Juhani Pietarinen

OVERCONFIDENCE AND INVESTOR TRADING BEHAVIOR IN THE FINNISH STOCK MARKET

Master’s Thesis
Oulu Business School
April 2014
Empirical studies have analyzed how investors trade and perform in the financial markets. The studies show that rational trading needs do not explain the excessive manner of trading shown by the investors. Theoretical models offer overconfidence as one of the explanations for irrational trading behavior. Overconfidence is a psychological trait, argued to cause the investors to misinterpret useful information, which leads to an increase in trading activity and hurts their performance.

In this study we analyze over 1.5 million Finnish trading records from the beginning of 1995 to the end of 2010. We evaluate the differences in trading behavior between males and females and with investors of diverse ages. We find that men trade securities more frequently and with higher turnover than females. Consistently with our reference studies we find that the level of turnover decreases as the investors age. We also analyze the profitability effects of trading by calculating raw returns and abnormal returns. The abnormal returns are adjusted with a passive benchmark portfolio. Earlier studies show that the more active trading of males reduces their abnormal returns. Our abnormal return ratios do not support this finding. However, we find consistently that the raw returns are higher for females than males. Females also hold portfolios with lower volatility than males. Finally, we find consistently with the models of overconfidence by Odean (1998b) and Gervais and Odean (2001) that the trading skill seems to get better with experience. Older investors receive higher raw returns and trade less, resulting in lower portfolio turnover. The transition in trading behavior may be an outcome of learning.

**Keywords**
Turnover, Abnormal returns, Trading activity, Portfolio performance
# CONTENTS

1 INTRODUCTION............................................................................................................. 6
  1.1 Research Problem................................................................................................. 8
  1.2 Related literature................................................................................................. 9

2 OVERCONFIDENCE ................................................................................................. 13
  2.1 Background........................................................................................................ 13
  2.2 General characteristics...................................................................................... 13
  2.3 Illusion of control.............................................................................................. 15
  2.4 Illusion of knowledge......................................................................................... 15
  2.5 Self-attribution bias.......................................................................................... 17

3 OVERCONFIDENCE IN THE FINANCIAL MARKET ............................................ 18
  3.1 The outcome of frequent trading on return performance ......................... 18
  3.2 Gender differences in trading behavior......................................................... 21
  3.3 Learning with experience............................................................................... 23
  3.4 Overconfidence and market trading volume............................................... 24
  3.5 Investor surveys and trading behavior........................................................... 26
  3.6 Psychological factors and trading behavior................................................... 27

4 DATA .......................................................................................................................... 30

5 METHODOLOGY ..................................................................................................... 33
  5.1 Measures for trading activity.......................................................................... 33
  5.2 Gross and abnormal return calculations........................................................ 33

6 RESULTS.................................................................................................................... 36
  6.1 Trading frequency and returns....................................................................... 36
  6.2 Gender and age differences in trading behavior........................................... 39
  6.3 The balance of abnormal returns and turnover............................................ 45
  6.4 Regression analysis.......................................................................................... 49
7  CONCLUSION ........................................................................................................52

REFERENCES ..........................................................................................................54
FIGURES

Figure 1. Monthly turnover and annual performance of individual investors (Barber & Odean 2000). ................................................................. 20

Figure 2. Annualized Portfolio Turnover of single and married males and females during 1991-1997 (Nofsinger 2005:13). ................................................................. 22

Figure 3. The trend in raw returns and abnormal returns versus turnover. ...................... 39

TABLES

Table 1. Descriptive statistics ................................................................................. 32

Table 2. Turnover versus abnormal returns and raw returns ................................. 38

Table 3. Trading activity, abnormal returns, raw returns and portfolio volatility ......... 44

Table 4. The balance of abnormal returns and turnover ...................................... 47

Table 5. Results of the regression models ............................................................ 51
1 INTRODUCTION

The basis for traditional neoclassical finance theory is rational investor behavior. According to the theory, rational investor behavior should set the actual asset prices equal to their fundamental values. The most well-known studies, which apply rational investor behavior as a basic paradigm, are portfolio theory by Markowitz (1952), capital structure theory by Modigliani and Miller (1958), and capital asset pricing model by Sharpe (1964).

The 1980s included a born of a completely new field in the literature called behavioral finance. The basic principles behind behavioral finance are that investors possess a limited ability to interpret information and there are systematic factors affecting their decision making in the financial market. A great number of published studies related to behavioral finance are based on psychology literature published by Kahneman and Tversky (1972, 1973, 1979).

Overconfidence is an example of one of the psychological factors affecting human decision making. People affected by overconfidence are prone to overestimate their abilities, knowledge and future prospects. Overconfidence is usually excessive for difficult tasks requiring high degree of skill and for forecasts with low predictability. Information uncertainty also increases the level of overconfidence. Therefore matters, which lack clear and immediate feedback are highly affected by overconfidence. People who possess high degree of skill tend to be the most overconfident. (Kahneman & Tversky 1996.)

More recently, empiricists have used trading records from brokerage houses to analyze how investors behave in the financial market. The researchers have puzzled over the excessive trading activity shown by the investors. Barber and Odean (2000) report that households turn their portfolios annually by 75 percent. The researchers have shown that the rational trading needs do not offer an explanation for such behavior. Especially, when the actively trading investors are reported to reduce their net returns even when the transaction costs are ignored. Overconfidence has been offered as one of the factors causing increase in trading activity. (Odean 1999.)
The investors trade in the fashion that they would perform significantly better by holding passive buy-and-hold portfolios. Frequent trading also leads to high trading costs, which only benefit the brokerage houses used by the investors. Why do the investors behave in such manner? Psychological and behavioral finance studies argue that investors affected by overconfidence are prone to overstate their personal skills and abilities. They believe that they are better informed and skilled than other investors. As a consequence the investors trade more actively as they are expecting to receive higher returns. The empirical evidence shows that the actual outcome of such behavior leads to undesired results. We apply the trading records of Finnish investors to test if similar behavior also exists in the Finnish stock market.

In this study we analyze over 1.5 million trading records containing 128 000 investors during 1995 to 2010. Our primary objective is to analyze how trading affects to portfolio returns. We also analyze if there are differences in trading behavior between males and females. Finally, we also study if trading behavior and returns vary by the age of the investors. Our study applies similar methodology as Barber and Odean (2001b) and Perttunen and Tyynelä (2003). Turnover is accepted as a proxy for trading activity. We also calculate the annual average of individual trades. To analyze the actual profitability of the trading we calculate raw returns and abnormal passive portfolio returns. For more comprehensive analysis the investors are divided into different groups by gender and age.

The results show consistently with Barber and Odean (2001a) and Perttunen and Tyynelä (2003) that males trade stocks more frequently than females. Males exhibit higher turnover ratios than females in each age category. Males also execute a higher number of individual trades than females. The evolution of turnover ratios follows the same pattern as proposed by Gervais and Odean (2001) and Perttunen and Tyynelä (2003) if we accept age as a proxy for experience. The turnover ratios decrease as the investors age. However, we do not find clear evidence that a passive buy-and-hold investment over performs actively held portfolio measured by abnormal returns. Our abnormal returns are positive for each investor age group, which is inconsistent with Odean (1999) and Perttunen and Tyynelä (2003). Additionally, males earn higher abnormal returns than females in each age category. Our results also indicate that the abnormal returns do not improve with the age of the
We also calculate raw returns and portfolio volatilities for each investor group. Consistently with the model of overconfidence by Odean (1998b) we find that investors with higher turnover ratios display lower raw returns and higher portfolio volatilities. Odean (1998b) reports that in addition with high frequency trading, overconfident investors also invest into risky stocks and hold undiversified portfolios. The results also indicate that women earn higher raw returns than males under each age group. The raw returns increase with the age of the investors, while turnover and volatility decrease. The ratios for turnover, raw returns and portfolio volatility are in contrary with the models of overconfidence by Odean (1998b) and Gervais and Odean (2001).

In this study we apply a data, which contains trading records from different brokerage houses. The data is unique compared to Odean (1999) and Barber and Odean (2001a), which apply the data from a single brokerage house. Our data also contains a higher number of observations as the overall data period is wider and includes the trading history of 16 years. In this study we apply the same Finnish Central Securities Depository (FCSD) data as Perttunen and Tyynelä (2003), however our data contains 12 more years of trading history. The wider data period and the large amount of observations improve the robustness of the results, which may be considered as the main contribution of the thesis compared to previous studies.

This thesis is structured in the following manner. The second chapter determines the psychological framework behind overconfidence. The third chapter reviews the behavioral finance studies, which are used as a reference to form our hypotheses. The fourth and fifth chapter contain a description of the data and define the methodology applied in this study. In chapter six we present the results of our calculations. Finally, we end with a conclusion, which includes a review of our main results.

1.1 Research Problem

Empirical studies have confirmed that investors behave irrationally when making their investments decisions. Odean (1999) and Linnainmaa (2010) show that the frequent trading of investors lower their portfolio returns even when the transaction
costs are ignored. According to the studies, the most active traders receive the lowest returns on average. We use the Finnish trading records to study how the trading activity affects to portfolio returns. The first hypothesis may be stated as

H1: A high trading frequency (measured by turnover) in the stock market leads to lower returns on average.

Barber and Odean (2001a) show that males and females differ in their trading behavior. Males are more active traders on average than females. The frequent trading also lowers the returns of males while females get better returns with more passive trading behavior. To test if this phenomenon is consistent also with the Finnish trading records the following hypothesis may be assumed

H2: Men trade more than women and by trading more they hurt their performance more than women.

Gervais and Odean (2001) build a model of overconfidence and accept trading experience as proxy to test if investors learn from their past trading experiences. They find similarly as Perttunen and Tyynelä (2003) that the turnover decreases as the investor gains more experience. Perttunen and Tyynelä (2003) use age as proxy for experience. In addition to the lower trading activity the older investors also receive better net returns than younger investors. To analyze if there are changes in the trading behavior of investors measured by their age, the third hypothesis may be assumed as

H3: Younger investors trade more than older investors and by trading more they hurt their performance more than older investors.

1.2 Related literature

The studies in behavioral finance show that investors trade securities more frequently than they should. Odean (1999) shows that investors hurt their performance by trading even when the trading costs are ignored. The investors would do better in average if they just kept their portfolios untouched. In other words, they should apply
passive buy-and-hold trading strategy. In addition to high trading volume, overconfident investors hold undiversified portfolios and invest into more risky stocks. Overconfident investors underweight publicly available information and overweight their own private information. Overconfidence causes the investors to believe that they have a better ability to interpret information than others market participants. Therefore they give less emphasis to views and beliefs of other people. Consequently, overconfident investors under react to earnings announcements and to other news in the market. (Odean 1998b.)

Barber and Odean (2001b) and Barber and Odean (2002) analyze how the development of technology has affected to trading behavior. The development of Internet has made trading more accessible and more swift for investors. Barber and Odean (2002) analyze how the investors who switched to online trading from phone-based trading performed prior and after the switch. They find that the overall trading activity increased remarkably with the possibility of investing online. The investors who switched from phone-based trading to online trading traded more speculatively in the following years. Prior to the switch, the investors yearned positive returns. However, after trading more actively and speculatively the investors earned lower profits and underperformed the market by over three percentages.

Barber and Odean (2002) claim that overconfidence is one possible cause for this behavior. Empirical studies report that overconfidence increases the tendency to trade more frequently. Barber and Odean (2002) list various cognitive biases, which cause the investors to become more overconfident. The Internet offers a large quantity of data for investors, which causes an illusion of knowledge. Investors believe that a large amount of data enables them to make better investment decisions. Similarly, by investing online the investors may freely execute trades and manage their own stock portfolios, which leads to illusion of control that also increases overconfidence. Additionally, the investors are likely to attribute successes (such as positive returns before switching to online trading) for their own skill instead of luck and become more overconfident.

Barber and Odean (2001a) study if males and females differ in their behavior in the stock market. They analyze the differences between genders and married and single
households. They use turnover as a measure to assess the level of trading activity. Barber and Odean (2001a) report that that males trade 45 percent more than females. If measured by turnover, the difference between males and females is 24 percentage units higher for males. Single males trade the most followed by married males. Females are seemingly more careful in investing by having lower levels of turnover. Barber and Odean (2001a) also find that as a consequence of lower trading activity, females earn higher net returns compared to males. Their results indicate similarly as Odean (1999) and Linnainmaa (2010) that the more frequent trading leads to reduced net returns.

Gervais and Odean (2001) study if investors are able to learn from their experiences in trading in the securities market. They create a model of overconfidence, in which the investor is unaware of his own abilities in the standing point. The ability gradually evolves from successes and failures in the market. They find that the investors are prone to overly credit themselves for their own successes, which leads to higher overconfidence and more active trading. Statman, Thorley and Vorkink (2006) report consistently with the model of overconfidence that the past high market returns are followed with increased trading activity in the subsequent period. The major finding of Gervais and Odean (2001) is that the investors, who possess higher level of trading experience in the market receive higher net returns. Investors are likely to be more overconfident in the beginning path of their career. The investors become more familiar of their own abilities by acquiring more experience in trading and learn to adjust their behavior accordingly.

More recently the empiricists have begun to study the relation between the psychological characteristics of individuals compared to their trading behavior in the stock market. Grinblatt and Keloharju (2009) use the combination of Finnish trading data, investor tax filings, driving records and psychological profiles from the Finnish Armed Forces in their study. They document that the investors who receive high number of speeding tickets also trade more actively in the stock market. Equivalently, the investors who attain a high score from the psychological self-assessment test in the Armed Forces, trade securities with higher level of turnover. A high score from the self-assessment test indicates a higher level of overconfidence according to the test description.
Grinblatt, Keloharju and Linnainmaa (2012) apply the same data and report that the investors with higher intelligent quotient (IQ) receive better returns. The investors with high IQ display better market timing and stock picking skills. Additionally, Grinblatt et al. (2012) report that the investors with a high IQ hold more diversified portfolios as they invest into greater number of different securities.
2 OVERCONFIDENCE

2.1 Background

Excessive trading activity in the financial markets is in contrary with the classical finance theories. According to the efficient market hypothesis by Fama (1970) security prices should equal their fundamental values and therefore abnormal returns should not be possible to be made with active trading. Investors should hold diversified portfolios and use passive buy-and-hold trading strategies to avoid trading costs. Odean (1999) shows that investors hurt their performance in the financial markets by holding undiversified portfolios and by trading too frequently compared to passive buy and hold investments.

Empirical studies have attempted to find a solution for the reasons behind investors’ excessive trading behavior in the market. Asymmetric information models were introduced in the 1970s for example by Holmström (1979). The model developed by Holmström contains informed and uninformed investors (also known as noise traders). According to the model noise traders make decisions without the use of fundamental information and may drive security prices away from their fundamentals prices. Despite of this view introduced to the finance literature by the asymmetric information models, the neoclassical model with the rational investor persisted.

In the 1980s researchers claimed that behavioral aspects introduced by the psychological studies are applicable for assessing the investor behavior in the financial markets. A completely new area in finance literature was born. The behavioral finance theories claim that investors have a limited ability to interpret information and there are systematic factors affecting their decision making in the financial market.

2.2 General characteristics

Overconfidence is a psychological bias affecting the behavior of individuals. People who are affected by overconfidence are prone to overestimate their personal abilities
and knowledge. Svenson (1981) surveys American and Swedish students who have a driver's license about their driving skills. The key finding is that 93% of the American and 69% of the Swedish students evaluate themselves as better drivers than the average. This is called the better-than-average effect, which is one of the forms of overconfidence.

Overconfident individuals extrapolate their personal skills and knowledge. This effect is also called *miscalibration* or *overprecision*. Alpert and Raiffa (1982:294–305) study this effect by asking the participants of their test to provide low and high estimates for a series of challenging questions (e.g. "What is the weight of a blue whale?" or "What is the length of the Nile river?"). The participants were asked to provide their high and low estimates (confidence-intervals) in a fashion that they were 90% certain that the correct answer is between their limits. A well calibrated subject should provide such limits that the correct answer lies between the limits nine times out of ten. However, the subjects of the test provided more wrong answers than nine. They were overconfident about the estimate even though they were warned about the bias.

Overconfident individuals overestimate their skills to influence future events and underestimate the degree of risk they take. The level of overconfidence is found to be high for difficult tasks, which require a high degree of skill and for forecasts with low predictability. According to Buehler, Griffin and Ross (1994) individuals underestimate the time required to complete a time consuming task. Empirical studies have found that people who possess a high degree skill are likely to be overconfident. Malmendier and Tate (2005) analyze managerial overconfidence by using the panel data on personal portfolio and corporate investment decisions of Forbes 500 Chief Executive Officers (CEOs). They classify CEOs as overconfident if they consistently fail to reduce their personal exposure to company-specific risk. They report that overconfident managers overstate the returns to their investment projects and see external funds as overly costly.

Gender and age are also found to be significant factors for determining a person's tendency to be overconfident. Males are found to be more overconfident than females in masculine tasks (Lundeberg, Fox and Puncchahar 1994). Men feel that they
are more capable of performing well in financial matters than females. Therefore, males have more influence in household investment decisions. Men also trade stocks more and more frequently than women (Barber and Odean 2001a). Grinblatt and Keloharju (2009) document that young males have a high tendency to undertake risk seeking activities. They find a positive relation between the number of speeding tickets received by young males in comparison to their trading behavior in the stock market.

2.3 Illusion of control

Empirical studies have also confirmed that the degree of overconfidence increases when people think that they are able to influence the outcome of an uncontrollable event. The opportunity of making an active choice leads to a feel of control. People believe that they have better chance winning in a lottery if they decide the lottery numbers themselves instead of letting the seller make the decision (Langer 1975.)

The increasing publicity of World Wide Web during the late 1990s has been a major reason for behavior affected by overconfidence. The web provides an access to a large quantity of information and makes the individuals familiar with different tasks, which are now possible to handle online. The web revolutionized investing in many ways. Investors are now able to look for stock information online, control their investments by themselves and to make active choices to buy and sell. These attributes have been found to increase the tendency of an individual to become overconfident (Barber and Odean 2002). Along with information availability and task familiarity, an early positive outcome to an event also leads a person to become overconfident. The late 1990s was the time of a bull market, which provided many positive outcomes for investors in the form of profitable investments. (Barber & Odean 2002.)

2.4 Illusion of knowledge

As illustrated previously by the example of growing popularity of online trading, investors believe that the definitiveness of their forecasts increase if they have more information available. In simple terms, they believe that the quality of their decision
is better if they have more information available. This tendency has been tested empirically for example by Peterson and Pitz (1988) and Langer (1975). In one of the psychological tests the participants were asked to guess the number of the roll of a fair six-sided die. The participants were told that the outcome of the last three rolls was a number four. If the die is truly fair the added information is completely irrelevant in terms of the future probability of the die roll. The probability of an outcome ranging from 1 to 6 remains at one-sixth chance to infinity. Nevertheless, with the added information some of the participants believed that the number four had a greater chance of being rolled again (more than one to sixth). Similarly some participants believed that the change of four being rolled again had decreased (less than one-sixth). To summarize the findings, people believe that the added information affects their forecast to be more accurate and makes them overconfident even though in reality the probability remains the same despite of the information. (Nofsinger 2005:16.)

Tumarkin and Whitelaw (2001) and Dewally (2003) analyze the added information effect caused by newsgroups in Internet. By using the internet for the source of information investors have an access to large amount of historical data such as past prices, returns and financial ratios of different companies. Along with past historical data, the investors may also monitor financial news, stock prices and volume in real time. Naturally, only a small percentage of investors have the training or relevant education to be able to interpret the information properly. It is therefore logical that the investors who lack the training look for investment advice from Internet. The online advice includes for example newsgroups, chat forums and analyst recommendations. The problem with the online information is that it is not often possible to identify if the person behind the posting, comment or recommendation is truly finance professional or not.

The study by Dewally (2003) takes into consideration the stocks recommended in message boards and newsgroups. The stocks suggested for purchase, which had a very good past performance actually underperformed the market more than 19 percent in the following month. When taking into account all stocks recommended they did not perform significantly than the market as a total. Tumarkin and Whitelaw (2001) find similar results in their study. They examine the message board postings
at a popular web site called ragingbull.com. Their main finding is that there is no relation between the positive postings in the message board and subsequent returns in the following week. Nevertheless, they document that unusually high message activity was in relation with higher trading volume, which persisted also for the second day. According to these two studies the message boards and newsgroups do not contain useful information for investors. Most investors do not appear to realize this fact, rather they fall under the illusion of knowledge and become overconfident.

2.5 Self-attribution bias

The self-attribution bias is a form of overconfidence documented in the psychological literature for example by Baker, Ruback and Wurgler (2008) and Kahneman and Tversky (2000). The self-attribution bias affects people to overly credit their role or skill for positive outcomes and to overly blame external factors or bad luck for negative outcomes.

Barber and Odean (2002) and Gervais and Odean (2001) state that investors attribute too much of their successes to their abilities during bull markets, which makes them to become overconfident. They found that investors switched from phone-based to online trading after they had experienced good returns in the past. A possible reason for the switch was that the investors believe that they can further improve their performance by trading more. Daniel, Hirshleifer, and Subrahmanyam (1998) explain that the self-attribution bias may further result in overreactions, short term momentum and long-run reversals in stock prices. Barber and Odean (2002) show that investors who switched to online trading became more overconfident. They illustrate this by analyzing the trading activity and performance, which followed the change. They found that investors who switched to online trading begun to trade more actively, which was also followed by lower returns.
3 OVERCONFIDENCE IN THE FINANCIAL MARKET

Overconfidence is not directly observable in the financial market. It is not possible to determine if a certain behavior or an outcome is purely motivated by overconfidence. Hirshleifer (2001) argues that it is not clear how to connect the psychological evidence with investors’ behavior in the financial market. Therefore, researchers use various different approaches and indirect proxies to link the psychological framework to the observed behavior in the market. Studies by Odean (1998a, 1998b, 1999), Barber and Odean (2001a, 2001b) and Gervais and Odean (2001) focus on analyzing individual investor behavior by using investor surveys and trading data from brokerage firms. Grinblatt and Keloharju (2009) use a combination of investor tax filings, driving records and mandatory psychological profiles from the armed forces along with equity trading data to compare psychological characteristics in relation to trading behavior. By conducting the research in such fashion, they are able to analyze if certain psychological characteristics correlate with the observed trading behavior.

3.1 The outcome of frequent trading on return performance

Barber and Odean (2000) analyze how active trading affects the overall performance of investors. They apply the trading data of approximately 78 000 household accounts from a discount brokerage firm during 1991 to 1996. They use a measure called turnover to calculate the amount how much investors change their portfolio on a yearly basis. A hundred percent turnover is equivalent of investor selling all the stocks in the portfolio and buying new stocks as a replacement. Barber and Odean (2000) report that an average household turns the portfolio over annually by 75 percent. It does not seem logical that this much of trading is required for rational trading needs.

One may claim that the trading of investors is motivated by other rational reasons. Odean (1999) and Lakonishok and Smidt (1986) address this issue by taking into consideration that investors may trade for liquidity needs, tax loss selling, portfolio rebalancing or by attempting to move to lower risk securities. However, after eliminating these trades from the sample they find that these reasons do not account for
significant amount of the total trading quantity. Irrationality is clearly detectable from the observed trading.

Barber and Odean (2000) analyze the performance effects of trading by calculating average gross and net returns for the investors. The net return calculations are accounted by the bid-ask spread and transaction costs. The investors are sorted into groups according to the level of turnover. The received gross returns are stable within the different investor groups. However, the net returns significantly fall when moving to investor group with a higher turnover. Barber and Odean (2000) also compare the performance of investors to a value-weighted market index. They show that an average investor underperforms the index by 1.1 percent annually. They conclude that the excessive trading is harmful for the investor and a major determinant for the poor returns.

Figure 1 displays the relation between monthly turnover and return performance. The black (white) bar illustrates the monthly net (gross) return performance calculated by using the geometric mean. As the turnover increases the net returns tend to decrease. Figure 1 shows that those who trade the most receive the lowest net returns. (Barber & Odean 2000.)
Odean (1999) also analyzes the profitability of trading by investors. He uses trading data from a large brokerage firm including approximately 10,000 investor accounts during 1987-1993. He calculates an average commission for each trade. The net returns are calculated for each investor by subtracting the trading costs from the actual performance. A rational assumption is that investors should at least earn enough returns to cover their trading costs. Odean (1999) shows that investors hurt their total performance by trading too frequently. In fact, the investors fail to make profit even when the transaction costs are excluded from the calculations. Odean (1999) uses the three-factor model by Fama and French (1993) to form a benchmark for analyzing the profitability of trading. The benchmark portfolio clearly outperforms the actual returns earned by the investors. Linnainmaa (2011) documents similar findings using the data of Finnish households. He states that households seem to trade overly actively and that their returns are not enough to cover trading costs.

Odean (1999) also analyzes the return patterns following the sales and purchases. He finds that investors are prone to buy stocks that have fallen or risen more over the six
month period than stocks they sell. On average, investors sell the stocks, which have risen during the recent weeks. Investors are also prone to sell previous winner stocks than looser stocks. Odean (1999) suggests that the observed behavior is motivated by the difficulty of evaluating the high number of securities available for investors to buy and for the information effect of financial media. Numerous different alternatives and the large amount of information available is deceitful for some of the investors. Odean (1999) concludes that investors extrapolate their private information and misinterpret useful information, which is in line with the psychological studies.

3.2 Gender differences in trading behavior

Barber and Odean (2001a) use gender and marital status as a proxy to measure investor overconfidence in their study Boys Will Be Boys. They use the data for over 35,000 households from a large brokerage firm to compare the trading of males and females from February 1991 to January 1997. They apply turnover as the measure for trading activity. Barber and Odean (2001a) report that males trade 45 percent more than females in general. As illustrated in Figure 2 single men appear to be the most active traders with 85 percent portfolio turnover. They trade 67 percent more than single women. Overall, both single men and married men trade significantly more than women in general. Men turn their portfolios by 77 percent annually compared to 53 percent by women.
Figure 2. Annualized Portfolio Turnover of single and married males and females during 1991-1997 (Nofsinger 2005:13).

The ominous question is how the excessive trading affects the overall performance of males and females? The study implements a passive benchmark portfolio approach to calculate abnormal returns. The passive portfolio is built by using a similar approach as Lakonishok, Shleifer and Vishny (1992). The passive portfolio includes the stocks the investor had in the beginning of the year and its return is calculated similarly to a buy-and-hold investment as the investor had not traded at all during the year. The abnormal returns are calculated by subtracting the passive portfolio return from the actual returns. Barber and Odean (2001a) report that the more frequent trading by males reduced their net returns by 2.65 percentage points annually compared to 1.72 percentage points for females. The most frequent trading by single men cut their net returns 1.44 percentage points in comparison to single females.

Barber and Odean (2001a) extend the research to seek an answer to the question that is the lower performance by men due to worse security selection opposed to women or can it be explained with greater trading activity. They observe a similar finding as Odean (1999), the stocks both men and women decide to sell outperform the stocks they decide to buy. However, they are unable to find a statistically significant
difference between genders. They conclude that the lower net returns earned by men are due to more active trading and not for less successful stock picking ability.

A greater trading activity by males is consistent with the psychological studies. Lundeberg, Fox and Puncochar (1994) report that males are more overconfident in masculine tasks such as financial matters. The results of Barber and Odean (2001a) support this finding. Women are clearly more passive and careful in their investment decisions. The married men also trade less than single men. It is possible that women have some influence over the investment decisions and prevent a portion of the active trading. A more passive and careful trading behavior in stock market is beneficial for the investor, which leads to better returns on average.

3.3 Learning with experience

Empirical studies have confirmed that on average investors trade in the fashion that they would do better if they traded less (Odean 1999). The literature has also pointed out the differences in trading behavior between genders (Barber & Odean 2001a). Therefore it is only logical to consider if the investors have the capability to learn from their mistakes and to change their trading behavior accordingly.

Gervais and Odean (2001) build a model of overconfidence to illustrate if investors learn from their successes and failures. In the model they assume that investors are unaware of the abilities they possess. The awareness of one's personal abilities is formed according to successes and failures by trading in the market. They find that the self-attribution bias is also dominant in the stock market and investors tend to credit themselves for good outcomes. With more successful trades the investor attributes the good performance for his own abilities and becomes even more confident of his own skill. These reasons increase the tendency of an investor to trade even more. Consistent with Gervais and Odean (2001), Daniel, Hirshleifer and Subrahmanyam (1998) also report that the trading behavior of investors adjusts through time.

Linnainmaa (2011) seeks the answer to the same question using the trading records of Finnish households. Similarly he documents that the trading activity changes as
the investor gains more experience. The choice of deciding to trade may be viewed as an option. Investors have a trait to trade more to learn to become better in trading even if they know that they are unskilled. Linnainmaa (2011) also finds evidence similar to Gervais and Odean (2001) that the frequency of trading increases after positive outcomes and some households quit from trading after experiencing negative outcomes.

Gervais and Odean (2001) report that the investors seem to be the most overconfident at the early part of their career, which is also consistent with Linnainmaa (2011). The investors with least amount of trading experience exhibit the greatest level of overconfidence and trade the most. Grinblatt and Keloharju (2009) document that especially young investors tend to hold more riskier portfolios and trade most actively.

The studies by Gervais and Odean (2001) and Linnainmaa (2011) share the same key findings that overconfident investors trade excessively and their trading volatility increases according to number of their past successes. The level of overconfidence is greatest in the early part of the career. However, later as the investors gain more experience they become better aware of their personal abilities. Odean (1999) and Perttunen and Tyynelä (2003) show that older investors trade less frequently and with lower turnover, which leads to better returns.

### 3.4 Overconfidence and market trading volume

The studies described previously are focused on individual investors. Statman, Thorley and Vorkink (2006) analyze the market trading volume in general. They base their research on the models of overconfidence by Odean (1998b) and Gervais and Odean (2001). According to the models, a high market return leads to increased trading activity in the following period. Consistently low market returns lead to decreased trading activity in the subsequent period. The investors affected by overconfidence believe that the high returns are due to their own skill, despite that numerous other investors are receiving high returns during bull markets.
Statman et al. (2006) study the overall trading volume in the stock market in different periods to test if a similar pattern is observable as illustrated by the models of overconfidence. Statman et al. (2006) apply the common stock data from NYSE and AMEX. Their observations are monthly returns and their data period covers the years from 1962 to 2001. They use trading volume as the explanatory variable, from which they have removed trend to attain stationarity. Lagged market returns are used as a explanatory variable for market trading volume. Stock specific lagged returns and lagged market returns are used as variables to explain stock specific trading volume.

Statman et al. (2006) report supporting evidence for the models of overconfidence. They document that the trading activity is positively correlated with the lagged market returns. High (low) market returns are followed high (low) trading volume in the subsequent period. They also find that the stock specific trading volume is positively correlated with its own lagged returns and the market lagged returns. Statman et al. (2006) argue that the positive correlation between stock specific trading volume and market trading volume indicates a growth in overconfidence. They conclude that their results are in line with the model of overconfidence, however disposition effect may also affect their results. According to Shefrin and Statman (1985) disposition effect refers to the tendency of investors selling winning stocks at an early stage and hold on to loosing stocks for a longer period of time.

Zaiane and Abaoub (2009) adopt the methodology from Statman et. al (2006) and conduct a similar research using the Tunisian stock data from the beginning of 2000 to the end of 2006. Similarly, their data consists of monthly common stock returns in the Tunisian stock market. Zaiane and Abaoub (2009) also analyze the relationship between lagged market returns and trading volume. They also find evidence that there is a positive relation between lagged market returns and following trading volume. However, their results are not as evident as Statman et. al (2006). The statistical significance of the results is not as strong. Nonetheless, the results indicate a minor dependency between lagged market returns and trading volume. They argue that the results indicate that the lagged market returns increase the overconfidence of investors making them to trade more actively in the subsequent period.
3.5 Investor surveys and trading behavior

The behavioral finance studies such as Odean (1999) argue that overconfident investors trade more actively than other investors and the higher trading activity leads to lower returns. Glaser and Weber (2007) analyze the level of overconfidence by conducting an investor questionnaire, which was designed to measure different facets of overconfidence. Glaser and Weber (2007) analyze the correlation between the answers provided in the questionnaire and the actual observed trading behavior. The facets of overconfidence used in the study include miscalibration, volatility estimates and better than the average effect. Miscalibration refers to people's tendency to be confident about their probability estimates. Lichtenstein, Fischhoff and Phillips (1985:306-334) asked people to provide answers for a series of questions, which each included two alternatives. The participants were asked to estimate the probability that their answers were correct. Their finding was that the actual probability was significantly lower compared to the estimate provided by the participants. People are also miscalibrated about their volatility estimates. Graham and Harvey (2001) asked the CEOs of US companies to provide their estimates of the market risk premium. Their finding was that the CEOs clearly underestimated the historical volatility. People also tend to overstate their own personal skills and abilities. Svenson (1981) documents that the majority of the participants considered themselves as better drivers than the average. This is an example of better than the average effect.

Glaser and Weber (2007) apply three different data sets in their study. The first data set contains the trading records of German brokerage house during the years 1997 to 2001. The second data set contains self-reported information, which was collected by the brokerage house, including such variables as age, gender, investment experience and trading strategy. The third data set includes the answers the investors provided to the online questionnaire. In the questionnaire, Glaser and Weber (2007) asked the investors to provide confidence intervals to question related to financial knowledge. In addition, the investors were also asked to provide confidence intervals related to stock market forecasts. These sets of questions were designed to measure miscalibration and volatility estimates. The investors were also asked to answer
questions related to their personal skills and abilities to test the better than average effect.

Glaser and Weber (2007) form an overconfidence score based on the answers. They compare the overconfidence scores to the actual trading activity and performance of investors. Their results show that the overconfidence scores formed according to the answers to probability and volatility estimates are not significantly correlated with the observed trading volume. However, they find evidence that the investors who rate their investment skills and performance above average trade more actively. They also report that the past trading performance of these investors does not indicate increased trading activity in the future. Their finding is inconsistent compared to the model of overconfidence by Gervais and Odean (2001). Glaser and Weber (2007) state that the online questionnaire leads to higher variance of the results compared to controlled laboratory test. They consider this fact as a possible reason why they were not able to show the connection between miscalibration and increased trading volume.

Glaser and Weber (2007) report that the more frequent trading does not lead to higher gross returns. Consistently with Barber and Odean (2000), their results show that the most investors receive lower returns compared to a benchmark. Glaser and Weber (2007) apply a German blue chip index (DAX) as their benchmark. Additionally, their results do not indicate a correlation between performance and overconfidence scores. High portfolio returns in the past do not lead to higher degree of overconfidence measured by the overconfidence scores.

3.6 Psychological factors and trading behavior

Grinblatt and Keloharju (2009) analyze if different psychological characteristics of people have a connection to their behavior in the market. They use the Finnish trading data combined with investor tax filings, driving records and psychological profiles from the Finnish Armed Forces to build measures of overconfidence and sensation seeking.
Grinblatt and Keloharju (2009) state that along with overconfidence, sensation seeking is another psychological trait, which may cause investors to trade more. According to Zuckerman (1994) sensation seekers search for novel, intense and varied experiences, which include risk taking. The risk they bear may be real or imagined and related to social or financial matters. People who are prone to sensation seeking have been found to participate in such activities as risky driving, alcohol or drug abuse, extreme sports (for example bungee jumping) and gambling. Trading in stock market also suits the criteria of sensation seeking, because it is financially risky. However, trading does not provide a novel and an intense experience if it is not done constantly. Zuckerman (1994) implies that the change of a stock or a purchase of a new stock in one's portfolio offers an experience that a sensation seeker requires. Therefore, a sensation seeker may hold diversified or non-diversified portfolio as both approaches provide stimulation for him or her. However, a stable buy-and-hold portfolio strategy does not offer a varied and novel experience.

Grinblatt and Keloharju (2009) use two different approaches to analyze the relation between psychological factors and trading behavior. Their first approach attempts to measure trading attributed by sensation seeking. As stated previously, sensation seekers require novel, intense and risky experiences. Grinblatt and Keloharju (2009) state that risky driving behavior fits the criteria of sensation seeking. Risky driving may often lead to traffic violations; therefore the number of speeding tickets is used as a proxy for sensation seeking. The authors document a significant relation between the number of speeding tickets received and the level of turnover. The investors who received the largest number of speeding tickets exhibit the largest turnover and trade the most frequently.

In their second approach Grinblatt and Keloharju (2009) apply the data containing psychological profiles maintained by the armed forces. Each conscript is required to complete the psychological assessment test during the compulsory military service in Finland. The test is designed to measure the self-confidence of the participant. A high score from the test indicates a high level of overconfidence. Grinblatt and Keloharju (2009) apply the score from the psychological test as a proxy for overconfidence. They use various regression techniques and find that investors who received a high score from the test trade more frequently with high level of turnover.
Grinblatt, Keloharju and Linnainmaa (2012) analyze if the intelligence quotient (IQ) of investors' affects to their investment decisions. They also apply the data received from the Finnish Armed Forces (FAF) combined with the trading records of investors. Along with self-confidence, the FAF psychological test also contains a part, which measures the intellectual ability of the participant. The intelligence test covers such areas as mathematical ability, verbal skills and logical reasoning. They find that investors with high-IQ perform better in the market. The portfolios of investors with high-IQ outperform the portfolios of investors with low-IQ. Additionally, investors with high-IQ display better market timing and stock picking skills.

Grinblatt, Keloharju and Linnainmaa (2011) apply the Finnish trading records, tax records and the psychological data from the Finnish Armed Forces to determine if there is correlation between IQ and market participation. They also analyze if the IQ affects to the degree of diversification of investors'. They rank the investors into deciles according to their IQ level. The investors with the highest IQ are more likely to participate in the securities market later in their career. The finding is consistent when moving to a lower decile. The investors in the second decile are more likely to participate in the securities market than the investors in the third decile. Grinblatt et al. (2011) also analyze correlation between diversification and IQ. They find that the investor with highest IQ are also more diversified. The investors with a high IQ are more likely to invest into mutual funds, larger number of stocks and hold less risky portfolios. Additionally, the investors with the highest IQ exhibit the largest Sharpe ratios, which is logical when taking the preceding facts into account.

Grinblatt et al. (2011) analyze the financial implications of their results. They state that the earlier participation in the stock market in one's career results in higher life savings later in life. Also portfolio diversification and lower portfolio volatility tend to result in better returns on long term. Grinblatt et al. (2011) suggest that the higher returns received by the investors with a high IQ have more significant impact to the overall wealth distribution than wages.
The data used for this study was obtained from the Finnish Central Securities Depository (FCSD) and from the HEX stock data. The database is called Book Entry system and it is electronically registered. The selected FCSD data contains records of portfolios and trading records of all household investors in Finland from 1995 to 2010. The FCSD data includes such variables per investor as the account number, gender and age. In addition, only the direct investments of investors' are included in this study as it is not possible to observe the indirect investments through financial institutions.

The finalized data is based on investor years, which means that each observation in the data includes one year trading history and performance of an individual investor. Investors who are under 20 years old and investors who are more than 80 years old have been excluded from the data. The reasoning behind this decision is that it is not likely that these investors are making the investment decisions by themselves. There were also observations in the data, which did not include the birth year of a specific investor. These observations were also excluded from the final sample. Additionally, such observations are also excluded from the data in which the investor sells or creates the portfolio during the year. Specifically, the requirement is that the portfolio is kept intact during the one year period. These adjustments were made to achieve a better level of measurability.

The focus of the study is to measure trading behavior of active investors. The active sample of investors contains those investors, which have made a minimum of one trade per annum. In other words, passive investors with zero annual trades have been excluded from the sample containing active investors.

Before the adjustments the data contains total of 128 354 investors. After the adjustments the active sample of investors represented is 127 408. As a total there are 154 4576 observations for the whole sample and 729 129 for the active sample. For more than half of the observations the investors applied passive buy-and-hold strategy and held their portfolios untouched. In the active sample there are total of 94 741 male investors and 32 667 female investors.
According to Table 1, males appear to be more active participants in the stock market when observing only the ownership of investment portfolio. The number of male investors in each category is significantly higher than the number of female investors. The middle-aged category contains the greatest amount of investors for both genders. The amount of investors drastically falls for both genders when looking at the old investor category. The percentage of active investors is higher for male investors in each age category. Young female investors (20-40) hold portfolios of higher value than young male investors. However, middle-aged and old males exhibit higher portfolio values than females of the same age categories. Table 1 shows that males trade more frequently than females in each age category when observing quantity of the trades of both genders.
<table>
<thead>
<tr>
<th></th>
<th>Young</th>
<th>Middle-aged</th>
<th>Old</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(20-30)</td>
<td>(30-40)</td>
<td>(40-50)</td>
</tr>
<tr>
<td>Number of investors</td>
<td>854 654</td>
<td>5 028 468</td>
<td>1 765 168</td>
</tr>
<tr>
<td>Portion of active investors</td>
<td>26% 26%</td>
<td>30% 30%</td>
<td>32% 32%</td>
</tr>
<tr>
<td>Mean portfolio value (1000€)</td>
<td>94 65</td>
<td>46 33</td>
<td>96 62</td>
</tr>
<tr>
<td>Average number of trades</td>
<td>5.2 1.88</td>
<td>6.18 2.84</td>
<td>6.21 2.46</td>
</tr>
</tbody>
</table>

The investors are divided in three categories: young (20-40), middle-aged (40-60) and old (60-80). Each category has been additionally divided into two sub-sections. The statistic containing "active" sample of investors is displayed first in each row, followed by the statistic containing all investors, which is displayed in parentheses. The data period represented is from 1995 to 2010.
5 METHODOLOGY

5.1 Measures for trading activity

In this study the focus is on analyzing the trading activity of investors. Therefore, it is necessary to be able to separate passive investors from the more active ones. A measure called turnover is applied as the proxy for trading activity, which is similar as Barber and Odean (2001a) and Perttunen and Tyynelä (2003) are using in their study. Turnover is used to calculate the amount how much investors change their portfolio on a yearly basis. A hundred percent turnover is equivalent of investor selling all the stocks in the portfolio and buying new stocks as a replacement.

The yearly turnover ratios for every investor are calculated as the value of stocks sold divided by the value of the portfolio held at the beginning of the year. Finally, the investor year observations are pooled together to calculate averages for each age category.

It is also possible that investors may trade frequently with low turnover ratios. To address this issue an additional variable called trading frequency is used, which is similar used by Perttunen and Tyynelä (2003). Trading frequency is calculated by taking the average of individual trades for each age category. By calculating the ratios for trading frequency it is possible to identify investors who may trade frequently with low turnover ratios, for the reason these investors should also be classified as active investors.

5.2 Gross and abnormal return calculations

Barber and Odean (2001a) use gross and net return calculations in their analysis. They apply an approximation for trading cost of each trade. In this study only the gross returns are applied. The reasoning behind the decision is the same as stated by Perttunen and Tyynelä (2003), who also apply a similar data in their analysis. The data contains observations from investors, who are customers of different brokerage houses and may use various different counterparties for trading. For this reason, the
calculation of an appropriate approximation for each trade is not possible. Any estimation for transaction costs would cause the results to be biased.

The finalized data is displayed in investor years. The transaction price of each trade is used for calculating the stock return. In the absence of the transaction price the daily closing price has been applied. Each investor year observation has been calculated as the value weighted average formed from the returns of individual stocks.

The gross returns for each investor year observation has been calculated similarly as Barber and Odean (2001a)

\[
R_{ht}^{gr} = \sum_{i=1}^{S_{ht}} p_{it} R_{it}^{gr},
\]

in which \( p_{it} \) is the beginning of the year value for holding of stock \( i \) by investor \( h \) in year \( t \) divided by the beginning of the year market value of all stocks held by investor \( h \), \( R_{it}^{gr} \) is the yearly gross return for a specific stock, \( S_{ht} \) is the number of stocks held by investor \( h \) under year \( t \) and \( R_{ht}^{gr} \) is the gross yearly return for that particular stock.

After calculating gross returns for each portfolio it is necessary to apply a benchmark to evaluate the actual profitability of the trading. Perttunen and Tyynelä (2003), Barber and Odean (2000) and Lakonishok, Shleifer and Vishny (1992) use a passive benchmark portfolio to analyze how the trading of individual investors is affecting their performance compared to a buy and hold investment. A similar type of benchmark portfolio is also used for this study.

The passive benchmark portfolio contains the stocks the investor had in the beginning of the year and is held untouched until the end of the year. The return for the passive benchmark portfolio is calculated from January to December and the portfolio is updated separately for each yearly observation. The true profitability of the trading is calculated by subtracting the passive portfolio returns from the actual
returns for each observation. These subtracted returns are defined as abnormal returns in this study. The abnormal returns $AR^{gr}_{ht}$ for each portfolio are calculated as

$$AR^{gr}_{ht} = R^{gr}_{ht} - R^{b}_{ht}$$

where $R^{gr}_{ht}$ is the gross return component and the benchmark for investor $h$ is the year $t$ return for the portfolio held by investor $h$ from the beginning of the year, stated as $R^{b}_{ht}$. The passive benchmark portfolio represents the return for an investor if he had not traded at all during the one year period. (Barber & Odean 2001a.)

According to Barber and Odean (2001a) and Perttunen and Tyynelä (2003) there are two main reasons for the use of the passive portfolio approach in this context. There is no clear consensus among researchers, which risk measures should be applied. Therefore it is only appropriate to apply the passive portfolio approach, which does not include any risk characteristics and is not affected by one's risk preferences. Additionally, the passive benchmark permits the evaluation of two different trading methods for each investor. The passive benchmark allows the comparison between the profitability of "buy-and-hold" trading with the actual observed trading. In other words, by assessing the abnormal returns one can determine if the trading was profitable or not. Along with profitability one may also determine how well the investor performed in terms of security selection and market timing. To improve the abnormal returns investors have the possibility of selling stocks, which they believe to harm the future performance of the portfolio. Similarly, the investors may also buy stocks, which they consider to increase the future returns. (Perttunen & Tyynelä 2003.)
6 RESULTS

6.1 Trading frequency and returns

Empirical studies by Odean (1999) and Barber and Odean (2001a) show that more frequent trading leads to lower returns on average. They apply turnover as the measure for trading activity. The model of overconfidence by Gervais and Odean (2001) indicates that overconfidence strongly affects investor behavior. The more overconfident investors will trade more and as a result they lower their returns.

The first hypothesis is stated as: A high trading frequency (measured by turnover) in the stock market leads to lower returns on average. The hypothesis may be tested directly with the data available. Turnover is used as a measure for trading activity. For analyzing the performance in trading we calculate raw returns and the abnormal passive portfolio returns. Turnover, abnormal returns and raw returns have been calculated for each investor represented in the active sample.

In Table 2 the investors are divided into 11 columns according to the level of their turnover. The gap between each turnover level is 10 percentages, excluding the final column, which contains all the investors with turnover equal or over 100 percentages. The reasoning behind this decision is to closely analyze the effects as the turnover increases. After sorting the investors in the relevant columns the averages are calculated for abnormal returns and raw returns to cover the whole time period from 1995 to 2010. Due to large number of observations each ratio is statistically significant at 1% confidence level and therefore the low P-values are not displayed in Table 2.

Table 2 shows that most investors included in the active sample turn their portfolios annually on average from 1 to 20 percentages. As the level of turnover increases the number of investors decreases. However, there are also approximately 130 000 investors who turn their portfolios 100 percent or more on average. Table 2 shows that the passive portfolio adjusted abnormal returns increase while the turnover increases. This finding is not in line with the first hypothesis. Odean (1999) states that investors lower their net returns even when the transaction costs are ignored.
Each of the abnormal returns included in Table 2 are positive and are increasing with the turnover. Therefore, there is no evidence in the results that high turnover leads to lower abnormal returns. In fact, the results indicate that the investors were able to improve their returns by trading more as the abnormal returns increase with larger turnover. However, one has to take into account that the transaction costs are not included in the return calculations. The transaction costs were not included in the calculations as it is not possible to determine a precise estimation for the trading commissions as our data contains observations from various different brokerage houses.

The raw return performance follows close to a decreasing pattern, despite of the peak in turnover levels of 10-20 and 20-30 percentages. Table 2 shows that the raw returns decrease as the turnover increases. This finding is consistent with our hypothesis. The raw returns are not affected by any benchmark, however they may still be compared with turnover. The models of overconfidence by Odean (1998b) and Gervais and Odean (2001) predict that in addition with high trading volume, overconfident investors are likely to invest in risky stocks and hold undiversified portfolios. This type of behavior is also found to be harmful for investors in terms of reduced returns. We lack the data related to individual stock holdings of investors and are only permitted to observe portfolio returns. Therefore we are not able to analyze the overall diversification level of investors or the riskiness of individual stocks investors hold in their portfolio. Nevertheless, the decreasing raw return performance in combination with increasing turnover is strongly consistent with the models of overconfidence by Odean (1998b) and Gervais and Odean (2001).
Table 2. Turnover versus abnormal returns and raw returns

<table>
<thead>
<tr>
<th>Number of investors</th>
<th>Turnover (%)</th>
<th>Abnormal returns</th>
<th>Raw returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>147154</td>
<td>1-10</td>
<td>0.04 %</td>
<td>3.19 %</td>
</tr>
<tr>
<td>118744</td>
<td>10-20</td>
<td>0.04 %</td>
<td>3.74 %</td>
</tr>
<tr>
<td>83540</td>
<td>20-30</td>
<td>0.06 %</td>
<td>4.01 %</td>
</tr>
<tr>
<td>61708</td>
<td>30-40</td>
<td>0.53 %</td>
<td>3.95 %</td>
</tr>
<tr>
<td>47579</td>
<td>40-50</td>
<td>0.15 %</td>
<td>2.85 %</td>
</tr>
<tr>
<td>37211</td>
<td>50-60</td>
<td>0.24 %</td>
<td>2.56 %</td>
</tr>
<tr>
<td>29405</td>
<td>60-70</td>
<td>0.32 %</td>
<td>2.05 %</td>
</tr>
<tr>
<td>23578</td>
<td>70-80</td>
<td>0.45 %</td>
<td>0.99 %</td>
</tr>
<tr>
<td>19532</td>
<td>80-90</td>
<td>0.50 %</td>
<td>0.89 %</td>
</tr>
<tr>
<td>16820</td>
<td>90-100</td>
<td>0.74 %</td>
<td>-0.83 %</td>
</tr>
<tr>
<td>129148</td>
<td>100+</td>
<td>1.48 %</td>
<td>-4.83 %</td>
</tr>
</tbody>
</table>

The data represented is from 1995 to 2010. The investors are divided in 11 columns by their turnover ratios. The number of investors are calculated for each turnover level. Abnormal returns and raw returns are calculated for each investor. Averages are calculated for both ratios under each column. The ratios are statistically significant at 1% confidence level.

Figure 3 displays in graphical format how raw returns and abnormal returns evolve in comparison to turnover. The raw returns steeply decrease when moving to a higher level of turnover on the horizontal axis. The raw returns turn to negative after reaching turnover ratios of 90 to 100 percent. The trend in abnormal returns is moderately upward sloping.
6.2 Gender and age differences in trading behavior

We analyze the differences in trading behavior between males and females of diverse ages. The active sample of investors have been divided into different categories by gender and age. To be able to assess the predicted age effect the investors have been divided into three age categories by their age (young 20-40, middle-aged 40-60 and old 60-80). For analyzing the possible changes in the trading behavior more precisely, each age category has been additionally divided into two subcategories. As a total there are 12 subcategories.

Average turnover, number of trading days, passive benchmark portfolio abnormal returns, raw-returns and portfolio volatilities have been calculated for each investor similarly as Perttunen and Tyynelä (2003). The annual averages for each ratio have been calculated separately for all investors. The separate investor year observations are then pooled over the years of the subsequent data period for each investor. As the final procedure, the averages are taken for each variable over the age categories.
Table 3 contains the results of the calculations. The ratios displayed in table 3 are calculated from the active sample. Panel A displays the ratios for turnover and individual trades, which are used as measures for overall trading activity. The turnover ratios are higher for men than females in each age category. As a total for the whole sample the turnover for males is 22 percent and 12.2 percent for females. When only taking the active sample into account the turnover for males is 31.7% and 20.3% for females on average. On average men turn their portfolios over 11.4 percentage units more than females over the data period of 1995 to 2010. These findings are consistent with the second hypothesis and with the reference studies by Barber and Odean (2001a) and Perttunen and Tyynelä (2003) who also find males to be more active traders than females. Perttunen and Tyynelä (2003) report even higher turnover rates for males and females. However, they apply a data period from 1996 to 2000, which contains a lesser quantity of observations and is prior to the technology stock bubble when the overall market turnover was alarmingly high.

Gervais and Odean (2001) state that investors take too much credit of their own successes, which is the root cause for overconfidence and causes the investor to trade increasingly in the market. As the investor gains more experience in trading he or her is prone to trade less frequently. Similarly with Perttunen and Tyynelä (2003) we also accept the age of an investor as a proxy for experience. Consistent with their study we also find that the turnover ratios decrease with the age of the investor. However, there is a peak in the middle-aged age category (40-50) for males and similarly for females in the young age category (30-40). Despite of the peak, the change in turnover follows a similar pattern compared to Perttunen and Tyynelä (2003). The turnover ratio is 10.65 percentage units higher for young males (20-30) than for old males (70-80). Similarly, young females (20-30) turn their portfolios over 6.85 percentage units more than old females (70-80). Gervais and Odean (2001) state that as the investor gains more experience in trading he becomes better aware of his abilities. Our finding is consistent with the preceding statement in terms of turnover.

Along with turnover, we have also calculated the average number of trades per year for all investor categories. The results of average number of trades per year follow a similar pattern as turnover. Males trade more frequently than females in every age
category as predicted by the second hypothesis. The finding is also consistent with Perttunen and Tyynelä (2003). On the other hand, there is no similar age effect in average number of trades per year as documented by Perttunen and Tyynelä (2003). They calculate the average number of trading days per year and find that the ratios decrease with the age of the investor. Instead of using the average number of trading days per year we calculate the average annual quantity of individual trades. Our results do not indicate a similar relationship between the age of an investor and the average number of trades. In fact, the number of trades seems to increase as the investor ages. The finding is consistent for both males and females. Barber and Odean (2001a) do not calculate the quantity individual of trades in their study. Therefore we may only compare the results among Finnish data with Perttunen and Tyynelä (2003).

The results indicate that men exhibit higher turnover levels than females on average, which is consistent with the hypothesis. Our hypothesis also predicts that as a consequence of higher turnover men hurt their performance more than women. Panel B displays the ratios for average "passive-portfolio" abnormal returns, raw returns and portfolio volatilities. The results show that males and females earn positive average abnormal returns in every age category. Men earn higher abnormal returns than females in each age category. The differences in returns are statistically significant at 1 percent confidence level.

These findings are inconsistent with Barber and Odean (2001a) and Perttunen and Tyynelä (2003). In both studies female receive higher average abnormal returns than males. Barber and Odean (2001a) find that the investors receive negative abnormal returns even the transaction costs are not included in the calculations. On a completely opposite manner, our results indicate that the investors were able to improve their abnormal returns by trading more. The finding is not in line with our hypothesis. A higher level of turnover does not seem to decrease the average abnormal returns earned, which is the opposite predicted by our hypothesis. However, the abnormal return ratios would be significantly lower if transaction costs were included in the calculations. Nevertheless, the results indicate that investors do not receive negative abnormal returns when the transaction costs are excluded from the calculations.
Panel B contains the ratios of raw returns for all age groups and for both genders. Young males (20-40) earn negative raw returns for both sub age groups. The difference between the raw return ratios of young males (20-30) and old males (70-80) is 9.3 percentage units. The young age group (20-30) of females earns raw returns of 5.44 percentages, which is 9.08 percentage units more compared to males of the same age. Despite of the exception for young females (20-30), the raw return ratios tend to increase with the age of the investor. Similarly, the investors who possess higher turnover receive lower raw returns. These findings are in contrary with our second and third hypothesis. Odean (1999) and Barber and Odean (2001a) do not emphasize on raw returns. Their primary focus is in the abnormal return performance as the raw returns are not affected by any benchmark. Nevertheless, along with excessive trading Odean (1998b) reports that overconfident investors are prone to hold undiversified portfolios and invest in volatile securities. The trend in the raw return performance of our results is consistent with the theory by Odean (1998b). The investors may also reduce their returns by holding undiversified portfolios and investing in risky stocks, which also leads to higher level of portfolio volatility.

The Panel B of Table 3 additionally includes the ratios for portfolio volatilities. The portfolio volatility is higher for males than females in each age category, except for the old investors of age of 70-80. Our results for portfolio volatilities back up the overconfidence theory by Odean (1998b). He states that the more overconfident investors are likely to hold riskier portfolios. Our results indicate that a decrease in turnover also leads to a decrease in portfolio volatility. The results are in line with Perttunen and Tyynelä (2003) who also report a similar finding.

Gervais and Odean (2001) argue that the investor becomes better aware of his personal abilities once he attains more experience in trading. Our results support this finding as the turnover and volatility decrease and raw returns increase with the age of the investor. Perttunen and Tyynelä (2003) make a remark that the age of an investor is not a precise measure for experience as it is not possible to determine if the old investors were trading securities when they were younger. However, Perttunen and Tyynelä (2003) state that it is possible that the overall trading skill of an investor develops not only by trading securities, but in addition by other
experiences in life. The notions by Grinblatt and Keloharju (2009) support this theory. As the investor gains more age he trades securities less frequently and drives more carefully, which results in lesser quantity of speeding tickets opposed to younger investors. Equivalently Barber and Odean (2002) find that young males in particular were prone to switch from phone-based trading to online trading. The ones who switched to online trading also self-claimed to have a high level of investment experience. The young males were reported to have a tendency to invest in small growth stocks with high market risk. The older investors are less likely to undertake risk seeking activities. Evidently, the investors became more risk averse as they age, which is consistent with our hypothesis and reference studies.

Overconfidence is one possible cause for active trading. However, it is not possible to precisely determine, which portion of the trading is motivated by overconfidence. According to Hirshleifer (2001) it is not clear how to attach the psychological evidence to investors' financial behavior. The investors may also trade for rational reasons such as portfolio rebalancing, tax loss selling or moving to lower risk securities. However, Lakonishok and Smidt (1986) show that rational trading needs do not explain a significant portion of the trading. There are also other behavioral biases such as the disposition effect, which have an influence in investors' trading behavior. We may still argue that overconfidence is a significant factor causing increase in trading activity. The theoretical framework behind overconfidence is modeled and tested well in the finance literature for example by Barber and Odean (2001a) and Gervais and Odean (2001), which support our statement.
Table 3. Trading activity, abnormal returns, raw returns and portfolio volatility

### Panel A: Trading activity

<table>
<thead>
<tr>
<th>Age</th>
<th>Number of investors</th>
<th>Average annualized turnover</th>
<th>Differences in turnover</th>
<th>Average number of trades per year</th>
<th>Differences in trades per year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Females</td>
<td>Males</td>
<td>Females</td>
<td>Males</td>
<td>Females-Males</td>
</tr>
<tr>
<td>20-30</td>
<td>854</td>
<td>5028</td>
<td>22.06 %</td>
<td>33.42 %</td>
<td>11.36 %</td>
</tr>
<tr>
<td>30-40</td>
<td>1765</td>
<td>9390</td>
<td>26.56 %</td>
<td>32.79 %</td>
<td>6.23 %</td>
</tr>
<tr>
<td>40-50</td>
<td>2623</td>
<td>9080</td>
<td>25.15 %</td>
<td>37.79 %</td>
<td>12.64 %</td>
</tr>
<tr>
<td>50-60</td>
<td>2853</td>
<td>6965</td>
<td>21.91 %</td>
<td>32.63 %</td>
<td>10.73 %</td>
</tr>
<tr>
<td>60-70</td>
<td>1406</td>
<td>3099</td>
<td>17.91 %</td>
<td>28.27 %</td>
<td>10.36 %</td>
</tr>
<tr>
<td>70-80</td>
<td>509</td>
<td>873</td>
<td>15.21 %</td>
<td>22.77 %</td>
<td>7.56 %</td>
</tr>
</tbody>
</table>

### Panel B: Average annualised returns and portfolio volatility

<table>
<thead>
<tr>
<th>Age</th>
<th>Number of investors</th>
<th>Average &quot;passive-portfolio&quot; abnormal returns</th>
<th>Difference in abnormal returns</th>
<th>Average raw returns</th>
<th>Portfolio volatility</th>
<th>Difference in portfolio volatility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Females</td>
<td>Males</td>
<td>Females</td>
<td>Males</td>
<td>Females-Males</td>
<td>Females</td>
</tr>
<tr>
<td>20-30</td>
<td>854</td>
<td>5028</td>
<td>0.21 %</td>
<td>0.38 %</td>
<td>0.17 %</td>
<td>5.44</td>
</tr>
<tr>
<td>30-40</td>
<td>1765</td>
<td>9390</td>
<td>0.42 %</td>
<td>0.47 %</td>
<td>0.05 %</td>
<td>0.46</td>
</tr>
<tr>
<td>40-50</td>
<td>2623</td>
<td>9080</td>
<td>0.24 %</td>
<td>0.42 %</td>
<td>0.18 %</td>
<td>2.48</td>
</tr>
<tr>
<td>50-60</td>
<td>2853</td>
<td>6965</td>
<td>0.24 %</td>
<td>0.42 %</td>
<td>0.18 %</td>
<td>3.05</td>
</tr>
<tr>
<td>60-70</td>
<td>1406</td>
<td>3099</td>
<td>0.25 %</td>
<td>0.37 %</td>
<td>0.12 %</td>
<td>5.15</td>
</tr>
<tr>
<td>70-80</td>
<td>509</td>
<td>873</td>
<td>0.16 %</td>
<td>0.28 %</td>
<td>0.12 %</td>
<td>7.61</td>
</tr>
</tbody>
</table>

The data period covers years from 1995 to 2010. The ratios have been calculated separately for each one year observation per investor. The ratios are then pooled over the years and averages are taken for each ratio in the relevant category. The ratios are statistically significant at 1 percent confidence level.
6.3 The balance of abnormal returns and turnover

To analyze if the results are consistent throughout our data period of 1995-2010 the results have been divided into three six year periods. The method is similar as used by Perttunen and Tyynelä (2003). Table 4 displays the results for each corresponding period. The ratios for average "passive-portfolio" abnormal returns and turnover have been calculated for each age group. The results show that the ratios for abnormal returns and turnover resemble the same trend as observed in Table 3. Males and Females receive positive abnormal returns for all age groups in each period. The returns are statistically significant at 1 percent confidence level. Males also receive higher abnormal returns than females. The differences in abnormal returns are also statistically significant. These results are not consistent with the findings of Barber and Odean (2001a) and Perttunen and Tyynelä (2003). However, as predicted by our hypothesis males trade more frequently than females having higher turnover levels for each age group excluding one exception during 1995-2000. During the period of 1995-2000 females of age 30-40 have 6.16 percentage units higher turnover than males, which is the only exception in the results.

Our results confirm that males trade more than females, which is consistent with the second hypothesis. However, the higher level of trading does lead to reduced abnormal returns for the reason that males receive higher abnormal returns in each age group. The differences in abnormal returns between males and females are statistically significant at 1 percent confidence level.

The third hypothesis predicts that the abnormal returns should be higher for older investors as they are more experienced and trade less frequently. Again, we may confirm that older investors exhibit lower levels of turnover for each of the three periods. For instance, during the period ending in 2000 the difference in turnover between the young (20-30) and old (70-80) is 15.84 percentage units. This finding is also consistent for the other two periods, despite that the difference is not as high. Barber and Odean (2001a) and Perttunen and Tyynelä (2003) document similar results in terms of the turnover. However, our results do not provide support for the existence of similar relationship between the age and abnormal returns as reported by
Perttunen and Tyynelä (2003). In their study they divide their whole data period of 1996-2000 in four periods. They find that the older investors receive higher abnormal returns for most of the age groups in comparison to younger investors. Our results show that the old investors receive lower abnormal returns than young investors. The results do not indicate an existence of similar learning curve as proposed by Gervais and Odean (2001) and Perttunen and Tyynelä (2003). After a small increase in the middle-aged age category the abnormal returns decrease when approaching the oldest investor groups of 60-70 and 70-80. Each of the abnormal return ratio is positive and statistically significant. Despite being positive, all of our reported abnormal return ratios are under 1 percent.

If the transaction costs were taken into consideration it is likely that the results had been affected. For example during the period ending in 2000 the abnormal returns range from 0.27 % to 0.5 % for females and from 0.56 % to 0.67 % for males. The differences are only minor; therefore it is not clear to observe a relationship between the abnormal returns and turnover. As a summary, we find no evidence that the abnormal returns would increase for older investors as a result of lesser level of turnover. However, consistent with Perttunen and Tyynelä (2003) and Gervais and Odean (2001) we find that the older investors trade securities with lower level of turnover opposed to younger investors, which applies for each of our 6 year periods. This change in turnover levels may come from learning through experience.
Table 4. The balance of abnormal returns and turnover

<table>
<thead>
<tr>
<th>Age</th>
<th>Number of Observations</th>
<th>Average &quot;passive-portfolio&quot; abnormal returns</th>
<th>Difference in abnormal returns</th>
<th>Turnover</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Female</td>
<td>Male</td>
<td>(Males-Females)</td>
</tr>
<tr>
<td>20-30</td>
<td>2044</td>
<td>8630</td>
<td>0.35 %</td>
<td>0.63 %</td>
</tr>
<tr>
<td>30-40</td>
<td>3301</td>
<td>13688</td>
<td>0.50 %</td>
<td>0.67 %</td>
</tr>
<tr>
<td>40-50</td>
<td>5460</td>
<td>16225</td>
<td>0.32 %</td>
<td>0.64 %</td>
</tr>
<tr>
<td>50-60</td>
<td>7649</td>
<td>17746</td>
<td>0.45 %</td>
<td>0.66 %</td>
</tr>
<tr>
<td>60-70</td>
<td>4418</td>
<td>9196</td>
<td>0.48 %</td>
<td>0.65 %</td>
</tr>
<tr>
<td>70-80</td>
<td>2008</td>
<td>3379</td>
<td>0.27 %</td>
<td>0.56 %</td>
</tr>
</tbody>
</table>

Average annualized returns and turnover 2000-2005

<table>
<thead>
<tr>
<th>Age</th>
<th>Number of Observations</th>
<th>Average &quot;passive-portfolio&quot; abnormal returns</th>
<th>Difference in abnormal returns</th>
<th>Turnover</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Female</td>
<td>Male</td>
<td>(Males-Females)</td>
</tr>
<tr>
<td>20-30</td>
<td>2662</td>
<td>11909</td>
<td>0.55 %</td>
<td>0.75 %</td>
</tr>
<tr>
<td>30-40</td>
<td>4636</td>
<td>22655</td>
<td>0.80 %</td>
<td>0.87 %</td>
</tr>
<tr>
<td>40-50</td>
<td>6998</td>
<td>24448</td>
<td>0.53 %</td>
<td>0.71 %</td>
</tr>
<tr>
<td>50-60</td>
<td>10843</td>
<td>27151</td>
<td>0.53 %</td>
<td>0.75 %</td>
</tr>
<tr>
<td>60-70</td>
<td>7549</td>
<td>16934</td>
<td>0.50 %</td>
<td>0.61 %</td>
</tr>
<tr>
<td>70-80</td>
<td>3352</td>
<td>6368</td>
<td>0.41 %</td>
<td>0.49 %</td>
</tr>
</tbody>
</table>
The averages of the ratios are calculated individually for each six-year period from 1995 to 2010. The ratios are statistically significant at 1% confidence level.
6.4 Regression analysis

Similarly with Perttunen and Tyynelä (2003) we confirm the robustness of our results with a regression analysis. The regression model allows us to include additional explanatory variables and provides a different viewpoint to the analysis. We pool the individual investor year observations and run the two regression models to analyze, which factors have effect in trading activity. We apply the annual turnover ratios (TO) and trading frequency (TF) ratios as dependent variables. For independent variables we apply gender dummy, age and logarithmic market value of the portfolio.

Most of our results are statistically significant at 1 percent confidence level, excluding three estimates under the fourth column. Compared to Perttunen and Tyynelä (2003) our R-squares are higher for turnover, but lower for trading frequency. However, compared to Barber and Odean (2001a) our R-squares are higher. Our results indicate that the average annual turnover is higher for males than females, which is consistent with Barber and Odean (2001a) and Perttunen and Tyynelä (2003). The gender dummy is positive and highly significant. The annual turnover ratio decreases with age, however the estimate is low (-0.0008). Consistently with Perttunen and Tyynelä (2003) the logarithmic portfolio value appears to have a negative effect on average annual portfolio turnover. In other words, the average annual portfolio turnover decreases while the logarithmic portfolio value increases.

The third column contains the estimates for average annual trading frequency. Our results show that the average annual trading frequency is higher for males than females. The gender dummy is positive and statistically significant at 1 percent confidence level. The trading frequency ratios decrease as the investor ages. The increase in logarithmic portfolio value also increases the trading frequency. These findings are consistent with Perttunen and Tyynelä (2003).

The fourth column contains the estimates for annualized abnormal returns. We have set the abnormal returns as dependent variable. For analyzing, which factors have
effect on abnormal returns we pool the investor year observations and apply gender dummy, age, average logarithmic value of portfolio, turnover ratio, trading frequency ratio and TOTF-ratio (product of TO and TF). Our R-squares for abnormal returns and raw returns are significantly lower compared to Tyynelä and Perttunen (2003).

The results back up our previous findings. The gender dummy is positive and statistically insignificant. Therefore, we find no support that males receive lower abnormal returns than females as predicted by our hypothesis. The estimate for age parameter is remarkably low (0.00002), which indicates that the abnormal returns do not significantly increase with the age of the investor. These findings are inconsistent with our hypothesis and Barber and Odean (2001a) and Perttunen and Tyynelä (2003).

When assessing the trading activity measures under fourth column, we find no indication that higher turnover and trading frequency ratios lead to lower abnormal returns. The estimate for TO is positive (0.00697) and statistically significant at 1 percent confidence level, which indicates that abnormal returns increase as the turnover increases. The estimate for TF is also positive, however only statistically significant at 10 percent confidence level. These results are inconsistent with Odean (1999). The combined measure for turnover and trading frequency, TOTF is statistically significant, however moderately low. A negative value for the TOTF estimate implies that those who make large trades receive lower abnormal returns.

In the fifth column we present the estimates for raw returns by applying the same previously used independent variables. The estimate for gender dummy is negative and statistically significant at 1 percent confidence level, which implies that females receive higher raw returns than males. The estimate for age variable is positive and also statistically significant at 1 percent confidence level. This finding indicates that the older investors earn higher raw returns. These findings are in line with our hypothesis.
### Table 5. Results of the regression models

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>TO</th>
<th>TF</th>
<th>Abnormal returns</th>
<th>Raw returns</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intercept</strong></td>
<td>0.7654***</td>
<td>-19.8682***</td>
<td>-0.00338***</td>
<td>-0.2190***</td>
</tr>
<tr>
<td></td>
<td>(0.0022)</td>
<td>(0.1432)</td>
<td>(0.00049)</td>
<td>(0.0044)</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td>0.0357***</td>
<td>1.6962***</td>
<td>0.00004</td>
<td>-0.0200***</td>
</tr>
<tr>
<td></td>
<td>(0.0007)</td>
<td>(0.0478)</td>
<td>(0.00014)</td>
<td>(0.0013)</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>-0.0008***</td>
<td>-0.0391***</td>
<td>0.00002***</td>
<td>0.0007***</td>
</tr>
<tr>
<td></td>
<td>(0.0000)</td>
<td>(0.0016)</td>
<td>(0.00000)</td>
<td>(0.0000)</td>
</tr>
<tr>
<td><strong>Portfolio value (ln)</strong></td>
<td>-0.0440***</td>
<td>2.5560***</td>
<td>0.00014&quot;</td>
<td>0.0221***</td>
</tr>
<tr>
<td></td>
<td>(0.0002)</td>
<td>(0.0132)</td>
<td>(0.00004)</td>
<td>(0.0004)</td>
</tr>
<tr>
<td><strong>TO</strong></td>
<td>-</td>
<td>-</td>
<td>0.00697***</td>
<td>0.0233***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.00027)</td>
<td>(0.0024)</td>
</tr>
<tr>
<td><strong>TF</strong></td>
<td>-</td>
<td>-</td>
<td>0.00002&quot;</td>
<td>-0.0015***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.00001)</td>
<td>(0.0001)</td>
</tr>
<tr>
<td><strong>TOTF</strong></td>
<td>-</td>
<td>-</td>
<td>-0.00006***</td>
<td>0.0012***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.00001)</td>
<td>(0.0001)</td>
</tr>
</tbody>
</table>

Adjusted $R^2$  
9.3 %  
6.3 %  
0.1 %  
0.8 %

The four regression models are estimated over the sample period of 1995 to 2010. The observations, which each represent one year trading activity and performance of investors, have been pooled over the sample period. Standard deviations are in parenthesis. The symbols ***$, **$, and "$$ indicate a statistical significance at 1, 5 and 10 percent confidence levels.
7 CONCLUSION

Empirical studies argue that overconfidence is a possible reason for irrational trading behavior. Overconfidence is argued to cause an increase in trading activity and lead to reduced portfolio returns. Behavioral studies show that overconfident investors are prone to overestimate their own skills and abilities. They are certain about the precision of their own information and they misinterpret useful information. In this thesis the model of overconfidence is tested using the Finnish data.

In this study we analyze the Finnish portfolio recordings during 1995 to 2010. Our primary objective is to assess how frequent trading of investors affects their portfolio performance. We also study the differences in trading behavior between females and males. We calculate the trading activity and portfolio performance for both genders. Finally, we also analyze if investors adjust their trading behavior as they age to observe possible learning in the stock market.

To evaluate the trading activity of investors we apply turnover and frequency of individual trades as a proxy. For analyzing the actual profitability of the trading the raw returns and abnormal returns are used as our measures. The raw returns are the actual returns investors receive from trading. To calculate the abnormal returns we use a passive benchmark portfolio approach. For conducting our analysis we divide males and females into six different categories by their age.

Our results indicate that a higher portfolio turnover does not lead to lower abnormal returns. The finding is inconsistent with Odean (1999) who reports that investors loose even before transaction costs. However, consistently with the model of overconfidence by Odean (1998b) we find that the raw return performance decreases as the turnover increases. The model of overconfidence argues that overconfident investors trade securities more and lower their returns as consequence.

When analyzing the trading behavior between males and females, we find consistently with Barber and Odean (2001a) and Perttunen and Tyynelä (2003) that males exhibit a higher level of turnover than females. Likewise, males also execute individual trades more actively than females. Inconsistently with Barber and Odean
(2001a) we do not find evidence that females receive higher abnormal return than males. However, females receive higher raw returns and have lower portfolio volatilities than males on average. The results show that males are more active participants in the stock market than females. Nevertheless, the more active participation leads to worse overall performance.

The results also show that the older investors trade stocks more passively compared to younger investors. The level of turnover and portfolio volatility decreases as the investor ages. Again, we do not find evidence that the abnormal returns improve as the investor ages. Nevertheless, the raw return ratios are evidently better for older investors. The model of overconfidence by Gervais and Odean (2001) shows that the performance of investors improves as they gain more trading experience. When excluding the ratios for abnormal returns, our results are in contrary with the model of overconfidence if we accept age as a proxy for trading experience. Odean (1998b) states that investors who are affected by overconfidence trade more actively, hold undiversified portfolios and invest into riskier stocks. Our results (ratios for turnover, portfolio volatility and raw returns) imply that older investors do not behave in such manner. Younger investors are clearly more prone to overconfident behavior.

The data used in this study is from various brokerage houses, which prevents us to use an estimate for trading costs. The robustness of the study would improve if transaction costs were taken into account. Our ratios for abnormal returns are higher for the lack of transaction costs. However, the ratios would be even more biased if we had applied an imprecise estimate for transaction costs. If possible, one could also use wider data period to improve the robustness of the results.

For further research one could limit the focus on individual investors who trade actively during the whole data period. By only analyzing the trading records of investors who provide observations for the whole data sample, one could assess more precisely if these investors are a subject to behavior described by the model of overconfidence and if they are able to learn through their trading experience as they age.
REFERENCES


