TALLINN UNIVERSITY OF TECHNOLOGY
School of Business and Governance
Department of Economics and Finance

Gaganmeet Singh Dhir

INFLUENCE OF SOCIOECONOMIC AND DEMOGRAPHIC CHARACTERISTICS OVER HERDING IN ESTONIAN STOCK MARKET

Master's Thesis

Supervisor: Associate Professor Tõnn Talpsepp

Tallinn 2017

I declare I have written the master's thesis independently.
All works and major viewpoints of the other authors, data from the other sources of literature and elsewhere used for writing the paper have been referenced.

Gaganmeet Singh Dhir .....

(signature, date)

Student's code: 156480

Student's e-mail address: teachmysoul@gmail.com

Supervisor: Associate Professor Tõnn Talpsepp

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ABSTRACT

The study investigates the influence of demographics (educational background) and socioeconomic personality traits (age and gender) on the herding behaviour of individual investors in Estonian stock market. The study is deemed to be extremely beneficial for the individual investors along with financial advisors. The study would help financial advisors to know the extent of behavioural bias (herding) present in the Estonian stock market and they could advise the investors in a better manner to mitigate the tendency to herd. The study is based on the quarterly stock transactions of Estonian investors from January 2004 to December 2012. To measure the extent of herding the study follows Frey, Herbst and Walter (2007) (FHW indicator) that measures herding as the excessive dispersion of the transactions (Buying/Selling) on the similar side for the stocks.

The herding measures are calculated for each stock as well as for the whole market for all the 36 quarters. The stock wide herding measures suggest that there is a clear difference in the attitudes of gender groups towards different stocks and industries. Other than that for most of the stocks, people with age group of 30 to 40 herd less than the other age groups in the study. There is also a significant influence of educational parameters (level of degree, type of degree, grades in Mathematics, grades in English language and grades in Native language) on the herding behaviour of groups for each stock. Furthermore, the market wide results show the degree of relative difference in the herding measures of the groups which is analysed through statistical tests. It also shows the influence of 2007-2008 financial crises on the herding behaviour of Estonian investors. The analysis put forward interesting observations that serves as an asset to the existing literature in Behavioural finance.

Keywords: Behavioural Finance, Herd Behaviour, Demographic Characteristics, Socioeconomic Characteristics, FHW herding measure, Tallinn (Estonian) Stock Exchange.

INTRODUCTION

Human behaviour is a result of psychological and external factors (Endler and Magnusson, 1976). Maital in 1986 suggested that individual traits, risk tolerance, return, information perception and sentiments affect the behaviour of investors. According to the prospect theory given by Kahneman and Tversky in 1979, the decisions of an investor gets affected by the introduction of uncertain conditions. In the quest of generating profit, they start looking out for information from other sources or follow the advice of a professional investor. The prospect theory says that the investors tend to vary their actual decisions from rationality because of the changing psychological mind-set of the investor. Behavioural finance names one such behavioural bias of the investors as herding.

Herding behaviour is understood as an act of irrational decision making by an investor where the individual follows a group of investors and values the group's decision more over the available information. This often leads to extreme fluctuation in the stock market. Herding has a tendency to drive away the prices from their actual values. The herding behaviour is known to happen because of investors abandoning their own private information and following the action of others. Herding is seen in the individual investors as well as the analyst when they forecast asset prices. Institutional investors (insurance companies, banks etc.) are more prone to herding because of access to better information about other investors decisions and the greater knowledge of effects of herding on the volatility of stocks.

Motivated by the availability of new data that hasn't been explored much and my keen interest in finding the connotation of herding behaviour for money managers and investors, the purpose of this study is to examine the influence of selected socio-demographical and socio-economic attributes of a person over the extent of herding by investigating the listed and delisted stocks in the Estonian stock market. There hasn't been much research that establishes any relation between the demographics and the stock investment decisions of an individual particularly in a small country like Estonia. Some of the previous studies concerning Baltic States have only focussed on the impact of cultural aspects of the individual

on the behavioural bias where Hofstede's cultural dimensions are used as the base for cultural measurements.

This study undertakes the new perspective over the factors influencing an individual's herding behaviour. Socio-demographics aspects include gender, age, ethnicity etc. and socio-economic constitutes educational background and financial status of a person. A Selected attributes based on the data at hand are worked to get the respective herding measure to each of the groups involved. The study includes potential herding drivers which influence the inclination of the investors towards buying or selling of a particular stock. Exploration over such issue would open more deep analysis over indicators other than the culture which actuate the decisions of an individual in the stock market. The research question will centralize to the statement:

How does the socioeconomic and demographic characteristics influence herding in Estonian stock market.

The research question can be detailed as the following inquests:

1. Analysing the influence of gender attitudes on investor herding behaviour.
2. Evaluating the influence of age on herding behaviour.
3. Analysing the influence of educational parameters on investor's herding behaviour. The parameters include:

Level of degree - Masters/Bachelors/No degree.

Type of degree - Real Science/Humanities/Social Science.

High school score in Mathematics -

0-25 (Group 1 - Weak); 25-50 (Group 2 - Below Average); 50-75 (Group 3 - Above Average); 75-100 (Group 4 - Extremely Good).

High school score in Native Language -

0-25 (Group 1 - Weak); 25-50 (Group 2 - Below Average); 50-75 (Group 3 - Above Average); 75-100 (Group 4 - Extremely Good).

High school score in International (English) Language -

0-25 (Group 1 - Weak); 25-50 (Group 2 - Below Average); 50-75 (Group 3 - Above Average); 75-100 (Group 4 - Extremely Good).

The study is limited to Estonia (Tallinn Stock Exchange) and the time period for the evaluation range from 2004-2012 divided into 36 quarters. The study gives out the patterns of

herding measures for each group across all the stocks in the Estonian stock market. This also gives us an opportunity to get minute details over the comparative analysis of group's herding intensities. Even though the study puts forward some key observations that might be the reasons for such behavioural bias in Estonian investors, the study's observations are limited to the available data.

This paper proceeds as follows. After the introduction, chapter 1 describes the Literature that explains different kinds of financial terms namely traditional finance and behavioural finance. In addition to that, the chapter talks about the previous empirical studies conducted in the field of behavioural finance which particularly relates the socioeconomic and demographic characteristics of an individual with the herding behaviour. The write up is then followed by chapter 2 which states the methodology and data used. This chapter focuses on the different types of herding measures used to conduct such studies, the quantitative approach used in this study; the data and descriptive statistics. Chapter 3 describes the results and analysis based on the statistical calculations of data in hand. The chapter explains the herding numbers in terms of influence each parameter has on the herding behaviour of Estonian investors and compares the results with previous literature to know the reliability of results. The text is followed by conclusion, references and appendices.

I would also like to thank my supervisor Tõnn Talpsepp for his patience, support and advice in guiding me all the way through this study.

1. LITERATURE

1.1. Traditional versus Behavioural finance

There are two broadly classified theories depicting investment behaviour of the participants in the financial markets, the traditional and the behavioural finance. In the traditional schema of finance, the major emphasis is on the efficient market hypothesis (EMH). According to EMH at normal circumstances (efficient market) the prices always reflect back the available facts and particulars. The researchers have come up with three kinds of market efficiencies - strong, semi-strong and weak. The strong form depicts all the kind of public and private information getting reflected in the prices. The semi-strong form assumes that all the public information gets revealed in the prices and the third one which is weak form takes assumptions of prices exhibiting the historical information. The efficient market hypothesis is based on the rational approach of the investors and arbitrage (Fama 1970). According to Shleifer (2000), EMH rests on the following arguments; Firstly, the investors are initially assumed to be rational in their approach to evaluating the worth of their security. Also, for the investors who are not rational, the trades are random and tend to cancel out each other without affecting the prices. Finally, the effect of investors with a similar irrational approach gets cancelled out by the arbitrageurs in the market. The researchers in 1960 found the theory to have solid empirical evidence in support which turned EMH into a well proposed successful hypothesis.

Traditional finance tells us the way market works and behavioural finance explains the way people work. Traditional finance is useful under some conditions. It follows continuous pricing assumption in free and stable markets and rational wealth augmenters. Anything that occurs beyond these conditions cannot be explained by EMH but is governed by principles which are very different to the ones followed by EMH.

In 1980's the theories criticizing efficient market theory started to pop up. Nicholson (1968) challenged the efficiency of security prices and came up with the study that the stocks with low price-earnings ratio are undervalued and those with high PE ratio is overvalued. This was later confirmed by S. Basu (1977) and R. Ball (1978). This study is also well followed by Kahneman and Riepe (1998) who postulated overconfidence as one of the aspects of investor psychology that tend to project high earning growth and overpay for growth stocks. Similar findings were shown by Hawawini and Keim (1995) in the study about predictability of common stocks returns.

With the increase in the studies pointing out the fallacies of efficient market hypothesis, a new field of behavioural finance emerged. It combines financial theory with psychological and social elements. According to Shiller (2003), it is one of the most researched theories of finance nowadays. There are two pillars of behavioural finance - limits to arbitrage and psychology (Barberis and Thaler, 2003). The study suggests that presence of risks and costs in arbitrage leads to difference in the pricing in the financial market which directly opposes the EMH relying on arbitrage to eliminate mispricing. Also, after the stock market crash of 1997, Asian crisis of 1997, the dot-com bubble of 2000s and the financial crisis of 2008, the psychology of investors has been identified as one of the major driving force in the financial markets (De Bondt et al., 2008). The empirical studies demonstrate that the solidarity among the investors in the markets appears to be low. There are a number of phenomenon's that challenge the claim of investor's independent decision-making (Devenow and Welch, 1996). Researchers nowadays have started to focus more on herding, the tendency of investors to follow the action of others (De Bondt et al., 2008).

Traditional theory of Finance is descriptive but its accuracy to judge the behaviour of markets in future is very low. This leads to communication gap about the portfolios between the financial advisors and clients. Behavioural finance on the other hand gives out a way of maximising profit from the knowledge of markets as described by traditional theory. Although behavioural finance manages to describe how the investor's mind-set works, it too has some serious limitations. Human research is itself a very complex subject to deal with. Under the laboratory research process, the human mind behaves differently than it does when actually under the similar situations. The very knowledge of appearing stupid makes an individual nervous and the decisions that he/she takes at that moment might not correlate with the real approach.

The other factors that make the study of behavioural finance very complicated is that human minds don't always follow the rules. There is a very high possibility of humans changing their reactions under the influence of some events which are hard to find and the extent of influence that every event has on each individual is so very different. When something is really at stake human mind becomes more cautious and the time to react varies when compared to the normal mode. Also the expectations of the experimenters do affect the outcome of the proposed studies and the human subjects at times fall in the trap of those expectations. Then a human mind doesn't keep making mistakes all the time but its decisions change after the thorough analysis of previous decisions; the question is how many mistakes make the individual perfect is hardly known.

1.2. Herd Behaviour in Financial Markets

The researches depicting high degree of volatility among stock prices in comparison to the fundamentals gives rise to doubts over the efficiency of stock markets (Lux, 1995). The reason behind the cause is motivated by the herding intensity of the investors in the financial markets (Christie and Huang, 1995). Events like several financial crises over the past 25 years has really increased the interest of researchers in the existence of herd behaviour. It is now widely believed that the financial crisis is a result of herding among the investors (Chari and Kehoe, 2004).

There have been several definitions of the herding concept. Just as in case of the article by Banerjee (1992), herding is defined as "everyone doing what everyone else is doing, even when their private information suggests doing something quite different". This is a very general description of the concept. Herding in behavioural finance is used to investigate the degree of interdependency between the trades by investors (Chang and Zheng, 2010). Herding, to Bikhchandani and Sharma (2001) is a phenomenon where information of investing agents influences an investor to change his/her decision consciously in buying or selling a stock and the volume of trade as well. In this study we adopt the definition of Raafat et al. (2009) which define herding as a form of confluent social behaviour that arises because of personality traits, demographics or through localised interactions which aligns the thoughts of individuals in a group (herd).

Herding is broadly classified as intentional herding and spurious herding. Intentional herding occurs as a result of tendency of investors to mimic the actions of others. Spurious herding occurs when a group of investors receives similar information and face analogous problems. There are many factors that influence an investment decision so in theory it is extremely difficult to distinguish between intentional herding and spurious herding (Bikhchandani et al., 2001).

A few studies also suggest contradictory views of herding behaviour; rational and irrational (Devenow and Welch, 1996). The irrational approach just implies to the blindly following the other market participants. The rational approach is related to the most-favourable choice of decision getting altered by difficulties in information, compensation issues and burden of reputation (Bikhchandani and Sharma, 2001).

Firstly, the herding behaviour which arises due to the rudimentary information or informational cascades is the most common and general expression used to explain herding. It helps explain a few empirical events observed in the financial sector. There might be a numerous stimulus that could rattle the information cascade with better or new public information (Bikhchandani et al., 1998). The example depicting the formation of informational cascade is presented by Bikhchandani and Sharma (1998) where the thought process of 100 investors was studied. Each individual was to decide on whether to invest in an emerging market or not by doing the investment evaluations on their own. This made the investor's thought process different from others. Even though no information about the evaluation was shared, the investors who took the decision later changed their preferences on the basis of profitability results of the decisions made by former investors which clearly showed the possibility of herd behaviour.

Secondly, the herding based on compensation issues depends on the performance of investors in comparison to other market participants when there is an incentive for the agent to herd (Bikhchandani and Sharma, 2001).

The final form of rational herding is based on reputational issues. According to Scharfstein and Stein (1990), it is absolutely rational for an investor to follow the investment decisions of others. Their study said that managers can be modelled as low-ability investor or a high-ability investor. Low-ability investors are the ones who suffer a reputational loss by taking unsuccessful decisions contrary to the decisions made the predecessors and following own signals or information. Hence it sounds optimal to act like smart managers or high-ability

investors by neglecting one's own information and following the decisions made by the predecessors. Other than that another study given by Trueman (1994) states that analysts same as investors have a tendency to forecast similar to their predecessors, another case of reputational herding.

The non-rational approach of investor relies on his/her psychology and assumes that the investors completely ignores all the self-analysis of information and impersonates other investors (Devenow and Welch, 1996). This phenomenon is more prominent at the time large stock market fall when the investors start to react in panic and ignores all the level-headed analysis of the information in hand.

This study does not distinguish between the rational and irrational behaviour of investors but focuses on the combined (rational and irrational) presence of stock specific herd behaviour. Among the numerous factors influencing the herd behaviour of investors, the study intends to focus on the data-specific demographic and socioeconomic characteristics which constitute the personality traits of individuals. The personality traits and demographic background of individuals is one of the factors that inhibit features like overconfidence and act as more sure of their decisions than they should. The history of successful triumphs with the personal peculiarities induces the feeling of being more knowledgeable than they actually are. People suffering from the superiority complex, unknowingly, tend to sell the winning stock (Barber and Odean, 2000).

1.3. Previous literature on Demographic and Socio-Economic herding

After the time of great depression in 1929 it came into knowledge of researchers that characteristics such as age, gender, income and educational background of an individual does have an effect on the behaviour of investors (Guerrero et al., 2012). Psychology is one of the major factors that affect the financial decision making of the investors. According to Endler and Magnusson (1976) the personal psyche of a person results in the formation of his/her behaviour. Maital (1986) stated that sentiments response, personal characteristics, information interpretation and risk directs the investor's behaviour.

Studies on impact of different dimensions of personality on decision making have been done by many researchers. Rotter (1966) worked on the external and internal factors of

personality traits, Myers and McCauley (1985) came up with Myers-Briggs type indicator for personality assessments. Bailard T.E. et al. (1986) gave out BB & K model and Costa (1992) studied five personality traits model to figure out the extent of relation between investment biases and personality traits.

Estesa and Hosseinib (1988) investigated the relationship between demographics and confidence level while making any investment. They conducted an experiment on 1355 individuals to know the effect of gender and education on the confidence level while investing. The study revealed that males are more confident that females while making investment decisions and education has a positive relation with the confidence level of investors.

In 2001, Barber and Odean explored the gender bias and marital bias over investment behaviour of investors. They investigated nearly 35000 accounts over the span of 6 years from 1991 to 1997 collected from an intermediary firm. The results showed that higher percentage of shares in an account changed for men in comparison to women. Other than that single men made more transactions than married men whereas there was no significant difference in single women and married women. It has been indicated that men are more overconfident than women and consider themselves equipped with the information as compared to women. The study opened the sector for further research and it was followed by many similar findings.

Donker et al. in 2001 stated the relation between level of risk tolerance and age, gender, income, education. It was discovered that women and older people are not positive towards risk and people with higher educational background and higher level of incomes have positive correlation with their attitude towards stock market's risk. In the same year Harrison et al. discovered that with the increase in age, the individual's tolerance towards high risk stocks reduce. Also people especially after the age of 40 tend to feel less confident over their investment decisions. Other than that the study also demonstrated that with higher degree of education, the confidence of taking the investment decisions independently reduces.

In 1998, Jianakoplos and Bernasek gave out the study which said that single women are less confident in investment decisions than single men. Women with children are less confident than the women without children. As the household income increases the couple loses the self-confidence of taking independent decisions and the avoidance to risk increases.

It was also revealed that single black women herd less than single white women, married couple and single men.

Bajtelsmit et al. in 1999 examined the impact of gender on the risk perception over stock buy and sell decisions. The results suggested that women are more risk averse and have a higher risk perception than men. Women tend to play safe and get more advice from people around them before making any investment related decision. Fellner et al. (2007) did similar research on 280 participants to explore the degree of risk perception in men and women. The results showed that women have a higher perception of risk and offer more exchange in comparison to men.

In 2010, Baddeley et al. studied the impact of the majority's decision on the herding behaviour of individuals. Quantitative analysis of data revealed the non-homogenous nature of herding behaviour. The study showed that the extent of herding varies with gender, age and other personal characteristics. A similar study was conducted by Zaiane et al (2013) who worked on the Tunisian stock market data. 150 individual investors were questioned in a survey to know the demographic factors influencing herding behaviour. Statistical function correlation was used and the results indicated that age and income was not related to the herding behaviour in of Tunisian investors and men were more independent in decision making as compared to females. The relationship was illustrated with the following model in Figure1.

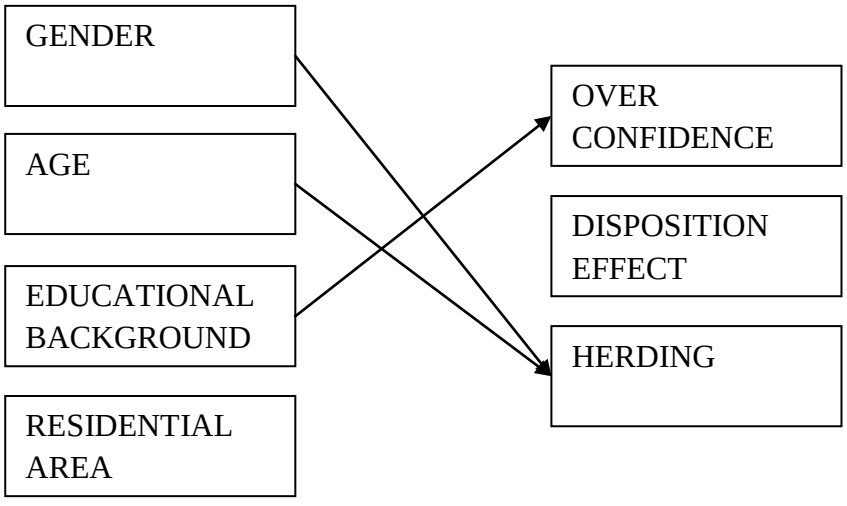


Figure1. Zaiane model of Behavioral bias and demographic factors.

In 2011 Faff et al. investigated the influence of socioeconomic and demographic aspects over an individual's risk tolerance level. The conclusion from their study suggested that the level of an individual's risk tolerance does get influenced by the affiliations of people around, age, education, marital status and level of income. In the same year 2011, Dohmen et al. pointed out that characteristics such as family history, education, gender, height and age influences the decisions of an investor. The study concluded that with age the tendency of herding increases, women herd more than men, investors with the educated parents tend to take more independent decisions and tall people are less influenced by the peer's decisions in the stock market.

In 2011, Rooij et al. conducted a study on 2000 investors to explore the relation between financial decisions and literacy. It was found that people with low levels of income and education have weakly varied portfolios. The study also found positive correlation between retirement plans and financial literacy. Georgarakos et al. in 2011 found in their study that different levels of financial knowledge are needed by different kind of people depending on their age, income and other characteristics to take self-dependent decisions in the financial sector.

Linn in 2011 worked on Taiwan Stock exchange individual investor's data to analyse the influence of psychological and demographical characteristics over financial inclination. A questionnaire survey of 554 samples was collected to study the disposition effect, overconfidence bias and herding. Linn evaluated the effects of five personality characteristics and demographical variables using two models of structural equation analysis. Following results pointed out the positive relationship between the investor bias and personality traits as well as demographics. Gender has a negative relation with overconfidence; Openness, Age and Conscientiousness are positively related to disposition effect and overconfidence; Extraversion and Neuroticism are positively related to herding and disposition effect.

Tauni and Zaidi (2012) worked on Lahore stock exchange to explore the relationship between personality characteristics, demographics and confidence level. A survey was conducted from a sample of randomly chosen 200 investors. Their results showed that Neuroticism has negative relation with independent decision-making process. Education and age does not have anything related to herding process of individuals. But Extroversion, conscientiousness and agreeableness have a positive relation with herding.

Navid et al. (2012) examined the Tehran stock exchange to get the impact of demographical characteristics over financial behaviour bias. The study of 215 people showed that age has negative relation with herding. Other than that herd behaviour is more prominent in females than males and education has a positive relationship with high confidence/less herding.

Linn in 2012 investigated the relation between extent of herding, types of investors and risk tolerance. A random sample of 389 investors was collected and a survey was conducted to check the role of investor behaviour and risk tolerance in herding bias. The result show that ardent type investors have high risk tolerance and are in positive relation to herding levels.

Taqadus et al. (2013) came out with the study that gives out relation between demographics and personal traits of an individual on the financial behavioural inclinations. 225 sample respondents including bankers, investors and students were questioned to analyse their bias and factors influencing them. The results were somewhat similar to the studies in the similar field. The study showed the connection between gender, age and education with the investor's behavioural bias.

Some other researchers such as Bashir et al. (2013) and Vasakarla et al. (2013) examined the relationship between investor's confidence level and demographics. Chi square test analyses and correlation regression showed that there exists no linear relation between the confidence level and the background on an individual. The European Scientific General published the following model (Figure2) in October 2013.

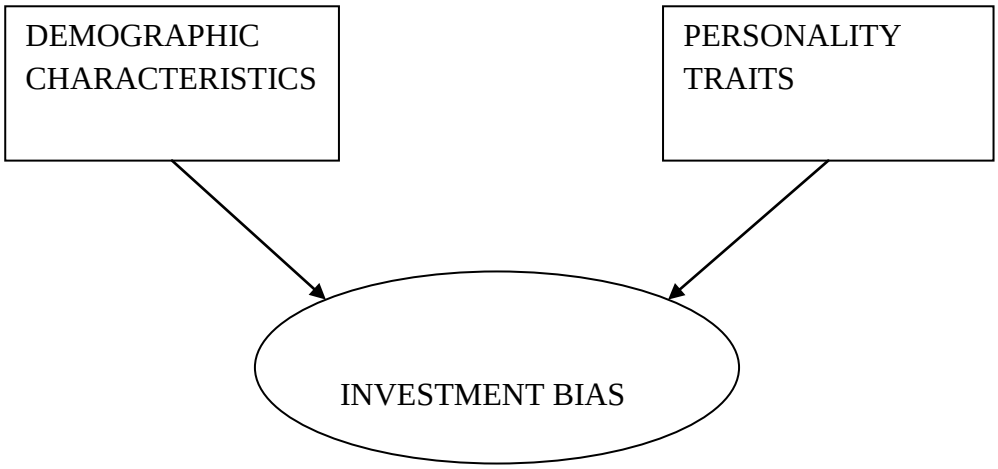


Figure2. ESG model of investment bias and factors affecting.

In 2014, Kempf et al. found that positive attitude leads to low risk perception and higher earnings whereas negative attitude leads to lower earnings and a high risk perception towards financial investments. The study also suggested that with the increase in the financial knowledge the confidence level of the investors increase and with that the extent of herding reduces.

2. METHODOLOGY AND DATA

This paper focuses on explaining the data and the approach followed to find herding measures. The methodology approach goes with the Quantitative data of investors obtained from Estonian central securities depository. The data at hand has the actual buying and selling preferences of the individual investors. The data is analysed using statistical testing. Since the volume of trade is not in question and we are only concerned with the buying and selling herd intensity, the study proposes to use the most recent and accepted herding measure given by Frey et al. (2007). Other than that the previous studies are used as references for the secondary data which is compared with the results of this study.

2.1. Prior models to detect herding

Lakonishok, Shleifer, Vishny were the first to design a model (LSV) which focussed majorly on the existence of herding and the positive-feedback trading. Herding was examined by assessing the extent of correlation factor among managers based on buying and selling. The model could finally test the possible destabilizing effect of financial investors in stock market. Lakonishok et al. (1992) gave the following explanation for their measure. Herd measure of 0.0365 for US pension funds implies that if the mean fraction of changes (buy/sell) over a stock is 50% then because of herding 53.65% is the actual number of investors who change their preferences in one direction and 46.35% in the other.

LSV model was based on the assumptions that under null hypothesis of independent trading the chance to observe a buy is equal to the average buy propensity of all stocks. Second, even if some trades are carried out in the dependent fashion, it assumes the average buy propensity under independent trading using all trades.

Christie and Huang in 1995 came out with another herding measure which was based on the fact that if investors herd on market consensus instead of trading on specific knowledge and information in regards to the firm, the large price dispersions of individual stocks will be reduced to lower levels during stress period than during non-stress periods. They proposed Cross section standard deviation (CSSD) measure to find the existence and extent of herding. They argued that at the time of herding, individual investors ignore their own information and evaluations, resulting in a more uniform change in returns. Thus in the presence of herding, security returns will not deviate too far from the overall market returns which would lead to increase in dispersion at a decreasing rate and in severe herding case, the dispersion might decrease as well.

The theory was followed by Chang, Cheng and Khorana in 2000. They extended the model of Christie and Huang with a more powerful approach, cross sectional absolute deviation of returns (CSAD) model. The new model worked along three dimensions, use of non-linear regression to study the relation between equity return dispersions and the market return, examining the presence of herding behaviour in US, Hong Kong, Japan, South Korea, and Taiwan stock investors and their tendency to exhibit herding behaviour. Thirdly, test the shift in herd behaviour in response to the reforms in Asian financial markets.

Then in 2004, Hwang and Salmon developed a new measure in their study of US and South Korean markets. The herding measure was based on the cross-sectional dispersion of the factor sensitivity of assets. They came out with the conclusion that when the investors follow behaviour, their perceptions of the risk-return relationship of assets might get distorted. If they heard towards market consensus, the individual asset return aligns in with the direction of market returns, deviates the CAPM-betas from their equilibrium values. The beta of the asset gets driven towards the market beta which is 1 and the cross sectional dispersion of the stocks would be expectedly smaller.

In 2007 Frey, Herbst and Walter made some corrections to the LSV model and made a stronger, more accurate and less statistically biased (FHW indicator) to calculate herding. FHW indicator is one of the most effective herding measures; it has been considered as the new standard empirical device for herding investigation in different contexts by various researches. The new empirical researches such as the one by M. El Hedi Arouri, R. Bellando, S. Ringued and A. Vaubourg (2010) state that FHW indicator is 2.5 times more accurate than the traditional LSV measure.

2.2. Research design

The Quantitative analysis of the study focuses on the difference between the variances (theoretical and empirical) under the assumption of zero herding. This approach is free from the unsound assumptions under Lakonishok et al., 1992 (LSV) measure which takes all the trades in the category of independent transactions even if they depend on some factor present in or outside the market. The LSV measure is based on the assumption that the buy/sell decision of a stock is randomly distributed in the absence of herding. Frey et al. (2007) squared the values in their formula (FHW) to compensate for the difference between dependent and independent herding. It also compensates for the lack of inter-temporal herding dimensions complementing the traditional LSV measure as it follows that under the hypothesis of zero herding the probability of buy corresponds to the overall buying probability for the whole period. FHW formula provides the consistent estimate by measuring the excess dispersion of stock trades (buy or sell). The mathematical expression given by Frey et al. (2007) is:

$$\big(FHW(i)\big)^2 = \frac{\left\{\left|\frac{B(i)}{B(i)+S(i)} - P(t)\right|^2 - Expected\ Value\left(\left|\frac{B(i)}{B(i)+S(i)} - P(t)\right|^2\right)\right\} I}{I-1}$$

Where *I* represent the number of active traders in quarter *t*. B(*i*) is the number of net buyers who increase their holdings of stock *i* in time *t*. S(*i*) is the number of money managers who are net sellers who decrease their holdings of stock *i* in time *t*. P(*t*) is the proportion of managers who increased their holdings in the quarter relative to the active managers in time *t*. The new model did not have the bias that was present in the old LSV herding measure. The study uses this new measure to find the herding measures of each respective groups. It does not consider the volume of trade but the buying and selling of stocks as the medium to know the extent of herd behaviour. The Monte Carlo simulations prove the better approach of Frey et al measure over LSV.

The study uses the FHW measure to estimate the extent of herding over each stock with several quarters of trading. To simplify the process, we assume the similar parameters for all the observations. The herding measure usually varies between 0.00(no herding) and

0.35(very strong herding). The observations per stock vary over large aggregation depending on the period of its listings in the Estonian stock market. The observations are also carried out on the market wide basis to know the degree of significance in the difference of herding measures and to know the impact of financial slowdown on the attitude of investors.

In this study the investor's data is divided among the following categories:

1. Gender
2. Age

Below 30 years	30 - 40 years	Above 40 years

3. Educational Qualifications

Level of degree	Mathematics score	Type of Degree	Language score
→Master	→Group1	→Real Science	→Group1
→Bachelor	→Group2	→Social Science	→Group2
→No Degree	→Group3	→Humanities	→Group3
	→Group4		→Group4

The mean herding measure for each stock over the period of 36 quarters is calculated for each group and compared. The results are then matched with the findings of previous empirical researches.

2.3. Data and Descriptive Statistics

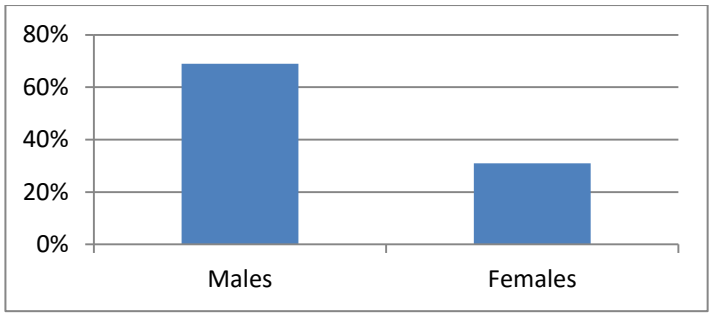
2.3.1. Data

The data incorporating investor's buy/sell/inactive preferences over each stock is retrieved from the Estonian central securities depository under the supervision of the authorised person (Prof. Tõnn Talpsepp). NASDAQ OMX Baltic maintains the records of

stock prices. The sample period is 2004-20012, divided into 36 quarters. The sample period is of interest as it comprises of the year 2008, the year of financial crisis.

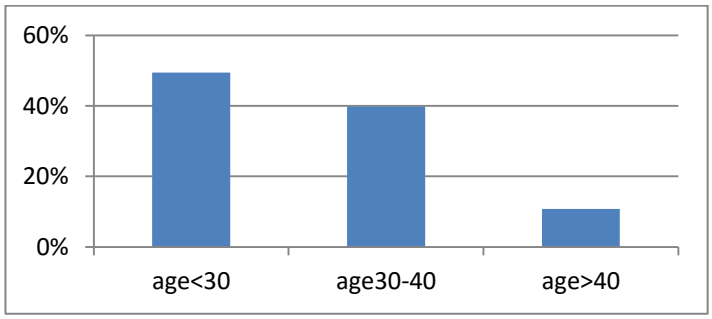
2.3.2. Descriptive Statistics

The dataset contains preferences of 28948 investors who have participated in buying or selling of any stock at some point from 2004 to 2012. Among the total investors 1139 investors did not disclose the information of their respective gender, besides there are 19186 males and 8623 females.



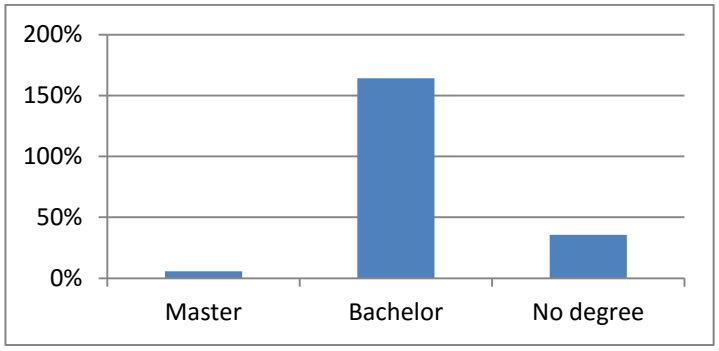
Percentage distribution (Gender).

10553 investors have their age group listed in the current data, out of which 5213 are of the age less than 30, 4200 investors have age in between 30 and 40 and above 40 years of age there are 1140 investors.



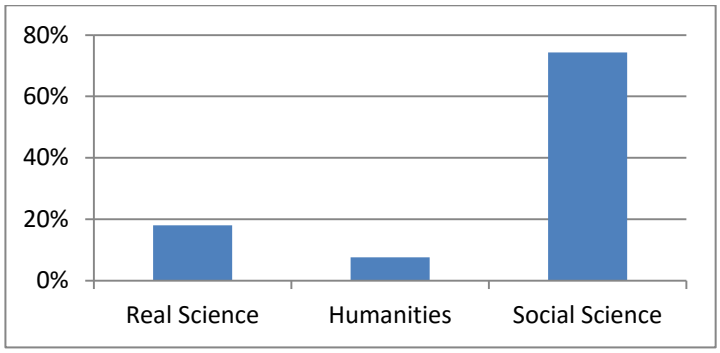
Percentage distribution (Age).

Other than that the educational information of 10553 investors is listed in the database at hand. 608 investors have master's degree, 6180 have bachelor degree and 3765 with no university degree.



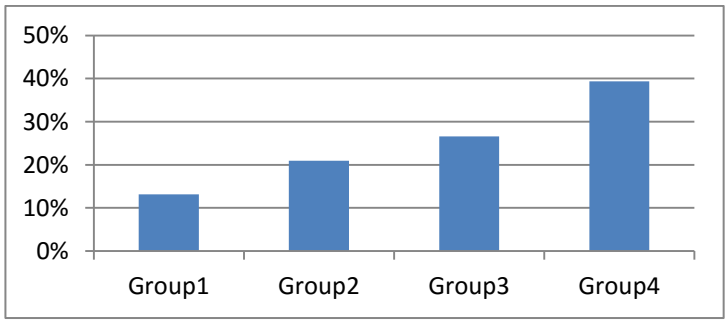
Percentage distribution (Level of Degree).

1243 investors are real science graduates, 528 humanities graduate and 5132 social science graduates.



Percentage distribution (Type of degree).

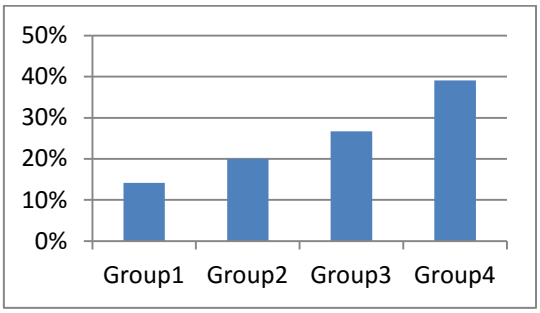
611 investors have weak score (Group1) in their mathematics exam at high school. 972 have below average score (Group2); 1237 have above average score (Group3) and 1827 have extremely good score (Group4).



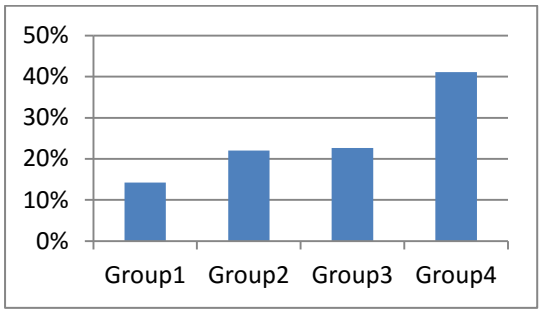
Percentage distribution (Grades in Mathematics).

Similarly, 773 have below weak average score in English test and 953 have weak score in native language test. The respective number of people scoring below average grades

in English and native language are 1090 and 1477. There are 1455 people with above average score in English test and 1519 people with above average score in native Language. Finally, people with extremely good scores in English and native Language are 2130 and 2757 respectively.



Percentage distribution (English Grades).



Percentage distribution (Native language Grades).

The 24 listed and delisted stocks in the Estonian market which are analysed are as follows:

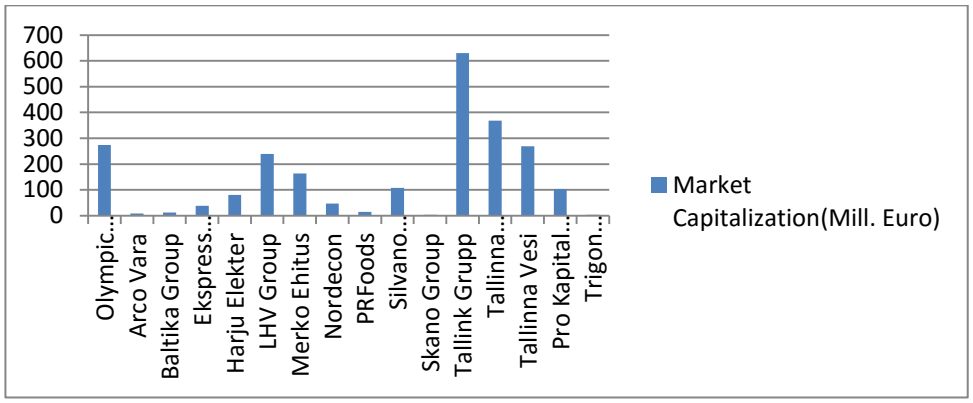
1) Hansabank: Hansabank group began in 1991 as a commercial bank in Tartu (a city in Estonia). Swedbank AS holds the 100% subsidiary of Hansabank since 2005.
2) Tallinn Kaubamaja: Tallinn Kaubamaja group started in 1960 works in retail and wholesale trade sector. It has been listed in the Estonian stock exchange main list since 1996.
3) Saku Õlletehas AS: The group is a beverage manufacturer founded in 1820. The company was listed in Tallinn Stock Exchange from January, 1998 to September, 2008.
4) AS Estiko: The Company is Estonia based found in 1918 under the name of Tartu comb which works in property development and packaging material production. AS-Estiko was registered as a public company in 1991.
5) Tallinn Pharmaceutical Plant: The oldest pharmaceutical plant made in 1913 in Estonia. The company got privatised in 1994 and listed in Tallinn Stock Exchange in 1996.
6) AS Silvano Fashion Group: The company was founded in 1944. The group is an international lingerie distributor that deals in manufacturing and selling of lingerie.

7) The company got listed in Estonian Stock exchange in 2007 under the name of PTA Grupp AS and is listed in the main list of Nasdaq Tallinn.
8) Norma AS: The Estonian company founded in 1891 that operates in manufacturing and selling of automobile systems and security equipments. The company got privatised in 1994 and entered Tallinn Stock Exchange in 1996.
9) Luterma AS: It was an Estonian company formerly known as AS Kalev which got delisted from the Tallinn Stock Exchange in 2009. The company sold its subsidiary Kalev Chocolate Factory AS in 2010 and was declared bankrupt in 2011.
10) Rakvere Lihakombinaat: Rakvere Lihakombinaat was established in 1944 as a meat processing plant. The company entered the Tallinn Stock Exchange in 1998 and exited in 2008. The company still hold a healthy share of the market close to 32%.
11) Trigon property development: The Estonian Real Estate Company was established in 1945. It registered itself in Tallinn Stock Exchange in 1997(main list). It operations are in Central and Eastern European countries.
12) Järvevana aktsia: AS Järvevana was established in 1990. The Estonian construction company was listed in the main list of Tallinn Stock Exchange in 1997 and in the secondary list since 2009.
13) Baltika: The clothing manufacturing and retail group was established in 1991. In 1997 it got listed (basic) in Tallinn Stock Exchange and in 2003 joined the main list. The group operates in Central and Eastern Europe.
14) Harju Elekter: AS Harju Electric operates in designing, manufacturing and selling of electrical and Telecommunication equipments. The company was established in 1993 and got listed in Tallinn Stock Exchange in 1997.
15) Tallink Grupp: Tallink is a sea shipping company that came into existence in 1994. It got listed in the Tallink Stock Exchange in 2005. Other than shipping the group also runs 4 hotels in Estonia and Latvia.
16) Eesti Telekom: It is the largest telecommunication group in the Baltic now called as Telia Eesti AS. The group was established in 1997 and got listed in Tallinn Stock Exchange in 1999. It got delisted in 2009.

17) Starman: It is the largest cable company in Baltic founded in 1992. The group got listed in Tallinn stock exchange in 2005 and got delisted in 2009. Half a million people are subscribed to the group's broadband and telecom services.
18) Ekspress Grupp: It is an international group of companies established in 1995 that works in media and publishing sector. The group got listed in Tallinn Stock Exchange in 2007. The group is the leading media company in the Baltic.
19) Tallinna Vesi: It is the largest water company in Tallinn established in 1967 that deals with water supply and sewerage management services. The company in 2005 got listed in Tallinn Stock Exchange basic list.
20) Arco Vara: The group established in 1994 operates in real estate development and servicing sector. The group has its operations in Eastern Europe and got listed in Tallinn Stock Exchange in 2007.
21) Nordecon Olympic Entertainment Group: It is Estonia's first legal international casino group established in 1993. It got listed in Tallinn Stock Exchange in 2006 and Warsaw Stock Exchange in 2007.
22) Skano Group: The group is Estonia's biggest wood processing company which manufactures and sells furniture. The group got established in 1945 and in 2007 got listed in Tallinn Stock Exchange.
23) AS Merko Ehitus: The group is the leading Estonian construction company established in 1990 that works in project management and contracting sector. The company is being listed in Tallinn Stock Exchange since 1997.
24) PR Foods: The Company operates in manufacturing, distribution and selling of food products. It was founded in 2008. In 2010, the group got listed in Tallinn Stock Exchange.

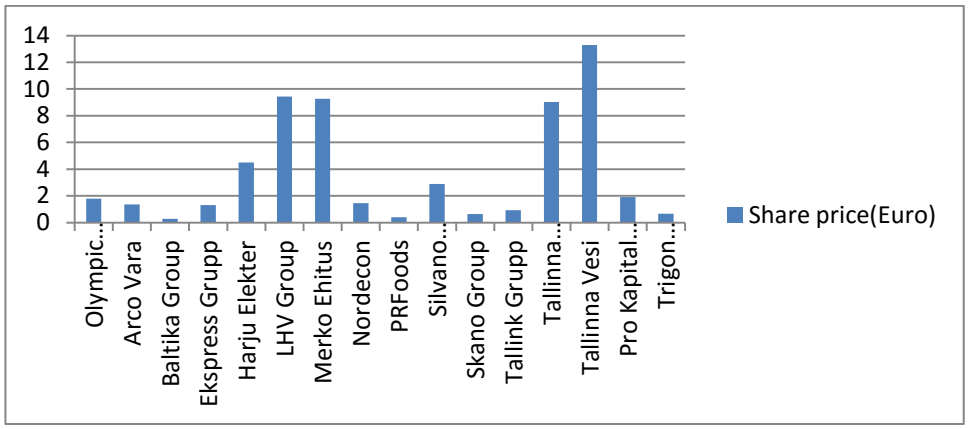
Currently there are 16 companies listed in Tallinn Stock Exchange. The most popular stock is the Tallink Grupp with 57% of the investors. The second most popular stock is Olympic entertainment Grupp with 38% of the investors followed by Tallinna Kaubamaja with 22% of the investors. Market capitalization wise, the biggest stocks are Tallink Grupp, Olympic entertainment Grupp, Tallinna Kaubamaja and Tallinna Vesi. Baltika is one of the most popular stocks but has a very small market capitalisation in comparison to other popular

stocks. Companies like Arco Vara, Express Grupp, Skano Grupp, PR Foods and Trigon Property Development have relative low market capitalization value.



Market Capitalization comparison.

This study does not talk about the stock volatility but previous empirical researches do state strong relation between the stock prices and the behavioural bias of investors (William et al, 2008). It is a matter of further study if the same relation exists in Estonian stock market. It is worth mentioning here that the companies with high stock prices include LHV group, Merko Ehitus, Tallinna Kaubamaja and Tallinna Vesi. The least priced stocks are Baltika Grupp, PR Foods, Skano Grupp and Trigon Property Development. There is often mispricing of the stocks that is a result of investor bias in the market.



Stock price comparison.

3. Empirical Results

3.1. Herding by Gender

Our stock based results (chart 1) find out vital differences between males and females herding measure. The findings are in complete agreement with the previous empirical researches that women tend to herd more than men. Out of the 24 stocks that we studied in Tallinn Stock Exchange, women are seen to have a higher herding measurement in 18 stocks. In rest of the stocks either the herding measures of both the genders are equal or vary with a very minute difference.

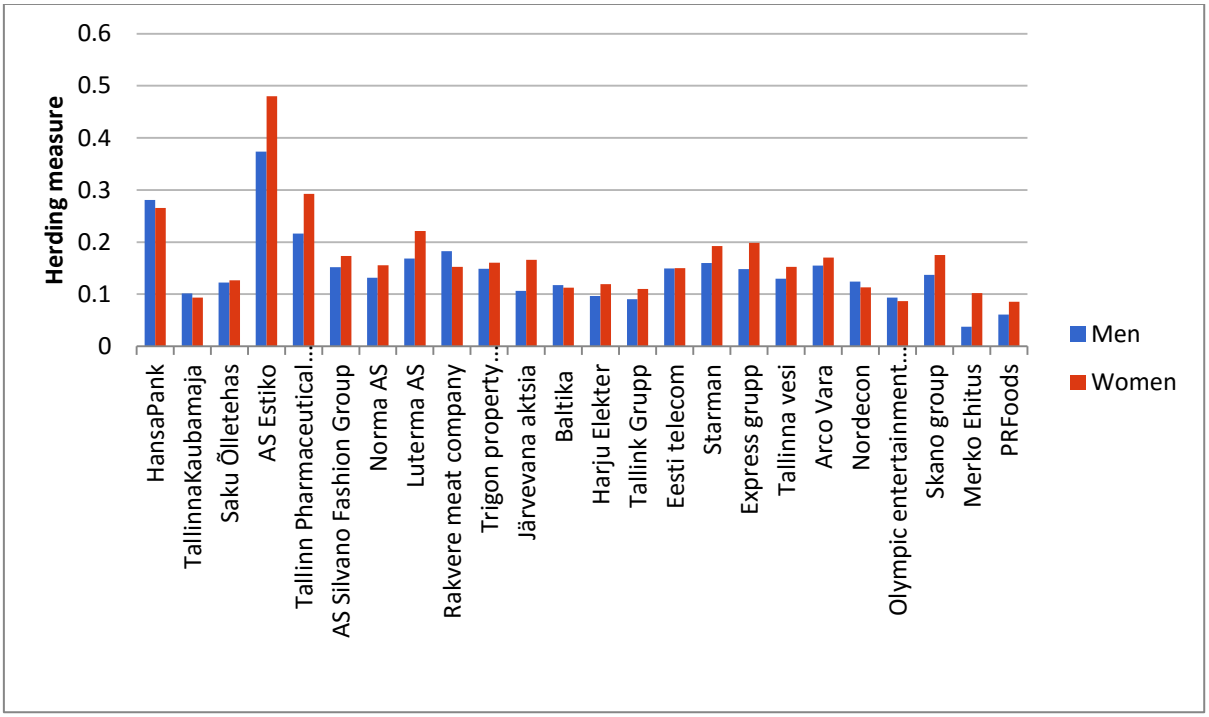


Chart 1: Stock wise comparison of herding measures for the gender groups.

The higher herding measure among women is seen as an effect of personality characteristic differences between Estonian men and women. Previous empirical studies (Jianakoplos and Bernasek (1998), Bajtelsmit et al. (1999)) state that women have higher risk aversion and herding intent and it shows in the Estonian population as well. The Estonian female investors demonstrate higher herding levels. The female gender group follows either their predecessors or look out for opinions of other market participants. We observe bigger gender gap in terms of independent approach towards investments.

The study also finds out the market wide herding measures for all the 36 quarters from 2004-2012 (chart 2). For most of quarters women are seen to herd more than men. Other than that even though the market wide herding measure is at lower end of the spectrum for most of the quarters our results say that there is a considerable increase in the herding measures of women at the time of financial crisis such as the one in 2007-2008. The herding intensity for men also change but the rise is very small as compared to women. This states that the investment approach of male investors stays unaffected by the economic instabilities in the financial market unlike female investors in Estonia.

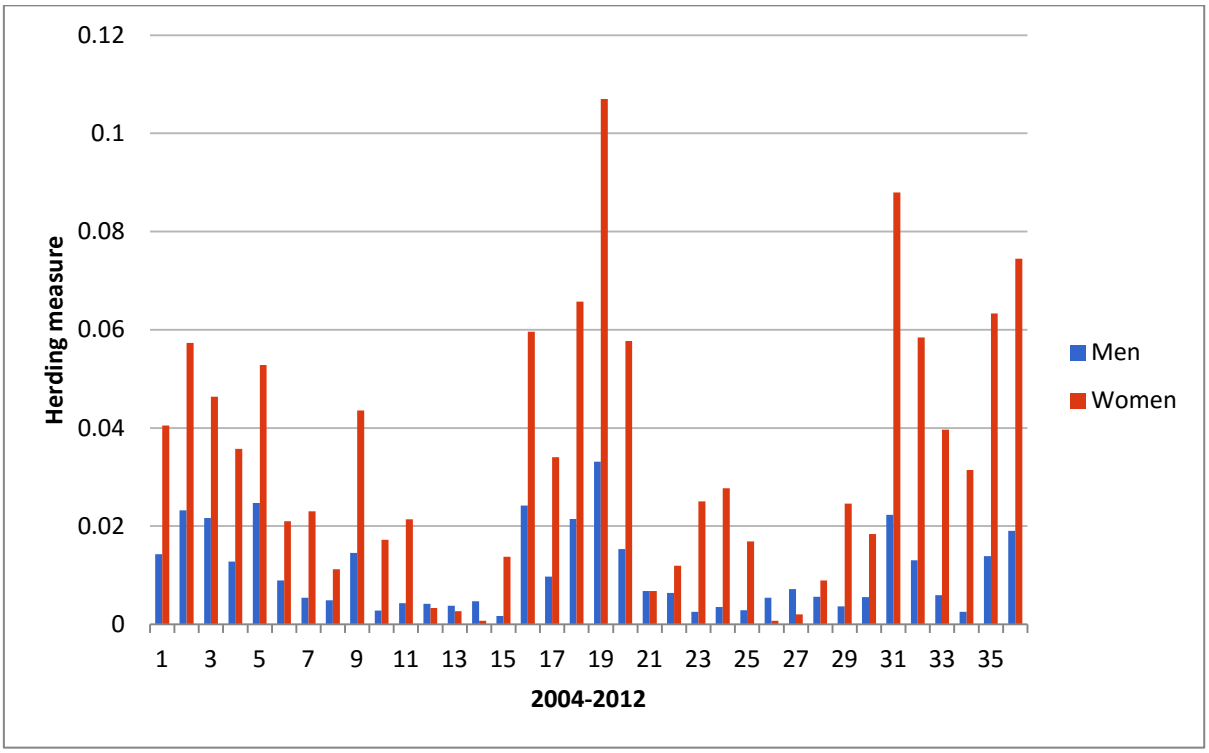


Chart 2: Market wide comparison of herding measures for the gender groups.

The statistical t test analysis (Appendix A, table 1) of the herding measures considering independent data values each quarter gives ample of evidence that there exists significant difference between the herding measures of the gender groups across all the 36 quarters. The test is done at a confidence level of 95% and the value of p is much less than 0.05 indicating significant difference between the herding measures of the two gender groups. The descriptive statistical values of the stock and market based resultant data can be seen in Appendix A, table 8 and table 9 respectively.

The herding measure differences are also attributed to the industry preferences while investing among both the genders. Barber and Odean (2001) indicate that women get more attracted towards the less risky portfolios and demonstrate higher level of confidence in making investment decisions for such portfolios. From our findings it can be seen from the herding numbers that women in Estonia take their own decisions more often in some specific stocks. Both the genders exhibit differences in their perception to evaluate information and follow themselves in specific industry types. This kind of bias is seen among Estonian female investors where they take more independent decisions as compared to men in the stocks such as Hansa Bank, Tallinna Kaubamaja, Baltika and Olympic Entertainment Group. Women feel comfortable enough to take the decisions independent of any influence in these specific stocks.

Male Estonian investors on the other hand feel confident enough while investing in the stocks of Tallinn pharmaceutical plant, Norma AS, Trigon, Luterma, Jarvevana, Merko Ehitus, Arco Vara, Eesti Telekom, Starman and Tallink Group. For all the mentioned stocks, the male Estonian investor trusts his information enough to take investment decisions which are not influenced by any external factor.

The reason that leads to such difference is a topic of further research but the statistical data of Estonian population answers to the cause to some extent. The very first reason that can be seen as the factor behind such behaviour is the division of labour market industry-wise. The labour market in industries such as banks, retail and fashion constitute very high percentage of women workers. Dorota Skala in 2008 came out with the study that relates positive illusion with the overconfidence (anti herd bias) of investors that leads to confirmation and optimism bias. The positive illusion can arise out of any unseen psychological behaviour of an individual. One of such positive illusions common in our case can be: Hansa bank, now Swedbank in Estonia has nearly 80% employees as women. Other

than that the biggest fashion and retail chain in Estonia, Tallinna Kaubamaja has more than 69% female employees. This can lead to confirmation and optimism bias among women across Estonia; woman easily relate to a sector as majority of the workforce is occupied by the same gender group. The same reason can characterize the herding behaviour of men in sectors such as automobile, telecommunication and real estate sector. Men under the effect of similar bias can easily relate to the fields which have high percentage of people from their own gender group.

The second reason that contributes to this gap might be related to very high degree of Gender pay gap. Estonia has highest gender pay gap in the whole of Europe which attributes to the difference in the approach of female investors to male investors. Donker et al. (2001) and Baddeley et al. (2010) suggest that lower wages leads to higher risk averse behaviour among the population. The study also says that low wages make people make people feel under confident and they start to look out for advice of others. Contrary to this, people with considerable good income level more often than not, don't have financial constraints and look to trust their own information instead of anyone else.

The third reason that looks close enough to validate the reason behind the difference is a very high percentage of families with children in Estonia run by women alone. According to the report in 2015 given by Eurostat (European commission), Estonia has the second highest percentage (22%) of single mothers when compared with other European countries. The previous studies (Jianakoplos and Bernasek, 1998) suggest that people with families get reluctant to take decisions independently because of the additional responsibility. People start to show higher risk aversion levels once they get married. More members in the family leads to hesitancy in the decisions involving finances and this further compels the investor to look out for investment pattern followed by other investors.

The study also points out high herding measures for most of the stocks for both the gender groups. This is in agreement with the Lakonishok, Shleifer and Vishny (1992) which says that smaller stock market often leads to high herding measures as there are very less sources of information available to the market participants and each investor has pretty much similar information to a good extent.

3.2. Herding by Age

Our stock-wise results (chart 3) show that Estonian investors with age less than 30 have very high herding measure in almost all the stocks in the study; this implies that they are less self-reliant of taking decisions independently. But the investors between the age group of 30 to 40 years have considerably low herding measure which indicates that with age market participants start to feel confident enough to keep them away from being part of a herd. As we move on to the investors above the age of 40 years, we find that the herding measure is on a higher side of the spectrum. Among all the three groups, investors with age more than 40 years herd the most.

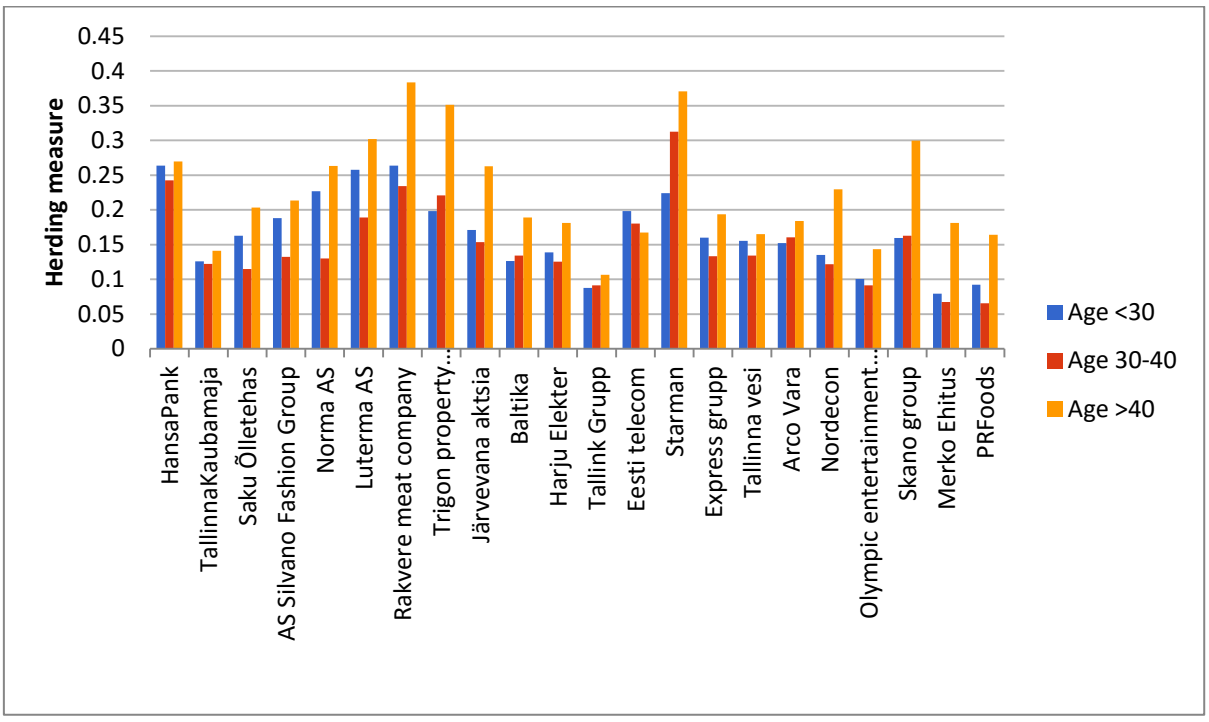


Chart 3: Stock wise comparison of herding measures for the age groups.

Our part results are in agreement with the previous empirical studies (Dohmen et al., 2011) which state that the tendency to herd among individuals tend to increase as the participants cross a certain maturity age level, they start to behave over cautiously and the risk aversion behaviour among the investors increase. As one gets older the thought process and the approach towards decisions start to change. Each age group has variations in risk preference which leads to differences in the way they behave. Similar results are seen in the

investment sector of Tallinn Stock Exchange. The small sample of data that we have for people above the age of 40, the high herding measure is also a result of much older investors in the sample. Among all the stock wise herding measures we get, majority of them (18 out of 22) showcase that the least herding measure of the three age groups is among the people with age more than 30 and less than 40.

The market-wide herding results (chart 4) do not reveal any changes in the pattern around the year of global economic crisis 2007-2008. The financial crisis had no effect on the herding measures of the three groups in the study. The market wide study also gives out similar patterns of least mean herding among the individuals of the age group 30 to 40 years for most quarters. Also, for most of the quarters the herding measure stays below 0.05 which is considered low.

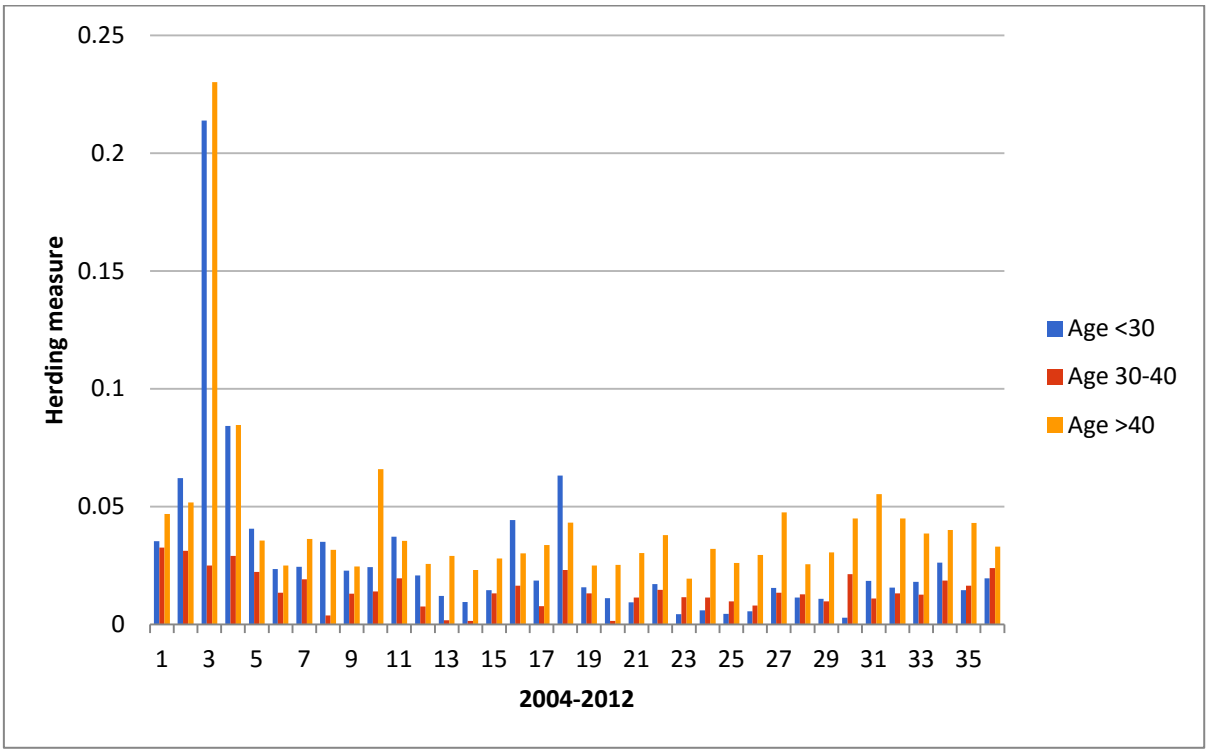


Chart 4: Market wide comparison of herding measures for the age groups.

The extent of differences in the herding measures of the three groups across the 36 quarters study can be seen from ANOVAs: single factor results (Appendix A, table 2). The test is done at a confidence level of 95% and the value of p is 0.0007 which is a clear indicative of the highly significant differences between the group's herding measures. The

stock and market based descriptive statistics can be referred to in Appendix A, table 10 and table 11 respectively.

3.3. Herding by Education

The findings of this study indicate that educational background of the investors does make an impact on the decisions they make in the Stock market. Our study stands in agreement with most of the previous empirical findings. Estesa and Hosseinib (1988) and Harrison et al. (2001) suggests that educational background happens to be one of the characteristics of an individual that affects his/her risk perception, overconfidence and thus the intent to be part of a herd. Herding measures calculated for each of the groups is indicated as follows.

3.3.1. Herding by level of degree

The stock wise herding results (chart 5) reveal that the market participants with higher degree of education (Master) herd more than the investors with a Bachelor degree. Our findings are in agreement with the previous empirical research done by Harrison et al. (2001) which says that as the degree of education rise, market participants start to evaluate the stocks with a higher degree of risk aversion behaviour.

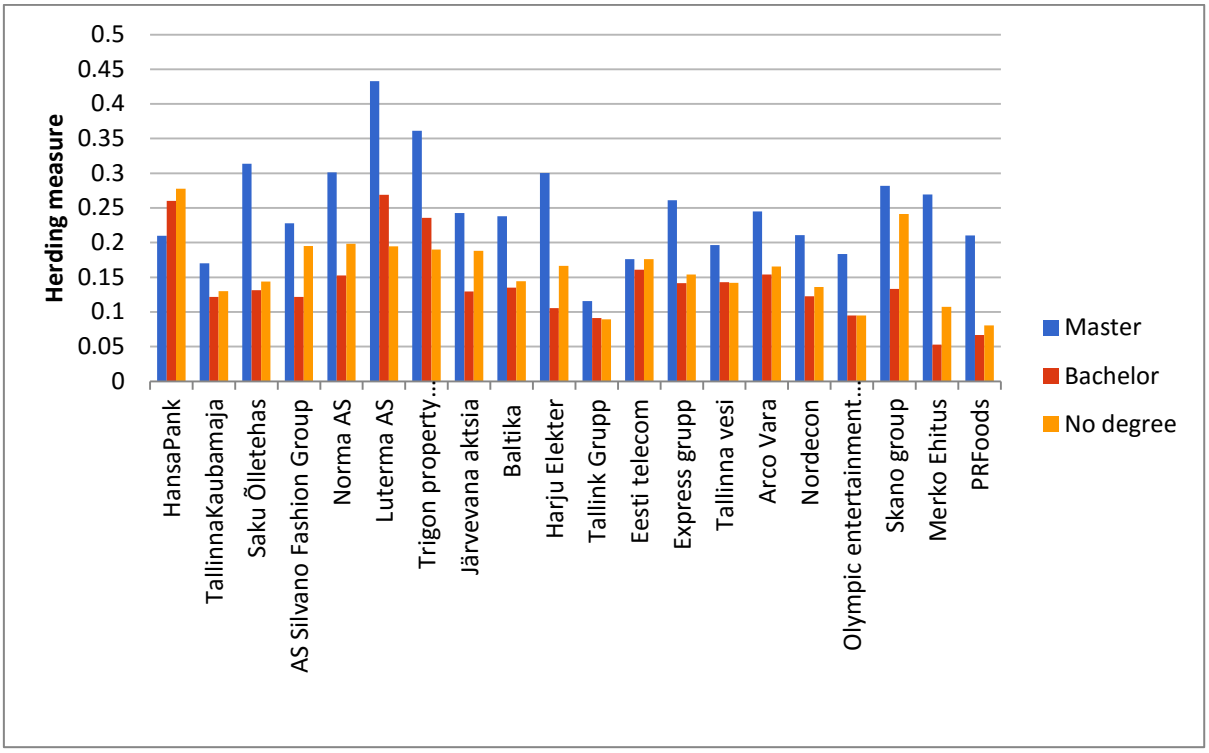


Chart 5: Stock wise comparison of herding measures for the groups by degree level.

The herding intensity is the least among the investors with only the bachelor degree, followed by the investors with no degree and then the investors with master degree herd the most. This implies that the first level graduate degree does lead to investors evaluating their own private information instead of following others and thus reduced herding levels. At times this leads to higher trade frequency which hurts back (Barber and Odean, 2000). As investors move towards much higher education such as a master's degree it changes the level of financial literacy along with new beliefs and attitude and the investor gets more cautious towards the investment decisions.

There is a positive correlation between the level of degree and the herding measure in 20 stocks which implies that when the level of degree rises, it leads to higher herding measure among the individuals. The herding measure gets very high among the investors in the stocks related to real estate sector. For rest of the stocks the extent of herding is more or less the same.

The market wide herding measure for all the quarters (chart 6) affirmatively suggests the same herding pattern with individual investors with master degree herding the most. There is a very clear fluctuation of the herding intensity over the 2007-2008 periods where the herding measures of all the three groups shoot up very vigorously. In the second quarter of

2008, the herding measure for the groups increases by more than 50%. This implies that the education degree of the individuals does not help the Estonian investors in staying firm at the time of economic instability conditions. The financial crisis of 2007-2008 created the environment of ambiguity among the investors and instead of trusting their own information, preferred to follow their predecessors or take advice from the people around them more often than when the market is behaving in a stable fashion.

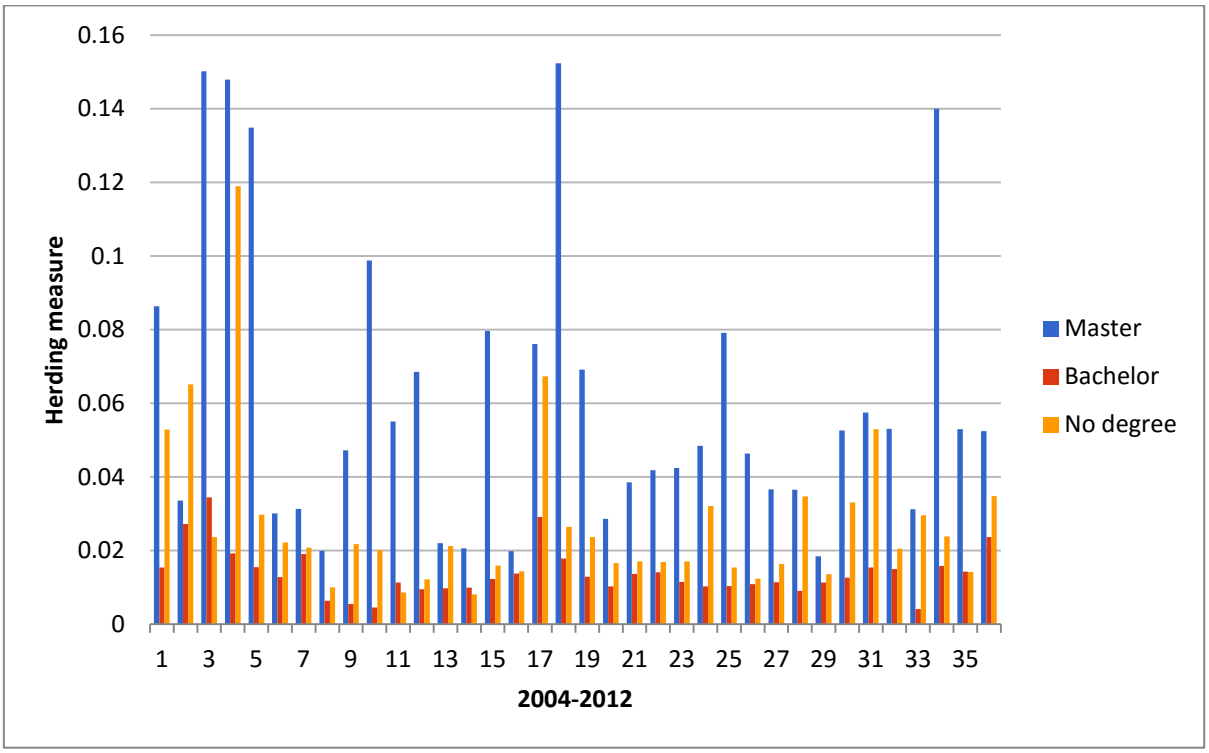


Chart 6: Market wide comparison of herding measures for the groups by degree level.

The pattern also suggests that people without a degree lack financial literacy or exposure to make decisions by themselves. Investors without a college degree thus herd more than the ones with the Bachelor degree. The statistical analysis across the 36 quarters by ANOVAs: Single factor test (Appendix A, table 3) at a confidence level of 95% gives negligible p value indicating significant differences between the herding levels of the groups. Appendix A, tables 12 and table 13 gives the stock and market based descriptive statistics respectively.

3.3.2. Herding by type of degree

There are not many studies on the differences in the investment attitudes of people in regards to the field of degree they possess. This study looks into the relationship between the investment approach of market participants and the kind of degree they own, that is real science, humanities and social science. Our stock wise results (chart 7) conclude that among all the analysed stocks (21); in 19 of them the herding measure of the market participants with a degree in social science is least. There is not much significant difference in the herding measures among participants with real science degree or humanities degree. Understandably, investors with a social science degree are more equipped with the information in regards to global economics, businesses, information technology which leads to the differences in the approach towards investments. This study proves that these investors use this knowledge to great effects and so doesn't herd as much as others. The results clearly suggest that social science degree people rely on their own personal assessment while making investment decisions than the ones with real science or humanities degree.

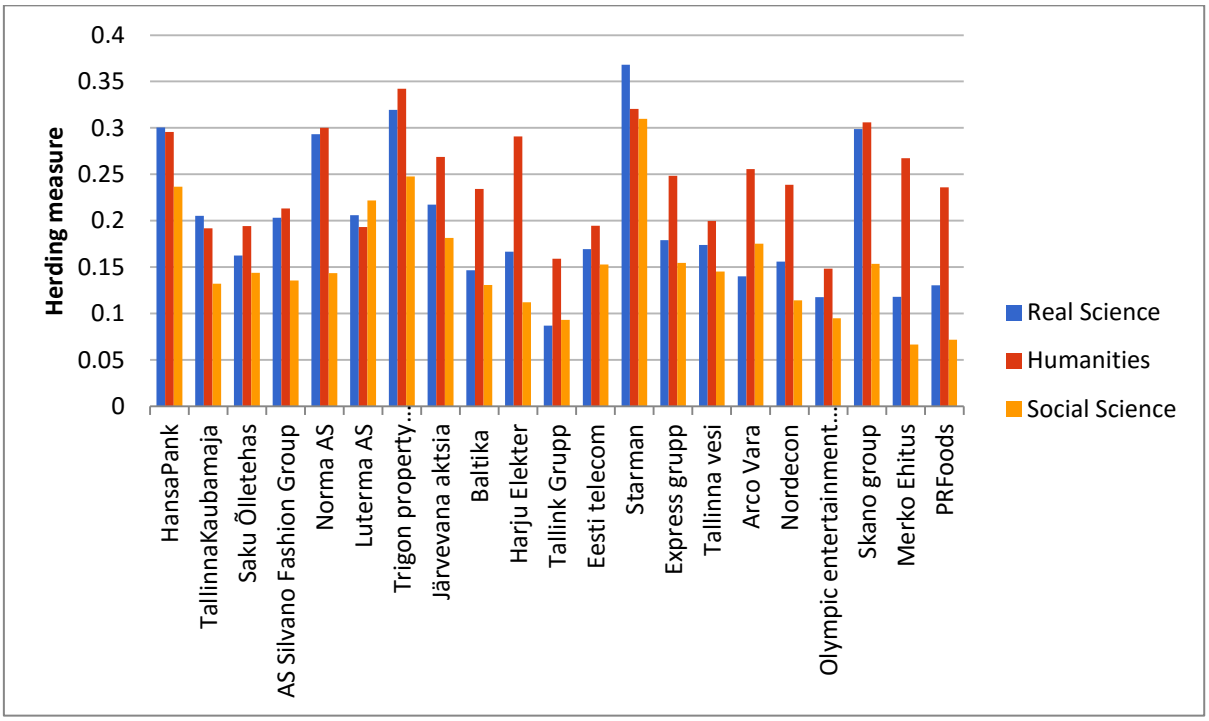


Chart 7: Stock wise comparison of herding measures for the groups by degree type.

The market wide herding results (chart 8) understandably shells out the similar patterns of least herding measure among the market participants with a degree in social sciences. The intensity of herding among market participants with humanities or real science degree is more than double of the herding measures of investors with a science degree. Other than that the intensity of herding doesn't change much during the period of financial crisis. This refers to the conclusion that there is no conformity over the relationship between the shift in the herding attitude of an investor at the time of financial instability in the Estonian stock market and the kind of educational degree he/she possess.

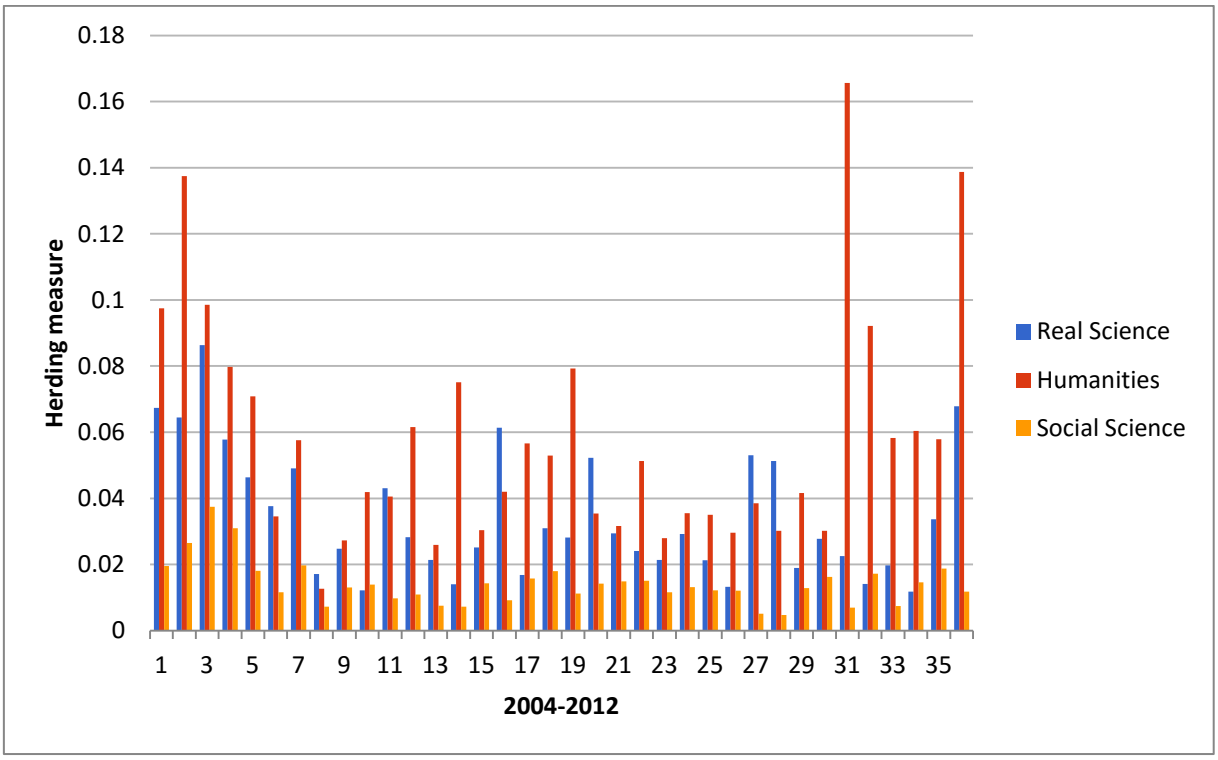


Chart 8: Market wise comparison of herding measures for the groups by degree type.

The degree of difference between the group's herding measures can be seen from the statistical analysis of herding data across the 36 quarters. ANOVAs: single factor test (Appendix A, table 4) at a confidence level of 95% has negligible p value. This reveals the contrast in the approach of individuals from the three groups. For the descriptive statistics for both the stock and market based analysis we can refer to Appendix A, table 14 and table 15 respectively.

3.3.3. Herding by grades in mathematics

The study of Mathematics self-efficacy by Gail and Nancy (1989) state that the people who score exceptionally well in the subjects that involves numbers and quantitative techniques are deemed to be have higher self-esteem. The study marks out the differences between the high scorers in their subjects involving numbers and those who couldn't do well in the numerical aptitude tests. The computational skills/aptitude have a relation with an individual's acceptance towards anything that involves numbers (National council of supervisors of mathematics, 1977). Our stock wise results (chart 9) show Estonian investors with high grades in Mathematics herd less than the ones with lower grade. The results give out a negative correlation between the grades of the investors and their herding measures in all the stocks in the study. The herding measures for real estate companies are the highest among all the studied stocks. In majority of the stocks investors who scored either above average or extremely good in the mathematics paper are the ones with least herding measure. People in these groups have considerably lower herding measures than the one with weak or below average grades.

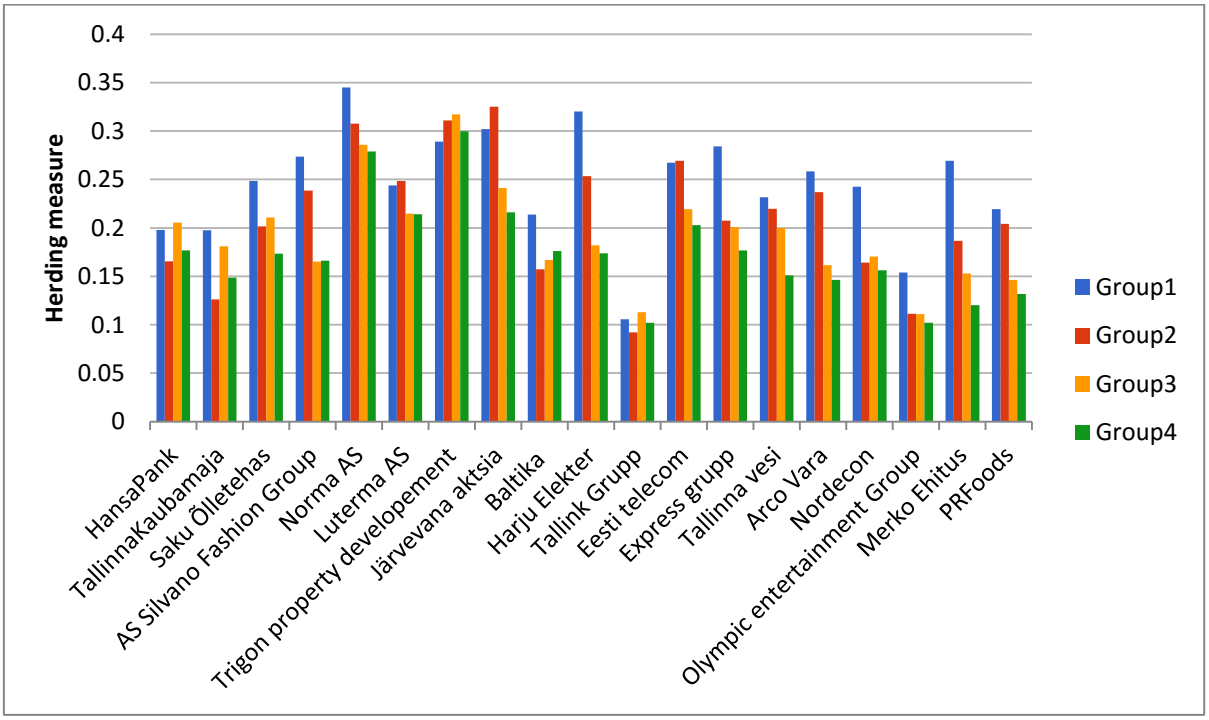


Chart 9: Stock wise comparison of herding measures for the groups by Mathematics grade.

The market wide herding results (chart 10) suggest that for all the quarters the investors with higher grades in Mathematics are found to be more confident in assessing their own private information and exhibiting lesser herding behaviour. The herding measure in the second quarter of 2008 shows a comparatively higher value than other quarters which might be a because of economic crisis. All the 4 groups have a higher herding measure in this period which tells us that even the investors with extremely good score in Mathematics came under the influence of global market upset.

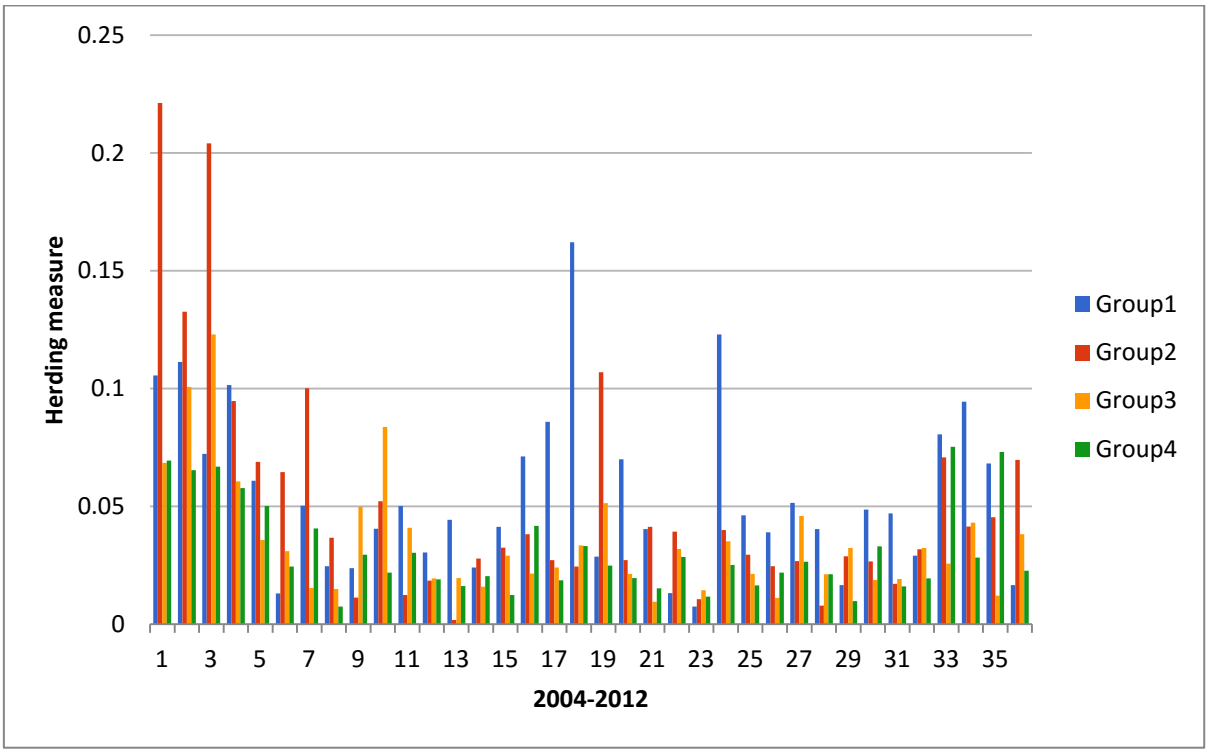


Chart 10: Market wise comparison of herding measures for the groups by Mathematics score.

In addition to that, ANOVAs: Single factor statistical analysis (Appendix A, table 5) of the data across the 36 quarters shows that there is a significant difference in the levels of herding measures across the 4 groups. The value of p is much less than 0.05(the significant factor with confidence level 95%) that confirms the pattern. The descriptive statistics for both the stock and market based analysis can be seen in Appendix A, table 16 and table 17 respectively.

3.3.4. Herding by grades in English Language

Our stock based results (chart 11) indicate that the people who did extremely well in the native language exam herd the least among the four groups. Among the analysed stocks there are 17 stocks where people with very good grade or above average grade got the least measure. For the people who are weak or below average, the herding measure is very high in almost all the stocks. The pattern we have received is not a linear relation but there is a strong negative correlation between the grades of participants in English (Foreign) Language and their herding behaviour. Among the industries in the study there is no notable difference in the herding measures which implies that there are no special preferences among the groups.

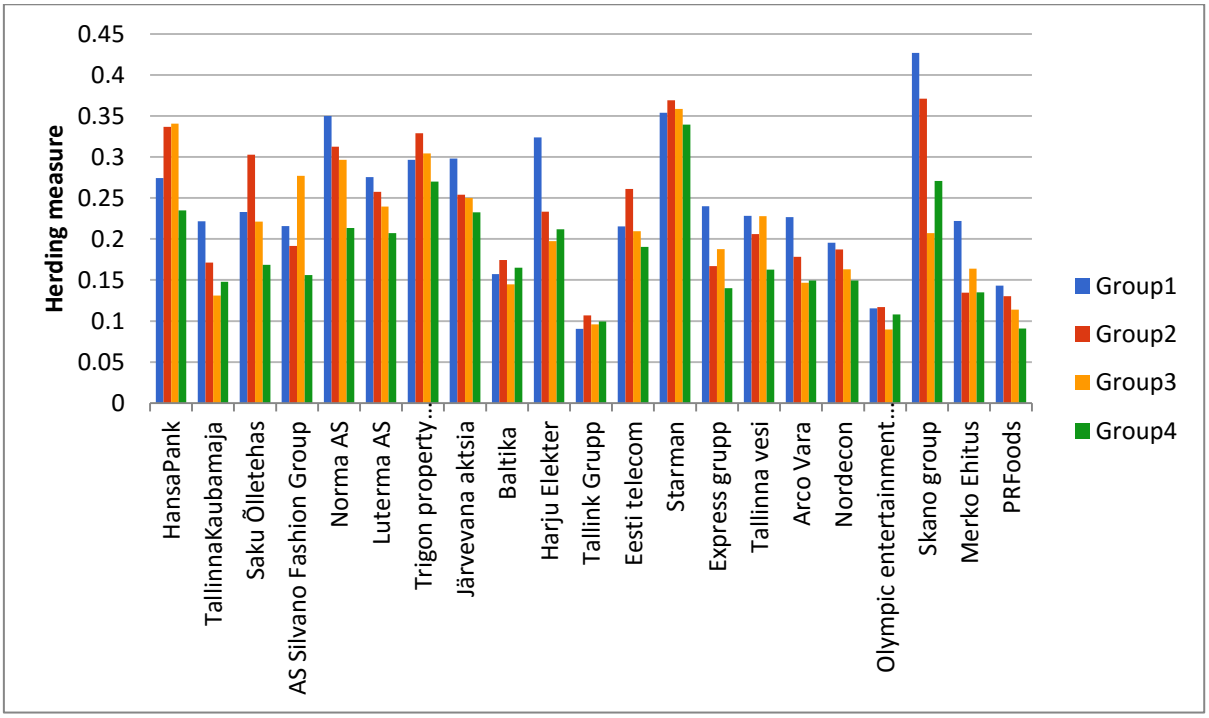


Chart 11: Stock wise comparison of herding measures for the groups by grades in English.

The market based analysis (chart 12) for all the 36 quarters tells us that herding measure of investors with better grades stayed lower for all the periods of study. There is a considerable difference between the herding measures of the groups which suggest that the individual academic performances be it in English language which is foreign to Estonian investors does have an impact on the way they react in financial markets. The comparison

also tells us that there is no effect of the financial slowdown in the market over the groups. The herding measure doesn't change much during the time 2007-2008.

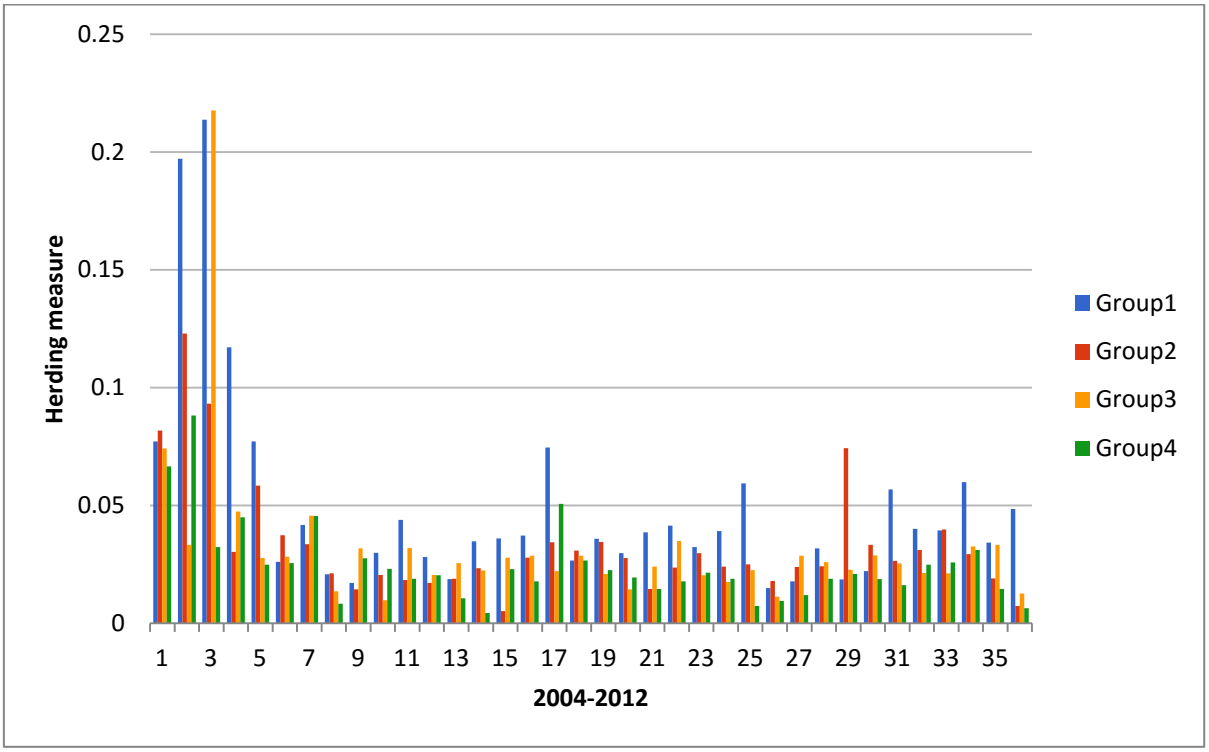


Chart 12: Market wise comparison of herding measures for the groups by grades in English.

The statistical analysis in ANOVAs: single factor test (Appendix A, table 6) over the herding measures across 36 quarters with confidence level of 95% has a low p value of 0.008 which suggest significant differences in the herding measures of the groups. The descriptive statistics for both the stock and market based analysis can be seen in Appendix A, table 18 and table 19 respectively.

3.3.5. Herding by grades in Native Language

The population sample was also divided on the basis on their grades in their native language examination. There are not many empirical studies that depict the relationship between native language aptitude and the confidence of an individual.

The stock based analysis (chart 13) reveals that in quite many of the stocks, the group with the highest grade has the least herding measure. The pattern is followed in 15 of the 22 stocks we study. The herding numbers do not form a consistent relation with the grades but

there is a considerable difference between the herding measures of participants with weak score and the ones with extremely good score.

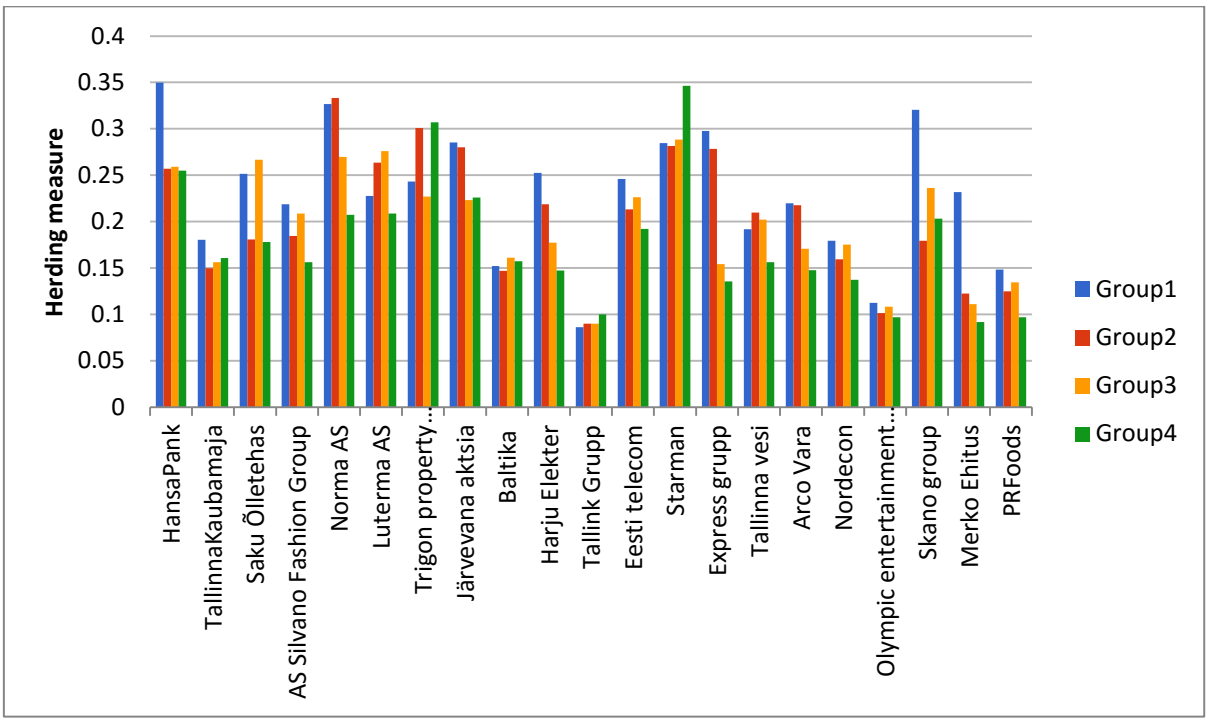


Chart 13: Stock wise comparison of herding measures for the groups by grades in Native language.

The market wide analysis (chart 14) suggest that there is positive difference in most of the quarters between the investors with weak scores in the subject and investors with extremely good scores indicating lower levels of herding in the attitude of the investors who score extremely well in their native language examination. It also tells us that there is no significant fluctuation in the period 2007-2008 which tells us that the attitude of all the 4 groups doesn't change much with any instability in the financial market.

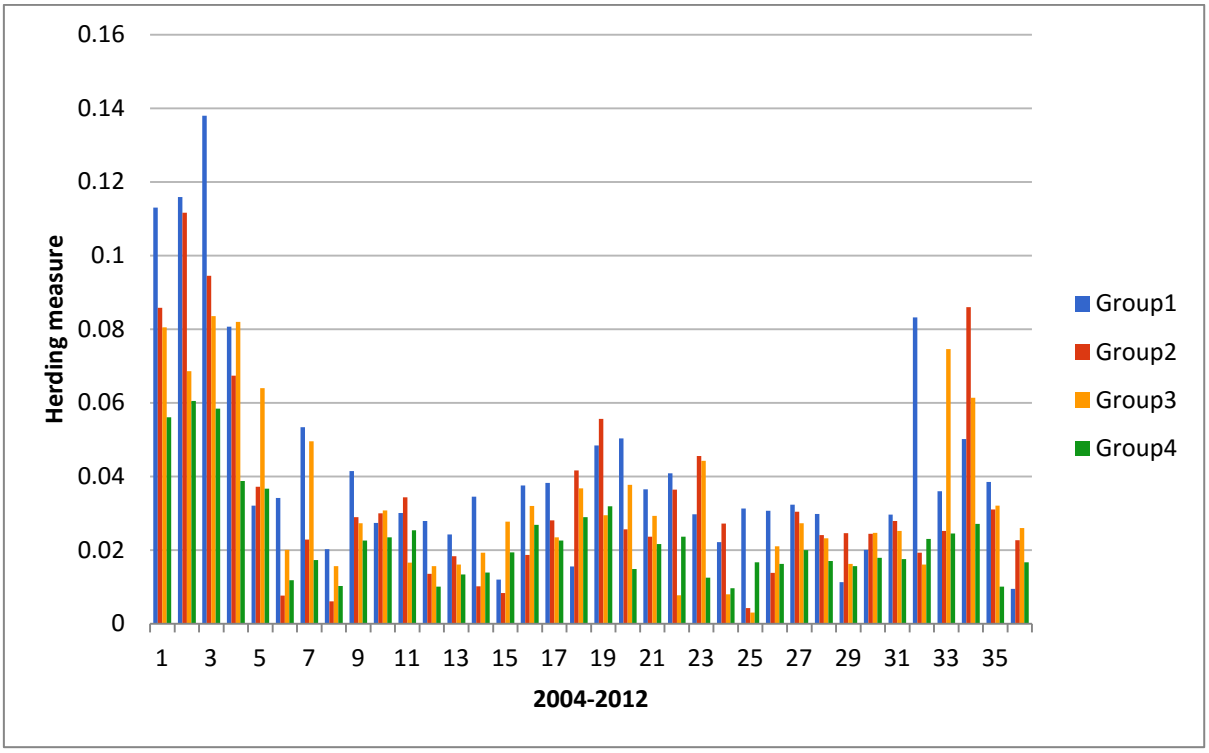


Chart 14: Market wise comparison of herding measures for the groups by grades in Native language.

The ANOVAs: single factor analysis (Appendix A, table 7) across the 36 quarters for a confidence level of 95% has p value of 0.01 which is less than the significant level that proves the high degree of differences between the groups involved in the study. The descriptive statistics for both the stock and market based analysis can be seen in Appendix A, table 20 and table 21 respectively.

3.4. Discussion

This part of the thesis concentrates on the comparison and discussion of combined results and reasons of occurrence of stock wise and market wide herding bias. Since existence of herding formed the basis of this research; the study showed the existence of herding as was expected. The evaluation of results reflects the findings available in literature that discusses the relation between herding, risk perception, industry preferences and demographic, socioeconomic factors. As presented in the literature, investor's willingness to take decisions

based on the gathered information of their own may change depending on the social, economic and demographic elements associated with the investor. Age, gender, education are one of the characteristics that form behavioural patterns which keeps changing in every phase of life that in turn influence their point of views.

The complete answer to why herding bias exist hasn't been completely identified. It can be argued how much the effect of psychological bias, beliefs and preferences is over herding. One of the measures of investor's intelligence, education as well as other factors is expected to monitor the direction of his/her decision making. Therefore, this part of the study tries to find out how these factors relate to the herding bias.

The very first factors analysed were the gender and age of the investor. They are one of those indicators that cannot be influenced by the investors themselves but there should be decent awareness about its effects. Accordingly, it is being expressed that financial herding intent and risk perception is higher in women than males (Schaefer et al., 2004; Jianakoplos et al., 1998) which confirms our findings than women intentionally or unintentionally herd more than men.

Other than that Bashir et al. in 2013 argued that as the age increases the risk perception and the herding bias increase too. They said that investors with age get more risk averse and look out for more advice around them which makes them part of herd. Our study on the other hand gives a better and detailed insight that Estonian investors older than 40 or younger than 30 are more prone towards herding bias and the ones between 30 and 40 are mostly self-reliant and have a smaller herding effect.

The difference with Bashir et al. Study can be because of the difference in the demographics regions of their study and ours. Bashir et al. Study is based on Pakistan stock exchange. The difference between the studies can be contributed to the Estonian history. Investors below the age of 30 have been part of the republic of Estonia for most part of their life in comparison to older investors who had their education under Soviet's rule. The difference may be attributed to the difference in the education from the older investors and experiencing a different economic setup while growing up.

While testing the influence of educational background on the herding effect it was expected from the previous study (Suleyman et al., 2013) that as the educational degree goes higher, the herding intent also increases. Our study says that investors with Master degree herd more than the ones with a lesser degree (Bachelor or no degree) but the investors with

Bachelor degree herd less than the ones with no university degree. It is difficult to point out the exact reasons for the difference in the studies but it can be attributed to the fact that a very high number of investors with no university degree are much older than the ones with a bachelor degree. The high end age of investors with no university degree results in higher herding numbers for the group.

The herding effect of graduating in real science, humanities and social science is tested. Social science graduates are found to herd less than the humanities or real science graduates. It was expected as finance specialisation includes a lot of data on stock exchanges and how to make right decisions using various accepted techniques. It seems that the investors with a social science degree use their knowledge gained from the graduation study when it comes to herding effect in Tallinn stock exchange.

High school grades in various subjects (Mathematics, English, Native language in our study) should reveal different sections of investor intelligence. But better results must be indicative of more intelligent investors is a hard statement. So it was hard to predict the analysis. The results though showed that the investors with better grades herd less than the ones with lower grades. Even though some models as described by National council of supervisors of mathematics (1977) state that there is an influence of high school grades in mathematics over the decisions individual make in different aspects of life. We cannot be sure of whether this theory applies in the field of investments, so it is hard to predict one definite conclusion over our high school grade herding results.

To sum up the results based on the sample set in the study, a male investor who is between 30 and 40 years of age with a bachelor degree in social science is expected to follows his own private information more often while making investment decisions in Tallinn stock exchange and is less prone to herding effect.

CONCLUSION

In this paper, we study the influence of socioeconomic and demographic characteristics on the herding behaviour of investors in Estonian stock exchange. The study's contribution to the existing literature is that it gives insight to financial advisers, financial planners, analysts and individual investors about the herding bias in Estonian stock market, its extent and socio-demographic-economic factors related to it. Individual investors can associate themselves to the herding bias they might follow based on their age, gender or educational background that plays a critical role in making financial decisions. Appropriate steps can be taken by the actual market participants (analysers, planners, individual investors) to avoid or minimize the effect of the bias. The analysis is done on the thorough scanning of actual transactions of securities and not any survey which gives a pragmatic perspective to the study.

The study finds out vital information about the market wide as well as stock specific herding intensity over the span of 9 years. The approach of Frey, Herbst and Walter (2007) is used to detect the herding measures across all the groups. The stock transactions (buying/selling) with higher dispersion from the market proportion of buying or selling of stocks are indicative to higher intent of herding. Our results state a significant relationship between age, gender and the educational background of the Estonian investor with his/her tendency to herd in the stock exchange.

The results show the female investors in Estonia herd much more than the other gender group. The statistical tests prove a significant degree of difference between the herding attitudes of the gender groups. The results show that men and women have different industry preferences while choosing to herd or not to herd. Just as in our study, for listed stocks from real estate, automobile and the telecommunication sector, men are found to herd less than females. On the other hand, women investors rely on their own assessment of stocks and herd less in making investment decisions for the companies in banking and retail sector listed in

Tallinn stock exchange. The market wide herding measures based on the gender effect also reveal that under the state of financial instability or market stress, women investors in Tallinn stock exchange get more reluctant to make decisions on their own. This comes from the results where women investors have a very high herding measure during the period of global financial crisis 2007-2008. Men on the other hand do not exhibit any such change in their behaviour. They seem to be more firm in their attitude towards investment decisions.

Among the three age groups we have, people within age group 30-40 years rely more on their own assessment of information and doesn't follow their predecessors as much as the other age groups do. The investors with age more than 40 herd the most and those less than 30 years of age come second in the list. The difference in the herding measures can be attributed to the changing economic regime in Estonia from Soviet Union times to being a European state at present which has led to difference in the education and experiences among different age groups. The market wide analysis doesn't give any noticeable change in the herding measures of the groups around the period of financial crises (2007-2008). Also there aren't any noticeable industry preferences among the groups that might influence their decision to herd.

The third parameter on our list Educational background too has a strong relationship with the herding behaviour of investors. The study states that the investors with higher level of university degree such as a university masters have higher herding intent than the ones with a bachelor degree or the ones with no degree at all. Among the three groups, investors with a bachelor degree herd the least, followed by the investors with no degree and then the ones with a master degree. The herding numbers of investors with no university degree get influenced by the older investors in the group. The statistical tests show significant degree of difference in the mean herding measures of the groups. The herding numbers also indicate that the herding intensity of the three groups increased at the time of financial crises.

The study also reveals a significant difference in the approach of investors with a real science degree, social science degree and humanities degree. The investors with a social science degree herd the least among the three groups. This is indicative of the use of knowledge imparted by the social science degree among the graduate investors that leads to higher level of self-reliance among the financial investors. There isn't any significant change in the herding attitude of the groups during the financial crises.

Other than that the study finds investors with higher grades in Mathematics with less herding measure than the ones with lower grades. There is a significant difference between the mean herding measures of the investors with higher grades and the ones with lower grades in mathematics. The investors with high grades in English which is an international language in this part of the world are found to herd less than the ones with lower grades in English. The same holds for the native language analysis. Investors with higher score in their native language are found to herd less than the ones with lower grades. Even though the numbers are statistically significant, the lack of previous studies in predicting investor intelligence on the basis of their high school grades doesn't confirm the complete reliability of the results.

The suggestions to further research include studying the relationship between the socioeconomic and demographic characteristics of the investors in Nordics and central European countries and comparing their behavioural bias with this study's results. This would highlight major differences between the level of overconfidence, herding and disposition effect among the European countries. To analyse that study, Hwang and Salmon (2004) herding measure can also be applied to see if it gives any different results than this study.

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APPENDICES

Appendix A: Tables

Table 1: T-test of gender influence.

t-Test: Two-Sample Assuming Unequal Variances		
	Males	*Females*
Mean	0.010631361	0.033701833
Variance	6.76954E-05	0.000691169
Observations	36	36
Hypothesized Mean Difference	0	
df	42	
t Stat	-5.024880493	
P(T<=t) one-tail	4.90957E-06	
t Critical one-tail	1.681952357	
P(T<=t) two-tail	9.81914E-06	
t Critical two-tail	2.018081703	

Table 2: ANOVA single factor test for age influence.

Anova: Single Factor						
SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
Age <30	36	1.014387	0.028177417	0.00133261		
Age 30-40	36	0.530344	0.014731778	6.04567E-05		
Age >40	36	1.51087	0.041968611	0.001209825		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.013353928	2	0.006676964	7.695627731	0.000760683	3.082852016
Within Groups	0.091101239	105	0.000867631			
Total	0.104455167	107				

Table 3: ANOVA single factor test of level of degree influence.

Anova: Single Factor						
SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
Master	36	2.200008	0.061111333	0.001565453		
Bachelor	36	0.500425	0.013900694	4.21703E-05		
No degree	36	0.98433	0.0273425	0.000457311		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.042598328	2	0.021299164	30.9440939	2.72329E-11	3.082852016
Within Groups	0.072272668	105	0.000688311			
Total	0.114870996	107				

Table 4: ANOVA single factor test of degree type influence.

Anova: Single Factor						
SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
Real Science	36	1.243764	0.034549	0.000369645		
Humanities	36	2.082292	0.057841444	0.001216294		
Social Science	36	0.510608	0.014183556	4.59088E-05		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.034359607	2	0.017179803	31.58346697	1.82413E-11	3.082852016
Within Groups	0.057114672	105	0.000543949			
Total	0.091474279	107				

Table 5: ANOVA single factor test of Mathematics influence.

Anova: Single Factor						
SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
Group1	36	1.974254	0.054840389	0.001230307		
Group2	36	1.855481	0.051541139	0.002447075		
Group3	36	1.272527	0.035347972	0.000635847		
Group4	36	1.115185	0.030977361	0.000364209		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.01498026	3	0.00499342	4.270217505	0.00641908	2.669256364
Within Groups	0.163710346	140	0.00116936			
Total	0.178690606	143				

Table 6: ANOVA single factor test of English language influence.

Anova: Single Factor						
SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
Group1	36	1.779214	0.049422611	0.001911546		
Group2	36	1.196453	0.033234806	0.000588986		
Group3	36	1.156315	0.032119861	0.001144517		
Group4	36	0.8811	0.024475	0.000283199		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.011882112	3	0.003960704	4.033048813	0.008701008	2.669256364
Within Groups	0.137488684	140	0.000982062			
Total	0.149370797	143				

Table 7: ANOVA single factor test of Native language influence.

Anova: Single Factor						
SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
Group1	36	1.507458	0.041873833	0.000860613		
Group2	36	1.213698	0.033713833	0.000655089		
Group3	36	1.21772	0.033825556	0.000492768		
Group4	36	0.833947	0.023165194	0.000166244		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.006356728	3	0.002118909	3.897356263	0.010356082	2.669256364
Within Groups	0.076115009	140	0.000543679			
Total	0.082471736	143				

Table 8: Descriptive analysis of stocks (Gender influence).

Men		*Women*	
Mean	0.145273086	Mean	0.168945183
Standard Error	0.014128539	Standard Error	0.017275722
Median	0.134401	Median	0.1539585
Mode	#N/A	Mode	#N/A
Standard Deviation	0.069215421	Standard Deviation	0.084633409
Sample Variance	0.004790775	Sample Variance	0.007162814
Kurtosis	4.654917378	Kurtosis	7.448044346
Skewness	1.768766325	Skewness	2.381693988
Range	0.33555	Range	0.394729
Minimum	0.037861	Minimum	0.085362
Maximum	0.373411	Maximum	0.480091
Sum	3.486554069	Sum	4.054684389
Count	24	Count	24
Largest(1)	0.373411	Largest(1)	0.480091
Smallest(1)	0.037861	Smallest(1)	0.085362
Confidence Level(95,0%)	0.029227109	Confidence Level(95,0%)	0.035737555

Table 9: Descriptive analysis of market (Gender influence).

Men		*Women*	
Mean	0.010631361	Mean	0.033701833
Standard Error	0.001371287	Standard Error	0.004381681
Median	0.0066225	Median	0.0263815
Mode	#N/A	Mode	#N/A
Standard Deviation	0.008227722	Standard Deviation	0.026290087
Sample Variance	6.76954E-05	Sample Variance	0.000691169
Kurtosis	0.045596651	Kurtosis	0.32365144
Skewness	0.999947938	Skewness	0.840896849
Range	0.031426	Range	0.106243
Minimum	0.001733	Minimum	0.000741
Maximum	0.033159	Maximum	0.106984
Sum	0.382729	Sum	1.213266
Count	36	Count	36
Largest(1)	0.033159	Largest(1)	0.106984
Smallest(1)	0.001733	Smallest(1)	0.000741
Confidence Level(95,0%	0.002783861	Confidence Level(95,0%	0.008895286

Table 10: Descriptive analysis of stocks (Age influence).

Age <30		*Age 30-40*		*Age >40*	
Mean	0.16670749	Mean	0.150890979	Mean	0.225623083
Standard Error	0.011932866	Standard Error	0.012788713	Standard Error	0.016475813
Median	0.1599085	Median	0.133730636	Median	0.198381
Mode	#N/A	Mode	#N/A	Mode	#N/A
Standard Deviation	0.055970104	Standard Deviation	0.059984379	Standard Deviation	0.077278414
Sample Variance	0.003132653	Sample Variance	0.003598126	Sample Variance	0.005971953
Kurtosis	-0.729551699	Kurtosis	1.21829943	Kurtosis	-0.399940612
Skewness	0.298504492	Skewness	1.027163899	Skewness	0.695503264
Range	0.184315	Range	0.246860355	Range	0.276875
Minimum	0.079549	Minimum	0.065720651	Minimum	0.106377
Maximum	0.263864	Maximum	0.312581006	Maximum	0.383252
Sum	3.667564771	Sum	3.31960153	Sum	4.963707825
Count	22	Count	22	Count	22
Largest(1)	0.263864	Largest(1)	0.312581006	Largest(1)	0.383252
Smallest(1)	0.079549	Smallest(1)	0.065720651	Smallest(1)	0.106377
Confidence Level(95,0%)	0.024815754	Confidence Level(95,0%)	0.026595584	Confidence Level(95,0%	0.034263329

Table 11: Descriptive analysis of market (Age influence).

Age <30		*Age 30-40*		*Age >40*	
Mean	0.028177417	Mean	0.014731778	Mean	0.041968611
Standard Error	0.006084156	Standard Error	0.001295898	Standard Error	0.005797091
Median	0.0183305	Median	0.0132235	Median	0.033364
Mode	#N/A	Mode	#N/A	Mode	#N/A
Standard Deviation	0.036504938	Standard Deviation	0.007775389	Standard Deviation	0.034782544
Sample Variance	0.00133261	Sample Variance	6.04567E-05	Sample Variance	0.001209825
Kurtosis	19.7161118	Kurtosis	0.06439217	Kurtosis	25.85400757
Skewness	4.075112608	Skewness	0.464525079	Skewness	4.806459633
Range	0.210977	Range	0.031047	Range	0.210567
Minimum	0.00288	Minimum	0.001539	Minimum	0.019515
Maximum	0.213857	Maximum	0.032586	Maximum	0.230082
Sum	1.014387	Sum	0.530344	Sum	1.51087
Count	36	Count	36	Count	36
Largest(1)	0.213857	Largest(1)	0.032586	Largest(1)	0.230082
Smallest(1)	0.00288	Smallest(1)	0.001539	Smallest(1)	0.019515
Confidence Level(95,0%	0.012351494	Confidence Level(95,0%	0.002630813	Confidence Level(95,0%	0.01176872

Table 12: Descriptive analysis of stocks (Degree level influence).

Master		*Bachelor*		*No Degree*	
Mean	0.247444073	Mean	0.141095843	Mean	0.160766244
Standard Error	0.016138155	Standard Error	0.012649742	Standard Error	0.011123177
Median	0.240462	Median	0.1323435	Median	0.159711
Mode	#N/A	Mode	#N/A	Mode	#N/A
Standard Deviation	0.072172021	Standard Deviation	0.056571367	Standard Deviation	0.04974436
Sample Variance	0.005208801	Sample Variance	0.00320032	Sample Variance	0.002474501
Kurtosis	1.201224946	Kurtosis	1.05736379	Kurtosis	0.355885068
Skewness	0.754941375	Skewness	1.046426335	Skewness	0.432121285
Range	0.317105	Range	0.216086	Range	0.197191
Minimum	0.11589	Minimum	0.052787	Minimum	0.080375
Maximum	0.432995	Maximum	0.268873	Maximum	0.277566
Sum	4.948881453	Sum	2.821916868	Sum	3.215324886
Count	20	Count	20	Count	20
Largest(1)	0.432995	Largest(1)	0.268873	Largest(1)	0.277566
Smallest(1)	0.11589	Smallest(1)	0.052787	Smallest(1)	0.080375
Confidence Level(95,0%)	0.033777546	Confidence Level(95,0%)	0.026476215	Confidence Level(95,0%)	0.023281077

Table 13: Descriptive analysis of market (Degree level influence).

Master		*Bachelor*		*No degree*	
Mean	0.061111333	Mean	0.013900694	Mean	0.0273425
Standard Error	0.0065943	Standard Error	0.001082311	Standard Error	0.003564137
Median	0.0504405	Median	0.0127	Median	0.02104
Mode	#N/A	Mode	#N/A	Mode	#N/A
Standard Deviation	0.0395658	Standard Deviation	0.006493868	Standard Deviation	0.02138482
Sample Variance	0.001565453	Sample Variance	4.21703E-05	Sample Variance	0.000457311
Kurtosis	0.59290023	Kurtosis	2.469663974	Kurtosis	9.128692849
Skewness	1.244815545	Skewness	1.383507375	Skewness	2.713834508
Range	0.133914	Range	0.030311	Range	0.110797
Minimum	0.018435	Minimum	0.004111	Minimum	0.008136
Maximum	0.152349	Maximum	0.034422	Maximum	0.118933
Sum	2.200008	Sum	0.500425	Sum	0.98433
Count	36	Count	36	Count	36
Largest(1)	0.152349	Largest(1)	0.034422	Largest(1)	0.118933
Smallest(1)	0.018435	Smallest(1)	0.004111	Smallest(1)	0.008136
Confidence Level(95,0%)	0.013387141	Confidence Level(95,0%)	0.002197209	Confidence Level(95,0%	0.007235582

Table 14: Descriptive analysis of stocks (Degree type influence).

Real Science		*Humanities*		*Social Science*	
Mean	0.198074412	Mean	0.242798153	Mean	0.153245492
Standard Error	0.016580636	Standard Error	0.011784308	Standard Error	0.013121264
Median	0.173989	Median	0.238783	Median	0.14407
Mode	#N/A	Mode	#N/A	Mode	#N/A
Standard Deviation	0.075982019	Standard Deviation	0.054002485	Standard Deviation	0.060129187
Sample Variance	0.005773267	Sample Variance	0.002916268	Sample Variance	0.003615519
Kurtosis	-0.205660045	Kurtosis	-0.877108724	Kurtosis	1.052864333
Skewness	0.810790316	Skewness	0.060254508	Skewness	0.979850736
Range	0.281172	Range	0.193786	Range	0.243137
Minimum	0.08691	Minimum	0.148347	Minimum	0.066624
Maximum	0.368082	Maximum	0.342133	Maximum	0.309761
Sum	4.159562661	Sum	5.098761217	Sum	3.218155326
Count	21	Count	21	Count	21
Largest(1)	0.368082	Largest(1)	0.342133	Largest(1)	0.309761
Smallest(1)	0.08691	Smallest(1)	0.148347	Smallest(1)	0.066624
Confidence Level(95,0%)	0.0345866	Confidence Level(95,0%)	0.024581637	Confidence Level(95,0%	0.027370478

Table 15: Descriptive analysis of market (Degree type influence).

Real Science		*Humanities*		*Social Science*	
Mean	0.034549	Mean	0.057841444	Mean	0.014183556
Standard Error	0.003204359	Standard Error	0.005812568	Standard Error	0.001129267
Median	0.028238	Median	0.046639	Median	0.0130765
Mode	#N/A	Mode	#N/A	Mode	#N/A
Standard Deviation	0.019226152	Standard Deviation	0.034875408	Standard Deviation	0.006775601
Sample Variance	0.000369645	Sample Variance	0.001216294	Sample Variance	4.59088E-05
Kurtosis	-0.028212468	Kurtosis	2.144083833	Kurtosis	3.558102967
Skewness	0.898342215	Skewness	1.518211025	Skewness	1.567567356
Range	0.074574	Range	0.152934	Range	0.032692
Minimum	0.011773	Minimum	0.012679	Minimum	0.004756
Maximum	0.086347	Maximum	0.165613	Maximum	0.037448
Sum	1.243764	Sum	2.082292	Sum	0.510608
Count	36	Count	36	Count	36
Largest(1)	0.086347	Largest(1)	0.165613	Largest(1)	0.037448
Smallest(1)	0.011773	Smallest(1)	0.012679	Smallest(1)	0.004756
Confidence Level(95,0%	0.006505194	Confidence Level(95,0%	0.01180014	Confidence Level(95,0%)	0.002292534

Table 16: Descriptive analysis of stocks (Mathematics influence).

Group1		*Group2*		*Group3*		*Group4*	
Mean	0.283173132	Mean	0.30131027	Mean	0.332247355	Mean	0.365571215
Standard Error	0.039716997	Standard Error	0.09056789	Standard Error	0.140859042	Standard Error	0.191618117
Median	0.253371	Median	0.213647	Median	0.1909875	Median	0.173691
Mode	#N/A	Mode	#N/A	Mode	#N/A	Mode	#N/A
Standard Deviation	0.17761981	Standard Deviation	0.405031918	Standard Deviation	0.629940788	Standard Deviation	0.856942269
Sample Variance	0.031548797	Sample Variance	0.164050855	Sample Variance	0.396825397	Sample Variance	0.734350052
Kurtosis	15.72923868	Kurtosis	18.82617394	Kurtosis	19.70233886	Kurtosis	19.83834961
Skewness	3.743272974	Skewness	4.283156292	Skewness	4.424964799	Skewness	4.446529769
Range	0.89439	Range	1.907787	Range	2.889006	Range	3.898127
Minimum	0.10561	Minimum	0.092213	Minimum	0.110994	Minimum	0.101873
Maximum	1	Maximum	2	Maximum	3	Maximum	4
Sum	5.663462646	Sum	6.026205408	Sum	6.644947102	Sum	7.311424309
Count	20	Count	20	Count	20	Count	20
Largest(1)	1	Largest(1)	2	Largest(1)	3	Largest(1)	4
Smallest(1)	0.10561	Smallest(1)	0.092213	Smallest(1)	0.110994	Smallest(1)	0.101873
Confidence Level(95,0%)	0.08312863	Confidence Level(95,0%)	0.189560773	Confidence Level(95,0%)	0.294821364	Confidence Level(95,0%	0.401061327

Table 17: Descriptive analysis of market (Mathematics influence).

Group1		*Group2*		*Group3*		*Group4*	
Mean	0.054840389	Mean	0.051541139	Mean	0.035347972	Mean	0.030977361
Standard Error	0.005845954	Standard Error	0.008244654	Standard Error	0.004202669	Standard Error	0.003180712
Median	0.0466	Median	0.034603	Median	0.0300055	Median	0.024677
Mode	#N/A	Mode	#N/A	Mode	#N/A	Mode	#N/A
Standard Deviation	0.035075726	Standard Deviation	0.049467922	Standard Deviation	0.025216012	Standard Deviation	0.01908427
Sample Variance	0.001230307	Sample Variance	0.002447075	Sample Variance	0.000635847	Sample Variance	0.000364209
Kurtosis	1.174339857	Kurtosis	4.960078986	Kurtosis	3.985464364	Kurtosis	0.309375544
Skewness	1.098525072	Skewness	2.175885713	Skewness	1.921887012	Skewness	1.190686376
Range	0.154457	Range	0.219252	Range	0.113416	Range	0.067742
Minimum	0.007564	Minimum	0.001866	Minimum	0.009536	Minimum	0.007566
Maximum	0.162021	Maximum	0.221118	Maximum	0.122952	Maximum	0.075308
Sum	1.974254	Sum	1.855481	Sum	1.272527	Sum	1.115185
Count	36	Count	36	Count	36	Count	36
Largest(1)	0.162021	Largest(1)	0.221118	Largest(1)	0.122952	Largest(1)	0.075308
Smallest(1)	0.007564	Smallest(1)	0.001866	Smallest(1)	0.009536	Smallest(1)	0.007566
Confidence Level(95,0%	0.011867918	Confidence Level(95,0%	0.016737537	Confidence Level(95,0%	0.008531871	Confidence Level(95,0%	0.006457188

Table 18: Descriptive analysis of stocks (English language influence).

Group1		*Group2*		*Group3*		*Group4*	
Mean	0.242973302	Mean	0.228155331	Mean	0.207882351	Mean	0.182977181
Standard Error	0.017869948	Standard Error	0.018173044	Standard Error	0.016831877	Standard Error	0.013596868
Median	0.228279	Median	0.205839	Median	0.207293	Median	0.164924
Mode	#N/A	Mode	#N/A	Mode	#N/A	Mode	#N/A
Standard Deviation	0.081890388	Standard Deviation	0.083279351	Standard Deviation	0.077133351	Standard Deviation	0.062308675
Sample Variance	0.006706036	Sample Variance	0.00693545	Sample Variance	0.005949554	Sample Variance	0.003882371
Kurtosis	0.177841022	Kurtosis	-1.099275109	Kurtosis	-0.643528067	Kurtosis	0.502573119
Skewness	0.23170683	Skewness	0.323133428	Skewness	0.333657282	Skewness	0.767456698
Range	0.336408	Range	0.264013	Range	0.268743	Range	0.248559
Minimum	0.090539	Minimum	0.107024	Minimum	0.089631	Minimum	0.090747
Maximum	0.426947	Maximum	0.371037	Maximum	0.358374	Maximum	0.339306
Sum	5.10243935	Sum	4.791261947	Sum	4.365529362	Sum	3.84252081
Count	21	Count	21	Count	21	Count	21
Largest(1)	0.426947	Largest(1)	0.371037	Largest(1)	0.358374	Largest(1)	0.339306
Smallest(1)	0.090539	Smallest(1)	0.107024	Smallest(1)	0.089631	Smallest(1)	0.090747
Confidence Level(95,0%)	0.037276058	Confidence Level(95,0%)	0.037908306	Confidence Level(95,0%	0.035110681	Confidence Level(95,0%	0.028362569

Table 19: Descriptive analysis of market (English language influence).

Group1		*Group2*		*Group3*		*Group4*	
Mean	0.049422611	Mean	0.033234806	Mean	0.032119861	Mean	0.024475
Standard Error	0.007286872	Standard Error	0.004044838	Standard Error	0.005638453	Standard Error	0.002804752
Median	0.036643	Median	0.027141	Median	0.025837	Median	0.0206865
Mode	#N/A	Mode	#N/A	Mode	#N/A	Mode	#N/A
Standard Deviation	0.043721232	Standard Deviation	0.024269027	Standard Deviation	0.033830718	Standard Deviation	0.016828514
Sample Variance	0.001911546	Sample Variance	0.000588986	Sample Variance	0.001144517	Sample Variance	0.000283199
Kurtosis	8.183379568	Kurtosis	5.346671407	Kurtosis	27.48003293	Kurtosis	5.639861674
Skewness	2.801644627	Skewness	2.24216352	Skewness	5.005521325	Skewness	2.128364248
Range	0.198661	Range	0.117705	Range	0.207783	Range	0.083839
Minimum	0.014996	Minimum	0.005266	Minimum	0.009818	Minimum	0.00439
Maximum	0.213657	Maximum	0.122971	Maximum	0.217601	Maximum	0.088229
Sum	1.779214	Sum	1.196453	Sum	1.156315	Sum	0.8811
Count	36	Count	36	Count	36	Count	36
Largest(1)	0.213657	Largest(1)	0.122971	Largest(1)	0.217601	Largest(1)	0.088229
Smallest(1)	0.014996	Smallest(1)	0.005266	Smallest(1)	0.009818	Smallest(1)	0.00439
Confidence Level(95,0%)	0.014793137	Confidence Level(95,0%)	0.008211457	Confidence Level(95,0%	0.011446668	Confidence Level(95,0%	0.00569395

Table 20: Descriptive analysis of stocks (Native language influence).

Group1		*Group2*		*Group3*		*Group4*	
Mean	0.228925459	Mean	0.20449805	Mean	0.196356908	Mean	0.176659608
Standard Error	0.01525377	Standard Error	0.01514923	Standard Error	0.012871873	Standard Error	0.01459001
Median	0.231758	Median	0.209842	Median	0.202064	Median	0.157463
Mode	#N/A	Mode	#N/A	Mode	#N/A	Mode	#N/A
Standard Deviation	0.069901556	Standard Deviation	0.069422493	Standard Deviation	0.05898633	Standard Deviation	0.066859826
Sample Variance	0.004886228	Sample Variance	0.004819482	Sample Variance	0.003479387	Sample Variance	0.004470236
Kurtosis	-0.38398537	Kurtosis	-0.971780233	Kurtosis	-1.010999287	Kurtosis	1.016647121
Skewness	-0.252892158	Skewness	0.09107811	Skewness	-0.140854843	Skewness	1.020865932
Range	0.263406316	Range	0.243106	Range	0.198165	Range	0.254655
Minimum	0.086404	Minimum	0.090174	Minimum	0.09024	Minimum	0.091762
Maximum	0.349810316	Maximum	0.33328	Maximum	0.288405	Maximum	0.346417
Sum	4.807434647	Sum	4.294459045	Sum	4.123495069	Sum	3.70985176
Count	21	Count	21	Count	21	Count	21
Largest(1)	0.349810316	Largest(1)	0.33328	Largest(1)	0.288405	Largest(1)	0.346417
Smallest(1)	0.086404	Smallest(1)	0.090174	Smallest(1)	0.09024	Smallest(1)	0.091762
Confidence Level(95,0%)	0.031818807	Confidence Level(95,0%)	0.03160074	Confidence Level(95,0%	0.026850256	Confidence Level(95,0%)	0.030434228

Table 21: Descriptive analysis of market (Native language influence).

Group1		*Group2*		*Group3*		*Group4*	
Mean	0.049422611	Mean	0.033234806	Mean	0.032119861	Mean	0.024475
Standard Error	0.007286872	Standard Error	0.004044838	Standard Error	0.005638453	Standard Error	0.002804752
Median	0.036643	Median	0.027141	Median	0.025837	Median	0.0206865
Mode	#N/A	Mode	#N/A	Mode	#N/A	Mode	#N/A
Standard Deviation	0.043721232	Standard Deviation	0.024269027	Standard Deviation	0.033830718	Standard Deviation	0.016828514
Sample Variance	0.001911546	Sample Variance	0.000588986	Sample Variance	0.001144517	Sample Variance	0.000283199
Kurtosis	8.183379568	Kurtosis	5.346671407	Kurtosis	27.48003293	Kurtosis	5.639861674
Skewness	2.801644627	Skewness	2.24216352	Skewness	5.005521325	Skewness	2.128364248
Range	0.198661	Range	0.117705	Range	0.207783	Range	0.083839
Minimum	0.014996	Minimum	0.005266	Minimum	0.009818	Minimum	0.00439
Maximum	0.213657	Maximum	0.122971	Maximum	0.217601	Maximum	0.088229
Sum	1.779214	Sum	1.196453	Sum	1.156315	Sum	0.8811
Count	36	Count	36	Count	36	Count	36
Largest(1)	0.213657	Largest(1)	0.122971	Largest(1)	0.217601	Largest(1)	0.088229
Smallest(1)	0.014996	Smallest(1)	0.005266	Smallest(1)	0.009818	Smallest(1)	0.00439
Confidence Level(95,0%)	0.014793137	Confidence Level(95,0%)	0.008211457	Confidence Level(95,0%	0.011446668	Confidence Level(95,0%)	0.00569395