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**Overconfidence and Myopic Loss Aversion as Determinants of
Stock Market Participation**

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I hereby declare that I have compiled the paper independently and all works, important standpoints and data by other authors has been properly referenced and the same paper has not been previously presented for grading. The document length is 8,653 words from the introduction to the end of conclusion.

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ABSTRACT

This research studies the determinants of individuals' stock market participation, specifically, socio-economic characteristics and behavioral traits such as myopic loss aversion and overconfidence. Using a survey data from a sample of Finnish individuals (n=55) the study finds that age and income are weakly positively associated with the stock market participation. However, there seems to be no association between either overconfidence or myopic loss aversion and stock market participation. Furthermore, individuals who self-report better financial knowledge and who are willing to obtain financial advice tend to have a higher probability of holding stocks. There is also no statistically significant association between gender and stock market participation, even though, in line with the prior literature men score higher on a measure of overconfidence.

Keywords: Behavioral Finance, Stock Market Participation, Overconfidence, Myopic Loss Aversion, Participation Puzzle

INTRODUCTION

With the developing technology around the world, the life expectancy has been steadily growing, allowing people to enjoy even longer retirements, along with the increasing competitiveness of labor markets. In the future, employees will be replaced with automated machinery exposing more households to financial insecurity. Individuals working on a easily automatised field will become less reliant on traditional salary and instead, they need to start looking for additional income to secure their level of well-being and wealth for retirement and to support their families. At the same time, the additional income should be acquired without spending too much time and energy, suggesting that the variety of financial instruments available for everyone should be used.

Households need to obtain returns to have money when they retire or when their jobs will be automatised. By participating in the stock market, people could take advantage of equity risk premium and derive additional income. Therefore, people should participate in the stock market.

Even though, there is a lot of money available in the stock market, people seem to be not interested in participating. For example, Gionnetti and Koskinen (2010) found out that the domestic investor's participation rate in the domestic stock market covered only 18,7% in Finland. There are many reasons why people do not participate in the stock market, for example the lack of awareness and capital, preferences on consumption decisions, undervaluing own abilities to succeed in the stock markets and, simply, people may be loss averse and perceive investing in stocks as a form of gambling.

Equity premium puzzle is a phenomenon that has been found all over the world describing higher historical real returns of stocks compared to "risk-free" assets, e.g. government bonds. According to the previously presented statements where the riskiness of an investment defines its expected returns, the equity premium puzzle should be well-understood and accepted as it has been studied carefully. As stocks hold more risk over the government bonds, the return of stocks should be higher. Virk (2012) conducted a study to analyse whether the equity premium puzzle existed in Finland. The statistics of his study reveal the equity premium puzzle phenomenon showing that

returns on stock market and other stock related factors were significantly higher than the returns of risk-free bonds. Furthermore, in the study, Virk clearly states that the real consumption growth in Finland has been negative since 1990 which is supported by Oikarinen and Kahra (2002). However, at the same time the real consumption growth has been negative, the gross domestic product per capita in Finland has been steadily increasing from 1993 until the Great Recession of 2008. Since the recession, the GDP per capita has been stabilized and continues to increase closing on the all time high of the beginning of 2008. As the real consumption growth has been negative and the GDP per capita steadily increasing as well as the knowledge of the equity premium puzzle continues to increase, why do individuals invest in the stock market instead of saving?

The aim of this study is to explore the factors that determine stock market participation. Specifically, the study aims to identify the effect of myopic loss aversion and overconfidence of the respondents for participation, and to find the impact of socio-economic characteristics and behavioral traits, such as loss aversion, willingness to take financial risk and financial literature knowledge, on stock market participation.

In order to obtain the data for this paper, I structured a survey consisting of 36 questions divided into six sub-sections and it was shared on social media and directly. The survey had 55 responses, consisting of 63,6% (35 respondents) of men and 36,4% (20 respondents) of women. The average age of participants was 35,65 years including different age groups and educational backgrounds. To analyse the data from the survey results, I run multiple logistic regressions through the probit model to reveal the impact of socio-economic characteristics and behavioral traits on stock market participation, as stock market participation is represented with a binary variable.

The results of this study suggested that neither overconfidence nor myopic loss aversion are statistically significant predictors of the stock market participation decision when multiple variables were taken into account. However, overconfidence seemed to become more statistically significant if fewer variables are taken into account meaning that there might be a connection between overconfidence and stock market participation, but the results were not clear. Regarding other variables, there seemed to be mixed results when shifting between models which may indicate that there may be weak links to stock market participation. For example, when controlling for income, the relationship between age and stock market participation turned out to be insignificant, even though it was determined to be significant in the previous model.

1. BEHAVIORAL TRAITS

Standard finance is known to use assumptions in order to structure a clear and understandable foundation for developing theories to support the financial decision making. According to Statman (2010) there are four main blocks to which standard finance is based upon. First foundation block determines that people are rational and their financial decisions are justified by relevant information or logic. Secondly, the markets are determined to be efficient meaning that all the relevant information has already been reflected in the prices. Third foundation block states that people should design portfolios by the rules of mean-variance portfolio theory and do so. Furthermore, as the fourth foundation block, Statman (2010) offers an assumption that expected returns of investments are described by standard asset pricing theory, where differences in expected returns are determined only by differences in risk. However, if all these statements were true, there should be no reason for individuals to make different decisions on how they are investing and which stocks they should sell, buy or should they even invest at all.

To find the characteristics and reasons behind individuals financial decision-making, finance as a field has developed a sub-field dealing with the human behavior related factors. Behavioral finance lacks a single definition and clearly defined boundaries, but has rather established itself as a complex web of related sub-fields in research aiming to understand the financial decisions of economic agents, according to Illiashenko (2017). As the foundations of standard finance have been determined to include too many assumptions, Statman (2014) modified these foundation blocks to create a more useful structure for behavioral finance that incorporates parts of standard finance, replaces others and includes links between theory, evidence and practice. As people tend to be rational, but possess cognitive errors that affect the decision making, such as overconfidence and hindsight as well as emotional factors, for example exaggerated fear and hope, our decisions are not always based only on relevant information or logic. By this logic, people are not irrational but sometimes make mistakes due to psychological factors. However, these factors are affecting the majority of individuals, leading to the first foundation block for behavioral finance according to Statman (2014): “People are normal”. If the markets were efficient all the time and reflecting all relevant information to the prices, how could one gain by shorting or going long? This

insecurity creates the second foundation block stated as: “Markets are not efficient, even if they are difficult to beat”. The third foundation block for behavioral finance is that “people tend to design portfolios by the rules of behavioral portfolio theory (BPT)” and, the fourth foundation block states that “expected returns of investments are described by behavioral asset pricing theory, where differences in expected returns are determined by more than differences in risk”. These foundation blocks for behavioral finance allow us to concentrate on the cognitive and emotional aspects of one sub-field of behavioral finance, investment decision-making process. Although, people are determined to be normal (rational with psychological factors affecting their decisions) and the classical assumption is that investors differ only in their wealth and risk aversion (Conlin (2018)), the reality is that each individual has their own set of skills and traits affecting their decision-making broadening the heterogeneity of investors.

The result of combining standard finance and behavioral finance as they are would suggest that the portfolio of all investors comparable by the level of wealth should only differ by the risk one is willing to take. However, many studies have shown that in addition to the classical assumption where investors’ decision are affected only by their level of wealth and risk aversion, there are more factors affecting the decision to participate in the stock market (e.g. Barber and Odean (2001), Kamstra et al. (2003), Grinblatt et al. (2013), Kaustia et al. (2018)). For example, Guiso et al. (2008) suggested that trusting the data available for investors is reliable and that the overall system is operating fairly and equally are affecting the individuals’ decision to participate in the stock market. Furthermore, they stated that trust has more impact on the investment decisions when the investors are unfamiliar with stock markets or lack data to assess it. Furthermore, prior work on other stock market participation related factors have revealed that social activity (Hong et al. (2004)), general optimism (Puri and Robinson (2007)), monetary costs (Vissing-Jørgensen (2003)), political ideology (Kaustia and Torstila (2011)), cognitive ability (Cole and Shastry (2009)), Grinblatt et al. (2011)) and sensation seeking (Grinblatt and Keloharju (2009)) are affecting the decision to participate in the stock market.

Other two main factors affecting the individuals’ financial decision-making process are overconfidence and loss aversion, and furthermore, myopic loss aversion. These two factors, overconfidence and myopic loss aversion, are taken into more precise study in this paper.

As a second and important behavioral characteristic, loss aversion (or furthermore myopic loss aversion) has been determined to be a significant factor when an individual is deciding whether to participate in the stock market or not and when making financial decisions. Put simply, loss aversion means the rate by which an individual is more sensitive to losses or reductions in their wealth compared to gains and increases. An example where loss aversion in risky choices is found is one where individuals reject small-scale gambles that have positive expected value but may lead to small losses. For example, if one was offered a bet with a positive expected payoff, the one with higher loss aversion would be most likely to deny that offer. Myopic loss aversion happens when an investor is too focused on the short-term performance of their portfolio and emphasizes the negativity of the recent losses leading to a situation where they may sacrifice the long-term benefits over the short-term performance. The more often an investor is evaluating their portfolio, the more they are likely to find short-term losses as the stock prices are usually fluctuating on a daily basis. Therefore, it would be reasonable to assume that the more often an investor evaluates their portfolio performance, the more they may sacrifice the long-term benefits over the short-term performance and the more they are likely to invest in more safe assets, e.g. government bonds.

1.1. Overconfidence

One of the most important skills in finance and investing is the ability to understand the development of both domestic and foreign markets and the ability to link global events to one's forecasts of the future. As usual, learning skills that require a lot of time and effort, people tend to become more confident on their skills leading some to rate their skills to be better than the average competitors. Otherwise, what would be the point of participating in competitions if nobody would prefer their chances of winning? Overconfidence bias is the tendency individuals have to be more confident in their own skills and abilities than is reasonable. In this paper, overconfidence is defined to be a belief that individuals have more precise information of financial events and stock market than the average person leading to the individual's belief that they can make the right decision when a challenge is encountered.

Overconfidence has been found in several professional fields, for example clinical psychologists (Oskamp (1965)), investment bankers (Stael von Holstein (1972)), negotiators (Neale and

Bazerman (1990)) and managers (Russo and Schoemaker (1992)). As stock market industry is highly competitive and even small margins matter, usually people who are pursuing a career in finance and investing are competitive and intelligent in nature allowing many of them to consider themselves to be above average regarding their analytical and forecasting abilities. However, it is statistically impossible for most analysts to be above average. Montier (2002) conducted a survey for 300 professional fund managers in order to find out their confidence level to their own abilities and skills. His findings were that approximately 74% of the respondents considered their abilities to be above average and the remaining respondents described themselves as an average revealing the high level of overconfidence amongst those 300 professional fund managers.

According to Grinblatt and Keloharju (2009), overconfidence definition has developed into two separate interpretations: the first one is called hubris or “better-than-the-average effect” and the second is “miscalibration”. They stated: “Miscalibration arises when the confidence interval around the investor’s private signal is tighter than it is in reality”. Both interpretations of overconfidence lead the investor to weight their own abilities and knowledge excessively making the investor weight stock prices according to their own valuation more than the market’s valuation. Furthermore, Grinblatt and Keloharju (2009) suggest that this leads to a larger willingness to trade compared to less confident investor. Odean (1998) supports this argument as he states that overconfident investors trade more than rational investors and doing so they lower their expected utilities as well as finding out that trading volume tends to increase when price takers, insiders and marketmakers are overconfident.

1.1.1. Gender-based overconfidence

Prior studies have shown that overconfidence is higher among male investors compared to female investors (Johnson et al. (2006), Barber and Odean (2001)) . However, Deaves et al. (2008) argue based on their study that men and women are indifferent in their overconfidence level and, furthermore, propose that women who are attracted to “male” disciplines such as economics, finance and business are more overconfident than the rest of the overall female population. As there is more studies supporting the argument that men are more overconfident than women, in this study I expect that: *Men are more overconfident than women.*

This argument will be tested as a comparison if men weight their knowledge and abilities to be better than average more often than women do based on the survey answers. In addition, I aim to find if men are participating in the stock market more than women based on the survey answers as prior literature suggests so.

1.1.2. Wealth-based overconfidence

When comparing two individuals who have substantially different amount of money or wealth to spend, usually the one with less money is more concerned where to invest it, whether they have to pay their bills, visit to the grocery store or pay off sudden medical bills. Whereas the one with considerably higher level of wealth may make impulse decision on buying unnecessary goods or services without concerns about the future. Therefore, individuals with lower level of wealth should be more risk averse and insecure about their investment decision.

As participating in the stock market provides investors opportunities to gain substantial amounts of income quickly with a counter-balancing threat of losing money by making the wrong investment decisions, I aim to find out if the level of households' wealth provides support to be more confident when making the decision whether or not to participate in the stock market leading to an expectation: *Individuals who are more satisfied with the financial position of their household are more likely to participate in the stock market.*

Regarding previous research on this subject, I could not find anything that would support this statement, however, I did not find counter-arguing statements either.

1.2. Loss aversion

As a second and important behavioral characteristic, loss aversion (or furthermore myopic loss aversion) has been determined to be a significant factor when an individual is deciding whether to participate in the stock market or not and when making financial decisions. Put simply, loss aversion means the rate by which an individual is more sensitive to losses or reductions in their

wealth compared to gains and increases. An example where loss aversion in risky choices is found is one where individuals reject small-scale gambles that have positive expected value but may lead to small losses. For example, if one was offered a bet with a positive expected payoff, the one with higher loss aversion would be most likely to deny that offer.

Loss aversion as a tendency may occur both in riskless and risky choices, however, as I am studying the effects in the stock market participation it is justified to include only the loss aversion in risky choices. The classical assumption about investors is that they tend to experience losses more harmful than equal amount of gains as positive. Therefore, the definition of loss aversion is the tendency to be more sensitive to reductions in one's level of wealth compared to the positive effects of gains. (Benartzi and Thaler (1995)). To study the loss aversion in a risky choice for this paper, I used a simple question in the survey based on the statement by Gächter et al. (2007), whether the respondent would accept a bet if they had 50% chance of winning €300 and 50% chance of losing €150. This question holds expected payoff of €75 meaning that people with low level of loss aversion would tend to accept this bet. However, in the study approximately 60% of respondents were not willing to take the bet and there could be no other explanation than the higher level of loss aversion. Furthermore, I study if there is any correlation between the level of loss aversion and gender, age and satisfaction to the financial position of one's household on the respondents' answer to the survey, as Gächter et al. (2007) found out. This is justified as all the respondents were Finnish and varied in age, education level and level of wealth which was measured as the satisfaction to the financial position of one's household.

As younger individuals rarely possess large amounts of wealth and have completed the lower level of education, it seems that the younger an investor is the less they are willing to take risks. This is supported by Gächter et al. (2007) stating that "higher education reduces loss aversion". Therefore, I expect: *The younger the investor, the higher the level of loss aversion.*

This is important and useful to study as the sample consisted of people from different age groups, educational backgrounds and the level of wealth.

1.2.1. Myopic loss aversion

As the equity premium puzzle is showed to exist in Finland by Virk (2012) and Benartzi and Thaler (1995) proposed a solution to the puzzle where the puzzle could be solved by studying the loss aversion as well as the prospect theory (mental accounting) combined with the frequency of how often an investor evaluates their portfolio performance. This combination was named as myopic loss aversion which they argued to be more useful compared to the previously presented explanations which were inconclusive.

Myopic loss aversion occurs when an investor is too focused on the short-term performance of their portfolio and emphasizes the negativity of the recent losses leading to a situation where they may sacrifice the long-term benefits over the short-term performance. The more often an investor is evaluating their portfolio performance, the more they are likely to find short-term losses as the stock prices occur to fluctuate on a daily basis. Therefore, it would be reasonable to assume that the more often an investor evaluates their portfolio performance, the more they may sacrifice the long-term benefits over the short-term performance and the more likely they are to invest in more safe assets, e.g. government bonds or trust funds.

The concept of myopia (short-sightedness) was initially established to describe the short-sightedness created by the portfolio evaluation frequency, however, Bellemare et al. (2004) argued that investors' myopia was only determined by the evaluation frequency. Furthermore, Langer and Weber (2006) counter-argued by stating that rebalancing frequency should be used to determine the myopia. Later studies from Fellner-Röhling and Sutter (2009) stated both of these frequencies to be useful variables when measuring the myopia. As it is more convenient to get answers to the question about the respondents portfolio evaluation frequency, I based the measurement of myopia to the evaluation frequency criteria combined with the frequency a respondent follows financial news.

As it has been found out that a higher volume in trading activity means that the more an investor trades, the more they are exposed to evaluating and rebalancing their portfolio, the higher the myopia factor should be. Furthermore, following financial news often should provide more pressure for portfolio performance evaluation. And if an investor shows signs of loss aversion, the myopia factor will then increase the pressure for avoiding losses resulting in higher level of loss aversion. Therefore, my last expectation for this paper is as follows:

Higher level of myopic loss aversion leads to the decision not to participate in the stock market.

Benartzi and Thaler argued that the most used evaluation period is once a year due to the fact that individuals pay and deduct taxes once a year. However, they also stated that it is likely for private investors to use a combination of evaluation periods, for example basic evaluation once a month, more deeper analysis per quarter and for long-term planning the most detailed evaluation once a year when companies are publishing their annual reports. To find the respondents' evaluation frequency, I included a simple question in the survey: How often do you check the performance of your portfolio? The answer was then stated on a linear scale from 1-Never to 10- On a daily basis. In order to find the level of myopic loss aversion, I will combine the loss aversion results with the results from the myopia section.

2. DATA AND METHODOLOGY

2.1. Data

The empirical data used for this study was collected, as previously mentioned, by a survey which was shared for potential participants through social media, i.e. Facebook and LinkedIn. The survey was a cross-sectional study conducted on individuals. Cross-sectional data represents the gathered information in a time period. The survey was constructed of 36 questions and consisted six sub-sections, all aimed to gather information from socio-economic characteristics to expressive and emotional beliefs. In this paper, overconfidence, loss aversion and myopia are studied in detail combined with socio-economic characteristics such as gender, age and educational background.

The survey gathered 55 answers (n=55) in a week and all the respondents were Finnish. Even though, the gathered sample size was rather small, the diversity inside the sample was good. The participants were from different socio-economic groups, such as undergraduate students, graduate students, workers, pensioners and managing directors, for example CEO's.

There were more male participants (35) compared to female participants (20). Out of these 55 participants, 34 are married or have a partner and the rest 21 participants notified to be single. The age of the participants varied from 22 to 71 with median of 26 years and average 35,65 years. The educational background was categorized into five options such as "do not have a college degree / unfinished college degree / bachelor's degree / master's degree / PhD". However, there were no participants who had completed any doctoral programme. Therefore, the measurement of education was defined to be master's degree or otherwise. Out of the sample group, 35 respondents have participated in the stock market and 20 individuals did not hold any stocks. However, out of these 20 participants who did not hold any stock, three hold bonds, one holds mutual funds, one hold both bonds and mutual funds, and one participant hold bonds and has invested in mutual funds, crowdfunding and derivatives market.

Table 2.1. Correlation Matrix for the Variables

	1	2	3	4	5	6	7	8
1. Gender	1							
2. Age	0.03	1.00						
3. Marital status	0.03	0.39	1.00					
4. Education	0.12	0.63	0.31	1.00				
5. Income	0.00	0.54	0.37	0.52	1.00			
6. Fin.Satisfaction	0.07	0.24	0.39	0.30	0.59	1.00		
7. Fin.Lit	0.45	0.21	0.19	0.17	0.40	0.15	1.00	
8. Stocks	0.06	0.31	0.03	0.12	0.28	-0.06	0.54	1.00
9. Risk	0.27	-0.13	0.07	-0.15	0.04	0.07	0.61	0.40
10. Forward looking time	-0.15	-0.30	-0.17	-0.24	-0.11	-0.06	-0.15	-0.06
11. Status	-0.01	-0.02	0.28	-0.05	0.21	0.09	0.12	0.09
12. Left political beliefs	-0.43	-0.23	-0.07	-0.34	-0.10	0.05	-0.45	-0.10
13. Trust in stock market	0.43	-0.13	-0.10	-0.15	-0.02	0.09	0.44	0.27
14. Look for advice	-0.12	0.09	0.09	0.08	0.01	-0.01	-0.22	0.19
15. Overconfidence	0.33	0.05	-0.13	0.01	0.13	-0.05	0.40	0.31
16. Myopic loss aversion	-0.10	-0.04	-0.01	-0.05	0.11	0.04	0.16	0.12

	9	10	11	12	13	14	15	16
1. Gender								
2. Age								
3. Marital status								
4. Education								
5. Income								
6. Fin.Satisfaction								
7. Fin.Lit								
8. Stocks								
9. Risk	1.00							
10. Forward looking time	0.00	1.00						
11. Status	0.00	-0.16	1.00					
12. Left political beliefs	-0.26	0.14	0.05	1.00				
13. Trust in stock market	0.32	-0.09	0.13	-0.31	1.00			
14. Look for advice	-0.24	0.01	-0.12	0.09	0.01	1.00		
15. Overconfidence	0.35	0.17	-0.01	-0.22	0.38	0.10	1.00	
16. Myopic loss aversion	-0.11	0.09	-0.07	-0.01	0.10	0.04	-0.19	1.00

It is necessary to understand that even with carefully designing the survey questions, there may still be some questions which were too hard to understand or which were unable to obtain the expected answers. I will describe the questions in more detail in the section 2.3. Survey structure. The correlation matrix presented in table 2.1 may be used to understand the connections between variables, however it is not studied in detail in this paper.

2.2. Methodology

As results have shown, behavioral and personality traits may be used to explain stock market participation. Most of the mean scores for the behavior and personality traits differ significantly between people who have participated in the stock market and those who have not participated. Therefore, I perform logistic regression analysis to measure the impact of the traits to stock market participation while controlling for different socio-economic and behavioral characteristics. I use cross-sectional regression analysis for studying why some individuals have participated in the stock market and others have not. The cross-sectional regressions analysis study the connections between the dependent variable and independent variables.

The most used and simplest method for analysing relationships and correlations between different variables is conducting regressions and interpreting them. The basic ordinary least squares (OLS) model suits data that do not hold any dummy variables or binary numbers. OLS-model should predict accurate scores for dependent variables that have been obtained by using a linear scale from one to 10 as answer options. This model is used to determine the coefficients and significance of different variables. However, as the aim of this paper is to study the impact of different behavioral characteristics and traits to stock market participation, measured by a simple answer, yes or no, the OLS-model would not provide accurate results. OLS-model provides results on a standardized equation as follows:

$$Y = \alpha + \beta X, \tag{1}$$

where Y is the dependent variable being predicted, α and β are coefficients and X is the independent variable.

As the main goal was to examine the function of stock market participation in respect to different independent variables and the stock market participation was defined by binary numbers, the OLS-model needed to be modified into a model which takes into account binary numbers and multiple relationships. Therefore, the other more appropriate model was deemed to be the probit model, as it has been used more amongst economists compared to the logit model. In the end, both of these models provide rather similar results. Compared to the linear regression model, probit modifies the OLS-model to yield a nonlinear relationship. Therefore, probit models are commonly presented as follows:

$$Y = f(\alpha + \beta X). \quad (2)$$

In order to define $f(X)$, the probit model uses the cumulative distribution function of the standard normal distribution which will take any number and adjust it to scale between 0 and 1 resulting in to a possibility to predict accurate probabilities.

As there were only 55 responses (observations) to the survey and 12 different variables, there needed to be more than one regression used to provide accurate results of the connections between the dependent variable and the independent variables. The commonly used number of variables simultaneously is calculated usually as one per every 5-8 answers, thus there could be a maximum of eight independent variables in each model. However, in the end when the relationships have been studied in the correct manner, I will include an additional model which takes into account all of these variables at the same time.

The main factors obtained from the probit models are the coefficients, standard errors and, the significance revealing, p-value. In the table, the significance of an independent variable is denoted by the amount of asterisks. Zero means that the variable does not hold any significance, one (*) indicates that the p-value of the variable is less than 0.1. Two stars (**) mean that the p-value is less than 0.05 and the most significant variable is defined with three stars (***) meaning that the p-value is less than 0.01.

In addition to these factors, McFadden R-squared and Adjusted R2 are also denoted in the table in order to provide the estimate for the likelihood value of the model.

2.3. Survey structure

To obtain as many answers as possible, the structure of the survey had to be clear and it was defined to be answered in under ten minutes. The questions were designed to be easy to answer to speed up the process and therefore, the quantitative questions were used. Later, the survey was

finalised and determined to hold additional questions that could be used in a possible following study.

The survey consisted of six parts. The first part was used to define the socioeconomic characteristics of the participants. There were nine questions in the first part, revealing the participants gender, age, nationality, marital status, educational background, household income level, the level of satisfaction in their households' financial situation, knowledge about investments, and finally, the participants knowledge about stock markets. The last four questions in this first part were answered on a scale from 1-10, where 1 denoted the least knowledge or low level of satisfaction and 10 indicated complete satisfaction or top knowledge.

The second part of the survey was designed to state the participants stock market participation. The first question was whether or not they hold any stocks revealing if the participants had invested in a stock market. The second question asked if they had invested in any other financial market beyond stocks. The survey offered some options to be chosen from, for example bonds, mutual funds, crowdfunding, derivatives market or none of the mentioned. The third question defined which stocks the participants hold most in their portfolios, domestic or foreign. And finally, the last question in the second part was whether or not they had ever participated in initial public offerings.

The third part consisted of three questions aimed to reveal the respondents' risk preferences. The first question in this part was designed to obtain the amount of financial risk the participants were willing to take when saving or making investments. In order to use quantitative methods for analysing the outcomes of the survey, a scale from 1 to 10 (not willing to take any risk - willing to take substantial financial risks expecting to earn substantial returns) was used. The second question in this part seemed to have been too unclear, as the respondents' answers were not in the right form (percentage) and some had left this question unanswered. The question was: How much downside in income are you willing to accept for a 50/50 chance of a 50% upside? However, the last question derived answers as all of the others. This question asked whether or not the participants would be willing to accept a bet, if they had a 50% chance of winning €300 and a 50% chance of losing €150. This question was used to define the level of loss aversion among the respondents.

The fourth part of the survey gathered information about time preferences. It consisted of six questions from measuring the expected internal return of each respondent to the frequency of

monitoring their portfolios and following financial news. The frequency of checking their portfolios was designed to be used in measuring the myopia of the respondents.

The second to last part was designed to reveal the expressive and emotional beliefs of each respondent, however, these findings should not be used in this research, but they may be used later. This part asked about the participants' reaction to figurative events and how they would affect the investment decisions, if the decision to participate in the stock market would increase the status of each respondent, their political leanings and the trust to stock markets operating fairly and equally.

The last part was the main part of the survey as it was used to define the overconfidence level of each respondent. This part consisted of four questions, each answered on a linear scale from 1 – Completely disagree to 10 – Completely agree. In these questions, the better-than-the-average - method was used.

In the end, the survey may have been too long in order to attract more participants leading to the rather small sample size which may have resulted in biased results.

The variables for this study are described in the Appendix 1.

3. EMPIRICAL RESULTS

I have created four main logistic regression models for this paper and after the results did not provide as clear implications as wanted regarding overconfidence and myopic loss aversion as variables, I created four more models aimed to reveal the relationships of these two independent variables with less factors taken into account.

The dependent variable used is whether or not the participants are currently holding any stocks. Age acts as normal, the older the participant, the higher the value of the variable. Gender was coded to be a dummy variable where it takes a value of zero when the participant is female and a value of one when the participant is male. Marital status dummy takes a value of one when the respondent is in a relationship and zero when they are not. Education was designed to take a value of one if the respondent had master's degree and zero if otherwise. Income and financial satisfaction took values between one and ten depending on the participants' view of their financial position. The higher the value, the more they earn income and the more satisfied they are with their personal balance sheets. Risk variable took values on a same scale from one to ten, the latter representing willingness to take substantial financial risks. Forward looking time preferences dummy took a value of one if the respondent revealed to be forward looking and zero if not. Financial literature was stated on a scale of one to ten and combined of two separate questions about the participant's knowledge. Looking for advice varied on the same scale where the higher value denoted the willingness to look for advice from experts and family/friends. Overconfidence variable was combined from four questions and took values between one and ten, once again higher value indicating more confidence. Myopic loss aversion was measured in the same way as overconfidence. The adjusted R² and McFadden R-squared increase from model 1 to model 3, but decrease when shifting to model 4. This implies that model 3 is the superior model.

Gender had no indication on being a significant factor through every model as was the case with marital status, education and forward looking time preferences. Age had significant importance in the first model, however, when adding other important variables in the model, the coefficient for age turned out to be insignificant. The median age of the sample was 26 years and the average age was 35,65 years. Male participants seemed to be slightly older than female as both their median age and average age exceeded the respective ones of female.

Table 3.1. Gender based age.

	MEDIAN	AVERAGE
FEMALE	25,5 years	35,05 years
MALE	26	36
SAMPLE	26	35,65

When controlling for income, the connection between age and stock market participation became not significant. Therefore, the result obtained from the Model 1 was biased, indicating that older people were probably participating more due to a higher income and not because of their age. However, when experimenting with overconfidence and myopic loss aversion variables in the Model 4, age becomes statistically significant even as income and other variables are controlled for simultaneously. This can also be confirmed from further checks, Models 5.1.-5.4. Thus, there seems to be a weak connection between age and stock market participation. When controlling for the willingness to take financial risks in model 3 and 4, age seemed to become more significant indicating that there may be a connection between age and loss aversion and the expectation: *The younger the investor; the higher the level of loss aversion has some support.*

Income level has significant effect on the participation in the model 2 and as previously stated, income also affects the significance of age. However, the result is statistically significant only in this model and when controlling for financial literature knowledge and the willingness to look for advice from experts and family/friends, income loses its' significance. The same results can be seen in the financial satisfaction variable. This implies that financial literature knowledge and looking for advice hold more stronger links to stock market participation, thus, making the expectation (*Individuals who are more satisfied with the financial position of their household are more likely to participate in the stock market*) to remain uncertain.

The knowledge of financial literature and the willingness to look for advice both reveal to have positive effect on the stock market participation. The positive coefficients indicate that more knowledge about financial literature and being more open to search for advice from experts and family/friends supports the stock market participation decision.

Table 3.2. Regression results

Dependent variable: Stock Market Participation					
	Model 1		Model 2		
	coef.	st.er	coef.	st.er	
Gender	0.13	0.37	0.30	0.40	
Age	0.03	0.01	**	0.05	0.04
Marital_status			-0.21	0.43	
Education			-1.30	1.00	
Income			0.24	0.12	**
FinSatisfaction			-0.22	0.13	*
Risk					
Forward_looking_time					
FinLit					
Look_for_advice					
Overconfidence					
Myopic_Loss_Aversion					
const	-0.79	0.53	-1.16	1.15	
Observations	55		55		
McFadden R-squared	0.09		0.19		
Adjusted R2	0.00		0.00		
Dependent variable: Stock Market Participation					
	Model 3		Model 4		
	coef.	st.er	coef.	st.er	
Gender	-0.43	0.68	-0.59	0.69	
Age	0.05	0.03	0.05	0.02	*
Marital_status					
Education					
Income	0.03	0.15	-0.08	0.12	
FinSatisfaction	-0.25	0.17			
Risk	0.32	0.17	*	0.30	0.17 *
Forward_looking_time	0.22	0.84			
FinLit	0.48	0.21	**	0.51	0.22 **
Look_for_advice	0.45	0.18	**	0.47	0.19 **
Overconfidence			0.00	0.20	
Myopic_Loss_Aversion			0.03	0.09	
const	-6.47	2.65	**	-7.45	2.51 ***
Observations	55		55		
McFadden R-squared	0.54		0.50		
Adjusted R2	0.29		0.25		

In order to measure the level of overconfidence, I included in the survey four statements in which the participants stated their opinion on a scale from 1- Completely disagree to 10- Completely

agree. These four statements were designed to allow the usage of the “better-than-the-average” - method. First two statements concerned the skills a respondent believes to have regarding investing and the last two were everyday related (Work/school and planning). The answers to the first two statements aimed directly to measure the individuals’ confidence about their abilities regarding investing activity ranged from one to ten with medians of 4 and 3 averaging scores of 3,65 and 3,82. This reveals the fact that the participants of the survey did not rate their investing abilities above average rate of 5 meaning that only a few of the sample rated their skills to be better than the average investors. However, the everyday confidence statements were opposite as the individuals’ ratings ranged also from one to ten with means of seven and six, respectively. They also averaged higher than the average scores, 6,34 and 6,32 meaning that the respondents rated their skills at school or work and planning to be significantly higher than the average.

As each statement was answered using a range of one to ten and there were four statements regarding the confidence level, the total score for confidence is 40. This total score was calculated separately for each individual by adding up the ratings they stated for each statement. For example, one could have rated their investment skills, information level, performance at school or work and planning skills to be 4, 5, 6 and 7 respectively. Then, their total confidence score would have been 22 points out of 40 or 55%. To compare male respondents with female respondents, their answers were separated and the averages were calculated.

Table 3.3. Gender based overconfidence scores.

Gender	Investment skills	Information level	Performance at school/work	Planning skills	Total score
Female	2,75	2,75	6	6,05	44 %
Male	4,17	4,51	6,54	6,49	54 %

Female respondents (sample of 20) rated on average their investment skills and information level to be less than the average, 2,75 and 2,75, respectively. However, they rated themselves to be more skillful on average when considering their performance at school or work and planning skills. In these statements, the female respondents averaged scores of 6 and 6,05, when the average individual’s skills would equal the rating of 5.

As male respondents (sample of 35) were studied, they rated on average their investment skills to be 4,17 and their information level of investments to be 4,51 which are both less than the average of 5. However, the male respondents rated their everyday skills, performance at school or work

and planning skills, to be higher than the female respondents as they rated on average their performance at school or work to be 6,54 and planning skills as 6,49.

When calculating the average of the total scores of each female respondent, their result equalled 44% or 17,55 points out of 40 compared to the results of the male respondents of 54% or 21,71 points out of 40. Thus, there is a difference of 10% between the male and the female respondents confidence level where the female respondents showed no overconfidence and the male respondents showed some overconfidence when the better than the average -method was used. Therefore, the expectation: *Men are more overconfident than women* is supported by the data from the survey. Furthermore, the male respondents showed more confidence in their abilities in all of the categories and the largest differences were found when the investing skills and information level of the investments were considered.

Table 3.4. Additional regression results

Dependent variable: Stock Market Participation						
	Model 5.1			Model 5.2		
	coef.	st.er		coef.	st.er	
Gender	-0.17	0.41		0.14	0.38	
Age	0.03	0.01	**	0.03	0.01	**
Marital_status						
Education						
Income						
FinSatisfaction						
Risk						
Forward_looking_time						
FinLit						
Look_for_advice						
Overconfidence	0.32	0.14	**			
Myopic_Loss_Aversion				0.06	0.06	
const	-2.23	0.85	***	-0.99	0.56	*
Observations	55			55		
McFadden R-squared	0.17			0.10		
Adjusted R2	0.06			-0.01		

Dependent variable: Stock Market Participation						
	Model 5.3			Model 5.4		
	coef.	st.er		coef.	st.er	
Gender	-0.19	0.41		-0.63	0.89	
Age	0.03	0.01	**	0.18	0.13	
Marital_status				-1.40	0.83	*
Education				-3.10	3.20	
Income				0.04	0.18	
FinSatisfaction				-0.21	0.20	
Risk				0.34	0.24	
Forward_looking_time				0.40	1.06	
FinLit				0.76	0.32	**
Look_for_advice				0.66	0.25	***
Overconfidence	0.38	0.15	**	-0.15	0.25	
Myopic_Loss_Aversion	0.10	0.07		0.09	0.12	
const	-2.83	0.97	***	-11.92	5.65	**
Observations	55			55		
McFadden R-squared	0.20			0.62		
Adjusted R2	0.06			0.26		

As the original regression models did not reveal any connections between overconfidence and myopic loss aversion to stock market participation, I ran additional regressions (shown in table 3.4.) to experiment if they hold significance when the important variables (financial literature, willingness to look for advice) are not concerned. However, as these two main variables showed no significant connections to stock market participation in the previous models, the results of models 5.1-5.4 may not be taken as the truth, rather they can be seen as directional models.

The model 5.1 is dedicated to study the connections between gender, age and overconfidence to stock market participation, meanwhile model 5.2 replaces overconfidence with myopic loss aversion and uses the same principles. The model 5.4 seeks to study the impact of overconfidence and myopic loss aversion together on stock market participation. The last model 5.4 was run as an experiment to reveal what happens when all 12 variables are taken into account simultaneously. However, the results from model 5.4 cannot be taken as truth due to the lack of observations towards each variable and needs to be critically considered.

As expected, model 5.1 implies that overconfidence has a positive connection to stock market participation. The positive coefficient suggests that the more confident one is, the more likely they are to participate in the stock market. Age seems to be significant factor on stock market

participation as well in this model. When shifting from the model 5.1 to model 5.3 where both overconfidence and myopic loss aversion are taken into account, overconfidence keeps its' significance, further supporting the expectation that people who have participated in the stock market show higher levels of confidence compared to those who have not participated.

Even though there is a lack of other important variables in the models 5.2 and 5.3 where myopic loss aversion is studied more precisely, the results suggest that there is no connection between myopic loss aversion and stock market participation, not a positive one nor a negative one. Thus, the last expectation (*Higher level of myopic loss aversion leads to the decision not to participate in the stock market*) derived no results. This may indicate that the sample size affected too much to the results or that the questions aimed to describe the respondents' myopia and loss aversion did not obtain the expected results.

4. DISCUSSION

In this section I will discuss the expectations and conclusions based on the logistic regression analysis conducted on the survey results. I will describe the implications derived from this study and compare them to the previous studies. Furthermore, I will discuss the limitations and challenges of the data and the methodology used in this study. Lastly, I will make suggestions for future research concerning this topic.

This study was conducted by cross-sectional logistic regression analysis as an effort to understand the socio-economic characteristics and behavioral traits supporting stock market participation. The dependent variable was stock market participation modified to be in binary form leading to the use of the probit model. Gender, age, marital status, education, income, financial satisfaction, risk, forward looking time preferences, financial literature, looking for advice, overconfidence and myopic loss aversion were used as the independent variables where the last two were in the centre of interest. The sample size for this study was 55 responses.

The limitation of a cross-sectional study is derived from the exposure and outcome performed at the same time. Thus, the causal relations between the two may not be studied in a long term. Due to the lack of varying time periods, the selection of independent variables has to be carefully weighted. The chosen variables for this study have been supported in previous research. However, as the survey was based on self-evaluation the results may include personal biases that cannot be observed from this study.

The results are derived from four main regression models, and to examine the effects of overconfidence and myopic loss aversion in more detail, four additional models were created to act as directional experiments. Age and income revealed to have significance on stock market participation, however, they both provided mixed signals. The third expectation (*Individuals who are more satisfied with the financial position of their household are more likely to participate in the stock market*) was not supported by the results as the significance of income and financial

satisfaction did not hold through the models. The second expectation (*The younger the investor, the higher the level of loss aversion*) did derive some support, however, it cannot be held as certain.

The first expectation was that men show more overconfidence compared to women and this was supported by analysing the average confidence scores relative to gender. The average confidence score for men was 54% (or 21,71 points out of 40) as the average score for women was 44% (or 17,55 points out of 40). To study the impact of overconfidence on stock market participation in more detail, the additional models 5.1, 5.3 and 5.4 were created. Models 5.1 and 5.3 suggested that there could be a connection between overconfidence and stock market participation, but neither of the main models supported this finding.

As the second main object of interest for this paper was to study the relation between myopic loss aversion and stock market participation, myopic loss aversion was studied later in the same manner than overconfidence. The models 5.2, 5.3 and 5.4 were designed to provide evidence that myopic loss aversion would interfere with the decision to participate in the stock market. However, the same conclusion had to be made as according to the main models that the study revealed no result on the relation between myopic loss aversion and stock market participation.

As a conclusion, the expectations that men are more overconfident than women and that the age of the investor has impact on the level of loss aversion holds true to some extent, however neither one was fully supported. The two other expectations did not derive any support, but they cannot be considered as false expectations.

Further suggestions regarding the topic of this research is to study similar variables, more precisely the behavioral traits, impact on stock market participation as there are still no clear reasons for individuals not to participate in the stock market. It would be beneficial to study these variables on a long term, deriving a time series for the variables, which would lead to more accurate results.

CONCLUSION

The aim of this research was to study the impact of overconfidence and myopic loss aversion among other socio-economical and behavioral characteristics and traits on stock market participation. The study was conducted by a survey shared on social media which received 55 responses.

As previous studies have stated, this paper also supports the argument that males represent more overconfidence bias than females when measured by the better-than-the-average method or so-called “hubris”. However, when the data from the survey were studied by logistic regression models, the overconfidence variable was often determined to not hold any significance in the decision to participate in the stock market. The significance of overconfidence was only revealed when there were less variables taken into account, suggesting that the results were inconclusive and the study did not determine accurately whether or not overconfidence supports the decision to participate in the stock market.

Myopic loss aversion resulted in a similar conclusion, as none of the models suggested that myopic loss aversion would hold any significance in the stock market participation. Even when studying myopic loss aversion with the base variables, gender and age, myopic loss aversion was determined to be insignificant. However, these results may be due to a lack of observations or, perhaps, the way that myopic loss aversion was measured in the present study.

The most important and significant factors supporting one’s decision to participate in the stock market were the self-reported financial knowledge and the willingness to look for advice from financial experts and family or friends. These results may be due to the fact that the participants who are interested in investing have obtained financial information and are likely to discuss the events and their effects on the financial markets with other people.

For further studies, there should be a larger sample size and it would be beneficial to have respondents from multiple countries and to include a time series analysis. Some survey questions could be modified to match better in the needs of the research and, perhaps, the survey should be consisted of fewer questions.

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APPENDICES

Appendix 1. Description of Variables

VARIABLE:	DESCRIPTION:	ANSWER OPTIONS:
Stock Market Participation	Question whether participants hold stocks	Yes – 1 No – 0
Gender	Statement of gender	Female - 0 Male – 1
Age	Statement of age	Any chosen number in years
Marital Status	Does the participant have a partner (married) or not	Have a partner – 1 Otherwise - 0
Education	Question about education level (No PhDs were observed)	Master’s degree – 1 Otherwise – 0
Income	On a scale of income, to which group your household belongs?	From 1 – Lowest to 10 – Highest
Financial Satisfaction	How satisfied are you with the financial situation of your household?	Scale from 1 – Not happy at all, to 10 – Extremely satisfied
Financial Literature	Consisted of two separate questions about the	Both questions answered on a scale from 1 – No knowledge to 10 – Top knowledge

	participants knowledge of investments and stock markets	
Risk	The amount of financial risk their household is willing to take when saving or making investments	Scale from 1 – Not willing, to 10 – Willing to take substantial risks
Forward looking time preferences	Which offer would the participant prefer? A) A payment of €2500 this month B) A payment of €2800 next month	Choosing option B reveals the forward looking time preference. A – 0 B - 1
Look for advice	Would they follow the advice from experts and family/friends	Scale from 1 – Completely disagree , to 10 – Completely agree
Loss Aversion	Simple bet question with a positive expected payoff	Accept the bet – 1 Deny the bet – 0
Myopia	Consisted of two questions about the frequency one follows the financial news and checks the performance of their portfolio	Both answered on a scale from 1 – Never, to 10 – On a daily basis
Myopic loss aversion	Combined the results of Loss Aversion and Myopia	
Overconfidence	Average of four statements each aimed to reveal the confidence level on the better than the average - method. For example, I am better at school/work than average. (Investment skills, knowledge about investing, school/work skills, planning skills	Each statement asked the participants to state their opinion about these four statements. 1 – Completely disagree 10 – Completely agree