investors I find some evidence of a similar risk-aversion behavior as Riley and Chow (1992) and more recently Alanko (2009) with Finnish data. Figure 20 (Appendix A) illustrates the RS statistics among the investors at different ages. Even though the investment horizon and risk profile tend to be on the more risky side for the young investors, this does not show in their risk-taking behavior. The actual risk taken seems to be even a little less than among the middle-aged investors. After a certain point the trend line starts sloping downward again, suggesting that the risky share of investments in the investors portfolios starts declining with age.

However, the evidence seems quite weak because, the situation has changed during the period examined here (Figure 21, Appendix A). It appears that the distribution can vary considerably over time. Investors in the young-end of the distribution have increased the share of risky assets in their portfolios considerably more than the older investors who have been more cautious in their moves. It may be that those investors with higher level of wealth in absolute terms are more conservative with the allocation changes in their portfolios. Investors with smaller assets behave more aggressively in terms of increasing the risky share of investments.

Figure 14 illustrates the change in the share of risky assets in the investors' portfolios. The most radical increases in the share of risky assets have taken place with young investors.
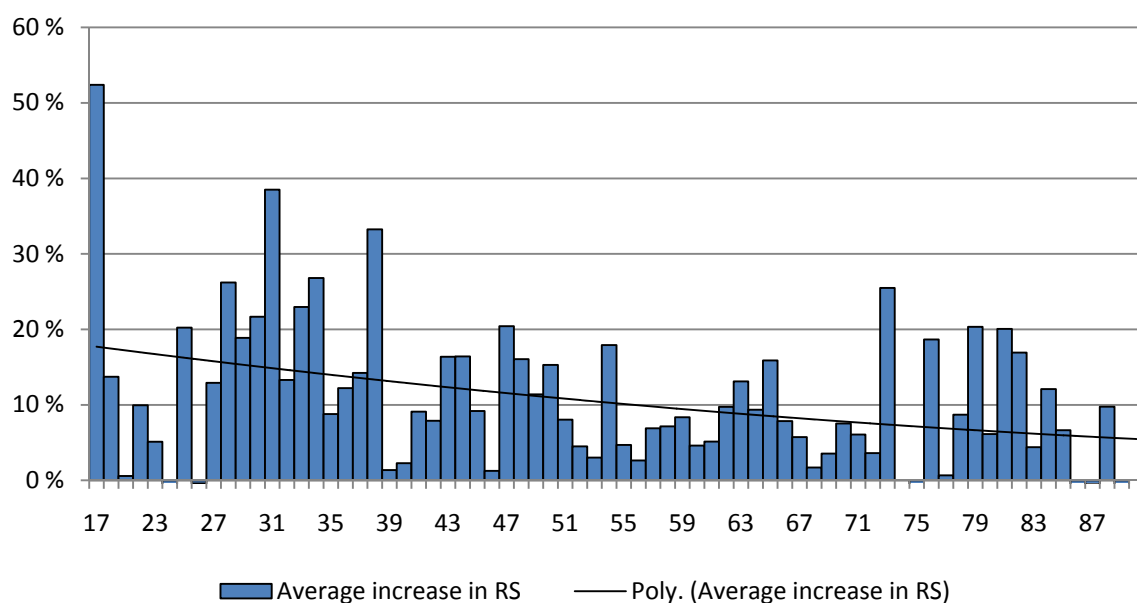
Figure 14. Average increase in risky share from Dec 31, 2008 to Oct 31, 2009.

In order to examine how actively the investors managed their portfolios during the period I have constructed data of their trading activity. Figure 15 shows the negative correlation between age and the average portfolio turnover ratio. Even though the correlation figures are fairly weak, there seems to be a connection between the trading activity of investors and the aggressiveness to make allocation changes in the portfolio.
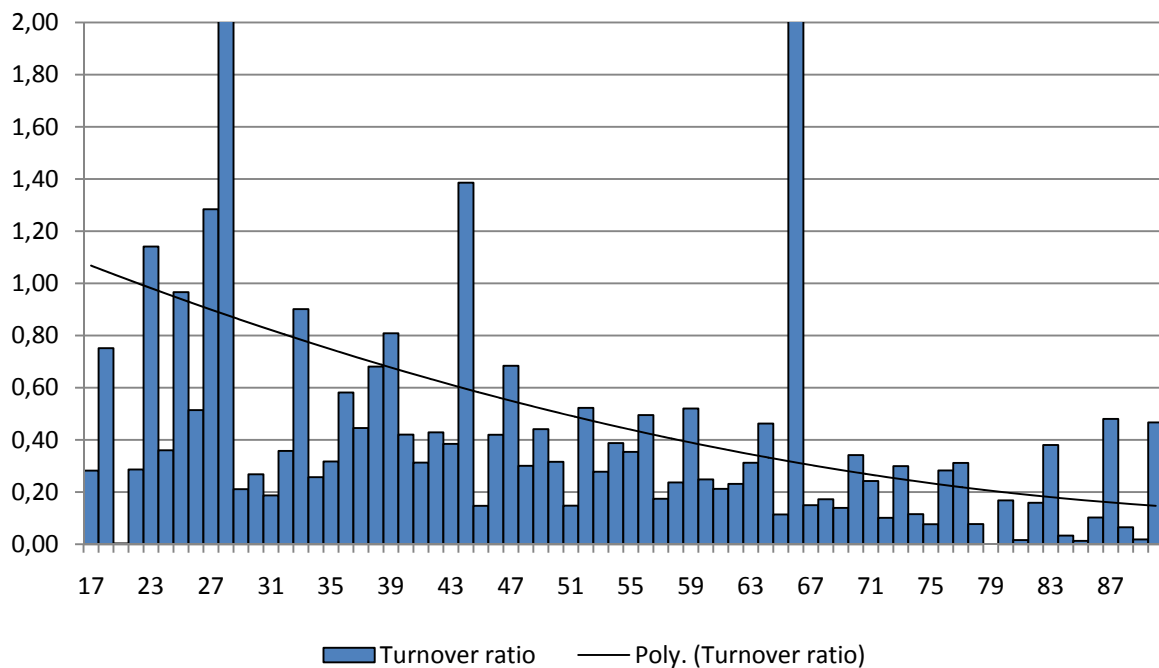
Figure 15. Average portfolio turnover ratios for the investors at different ages.

5.3.4 Gender

According to the existing research on differences in the risk-attitudes of males and females, the latter have been found to be by far more risk-averse on average. My evidence also supports this view. As I already mentioned earlier, women clearly dominate the risk profile categories associated with least risk, i.e. Value Minded and particularly Safety first. Table 11 introduces some of the findings in the data that point to the same direction. The aggregated average risky share figure is consistently higher for males than for females, regardless of the point or means of measurement. However, despite these differences it seems that both groups have increased the share of risky assets quite evenly during the period. Also the difference to the suggested allocation by the bank indicates that there are no big behavioral differences between the genders in this regard. Men deviate only marginally more from the bank's

allocation. The average investment wealth is higher among males than females, which is normal in this kind of sample. Males are also more active in trading their securities. However, the trading activity figure does not seem to have a clear connection with the average increase in the share of risky assets.

| | Gender statistics | | | | | |
| | Males | | | Females | | |
	Mean	Median	StDev	Mean	Median	StDev
Average investment wealth	191 394	32 071	644 258	140 991	16 825	1 700 464
Turnover ratio	0,583	0,038	4,249	0,458	0,020	2,705
Risky share 2008	35 %	26 %	31 %	30 %	25 %	28 %
Risky share 2009	46 %	46 %	29 %	39 %	38 %	25 %
Average increase in risky share	11 %	4 %	26 %	9 %	2 %	22 %
Difference in RS, 2008-bank	-5 %	0 %	37 %	-4 %	0 %	38 %
Difference in RS, 2009-bank	6 %	3 %	35 %	5 %	4 %	35 %

In addition to dominating the most risk-averse risk profile categories, women also seem to clearly outnumber males in the investment horizon category with the shortest expected investment time period, Investment horizon 1 (Figure 16). When taking into account the larger number of females in the sample, there seems to be a tendency of males being majority the longer the investment horizon, and vice versa with females. It may indicate that females feel uncomfortable with investing for a longer period and regard the savings to be meant for more short-term objectives. Males on the other hand might be more willing to invest their money for a longer time period in search for higher return and then trade actively during the investment period. However, there was no large difference between the average increases in the risky shares. So the more active trading of males does not seem to lead to relatively higher risk than with females when compared to the starting situation. Rather it seems that males choose the more risky allocation already in the beginning and trade without changing the allocation.
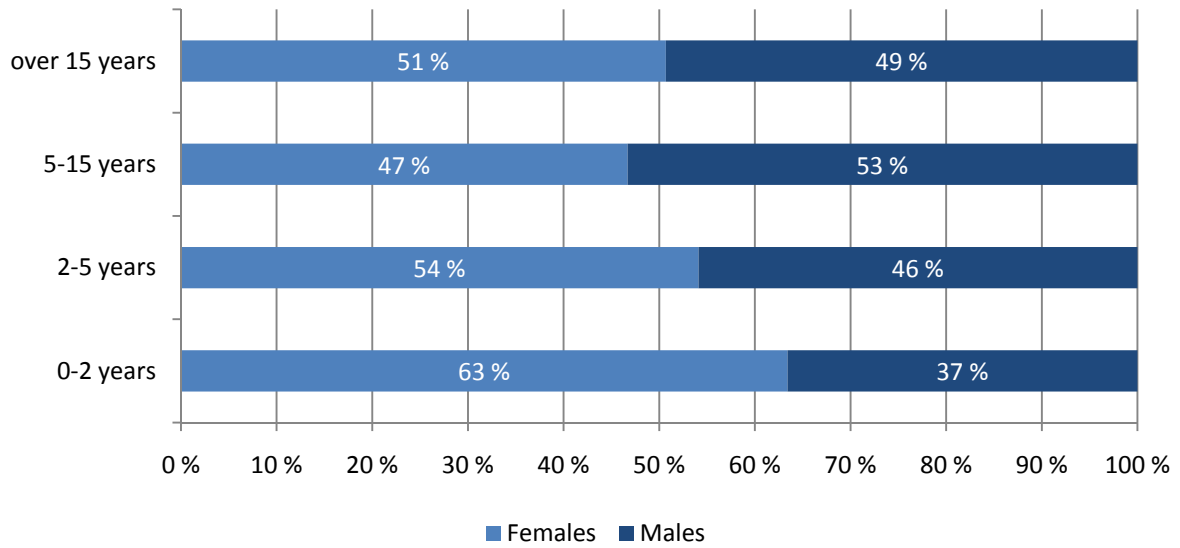
Figure 16. Share of males and females in each Investment horizon category.

Figure 17 shows the average risky shares for males and females in the different risk profile categories at the beginning of the period and at the end of the period. There are no large differences between the categories. Males have consistently higher risky shares in all the groups except in Safety first where females have a higher figure for the initial allocation.
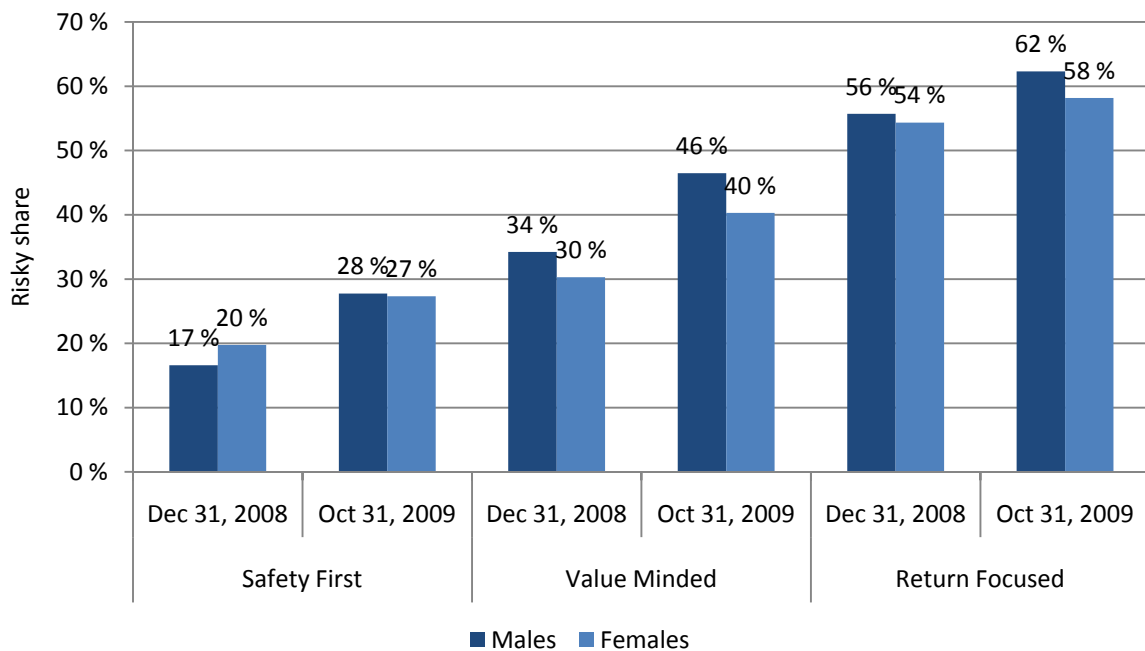
Figure 17. Breakdown of the risky shares for males and females at the beginning and at the end of the period. Figures are grouped by the risk profile categories.

5.3.5 Investment Wealth

I also study the effect wealth has on investor behavior and attitude towards risk. In order to do this I have divided the investors into deciles based on their investment assets.

First of all, as was pointed out earlier investors in the lower deciles are on average considerably younger than those in the higher deciles (Figure 22, Appendix A). It should be noted that this might affect some of the results I present here. This kind of a pattern is very normal. Young people tend to have most of their wealth in the form of human capital that is realized over their life cycle as income from work. The excess liquidity is then accumulated as savings in different investments. Therefore, the older the person I,s the more she has realized the human capital and turned it into the form of investable assets.

Figure 18 reports the share of males and females in each wealth decile. The share of males and females seems to be relatively even across the deciles. This indicates that there are no major differences in the distribution of wealth to the different genders despite the fact that males have higher wealth on average. Only in the highest decile men have a clear majority.
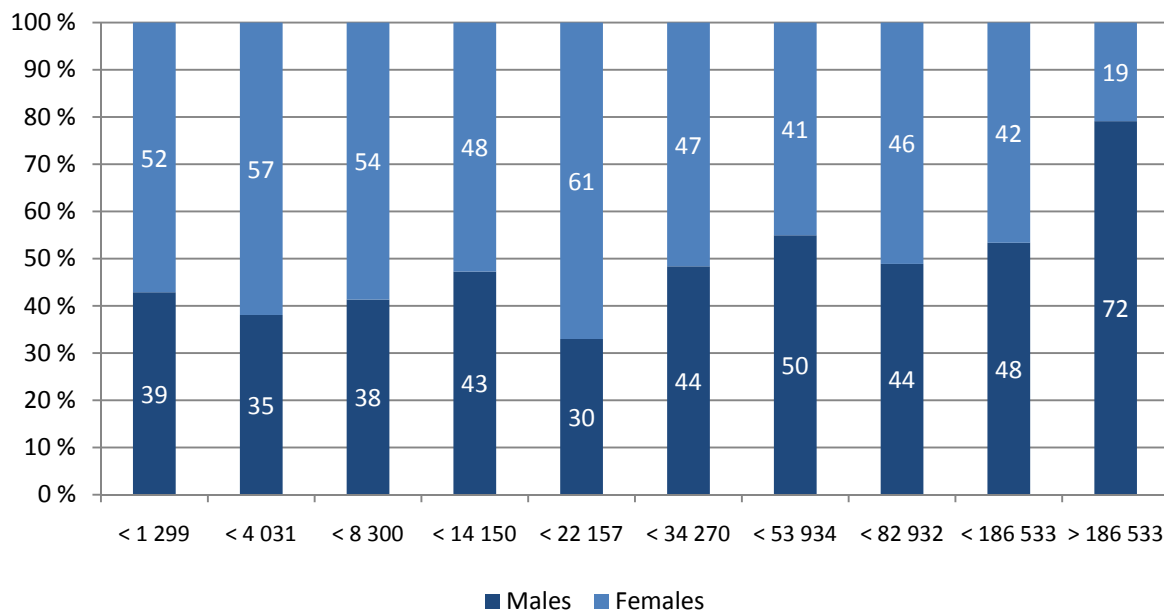
Figure 18. Share of females and males in the different wealth deciles.

Also the shares of investors with different risk profiles are reasonably stable across the wealth deciles. Return focused category is more popular among the lower deciles than among the higher ones. This may be due to the fact introduced earlier that investors in these deciles

consist of relatively younger individuals than in the higher deciles. Interestingly the share of Safety first investors increases in the middle deciles and decreases toward the high and low-ends of the distribution. This same finding was made by Alanko (2009). This is also reflected in Figure 19 which reports the risky shares of investors at the two dates. The risky share has increased in all groups but the figures vary considerably across the deciles and there does not seem to be any consistent pattern present. The only distinct observation is that the highest decile has a considerably higher risky share than the other deciles even though this is not apparent in the risk category choices (Figure 23, Appendix A).

	< 1 299	< 4 031	< 8 300	< 14 150	< 22 157	< 34 270	< 53 934	< 82 932	< 186 533	> 186 533
Risky share 2008	28 %	35 %	39 %	35 %	28 %	26 %	34 %	30 %	31 %	38 %
Risky share 2009	48 %	45 %	43 %	43 %	38 %	36 %	42 %	37 %	39 %	51 %
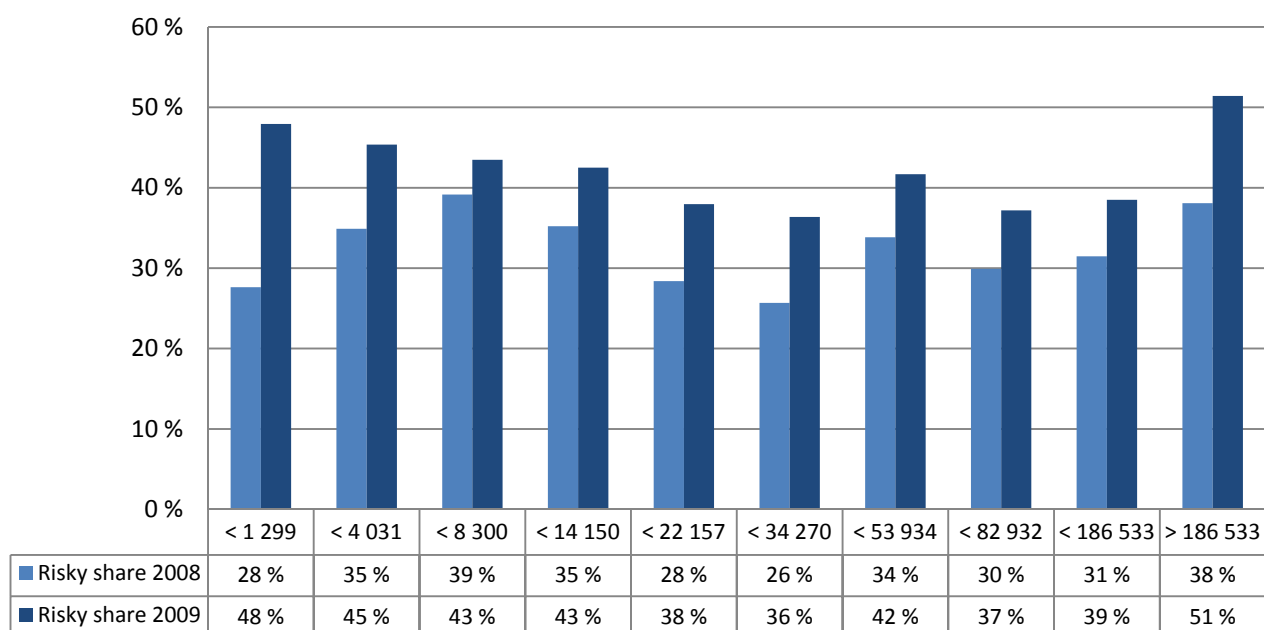
Figure 19. Investors' average risky share on Dec 31, 2008 and Oct 31, 2009. Presented by wealth deciles.

Lastly, I investigated the average portfolio turnover ratios of the investors in each wealth decile (Figure 24, Appendix A). Investors in the low wealth categories seem to have higher turnover ratios on average. However, the two outlier groups (<1299 and <34270) mix the picture and the overall results seem to indicate that there is no clear connection between wealth and turnover. The correlation is weakly negative and not significant enough to provide any new evidence.

5.4 Regression Analysis

In addition to the descriptive analysis I conducted in the earlier in the study I will now present the results of the regression analysis. Regression analysis provides more accurate information of the variables explaining the investor behavior. Regression analysis reveals which factors actually have an effect and to which degree on the dependent variables. I conduct linear regressions using ordinary least squares (OLS) method to determine the combined effect of the previously introduced variables on the dependent variables. As the explanatory variables, I use age, gender, risk profile, investment horizon, wealth and portfolio turnover ratio. Additionally, I use transformations of certain variables in order to test if I can get better explanatory power by doing so.

I conduct three separate regressions, each with different dependent variables. Firstly, I regress the explanatory variables by setting as the dependent variable the difference in the risky share between the investor's true portfolio on December 31, 2008 and the risky share suggested by the bank. Secondly, I do the same test by setting as the dependent variable the change in the risky share between October 31, 2009 and December 31, 2008. In the final regression the dependent variable is the difference in the risky share as of October 31, 2009 and the one suggested by the bank. In other words, first I try to identify variables explaining the difference in the share of risky assets chosen by the investor compared to the share given by the bank, i.e. what kinds of individuals actually follow the bank's advice the best in the beginning. In the second regression I aim to identify the characteristics of those investors who tend to increase the share of risky assets in their portfolios the most during the period. In the last regression I test whether the order and importance of the explanatory variables found in the first regression still hold at the end of the period.

5.4.1 OLS Regression – Comparison of the Risky Share in the Initial Allocation to the Bank's Suggestion

As a dependent variable in the first regression I have the difference in the risky share between the initial allocation of the investors and the allocation suggested by the bank. I run the regression with the aforementioned independent variables added with squared figure of age and a natural logarithm of wealth. This way I hope to get better fit for the model. I try to capture the importance of the independent variables in explaining the differences in the

investors' portfolios to the investment plan provided by the bank. I conduct the regressions by adding a single variable at a time and observing how the t-statistic changes. The significance of the results is measured by the P-value (in parenthesis). Table 12 reports the results of the regressions.

Table 12. Results of the Linear Regression (OLS). This table reports the results of the ordinary least squares regressions between the difference in the risky shares of the investors' portfolios relative to the bank's suggestions and different independent variables. I report the coefficients and the respective p-values in parentheses. *** denotes significance at 0,01 level, ** denotes significance at 0,05 level and * denotes significance at 0,1 level.

Dependend variable = Difference in RS, 2008-bank

Independent variable	Model							
	1	2	3	4	5	6	7	8
Age	0,0039	0,0068	0,0067	0,0076	0,0062	0,0063	0,0051	0,0049
	(0.000)***	(0.151)	(0.153)	(0.103)	(0.099)*	(0.095)*	(0.185)	(0.207)
Age squared		0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
		(0.537)	(0.536)	(0.312)	(0.185)	(0.182)	(0.264)	(0.289)
Gender			-0,0099	0,0045	0,0169	0,0172	0,0109	0,0117
			(0.679)	(0.848)	(0.377)	(0.368)	(0.579)	(0.550)
Risk profile				-0,1170	-0,0026	-0,0027	-0,0023	-0,0011
				(0.000)***	(0.875)	(0.874)	(0.891)	(0.949)
Investment horizon					-0,2563	-0,2559	-0,2555	-0,2552
					(0.000)***	(0.000)***	(0.000)***	(0.000)***
Wealth						0,0000	0,0000	0,0000
						(0.411)	(0.240)	(0.249)
Wealth (logaritmic)							0,0071	0,0064
							(0.189)	(0.237)
Turnover ratio								-0,0050
								(0.061)*
F-value	24,5	12,43	8,43	15,34	111,83	80,75	80,26	70,86
Prob > F	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
R^2	0,0263	0,0267	0,0269	0,0635	0,3821	0,3852	0,3838	0,3862
Adjusted R^2	0,0252	0,0245	0,0236	0,0593	0,3787	0,3805	0,3790	0,3807
Number of observations	910	910	910	910	910	910	910	910

The results reveal that the most important variable explaining the difference in the risky share is the investment horizon. Due to the correlation between risk profile and investment horizon it first appears as if the risk profile explained the difference. However, when the investment horizon parameter is added the significance of the risk profile disappears. The negative value indicates that investors overweight risky assets in the short investment periods and underweight them in the long investment horizons. This confirms the findings made in the previous sections about the investors' ignorance of the length of the investment period.

Age does not have statistical significance in explaining the results. However, I find that by adding the Age squared variable the importance of the Age variable decreases and gives a negative value for the Age squared. This indicates a tendency of the trend curve being parabolic rather than linear. In this case it indicates a convex function meaning that the younger the investor the more likely they are having less risky assets than suggested. And the tendency to overweight risky assets increases non-linearly with age. This emphasizes the

discrepancy between the investment horizon reported by the investors and the true behavior in allocating their assets.

Adding in the parameters for wealth and turnover ratio do not increase the fit of the model, they rather decrease it. When adding in the logarithmic wealth variable, it comes up positive while the wealth variable stays negative, giving a mixed picture of the direction of effect. Neither does the gender variable have any clear direction or significance in the results.

5.4.2 OLS Regression – Comparison of the Risky Share in the Initial Allocation to the Final Allocation

In the second regression I aim to identify the characteristics of those investors who were the most likely to increase the share of risky assets in their portfolios during the studied period. The results also indicate which kinds of investors are most likely to deviate from the allocation chosen by them initially.

As a dependent variable I use the change in the risky share between the final allocation and the initial allocation. The independent variables used here are same as in the first regression model. The results of the regressions are reported in Table 13.

Table 13. Results of the Linear Regression (OLS). This table reports the results of the ordinary least squares regressions between the difference in the risky shares of the investors' initial and final portfolios and different independent variables. I report the coefficients and the respective p-values in parentheses. *** denotes significance at 0,01 level, ** denotes significance at 0,05 level and * denotes significance at 0,1 level.

Dependend variable = Change in RS, 2009-2008

Independent variable	Model							
	1	2	3	4	5	6	7	8
Age	-0,0020	-0,0058	-0,0057	-0,0055	-0,0055	-0,0055	-0,0049	-0,0046
	(0.000)***	(0.065)*	(0.068)*	(0.077)*	(0.080)*	(0.0080)***	(0.129)	(0.155)
Age squared		0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
		(0.221)	(0.224)	(0.273)	(0.271)	(0.272)	(0.337)	(0.381)
Gender			0,0171	0,0201	0,1954	0,0195	0,0228	0,0218
			(0.28)	(0.206)	(0.219)	(0.219)	(0.164)	(0.181)
Risk profile				-0,0245	-0,0296	-0,0296	-0,0298	-0,0313
				(0.066)*	(0.035)**	(0.035)**	(0.034)**	(0.025)**
Investment horizon					0,0115	0,0115	0,0113	0,0109
					(0.245)	(0.246)	(0.255)	(0.270)
Wealth						0,0000	0,0000	0,0000
						(0.981)	(0.788)	(0.816)
Wealth (logaritmic)							-0,0038	-0,0029
							(0.406)	(0.523)
Turnover ratio								0,0063
								(0.005)***
F-value	14,68	8,10	5,79	5,20	4,43	3,69	3,26	3,86
Prob > F	0,0001	0,0003	0,0006	0,0004	0,0005	0,0013	0,0020	0,0002
R^2	0,0159	0,0175	0,0188	0,0225	0,2390	0,0239	0,0247	0,0332
Adjusted R^2	0,0148	0,0154	0,0156	0,0181	0,0185	0,0174	0,0171	0,0246
Number of observations	910	910	910	910	910	910	910	910

Risk profile appears to be the major variable explaining the change. The negative coefficient indicates that the more risk-averse the investors have reported to be, the more they have increased the share of risky assets in their portfolios. Furthermore, the results also indicate a significant positive relation with portfolio turnover and the change in the risky share. In effect, the more active the investor has been in trading during the period the more likely it is that he/she has done so to increase the share of risky assets in the portfolio.

The results point towards age playing some role in explaining the changes in the allocations. The negative value in the Age variable indicates a negative relation with the change in the risky share. However, the results are not statistically significant and thus do not have explanatory power when all the variables are taken into account.

There is some indication of a positive relation between gender and the change in the allocation, suggesting that males have increased the risky share more than females. Also the Investment horizon variable gets modestly positive values indicating that investors with longer investment horizons increase the risky share more. However, the results of these two variables cannot be considered as statistically significant. Wealth does not seem to have any statistically measurable explanatory power.

5.4.3 OLS Regression – Comparison of the Risky Share in the Final Allocation to the Bank's Suggestion

In the third regression I test whether the results found in the first regression explaining the difference in the investors' initial allocations to the bank's suggestion still hold at the end of period. This time I set the difference in the risky share between final allocation and the bank's suggestion as the dependent variable. To explain the dependent variable I use the same independent variables as in the previous regressions. I report the results of the regressions in Table 14.

Table 14. Results of the Linear Regression (OLS). This table reports the results of the ordinary least squares regressions between the difference in the risky shares of the investors' portfolios relative to the bank's suggestions and different independent variables. I report the coefficients and the respective p-values in parentheses. * denotes significance at 0,01 level, ** denotes significance at 0,05 level and * denotes significance at 0,1 level.**

Dependend variable = Difference in RS, 2009-bank

Independent variable	Model							
	1	2	3	4	5	6	7	8
Age	0,0019	0,0010	0,0010	0,0020	0,0007	0,0008	0,0002	0,0003
	(0.012)**	(0.826)	(0.821)	(0.643)	(0.835)	(0.821)	(0.945)	(0.931)
Age squared		0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
		(0.837)	(0.839)	(0.773)	(0.660)	(0.653)	(0.733)	(0.722)
Gender			0,0072	0,0246	0,0364	0,0367	0,0338	0,0336
			(0.750)	(0.265)	(0.041)**	(0.039)**	(0.066)*	(0.068)*
Risk profile				-0,1414	-0,0322	-0,0323	-0,0321	-0,0324
				(0.000)***	(0.040)**	(0.040)**	(0.041)**	(0.040)**
Investment horizon					-0,2448	-0,2444	-0,2442	-0,2443
					(0.000)***	(0.000)***	(0.000)***	(0.000)***
Wealth						0,0000	0,0000	0,0000
						(0.389)	(0.308)	(0.305)
Wealth (logaritmic)							0,0034	0,0036
							(0.504)	(0.484)
Turnover ratio								0,0012
								(0.625)
F-value	6,37	3,20	2,17	16,35	117,98	98,42	84,37	73,79
Prob > F	0,0118	0,0412	0,0905	0,0000	0,0000	0,0000	0,0000	0,0000
R^2	0,0070	0,0070	0,0071	0,6740	0,3949	0,3954	0,3957	0,3958
Adjusted R^2	0,0059	0,0048	0,0038	0,0633	0,3915	0,3914	0,3910	0,3905
Number of observations	910	910	910	910	910	910	910	910

As in the first regression I find also this time the Investment horizon variable explaining most of the difference. The magnitude as well as the direction and significance are at the same level as in the first regression. The second most important explanatory variable appears to be Risk profile. The negative relation implies that investors in the more risk-averse categories hold more risky assets than they should and vice versa with investors in the less risk-averse categories. This has changed from the situation at the beginning of the investment period where the Risk profile was only weakly negative and did not have any significance after the Investment horizon variable was added. However, now the Risk profile variable has more explanatory power and it stays significant even after adding the Risk profile variable. The conclusion of this is that even though at the beginning investors ignored the investment time period but hold on to their risk profile, they have now stopped following the risk profile as well.

The gender variable has more significance than before but as the results reveal this is mostly attributable to the variables mentioned above, i.e. Risk profile and Investment horizon. However, the variable has strengthened indicating that males are more likely to have a higher risky share relative to the suggested figure now than before. This supports the finding in the second regression that males were slightly more likely to increase the risky share more than females during the period.

The relations that existed between the variables measuring age and the difference in the risky shares have also changed from the beginning. The Age variable is still positive but only very weakly and its significance has also diminished. Furthermore, the Age squared variable has also weakened and lost its significance. The same has happened with Wealth and Wealth (logarithmic) that do not seem to have explanatory power as they didn't before.

6 Findings and Conclusions

6.1 Findings

My aim in this research was to investigate the behavior of Finnish private investors by examining how well they follow the investment advice given by their bank. The bank has mapped each investor's risk attitude and purpose of the investment in order to form a picture of the most suitable asset allocation for the individuals. Based on the information about the bank's suggestions and the investors' true portfolio allocations I was able to investigate the characteristics of those investors not following the bank's advice and find out patterns in the investors' behavior. I addressed the question by forming six hypotheses, which were analyzed in a dataset of 910 individuals. The results of the hypotheses are summarized in Table 15.

Table 15. Summary of the results. A "+"-sign indicates support for the hypothesis. A "-"-sign indicates that the hypothesis is rejected based on the results.

Hypotheses	Outcome	Previous studies
Hypothesis 1: Risk taking behavior can be predicted by individual risk attitude	+	+
Hypothesis 2: Risk taking behavior can be predicted by investment horizon	-	+ and -
Hypothesis 3: Risk tolerance decreases with age	-	+
Hypothesis 4: Men are more risk tolerant than women	+	+
Hypothesis 5: Higher wealth implies increased risk tolerance	-	+
Hypothesis 6: Risk taking behavior may change over time	+	+

I find clear evidence that the investors' risk-taking behavior can be predicted by their individual risk attitudes. This is consistent with the study by Alanko (2009) where he found statistically significant relation between risk taking and risk profiles. I find similarly that investors who say to be risk-averse also have a lower share of investments in risky assets than those saying to be less risk-averse. Thus, the risky share increases with risk profile in my

sample. Interestingly, when compared to the bank's suggestions investors in the low-risk category overweight risky assets and the ones in the high-risk category underweight risky assets. The middle group investors also first underweight risky assets but then shift to overweight during the period. The results were consistent over time although the relative differences between the risk profile categories decreased from the initial allocation to the final allocation. The decrease in the relative differences was caused by a relatively higher increase of risky share in the portfolios of investors belonging to the lower risk categories. In effect, those investors with less equities at the beginning of the period increased the share of them more than those who initially had higher share of equities. It seems that the positive performance in the stock market made the more risk-averse investors more willing to accept the risks involved.

The second hypothesis assumed that investors' risk-taking behavior could be predicted by the investment horizon. I do not find evidence supporting this hypothesis. Based on my data it seems that the investors clearly ignore the length of the investment when making allocation decisions. I find that the investment horizon is statistically the most significant variable in explaining the differences in the share of risky assets in investors' portfolios relative to the allocation suggested by the bank. When examining the investors' investment horizons, I find that they follow a pattern where the investment horizon decreases with age. This supports the traditional life-cycle hypothesis and the life-cycle investing models. However, there is a discrepancy between what the investors say that is their investment horizon and what their actions actually are. Figures about the true allocations reveal that there is no connection between the share of risky assets in investors' portfolios and the length of the investment. The bank's suggested allocation in fact depends more on the length of the investment than on the investment profile. Regardless of this, the investors do not seem to recognize the fact but choose to rely more on their individual investment profile in the allocation decision. Investors strongly overweight risky assets in the short horizon categories and respectively underweight those assets in the long horizon categories. This continued through the period although the average risky shares rose in all of the categories.

I find only some evidence of risk tolerance decreasing with age. When measuring the risky share of the initial allocations I find that the figures rise up to a certain age and then start to decrease. There is weak but visible concavity in the function similarly as Riley and Chow (1992), Hallahan et al. (2004) and Alanko (2009) report in their studies. However, the

situation changes during the period and when examining the final allocations I find that the pattern has changed. The share of risky assets has increased somewhat more among the younger investors than with older ones. Thus the distribution becomes more downward sloping and the concavity disappears. However, the negative correlation between the risky share and age actually strengthens. In the regression analysis age did not have statistical explanatory power when testing the variables against the change in the risky share during the period. I also did not find statistical evidence of age being a major explanatory variable regarding the deviations in the risky shares from the bank's suggestion.

I find evidence of males being more risk tolerant than females as investors. Males dominate the high-risk risk profile categories whereas females have a majority in the low-risk categories. During the period men also hold consistently more risky assets in their portfolios than females in all of the different risk profile categories. Males are also more active in trading. These findings are not very surprising and they are consistent with the existing research (e.g. Dohmen et al., 2005; Hallahan et al., 2004; Alanko, 2009). I do not find gender having much significance in explaining the differences in the risky shares between investors' portfolios and bank's suggestions. In this regard, males and females seem to follow the bank's advice in a similar manner. Males appear to increase the risky share during period slightly more than females supporting the hypothesis of males being more aggressive as investors. However, the statistical evidence for this is not very strong.

The results regarding investors' wealth (as in investment wealth here) are not clear enough to support my hypothesis of risk tolerance increasing with wealth. It seems that investors in the highest wealth decile have on average higher share of investments in risky assets but the pattern is not as clear with the other deciles. The results indicate that investors in the middle deciles are the most risk-averse in terms of risk profiles and average risky shares. These results are consistent with Riley and Chow (1992), Hallahan et al. (2004) and Alanko's (2009) where they find of wealth explaining investors' risk attitudes. However, when investigating the significance of wealth in explaining the differences between investors' true risky shares and bank's suggestions I do not find any clear relation. Regardless of the amounts, investors seem to behave fairly similarly when choosing the allocation for their assets relative to the bank's suggestions. The results of the regressions are mixed and do not give any significant indication of wealth having an effect on the way investors change their allocations over the period.

Finally, I can say that I find support for the last hypothesis regarding the changes in the investors' risk taking behavior. I find evidence of investors trying to actively increase the risky share of assets in their portfolios and certain types of investors making distinctively different changes in their allocations. These findings point to disposition effect, investor myopia and market timing attempts. It seems that investors ignore the investment horizons and engage in apparent attempts of market timing by actively shifting allocation towards a more risky weighting during the period, regardless of their initial investment plan. On an aggregate level, the net purchases of equities were positive whereas the net purchases of other assets were negative. I find the young and initially most risk-averse investors being most likely to increase the share of risky assets during the period. The evidence reveals that those with the lowest equity exposure were most likely to increase it more than those investors who already at the beginning had a higher share of assets in equities. Also the younger investors seem to have a tendency for more aggressive allocation changes.

6.2 Conclusions

I study the way a major Finnish retail bank gives investment advice to its private clients based on the data it gathers in its investment profile tool. The tool is linked to the requirements the MiFID regulations impose on banks. I investigate how well the investors actually follow the bank's advice by comparing the asset allocations suggested by the bank to the ones chosen by the investors. The bank's advice about the allocation is based on two main variables: the investor's individual investment horizon and risk profile. I first investigate how the investors' initial allocations match those suggested by the bank and then test whether the allocations have changed in ten months time. In addition to the investment horizon and risk profile I focus on explaining the differences in the allocations by the following demographic variables: age, gender and wealth. I also study the significance of trading activity in explaining the results.

The main findings of the research are following. Firstly, I find clear evidence of investors discarding the length of their investment horizons when making allocation decisions. The results show that the share of assets in risky investments does not increase with the investment horizon. On average investors choose the investment horizon so that it decreases with age, which is consistent with the assumptions of the traditional life cycle hypothesis and life cycle investing concept. However, when investigating their true allocations there is no consistency between the share of risky assets and the length of the investment horizon. When

compared to the allocations suggested by the bank the investors seem to heavily overweight risky assets in short investment horizons and oppositely underweight them in the long investment horizons. Investors seem to consider the advice regarding their individual risk profiles as much more important than the length of the investment period. This finding strongly supports the previous research on investors' myopic behavior by Mehra and Prescott (1985), Benartzi & Thaler (1995) and Thaler et al. (1997) where they conclude that investors make investment decisions on much shorter intervals than they should. The more frequently investors monitor their investments the more it affects their perceptions of risk even if the actual investment horizon was much longer.

In addition to the myopic behavior I find evidence of disposition effect and market timing attempts by the investors. There was a major shift in the portfolios toward more risky allocation during the period. Even though this was mainly due to a positive performance in the stock market during the period, by investigating the investors' trades I found evidence of them actively increasing the weight of equities in their portfolios. I find portfolio turnover ratio being a statistically significant variable in explaining the relative increase of risky assets in investors' portfolios. Also the aggregate net purchases of equities were strongly positive whereas the net purchases of other assets were negative.

Furthermore, some of the investors appeared to have increased the share of risky assets considerably more than others. The main characteristics of those investors included risk-averse risk profile and high trading activity. I found a significant negative relation between the increase in the share of risky assets and risk profile. This means that those customers who had reported to be as most risk-averse were likely to increase the share of risky assets more than those with higher reported risk tolerance. Also trading activity, measured by portfolio turnover ratio had a statistically significant positive effect on the increase of risky assets. Thus, those investors who were most aggressive with their allocation decisions also were most active in buying and selling securities.

6.3 Limitations of the Study and Suggestions for Further Research

Because my data was gathered from the databases of the bank there are some limitations to the study that could be addressed in further research. First of all, as the data about the investors' risk profiles and investment horizons is based on the results of a series of questions there might be some bias in the answers of the investors. For example, the interpretation of the questions regarding the ability to tolerate risk may vary across age groups. Also the investment advisors may cause some bias in the results by their actions. It is crucial that the investment advisors are able to explain the customer what is meant by risk in the questions.

Secondly, the data includes only assets kept in this bank. Of course, investors might have several bank relations and assets also in other banks. These assets in other banks cannot be taken into account in this study. However, the figures concerning the investors' holdings in this bank are very accurate because they are true figures that were retrieved from the bank's databases and not drawn from a survey.

Furthermore, due to numerous complications with combining the data there are only 910 individuals included in the sample. This causes some problems when interpreting the data. The sample group is in some cases too small to produce statistically reliable results even though it is large enough to elicit certain information with high significance. The small sample size was basically the cost of having longitude in the data. I had to exclude a high amount of completed risk profiles in order to find get those that were suitable for this research.

Despite these limitations, this study adds new important evidence about the behavior of investors and the functioning of the banks' risk profiling methods under the MiFID regulations. I manage to provide a new dimension of investment horizon into the existing research and include longitude in the data for the first time regarding this topic. Later on when the investment profile tools have been used long enough in banks, I believe it is possible to replicate this study with higher number of individuals, more longitude and new variables.

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8 Appendices

8.1 Appendix A – Graphs and Tables

Table 16. Regional weights in investors' portfolios on December 31, 2008 and the performance of the index over the period until October31, 2009. Total performance is the weighted return of the indexes.

Region	Weights	Performance
Global equities	23,6 %	13,2 %
Finnish equities	44,6 %	25,2 %
European equities	12,1 %	12,9 %
North American equities	5,2 %	15,5 %
Japanese equities	1,3 %	10,6 %
Emerging market equities	13,2 %	51,9 %
Total performance		23,7 %
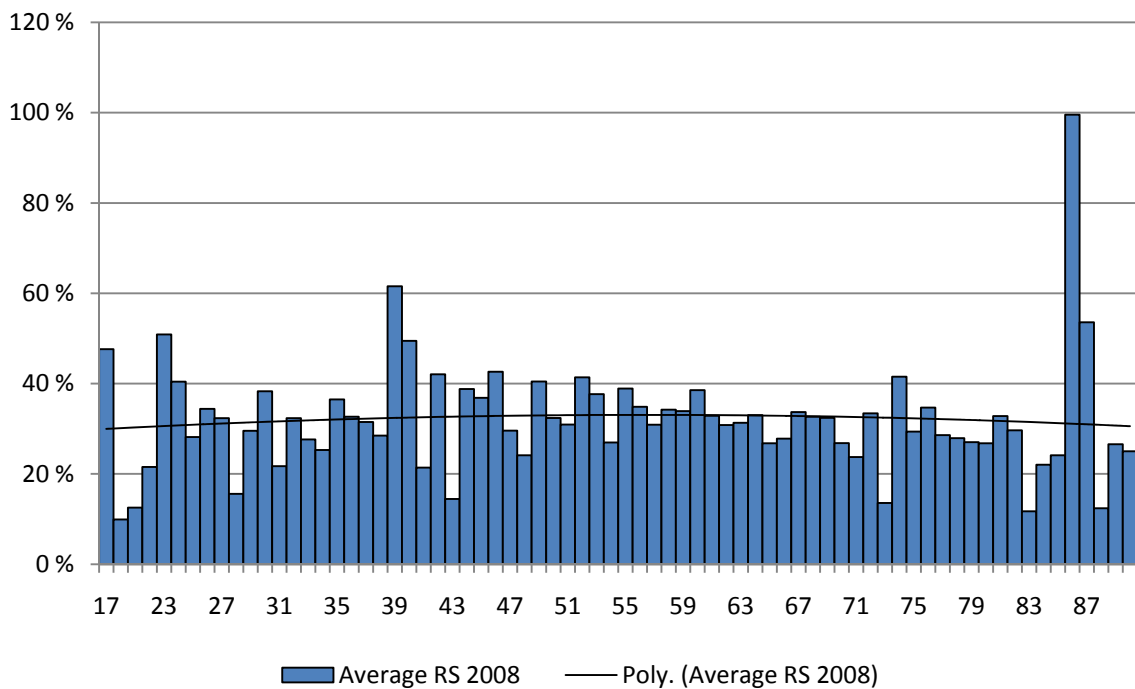
Figure 20. Average risky share (RS) of investments on Dec 31, 2008.
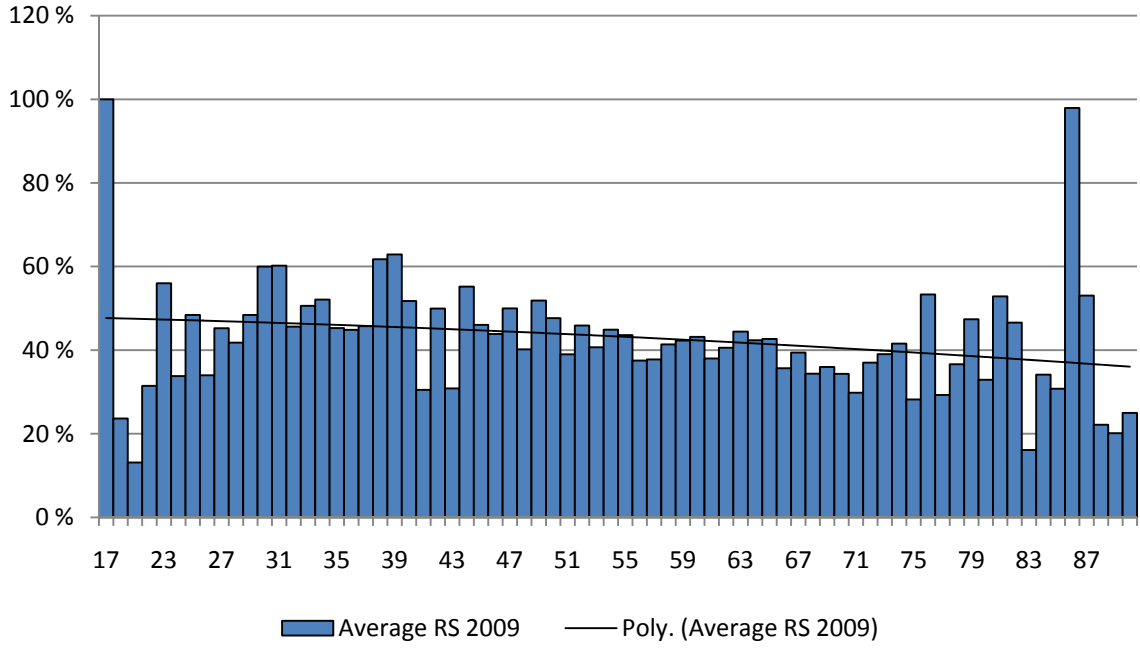
Figure 21. Average risky share (RS) of investments on Oct 31, 2009
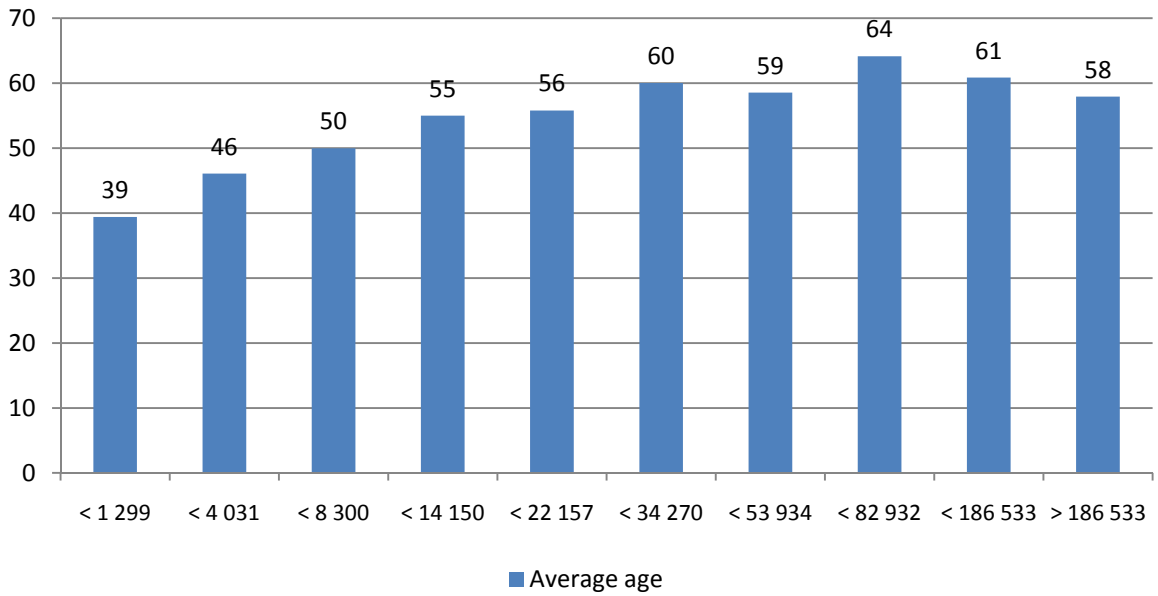
Figure 22. Distribution of investors by age into wealth deciles.
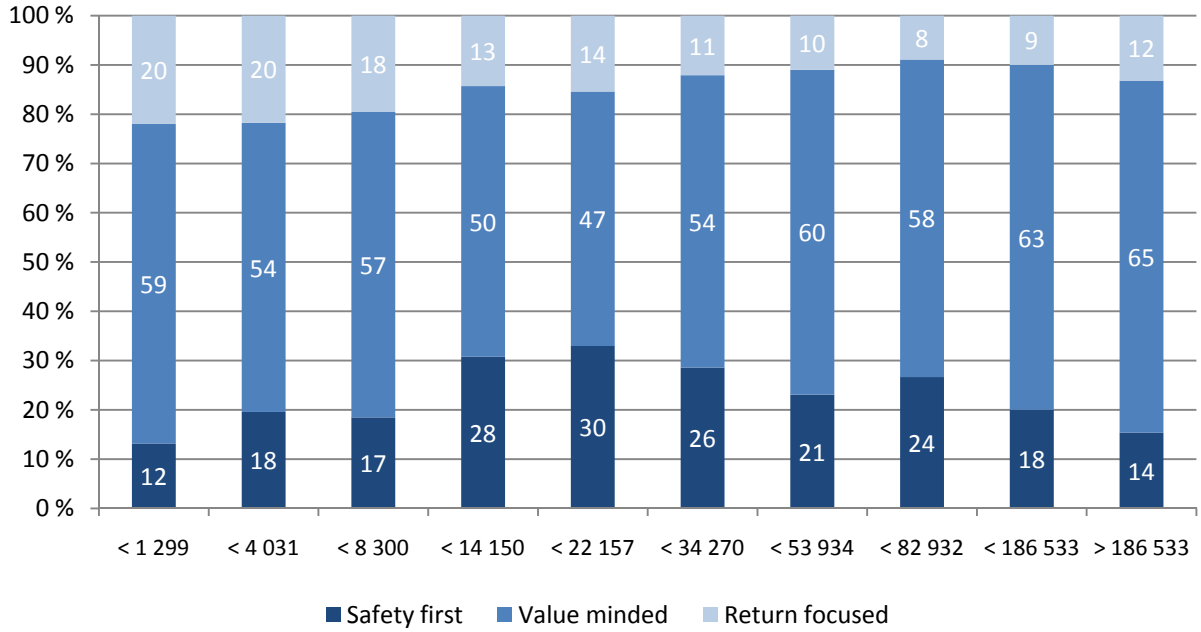
Figure 23. Share of investors with different risk profiles in each wealth decile.
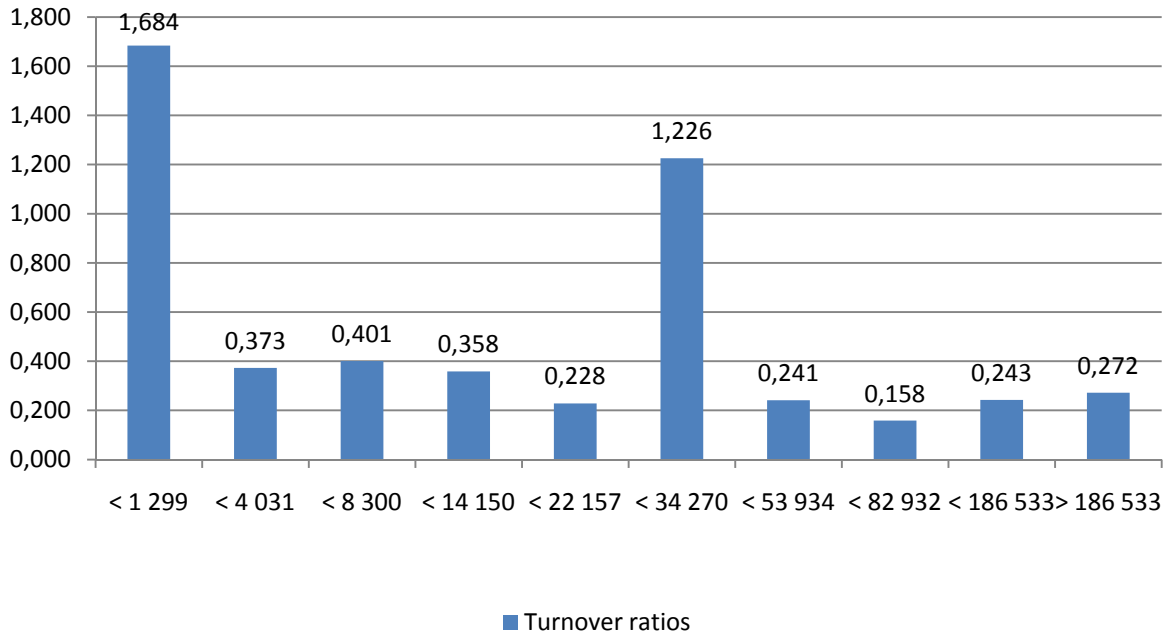

Figure 24. Portfolio turnover ratios of investors in different wealth deciles.

8.2 Appendix B – Investment Profile Questionnaire

Wealth and income

1) Estimate of income

Net income / year   _____ euros

2) Estimate of expenses

Expenses / year   _____ euros

Additional information (e.g. Interest expenses on loans):

_____

_____

3) Estimate of wealth

Note: Mutual funds are divided, according to their type, into equity, balanced and fixed income funds. Please put your fund assets in the table below – for example, as follows:
Equity funds: put all under "Equity investments".
Balanced funds: put 50 % under "Equity investments" and 50 % under "Fixed income investments".

Market value, euros

Equity investments   _____

Fixed income investments   _____

Money market investments   _____

Alternative investments   _____

Accounts and deposits   _____

4) Estimate of fixed assets and other wealth

Market value, euros

Own apartment   _____

Leisure-time apartment   _____

Investment apartment   _____

Forest and land   _____

Share of deceased's estate   _____

Own company   _____

Other, what?   _____

5) Estimate of debts

Total debts _____euros

6) Regular additional income needed from investments

Regular additional income needed from investments _____ euros.

Additional information (e.g. monthly, quarterly)
_____

_____

7) Loss tolerance
The loss tolerance is an assessment of how sensitive your financial situation is to fluctuations in asset values. Please select the alternative below that best describes your loss tolerance.

☐   **Small -** your financial situation will not tolerate large losses.

☐   **Moderate -** your financial situation will tolerate moderate losses.

☐   **Large -** your financial situation is not sensitive to investment-related risks and will withstand even large losses.

8) Experience and knowledge of investment products

How would you rate your experience and knowledge of the investment product properties, such as risks, listed below?

	Knowledge		Number of transactions in last 5 years		Summary of experience and knowledge	
Discretionary asset management agreement	☐ No	☐ Yes	☐ Fewer than 2	☐ More than 2	☐ No	☐ Yes
Low-risk fixed income products and funds	☐ No	☐ Yes	☐ Fewer than 2	☐ More than 2	☐ No	☐ Yes
Other fixed income products, funds and equities	☐ No	☐ Yes	☐ Fewer than 2	☐ More than 2	☐ No	☐ Yes
Structured products	☐ No	☐ Yes	☐ Fewer than 2	☐ More than 2	☐ No	☐ Yes
Warrants and convertible bonds	☐ No	☐ Yes	☐ Fewer than 2	☐ More than 2	☐ No	☐ Yes
Private equity funds, risk and hedge investments	☐ No	☐ Yes	☐ Fewer than 2	☐ More than 2	☐ No	☐ Yes

Any other information:

_____

_____

_____

9) Investment objectives and investment horizon

Your main goals and objectives:

We are interested in your goals and objectives because they help us to plan the management of your wealth better. Please explain your main goals and objectives in more detail below.

_____

_____

_____

_____

For how long time period do you estimate to invest your assets?

☐ **Maximum 2 years**

☐ **2 – 5 years**

☐ **5 – 15 years**

☐ **Over 15 years**

10) Risk profile

How would you characterise yourself as an investor?

☐ **Safety first.** As an investor you focus on taking care and securing your assets on the long term. You are ready to accept the low value fluctuations and low risk of losses that are inherent in the pursuit for returns.

☐ **Value-minded.** As an investor you focus on the controlled growth of your assets. You are ready to accept the risk of moderate value fluctuations and losses that are inherent in the pursuit for returns.

☐ **Return-focused**. As an investor you focus on the rapid growth of your assets. You are ready to accept the risk of large value fluctuations and losses that are inherent in the pursuit for high returns.

Other information (e.g. activity as an investor, and willingness to participate in investment activities):

_____

_____

8.3   Appendix C – Questions for Determining the Risk Profile

The risk profile can be found out with these questions (only in Finnish)

Suhtautuminen sijoittamiseen liittyviin riskeihin 1/6

Onko mahdollista, että tarvitset sijoitettavaksi suunnitellut varat käyttöösi jo ennen tavoiteajan loppua?

Vastausvaihtoehdot

1. Kyllä
2. Ehkä
3. Ei

Suhtautuminen sijoittamiseen liittyviin riskeihin 2/6

Mikä on sijoitettavaksi suunniteltujen varojen merkitys taloudellisen tilanteesi näkökulmasta sekä tavoiteajan lopussa että sitä ennen?

Vastausvaihtoehdot

1. Suuri merkitys. Tarvitsen näitä varoja jokapäiväiseen elämiseen.
2. Kohtalainen merkitys. Saatan tarvita näitä varoja jokapäiväiseen elämiseen.
3. Pieni merkitys. En tarvitse näitä varoja jokapäiväiseen elämiseen.

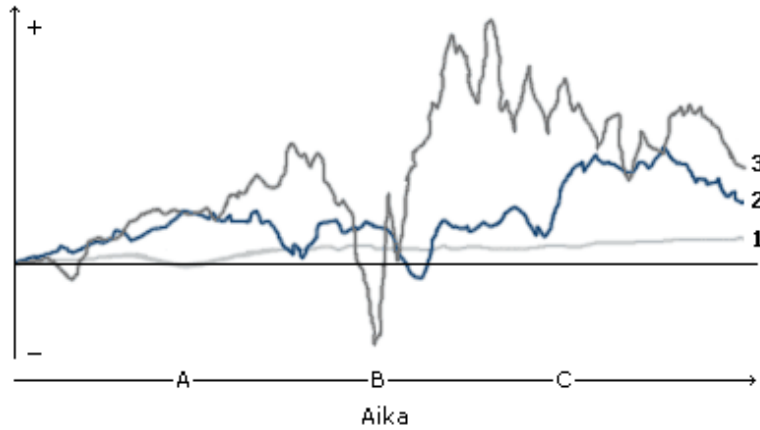### Suhtautuminen sijoittamiseen liittyviin riskeihin 3/6

Mitä odotat sijoitukseltasi?

Vastausvaihtoehdot

1. Haluan turvata sijoitukseni merkittävältä arvonvaihtelulta. Samalla hyväksyn, että sijoitukseni tuotto voi jäädä matalaksi.
2. Sijoitukseni arvon tulisi kasvaa vähitellen. Samalla hyväksyn, että arvonvaihtelu sijoitusaikana on maltillista.
3. Tavoittelen sijoituksellani pitkällä aikavälillä korkeaa tuottoa. Samalla hyväksyn, että korkeamman tuoton tavoitteluun kuuluu voimakas arvonvaihtelu.

Suhtautuminen sijoittamiseen liittyviin riskeihin 4/6

Alla oleva kuvassa esitetään kolmen eri sijoitusvaihtoehdon kehitys. Tarkastele oletettuja tuottoja ja arvonvaihteluja. Minkä sijoitusvaihtoehdon valitsisit, jotta voit nukkua yösi rauhassa?
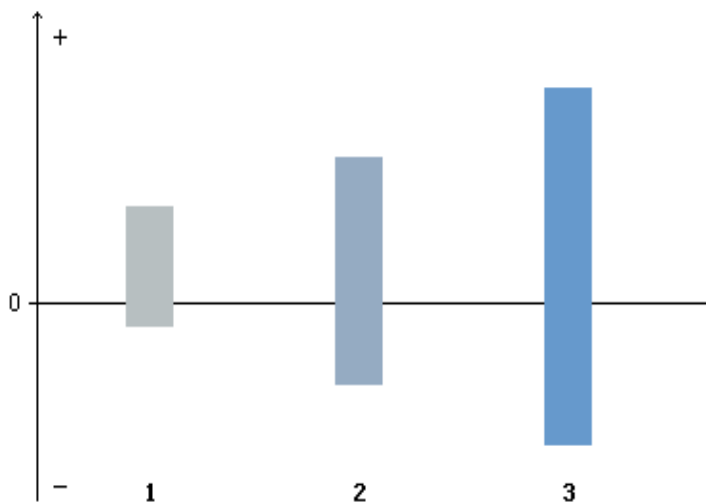

Vastausvaihtoehdot

1   Vaihtoehto 1
2   Vaihtoehto 2
3   Vaihtoehto 3

Suhtautuminen sijoittamiseen liittyviin riskeihin 5/6

Jos saisit vaihtoehtoiset sijoitussuositukset tavoitteellesi, joihin liittyy alla olevan kuvan mukaiset tuottojen vaihtelut, minkä sijoitusvaihtoehdon valitsisit?

Vastausvaihtoehdot

1   Vaihtoehto 1
2   Vaihtoehto 2
3   Vaihtoehto 3

Suhtautuminen sijoittamiseen liittyviin riskeihin 6/6

Jos sijoituksesi arvo laskee lyhyessä ajassa 20%, mitä teet?

Vastausvaihtoehdot

1   Myyn sijoitukseni. Sijoitusteni arvo voi vielä laskea ja haluan välttyä lisätappioilta.
2   Seuraan tilannetta, mutta en myy sijoituksiani. Vaikka sijoitusteni arvo on laskenut, uskon arvon nousevan pitkällä aikavälillä.
3   En huolestuisi asiasta. Uskon, että voimakas arvonvaihtelu kuuluu olennaisesti paremman tuoton tavoitteluun. Näen tilanteen lisäostojen mahdollisuutena.