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ENTREPRENEURSHIP AS A PREDICTOR OF STOCK MARKET PARTICIPATION

Bachelor's thesis
International Business Administration, Finance

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I hereby declare that I have compiled the thesis independently
and all works, important standpoints and data by other authors
have been properly referenced and the same paper
has not been previously presented for grading.

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ABSTRACT

This study investigates the association between entrepreneurship and stock market participation. Using the representative data from the United States collected within the framework of the FED Survey of Consumer Finance, the thesis tests the hypothesis that business owners are less likely to own stocks. Applying logistic regression analysis to the sample of 28885 individuals, I found that being an entrepreneur is not associated with participating in the stock market as there is a lack of statistical significance. Besides entrepreneurship, most factors of stock market participation mentioned in the previous studies are significant predictors of stock ownership in this study.

Keywords: stock market participation, entrepreneurship, behavioural finance

INTRODUCTION

Over the years, researchers have poured over data on the behaviour of financial markets and the factors that influence individual participation. People's involvement in the stock market is crucial to both the creation of new wealth and the expansion of the economy. Stock market participation rates vary widely, with many people opting out despite the market's significance. The aim of this thesis is to investigate which factors affect stock market participation, especially how having an entrepreneurial mindset and financial literacy can be linked to stock market participation.

This research draws on theories from the fields of economics, psychology, and business. Stock market involvement and other financial behaviours have long been explained using standard economic theories like rational choice and utility maximization. These hypotheses suggest that people maximize their wealth and financial well-being by basing their financial decisions on an evaluation of risk and reward. In addition, this research investigates how entrepreneurial characteristics affect financial decisions by analysing the entrepreneurship literature.

The main research questions for this study are:

1. Is there a link between higher financial literacy and increased stock market participation?
2. Does having an entrepreneurial mindset result in increased involvement in the financial market?
3. To what extent do these new factors influence stock market participation, and do they follow the same pattern as established in the prior research?

This study investigates the relationship between entrepreneurial activity and financial literacy, and their collective impact on stock market participation. The research is based on two main assumptions. The first hypothesis suggests that being an entrepreneur leads to a higher level of activity in the stock market. The second hypothesis proposes that having a strong understanding of financial literacy is associated with larger involvement in the stock market. We will use cross-sectional logistic regression analysis and a comprehensive survey of 28885 individuals to examine

the specific factors related to socio-economic, psychological, and behavioural factors on investment activity. The thesis follows an organised methodology, starting with a thorough examination of existing literature to guide the development of hypotheses. Subsequently, there is a comprehensive presentation of the data, statistical approaches, and descriptive analytics. The study concludes with a synthesis of the results, regression analysis, all of which add to the existing literature on financial behaviour.

1. LITERATURE REVIEW

The main focus of the theoretical background presented in this research is to offer a thorough knowledge of the numerous aspects that influence stock market involvement. The theoretical background outlines a brief description of the intersection of economics, psychology, and entrepreneurship. Based on the standard theories of rational choice and utility maximisation, which suggest that people make financial decisions, such as whether to invest in the stock market, based on an objective assesment of the risks and benefits involved. This perspective was highly supported by multiple reviews of various published studies on the relationship between income, wealth, education levels, and stock market participation.

In summary, the theoretical background sought to lay the foundation for the future empirical investigation through a combination of different viewpoints to provide a robust framework for understanding the factors contributing the stock market involvement.

1.1. Stock Market Participation

A stock market is a financial marketplace where investors can purchase and sell securities, including stocks and bonds. Several factors, including the state of the economy, investor confidence, risk aversion, and access to financial resources, can affect the stock market participation rate. Due to market volatility, stock market investments carry some risk, but they also present chances for wealth growth, portfolio diversification, and economic expansion.

1.1.1. Socio-economic factors

- Age

People's behaviour in the stock market and while making investments is significantly affected by their age. People's investment strategies tend to evolve as they move through different stages of life, primarily due to changes in their period for investing and risk tolerance.

Younger people typically have more time to invest in the stock market and are more willing to take on risk, (Poterba & Samwick's, 2001). Younger investors gain from having more time on their side because it enables them to profit from long-term bullish trends in the stock market and recover from any short-term bearish market.

When people get closer to retirement, their investing habits generally change. Ameriks and Zeldes (2000) observed that people approaching retirement tend to alter their investment approach to place a higher priority on capital preservation. They therefore usually choose more secure investments generating income. This change is mostly the result of a decline in risk tolerance since shorter periods for investing reduce one's ability to recover from market losses. These individuals often place a higher priority on income and stability, adjusting their investment portfolios to include a higher percentage of bonds and less volatile assets. This plan aims to ensure that their savings will last till retirement.

- Gender

There are gender differences in investing behaviour that have been demonstrated in the financial literature, especially when it comes to stock market participation. A variety of factors, such as risk tolerance, confidence levels, and investment approaches, have a significant effect on these disparities. Barber and Odean (2001) provides empirical support for the theory that men are more likely to invest in the stock market than woman. This tendency has been linked to men's inclination for risk-taking, which makes them less concerned with the volatility and potential for higher returns that come with investing in stock market. This tendency among men could be explained by their overconfidence, which leads to more trading activity and a readiness to take on more risk since they think they can outperform the market.

More research is done by Croson and Gneezy (2009) on the psychological traits that contribute to the gender disparities in investing behaviour. It is highlighted that, on average, men typically display higher degrees of overconfidence in their ability to make investments than do women. A more assertive trading style, more frequent portfolio adjustments, and an aptitude for riskier investing decisions are all indications of excessive confidence. On the other hand, women tend to

adopt a more conservative approach, placing a higher priority on financial security and conducting more thorough research before making investment decisions. Because of this difference in strategy, women make fewer trades than men do, which lowers transaction costs and may eventually lead to better investment performance.

- Education

Education has a big influence on stock market participation and interest among investors. Education and investment behaviour are correlated, indicating that higher educated people have a higher propensity to invest in stocks. This pattern of behaviour is impacted by a number of factors related to education.

According to research by Christelis et al. (2010), individuals with a higher education degree are more capable to navigate complex financial markets because they possess the required knowledge and skills, A well-informed investor is typically one who is aware of the range of investment products available, the possible risks and returns associated with various investment types, and the long-term benefits of stock investing.

Van Rooij et al. (2011) also pointed out that education enhances financial literacy, which is a strong predictor of stock market activity. Comprehending the concepts of compound interest, diversification, and the capacity to evaluate financial news and market fluctuations are all parts of financial literacy. Those with a higher education are more likely to be financially literate, which boosts their confidence when it comes to making investment decisions, particularly stock market-related ones.

- Educational specialization

Academic specialisation, specifically in finance and economics, is closely linked to the stock market's patterns of investment behaviour. People with these kinds of backgrounds are typically seen as more proactive and confident stock market investors.

Christelis et al. (2010) highlights the hypothesis that an individual's investment decisions can be greatly impacted by having a solid educational foundation in financial disciplines. Those having a background in economics or finance generally possess necessary knowledge and skills to evaluate market dynamics, understand complex financial instruments, and make thoughtful choices about

stock investments. Their background in finance makes it easier for them to evaluate investment risks and possible returns more successfully.

According to Kimball & Shumway (2010), people's attitudes on stock market investing may be impacted by enrolling in business, economics, or finance courses. They suggest that these course programmes usually teach on the principles of capital appreciation, portfolio diversification, and financial market mechanics. This information can emphasise the advantages of long-term investing and help make stock investing easier to comprehend. Cole et al. (2014) support the theory that a person's financial literacy defined as their comprehension of financial concepts and their ability to use this knowledge to make good decisions is influenced by their academic specialisation. Individuals with an education in finance or a closely related subject tend to be more financially literate, which enhances their comprehension of the stock market. Having greater financial literacy can lead to increased awareness of investment strategies and products as well as a deeper understanding of the relationship between risk and return.

- Income and wealth

Numerous studies have examined the significance of correlation between income, wealth, and stock market participation. The likelihood of wealthy people and families making stock market investments is higher. Many factors, including risk tolerance, the availability of market knowledge, and the availability of funds for investment, might be connected to the association.

Haliassos and Bertaut (1995) study underlines how wealthier households prefer to participate in larger-scale stock market and other speculative investment activities. Less disposable income may make people less likely to invest in the stock market since they don't have the money to endure the inevitable ups and downs in the market. Besides, those who earn more money have more room for saving, which allows them to allocate funds to a variety of investments, including stocks.

Guiso et al. (2002) provide additional information on this association by demonstrating that people' likelihood of investing in the stock market increases in in line with their income. Wealthy people often have better access to financial guidance and investment opportunities in addition to having more resources for investing. They also stand a better chance of receiving tax breaks created especially for particular types of investments, which usually belong to higher income groups.

- Financial literacy

Financially literate people can use their knowledge of risk management, budgeting, and investing to take charge of their financial situation. People who are more financially literate are also more likely to invest in stocks, hence financial literacy can be very important when it comes to stock market participation. The study done by Lusardi and Mitchell (2007), demonstrates whether financial literacy affects people's investing choices. A financially literate person is more inclined to invest in the stock market since he or she is aware of the dangers and potential rewards. In the following years, it was discovered by (Lusardi and Mitchell, 2011) that people with higher financial literacy also tend to diversify their portfolios, which reduces overall investment risk.

Van Rooij et al. (2011) also found a strong link between stock market participation and financial literacy. Higher financial literacy makes people more likely to buy stocks because it makes them more resilient to market fluctuations and helps them understand what's happening in the long run.

1.1.2. Psychological and behavioural factors

- Risk aversion

It is well known that individual risk tolerance is an essential factor when making investment decisions in the market. Risk aversion, which defines a person's reluctance to seize opportunities with unexpected outcomes, is one of the fundamentals in finance and investment theory. The studies of Dohmen et al. (2011) and Barsky et al. (1997) supported the risk aversion theory. They indicated that risk-averse individuals are more likely to avoid activities that have unpredictable outcomes. Consequently, these people typically favour less risky investments like bonds and savings accounts. Based on the utility theory, investors are satisfied when they achieve a specific level of utility, such as satisfaction and peace of mind, in addition to financial gains. This type of behaviour is consistent with that notion.

Personal biases and heuristics can influence investment decisions, making risk aversion a prominent topic in behavioural finance. People's investment decisions may be influenced by factors beyond what established models forecast such as personal experiences, biases, and subjective risk perception. For instance, the Kahneman-Tversky’s prospect theory asserts that people deviate from the expected utility theory because they place different weights on gains and losses.

- Trust

Investors' desire to trade stocks is largely influenced by their level of trust. Numerous studies have examined the relationship between trust and stock market involvement, and they all essentially show that a person's degree of trust in banks and other financial organisations has a big impact on whether they choose to trade stocks.

The study carried out by Guiso et al. (2007) indicates a significant correlation between investors' likelihood to invest in the stock market and their level of trust in financial institutions. Investors' willingness to acquire equities is directly proportional to their level of confidence or faith in the system. This is likely since trust decreases the perceived risk associated with investing in potentially volatile markets. When investors have faith in the safety of their financial assets and the dependability and efficient oversight of the organisations managing their money, they are more likely to invest in stocks. When investors choose whether to buy the stock of a certain company, he or she can develop their trust by analyzing the organisation's financial management structure.

Guiso et al. (2004) also point out that a person may be hesitant to buy stocks if they don't trust someone. Investors who have lost faith in financial institutions—possibly as a result of crises, financial scandals, or bad personal experiences—tend to steer clear of the stock market in favour of more transparent or safe alternative investment vehicles.

- Peer effects

The decision of an individual to invest in the stock market can be greatly affected by peer effects or social influence. Studies showed one's investment decisions can be impacted by the investment strategies shared by others in their social network, mainly by friends, colleagues, relatives etc. This might also occur due to the exchange of information and strategies across social networks. Following a study by Hong et al. (2004), people are more likely to invest in stocks when their social surroundings have such investments in common. There are several reasons for that. One scenario is when people have to make financial decisions, they seek for some advice from their peers for direction on what is considered appropriate right or wrong. Therefore, if there is an active stock market participation from one person in the group. It can easily widespread and have a potential to become a normative behaviour for all the individuals in the group.

People who have friends or acquaintances working in trade companies, may receive some insider information about certain stocks of company, or suggesting for investment behaviour during certain market run, and simply share their portfolios for further discussions on their financial experiences. Those who normally like to be reluctant participating in the stock market. might explain the process of buying equities as well.

- Culture

Culture has a big impact on investors' behaviour, particularly on how likely they are to engage in stock market activities. Cultural norms and values impact people's perceptions of risk, level of trust in financial institutions, and overall financial conduct. Culture can be one of the factors influencing stock market investor behaviour. Individuals from all over the world may have gone through horrible financial crises or scandals in their home countries, which have impacted their perception of investing in different financial institutions generally since it has weakened their trust.

Guiso et al., (2006) highlight the variations in stock market participation rates among different cultural contexts. Individualistic societies, for example, may promote greater stock market participation because they place a higher priority on building personal wealth and accepting risk. Conversely, cultures that prioritise collectivism may be more prone to embrace risk-averse investments. This is because individuals in these societies usually place a higher value on stability and financial security than they do on the potentially large returns associated with riskier assets like stocks.

1.1.3. Preferences and Attitudes

- Optimism

A psychological trait, optimism, has a big impact on investor decisions-making. An investor's optimism level may influence both the probability of buying stocks in the stock market and their anticipated rate of return in the future. Puri and Robinson (2007) found that investors are more likely to be optimistic, expect high returns on their investments, and trade stocks more frequently. Positive views on the market and the economy make people more inclined to think about increasing their investment returns. They typically overlook or undervalue risks in favour of the potential for profit. When someone adopts this optimistic perspective, their desire to make financial investments may increase.

People with pessimistic opinions, on the other hand, typically have lower expectations for the performance of the stock market, which makes them more inclined to avoid these risky activities. As they have a conservative view of potential rewards, these people are more likely to avoid taking risks and instead choose safer investments like bonds and savings accounts. Pessimism can be made worse by unpleasant events or economic downturns, which raises one's fear of investing risks.

- Overconfidence

An individual's cognitive bias of overconfidence has a major effect on their stock market investment activities. Overconfidence can have a significant impact on investment activities, which doesn't always play well in the end due to the risks associated with it. Many researchers have investigated that pattern and have a growing body of evidence proving its flaws.

A very prominent research by Barber and Odean (2001) shows the strategies of overconfident investors in the stock market. Overconfident investors trade excessively because they have an unfounded conviction in their trading abilities. However, this is not suggested as one of the best traits when it comes to investing, mainly because of the way the market reacts to trading and the tax implications of realizing capital gains, excessive trading can lead to higher transaction costs and lower profits.

Another study done by Daniel et al. (1998) examines the effects of overconfidence and shows that it can lead to less-than-ideal investment decisions. Their investigation also supported the concept of how overconfidence can cause overestimating expected returns, undervaluing possible risks, and putting eggs in one basket. At certain periods they can sell profitable investments prematurely to secure immediate gains. Consequently, they can hold onto These investors could have a propensity to sell profitable investments before they're ready to secure gains, or they might hold onto underperforming investments for an extended period in the hopes of eventually making up for their losses. This kind of behaviour can be described as a disposition effect.

- Decision-making habits

People's decisions about whether to invest in the stock market or not can be influenced by cognitive biases such as mental accounting. Mental accounting defines the different values a person places on the same amount of money, based on subjective criteria, often with detrimental results. People

categorise their funds in different accounts, depending on where it comes from and what they want to spend it for. Some people divide their investment money into "money they can afford to lose" and money they really can't. Thaler and Shefrin (1981) brought out a theory on how people's investment decisions can be influenced by this cognitive paradigm. People may divide their money into several accounts. Savings accounts are one of the common among everyone and are usually considered untouchable. Another optional account might be for luxury spending, also considered as emotional spending sometimes. This categorisation of their financial portfolios can impact their investment decisions in general. Due to the perceived risk involved with stock market investments, funds set aside for savings or future requirements may be difficult to invest.

Shefrin and Statman (2000) expand on this subject by studying the behavioural inclinations resulting from mental accounting. Investors who psychologically place their money in an account associated with safety and capital preservation may show reluctance to deploy it toward stocks. This may lead to a preference for safe investment options like certificates of deposit or bonds rather than stocks, which are thought to be riskier.

People who favour accounts associated with safety, and saving accounts, psychologically will be reluctant to invest in risky activities like trading stocks. They usually choose to keep their funds in bonds, which is preferred to be a safer investment option for them. Furthermore, mental accounting can lead to an investor's portfolio being undiversified if they fail to assess the overall risk profile of all their combined investments across all accounts. Besides, mental accounting may lead people to undesirable practices, whether it is holding onto underperforming stocks due to the fear of realising a loss and hoping to recover over the market run or selling rising stocks too soon to realise a quick profit.

- Risk-taking and impulsivity

There are several personality factors influence stock market participation and distinguish investors from regular people. Impulsivity and risk-taking are one of the most common. These attributes affect trading volume and frequency in addition to the investor's decision-making. Grinblatt and Keloharju (2009) research shows that those with natural risk-taking instincts are more likely to invest in risky activities, including stocks, mainly due to the high potential of rewards and intrinsic unpredictability. The stock market is one of the best tempting opportunities for those who favour risk-taking activities. These people may be driven by the excitement of trading and are more comfortable with the inherent volatility of traded stocks.

Table 1.1.1. Summary of prior research in stock market participation

Determinant	**Impact on Stock market participation**	**Representative studies**
Income/Wealth	Positive	Haliassos and Bertaut (1995); Guiso et al. (2002)
Education	Positive	Christelis et al. (2010); Van Rooij et al. (2011)
Risk Aversion	Negative	Dohmen et al. (2011); Barsky et al. (1997)
Trust	Positive	Guiso et al. (2007); Guiso et al. (2004)
Financial Literacy	Positive	Lusardi and Mitchell (2007); Van Rooij et al. (2011)
Peer Effects	Positive	Hong et al. (2004)
Culture	Varies depending on cultural values	Guiso et al. (2006)
Age	Varies depending on age group	Poterba and Samwick (2001); Ameriks and Zeldes (2000)
Gender	Varies, men more likely to participate	Barber and Odean (2001); Croson and Gneezy (2009)
Optimism	Positive	Puri and Robinson (2007)
Overconfidence	Positive, but can lead to suboptimal decisions	Barber and Odean (2001); Daniel et al. (1998)
Decision-Making Habits	Varies, depends on individual habits	Thaler and Shefrin (1981); Shefrin and Statman (2000)
Risk-Taking and Impulsivity	Positive	Grinblatt and Keloharju (2009)
Educational specialization	Positive, particularly for finance-related fields	Christelis et al. (2010); Kimball and Shumway (2010)

Source: author's own summary of previous literature researches.

Impulsivity may be another trait that is associated with taking risks. Impulsive people tend to seize any opportunity without doing sufficient examination, which sometimes fails to produce good results, thus they may engage in more frequent and impulsive trading. More cautious investors, who advise against making impulsive choices without conducting adequate study, particularly when it comes to stock market trading, consider this to be inconsistent.

Generally, having impulsive and risk-taking tendencies can make one more likely to trade excessively, which can be detrimental because of the costs involved in transactions and the potential for making trades at less-than-ideal opportunities. Furthermore, if the individual continuously looks for stocks or market opportunities that they deem to be "trendy," these traits may lead to a lack of portfolio diversification.

1.2. Entrepreneurs and Stock Market Participation: The role of Personality Traits

Because of the traits in their personalities, entrepreneurs are a unique species when it comes to the stock market. Due to their propensity for taking risks, overconfidence, and optimism, entrepreneurs may seek different investment strategies and outcomes.

- High need for achievement

According to Caliendo et al. (2007), entrepreneurs are more likely to invest in equities and prefer assets with the potential for large returns, even at the expense of increased risks. This is due to the fact that people who routinely acquire high levels of success frequently identify success with outperforming others and obtaining returns that are higher than average, both of which can be possible through stock investments.

- Need for Control

The entrepreneurial mindset has the concept of the need for control, which heavily impacts their investment decisions. Following Brockhaus (1982) study, the need for control is demonstrated by their inclination to forge their path and actively shape the results of their endeavours serves as evidence of this. This characteristic goes beyond company management and includes how entrepreneurs engage with the stock market. Those who exhibit strong control-seeking tendencies

are more inclined to actively manage their investment portfolios and use strategies that let them use their hands to make decisions. Dorn and Huberman (2005) state that these investors would choose to invest in individual stocks as opposed to passive index funds. Individual stocks are carefully selected and managed to create a sense of direct control and self-determination, along with a natural seek for control.

Nevertheless, there are pros and cons to the necessity for regulation in investment behaviours. On one hand, it can enhance cautious research and rational stock selection. On the other hand, it can result in overconfidence, increased trading volume, and the corresponding expenses. Additionally, a strong need for control can lead to an unwillingness to diversify their portfolio, since investors will focus on a small number of stocks that they think they can manage.

An investor's propensity for taking direct control of their assets may also reflect their belief in their ability to correctly forecast market trends or spot cheap stocks—a talent that may be impacted by their entrepreneurial successes. However, the skills and intuition that help business owners succeed in the stock market might not translate to that arena, since success in this field is also dependent on outside variables like economic and market conditions.

- Initiative

Entrepreneurs are known to be very initiative individuals. They actively seek and seize opportunities. This quality matters greatly in navigating perplexing markets and aggressively seeking out new opportunities for development and innovation. Birley and Westhead (1994) emphasised the significance of initiative in the entrepreneurial process, stating that effective identification and exploitation of new company opportunities are usually the results of this proactive trait.

When it comes to investing, entrepreneurs naturally being initiative, implement proactive and assertive approaches to actively seek out new corridors for investing in the stock market. Entrepreneurs who actively seek financial data, undertake comprehensive research, and stay up-to-date on market trends are more likely to take action.

- Autonomy and independence

A demand for control is common among entrepreneurs; they want to run their businesses and choose their own fates (Brockhaus, 1982). Investors who have a strong desire for autonomy are

likely to favor stock market tactics that provide them with a high degree of direct control over their holdings. Dorn and Huberman (2005) found that investors with a stronger demand for control favored individual stock investments over passive index funds since the former allowed for more direct control over portfolio decisions.

- Leadership

Due to the fact that entrepreneurs are expected to steer their businesses and keep their teams inspired, entrepreneurs tend to be natural leaders (Kuratko, 2005). They may be more willing to invest in firms with excellent leadership teams or to participate in shareholder activism in order to influence corporate governance if they possess this attribute as a leader. Gillan and Starks (2000) showed that those with higher levels of leadership ability were more willing to invest in the shares of companies with robust governance frameworks, on the theory that such organizations would have better financial results.

- Competitiveness

To succeed in business and advance ahead of the competition, entrepreneurs tend to be fiercely competitive (Covin & Slevin, 1989). Because of their natural drive to win, they may be more prone to actively traded stocks to outperform the market and their peers. People who are more competitive are more likely to trade stocks often to profit from short-term market swings and outperform the market (Barber and Odean, 2000). One potential drawback of being very competitive when making investing decisions is that it might cause trading behaviour that increases transaction costs and decreases profits.

In summary, entrepreneurs have a distinct set of personality qualities that might greatly affect their involvement in and investment behaviour inside the stock market. Entrepreneurs who exhibit the following traits, may find themselves taking greater risks in the stock market. If policymakers, educators, and financial advisors want to help entrepreneurs make smart investment decisions and manage their money, they'll benefit from a deeper understanding of the relationship between these attributes and stock market involvement.

- Persistance

Entrepreneurs possess another great quality, which is persistence. Their ability to constantly work to achieve goals, regardless of obstacles facing their way. Kuratko et al. (1997) studied how

entrepreneurs have the propensity to be extremely tenacious, which enables them to overcome the many challenges that come with starting and growing a business.

This characteristic is noticeable when they participate in the stock market as well. They can show a high level of resistance in their investing strategies, sticking with it even when the market is underperforming. Their ability to manipulate the ups and downs of their business operations has created an immune persistence to volatility. Their desire is to keep the assets in the belief that values will eventually recover and flourish.

Odean (1999) investigated this pattern of behaviour in terms of the stock market. He discovered that individuals with more persistence qualities are prone to hold their investment positions despite market negative fluctuations. They feel confident in their investment plan and are mentally prepared for such downfalls in the market. Nonetheless, experienced investors would always suggest preventing stubbornness and being more cautious with investment strategies, because excessive persistence and overconfidence can lead to huge losses for not capitalising on losses in time. Persistence does not imply continuing with investments that are not producing positive results. Rather, it entails retaining the discipline to stick to a carefully researched investment strategy while also being willing to change it in response to the latest data.

1.3. Hypotheses Development

This research paper analyses the relationship between stock market participation and entrepreneurship. The main focus is to measure the impact of all possible attributes linked to entrepreneurs on their financial behaviour. Studies show that there is a strong correlation between certain characteristics of an entrepreneur and stock market participation. Willingness to take risks, overconfidence, optimism, decision-making, and competitiveness traits have a strong connection with participation likelihood. Since entrepreneurs all have a high-risk tolerance and level of confidence, their investment patterns may differ in the stock market. Entrepreneurs with a high need for achievement and control characteristics usually prefer direct and proactive investment strategies because they choose to depend more on official channels like market research and less on mainstream media. Added to that, this study illustrates the importance of having a great grasp of financial literacy, because it can significantly affect an individual's stock market participation based on (Lusardi and Mitchell, 2011) studies.

This study argues that there is a higher likelihood for individuals with financial education to participate in the stock market. The purpose of the developed hypotheses is to improve understanding of how an entrepreneurial mindset influences financial decisions in the context of stock market investment.

H1: Entrepreneurs are more likely to participate in the stock market.
H2: The probability of participating in stock market is higher among those with high levels of financial literacy.

2. DATA AND METHODOLOGY

2.1. Data

The results presented in this study are based on data from the 2016-2019 SCF (Survey of Consumer Finances). The observational unit is a spesific person. The Survey of Consumer Finances (SCF) is conducted by the Board of Governors of the Federal Reserve System, a federal reserve that represents the country's central bank headquarters, once every three years. The Federal Reserve Board and the Department of the Treasury are working together to sponsor the study. Data have been gathered since 1992 by the University of Chicago's NORC.

The principal objectives of this survey are to support policymakers and, eventually, the general public in their endeavours to get a deeper comprehension of American families' financial circumstances and to explore the implications of different changes in the economic environment. The poll's statistics provide details on families' income, pensions, and demographic characteristics in addition to their financial situation. A wide range of research topics, including investing, saving, pension coverage, business ownership, using financial institutions, credit discrimination, and financial markets, are further supported by the data acquired from the survey.

Data is additionally incorporated from earlier Federal Reserve Board surveys of the same nature. These polls had a connection to the previously stated ones. There isn't another study in the nation that gathers data comparable to this one. The SCF's data are used for a wide range of purposes, from academic research at the main economic research centres to research and analysis conducted by the Federal Reserve and other government departments.

The dataset_1 was deprived from the official website of Federal Reserve to conduct analysis.

[1] The data can be downloaded using the following link:
https://www.federalreserve.gov/econres/files/scfp2016excel.zip

2.2. Structure of the Survey

The 2016-2019 Survey of Consumer Finances is structured into different sections with an emphasis on various aspects of consumer finance. In the beginning, to examine participants' financial attitudes and actions, they were asked general questions about their views on the economy, knowledge of personal finance, their propensity to take risks and their overall experiences with financial institutions.

Sections E and D were followed by comprehending the participant's real estate holdings and associated loans. When it comes to the entrepreneurial spirit of participants, a deeper examination of financial engagement and risk-taking propensity indicators was carried out in section F. Section G offers more details regarding leasing and car ownership. Consequently, section I, titled as "Other Loans" and section H, "Education Loans", provide an additional review of of all other forms of loans and debt related to education. One of the key sections for this thesis research, section J focuses on participants' views on investing and saving, and section N provides information on all the various financial holdings. Section R demonstrates participants' employment status, occupation categories, retirement issues and etc. Section T explores various income sources, tax implications and the principles of financial support. Section X gathers information on wealth inheritances and charitable endeavours. Finally, section Y concentrates on health, household structure and demographics.

The complex structure of the SCF provides a thorough and in-depth depiction of the financial situations, attitudes, and behaviours of American households. Because of this, it is a very useful tool for understanding the intricate world of consumer finance.

2.3. Descriptive Statistics

Descriptive statistics table can be found in Appendix 2.

2.3.1. Stock market participation and entrepreneurship

Data analysis shows that 23.72% of respondents participate in the stock market, which is a pretty high level of the sample. Entrepreneurs make up 27.40% of the sample with 42.53% of them actively participating in the stock market, demonstrating a strong inclination towards it.

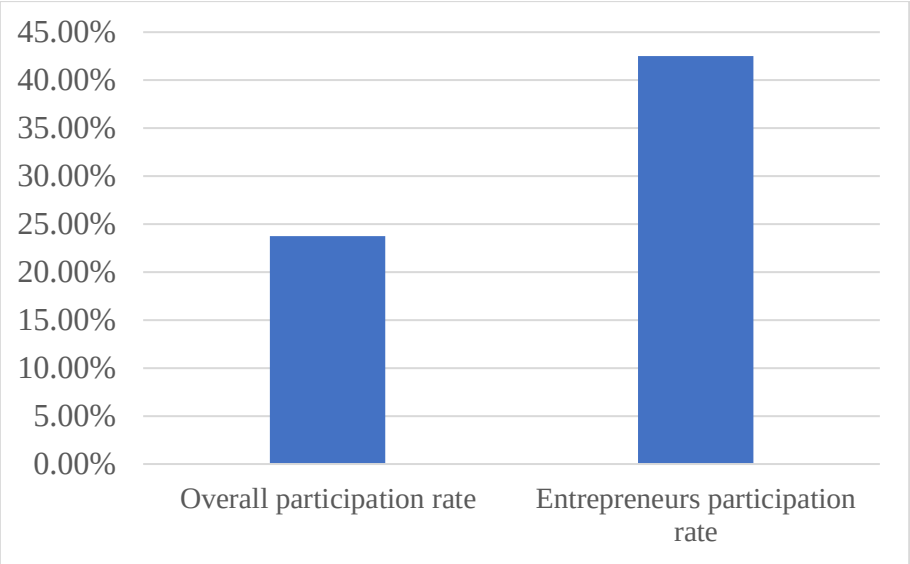

Figure 1 Individual and Entrepreneurial stock market participation rates

Source: 2016-2019 SCF data

2.3.2. Socio-economic characteristics

The dataset presents a complex socio-economic landscape. The sample's average age of 53, along with a median age of 54, indicates that the population belongs to an older generation. This suggests that financial security and stability may be a priority for this population. The gender distribution is predominantly male, with 77.62% of the sample. When it comes to stock ownership between males (27.70%) and females (9.93%) suggests a notable gender disparity in participation in the stock market. Similarly, males (33.32%) own more enterprises than females (6.88%). The study reveals that a substantial proportion of participants, specifically 62.40%, reported being married or in a committed relationship, while 39.10% indicated having children. These findings show that familial obligations may play a role in shaping individuals' financial decision-making, leading to a preference for investment strategies that prioritise caution and aversion to risk.

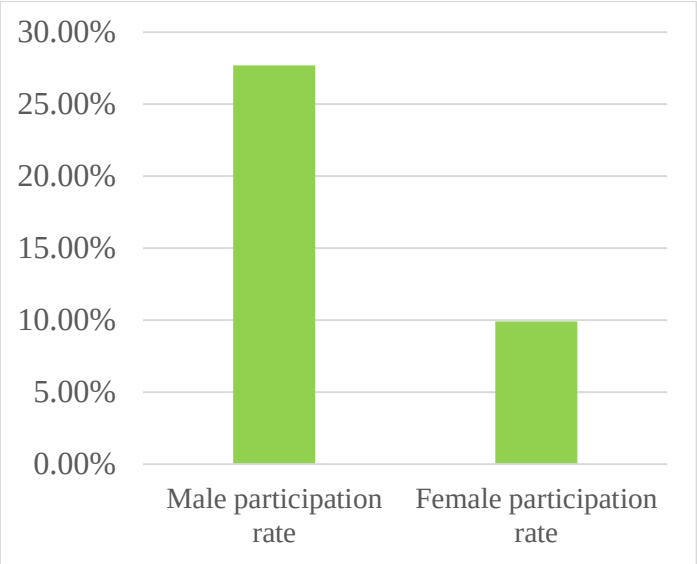

Figure 2. Gender disparities in stock market participation rates.

Source: 2016-2019 SCF data

The data reveals that education plays a significant role, as 70.29% of individuals possess a high level of education. Furthermore, within this educated group, 30.37% actively participate in the stock market, indicating a strong correlation between educational achievement and financial involvement. Regarding employment, the majority of 78.21% are in traditional employment, while the self-employed, accounting for 21.79%, exhibit an almost 40% participation rate in the stock market. The dataset also shows a relatively high average income of around $1,125,236, which is consistent with the observed active participation in the stock market. This suggests that higher income levels enable individuals to have more chances for investment.

2.3.3. Preferences and attitudes

The participants demonstrated a solid awareness of financial matters (FINLIT), as indicated by average scores of 2.31 for financial literacy, where each participant was asked 3 questions and 10 questions to test their awareness of personal finances, (described as KNOWL variable) which made up 7.39 on average score. 2.15% of the sample save money intentionally for investment goals, named as SAVRES8 variable. Followed by 29.76% have brokage accounts (HBROK), suggesting that there is a relative high rate of interest in investment activities.

Even though there is a very low level of risk tolerance present in the sample, as just 4.97%, and slightly over the third, 34.15% are involved in the stock market, which highlights a cautious attitude towards potentially volatile investments. The average debt-to-income ratio is currently 0.45, indicating not an extremely high rate, however, this might discourage people from engaging in investing in risky activities, such as stock market.

The data sets suggests that the older people get, the more they understand financial matters and actively engage in investment activities. Nevertheless, they take careful approach towards investing, since they are likely to be more influenced by social factors, such as family obligations, income levels, conscientious approach to debt management etc. The study emphasises how important it is to consider a variety of socioeconomic factors when analysing financial plans and investment behaviours.

There is a multicollinearity observed between variables such as MARRIED and KIDS and other independent variables like HHSEX (gender), which can lead to an increase in variances of parameter estimations, which in turn might produce less reliable statistical conclusions. The inclusion of the variables MARRIED and KIDS may not add additional explanatory power and may perhaps complicate the model excessively if they show a high association with other factors already included in the model.

Since the variable NETWORTH, which represents the participants' cumulative net worth, has the same meaning as other financial variables like INCOME and PIRTOTAL, which represent income and the debt-to-income ratio, it was excluded from the analysis. Considering their concepts are similar, adding them to the model could result in duplication and likely yield not much valuable data regarding the influence of stock market participation.

In the data set we have variable HBUS, describing active or non-active business ownership, which is referred to an entrepreneurship variable, and OCCAT1 describing self-employed or working for someone else. At first glance they are the same, but they are not. The data in correlation matrix table shows the correlation is only about 66% - so these variables reflect different information. Being business owner is not the same as being self-employed. Self-employed person might be a freelancer, a private tutor, blogger and etc, but having a business is directly related to entrepreneurship.

Correlation matrix is described in Appendix 3.

2.4 Regression specification

A quantitative methodological approach was employed in the research to investigate the factors that impact stock market participation. This study tests the hypotheses presented in Section 1.3 and attempts to discover significant factors influencing stock market participation through a cross-sectional regression analysis.

The main dependent variable is stock market participation, described as HSTOCKS, a binary outcome. Followed by a set of independent variables is included to examine their relationship to this outcome. HBUS is a binary variable that highlights the entrepreneurial status of the participant, demonstrating whether or not they have a business. Educational category (EDCL) is also a binary variable, that describes the higher degree level of participants. To examine the hypothesis related to financial literacy, the FINLIT variable was included in the analysis. Personal Income (INCOME) and risk tolerance (YESFINRISK) variables were added because they are one of the key factors influencing stock market participation rate according to the research from past studies. Moreover, the risk tolerance (YESFINRISK) variable can be described as an entrepreneurial trait, which according to the previous literature is a widespread characteristic among entrepreneurs. Demographic variables are age (AGE) and gender (GENDER) were included in order to investigate the gender and generation disparities when it comes to stock market involvement, alongside the occupation category (OCCAT1) variable. In the end, the ratio of monthly debt to monthly income (PIRTOTAL) was added, which also can be referred to propensity to take risks trait.

Before running regressions, data must first be prepared for analysis. One of the obstacles that can create spurious regression results can be the presence of outliers. Outliers can distort the coefficient estimates for the regression, leading to biased parameter calibration and misleading relationship between the variables. In order to eliminate such possibility, outliers were first identified using interquartile range (IQR) and then trimmed accordingly. In our dataset, a variable that could have outliers were INCOME and PIRTOTAL. For more details of removal of INCOME and PIRTOTAL outliers, look up in Appendix 4.

Given the binary nature of the dependent variable, logistic regression is employed as the analytical technique. The logistic regression analysis will be executed using Gretl, adhering to the logit model framework, with detailed methodology explicated in Section 3.1. Additionally, exploratory correlation analyses between the variables are conducted using Excel to investigate any supplementary interrelations.

For detailed description of variables look up in Appendix 1.

3. EMPIRICAL RESULTS

3.1 Regression results

In the analysis of stock market participation, I have developed 3 distinct logistic regression models to evaluate the hypotheses. The outcome variable of interest in these models is whether individuals participate in the stock market. The initial models are basic, focusing on socio-economic factors like age, gender, income, educational background, occupation category. The second model expand to encompass entrepreneurial variable, having active or non-active business. Finally, the third model introduces variables as financial literacy, propensity for risk-taking and overall knowledge of personal finance, where results are recorded by number of correct answers out of 10 given questions.

Table 3.1.1. Regression results

	Model 1			Model 2			Model 3		
Variable	Odds	P-val.		Odds	P-val.		Odds	P-val.	
AGE	1.01	0.00	***	1.01	0.00	***	1.01	0.00	***
HHSEX	1.77	0.00	***	1.76	0.00	***	1.55	0.00	***
EDCL	2.83	0.00	***	2.83	0.00	***	2.42	0.00	***
INCOME	1.00	0.00	***	1.00	0.00	***	1.00	0.00	***
PIRTOTAL	1.11	0.77		1.11	0.77		1.01	0.97	
OCCAT1	0.94	0.09	*	0.92	0.08	*	0.92	0.06	*
HBUS				0.98	0.50		0.98	0.68	
SAVRES8							1.32	0.00	***
YESFINRISK							1.32	0.00	***
FINLIT							1.45	0.00	***
KNOWL							1.08	0.00	***
N	28885			28885			28885		
Adj, R2	20.30%			20.29%			21.34%		

Note: *p < 0.1; **p < 0.05; ***p < 0.01, dependent variable is participation
Source: Alakbarov (2024), author's calculations based on SCF data

In the regression models, the odds ratios indicate how the likelihood of the dependent variable (stock market participation) changes with a one-unit change in the predictor variable, holding other variables constant. Here's what each independent variable shows across the three models:

Model 1

The logistic regression analysis reveals a detailed understanding of the factors that influence stock market participation. Age has a positive impact, as indicated by an odds ratio (OR) of 1.01. This means that for each extra year, the probability of participating in the stock market increases by 1%. Gender disparities are significant, as males exhibit a significantly higher probability - shown by an odds ratio of 1.77 - resulting in a 0.77% surge in stock market involvement compared to females. Higher levels of educational attainment are strongly associated with a 183% increase in the chance of market involvement, as indicated by an odds ratio of 2.83. Contrary to expectations, the income level, with an odds ratio (OR) of 1.00, does not appear to have an impact on market involvement, despite the statistical significance of the association. The debt-to-income ratio, denoted as PIRTOTAL, exhibits an odds ratio of 1.11, where a high p-value indicates that it is not statistically significant, therefore has no association with stock market participation. Furthermore, self-employed individuals are slightly less likely to participate in the stock market compared to employees as the odds ratio is just 0.94 for OCCAT1, suggesting that self-employed people have 6% less of likelihood to participate than individuals working for someone else.

Model 2

Following further examination, the factors that influence stock market participation exhibit both consistency and variability in their ability to accurately predict outcomes." The impact of age remains stable, as indicated by an odds ratio (OR) of 1.01, highlighting a steady 1% rise in the probability of engaging in the stock market for every additional year. Gender continues to be a significant determinant, with odds ratio of 1.76. Therefore, being male still correlates to a significantly higher likelihood of participating in the stock market. The influence of education level remained on the same level of significance and odds ratio. This indicates that greater levels of education are strongly linked to participation in the stock market. The impact of income stays consistent with an odds ratio of 1.00, indicating no change in stock market involvement. This result is statistically significant and aligns with the implications of the prior model. The debt-to-income

ratio, denoted as PIRTOTAL, continues to exhibit a lack of significant correlation with an odds ratio of 1.11. In addition, the model included a new variable HBUS, associated with being an entrepreneur. The odds ratio of 0.98. indicates that owning a business is associated with a less participation likelihood than regular individuals, although, the model shows that the variable also lacks statistical significance, suggesting that there is no association with stock market participation.

Model 3

Updating the statistical model for stock market participation gives a more complete picture of the factors that affect individual decisions. Age still has an impact, remaining with an odds ratio (OR) of 1.01. Gender still has a significant relationship with participation, but the strength of this relationship has decreased to an odds ratio of 1.55 for males. The educational level remains a significant indicator, with a slight decrease in odds ratio (OR) of 2.42. The impact of income, represented by an odds ratio of 1.00, is still showing a statistically significant level.

The debt-to-income ratio, represented by PIRTOTAL, has an odds ratio of 1.01, and a larger p-value indicates that there is no significant impact. The impact of being in occupational group 1 (self-employed) has significantly diminished, remaining an odds ratio (OR) of 1.10, still indicates small impact on stock market participation. The impact of entrepreneurship (HBUS) on market activity is still not significant and has remained at the same level of odds ratio.

Newly introduced variables provide supplementary perspectives: The SAVRES8 variable, with an odds ratio (OR) of 1.32, indicates a 32% higher probability of individuals engaging in saving activities for investing purposes. The inclination to engage in financial risks (YESFINRISK) is correlated with a 32% increased probability of participation, as evidenced by an odds ratio (OR) of 1.32. Individuals with higher levels of financial literacy are 45% more likely to participate in the stock market, as shown by an odds ratio of 1.45. Finally, there is a significant impact on stock market participation by self-assessed knowledge of personal finances (KNOWL), with an odds ratio 1.08 suggesting of 1.08 times being more involved than others. This approach emphasises the complex and varied aspects of financial involvement, emphasising the interaction between demographic characteristics, economic actions, and financial knowledge.

When combining the results from several models of stock market participation, certain variables consistently show consistency and importance. Age and educational attainment consistently and positively influence the likelihood of market engagement, with more years of education and educational levels reinforcing this relationship. Although the impact of gender, specifically being male, is slightly decreasing over time, it still plays a substantial role in all the models that were examined. Income, although having an odds ratio (OR) of 1.00, provides a multifaceted situation where the p-value indicates the presence of subtle variables that could impact participation. It is statistically significant, there is a positive relationship with dependent variable, however the magnitude of effect is very small as the odds ratio is 0.000000000012, which indicates 1 additional dollar of income results in more 0.000000000012% increase in thousands of income results.

The entrepreneurship variable shows a lack of statistical significance level, so apparently it has no association with the stock market participation. In the third model, additional variables are introduced, each having a noticeable effect: saving for investment, a willingness to take financial risks, financial literacy, and knowledge of personal finances all play a significant role in the model, serving as important indicators of an individual's likelihood to engage in the stock market. These observations highlight the complex nature of financial decision-making and emphasise the significance of demographic, educational, and behavioural factors in influencing investment behaviours.

Model Evaluation

In order to evaluate models, multi-collinearity tests were used for each model. The Variance Inflation Factor (VIF) test is used to identify the potential correlation between the independent variables, which can lead to false regression estimates.

If the value of each variable exceeds 5, there is potential collinearity. As it can be seen, no variable in all the three models does not exceed 5, proving no relationship between itself and other variables, thus the model is robust.

Table 3.1.2. Evaluation model

	>VIF model 1	>VIF model 2	>VIF model 3
AGE	1.048207	1.049054	1.08456
HHSEX	1.088326	1.090859	1.11243
EDCL	1.048129	1.048106	1.076552
INCOME	1.431469	1.688158	1.746953
PIRTOTAL	1.000265	1.000261	1.001552
OCCAT1	1.273621	1.789727	1.78884
HBUS		2.143994	2.133037
SAVRES8			1.007374
YESFINRISK			1.020721
FINLIT			1.151645
KNOWL			1.128087

Source: Alakbarov (2024), author's calculations based on SCF data

The table above shows the results of model evaluation for 3 different VIF (variance inflation factor) models. Each model reports VIF values for various predictors like AGE, HHSEX, EDCL, INCOME, PIRTOTAL, OCCAT1 etc. The VIF values range from around 1.0 to 2.1, with most values being close to 1, indicating low multicollinearity between the predictors.

3.2 Discussions

The results of all three regression models investigated the factors influencing stock market participation and showed a wide range of influences consistent with the multidisciplinary theoretical framework that was mentioned in the literature of previous studies. To provide an in-depth comprehension of investing behaviours, this study combines psychology, economic prudence, and entrepreneurial enthusiasm.

The research of Christelis et al. (2010) and Van Rooij et al. (2011), who found that education was a key element in encouraging engagement in the financial markets, are supported by the analysis, as well as the long-lasting influence of age and educational accomplishment. Surprisingly, the predicted association of entrepreneurs with active stock market participation, discussed by Caliendo et al. (2007), the empirical results didn't support the idea. The statistical analysis showed being an entrepreneur has no association with stock market participation, whereas being self-

employed has a negative association as it suggests 0.08% less likelihood of participation than people working for someone else.

Even if gender dynamics are on the decline, they are nevertheless significant because they explain the gender differences in market involvement that have been documented (Barber and Odean, 2001; Croson and Gneezy, 2009). The consistent impact of income, despite its odds ratio of 1.00, suggests an uncertain effect that requires more investigation, as indicated by (Guiso et al., 2002).

The empirical results failed to support the research questions' hypothesised association between stock market participation and entrepreneurship. However, the research examined the relationship between characteristics commonly associated with entrepreneurs, like an aptitude for taking on risks, and their choices about investments and found positive correlation with stock market participation.

The first hypothesis puts forward the idea that stock market activity is more likely to be involved with entrepreneurs. The hypothesis was rejected by the regression analysis. The findings showed a significant relationship between higher stock market participation and entrepreneurial qualities, but not business ownership.

Another goal of the research questions in this paper was to study whether the probability of participating in the stock market is higher among those with high levels of financial literacy. Additionally, how having an entrepreneurial mindset impacts increased participation in financial markets. The data analysis revealed a significant correlation between financial literacy and stock market participation, which supports the second hypothesis and studies done before. Furthermore, the willingness to take risks, particularly associated with an entrepreneurial mindset, was found to be positively correlated with stock market participation, thus providing affirmative answers to the research questions and hypotheses.

3.3 Limitations

This study has intrinsic limitations that affect its results. Because the data are cross-sectional, it is difficult to draw conclusions about causality, a weakness that is often criticised in financial

research. The study of the temporal dynamics in investment preferences is limited by the absence of longitudinal data. Additionally, when particular data are unavailable, the model may be impacted by omitted variable bias, a common problem in empirical research that attempts to comprehend complex human behaviours.

The study's emphasis on a specific demographic group may not accurately reflect the breadth of investing behaviours seen in various cultures and economies, as highlighted by (Guiso et al., 2006), which is another major limitation. As a result, while the study highlights significant factors influencing stock market participation, its conclusions are not broadly applicable.

Furthermore, while the study demonstrates how the entrepreneurial spirit influences investing decisions, it does not fully capture the variety of different types of entrepreneurs and the financial strategies that go along with them. This leaves room for more research.

In summary, this thesis has added to the body of knowledge about the factors that affect people's participation in the stock market, with a particular emphasis on the role of entrepreneurial traits. This study lays the groundwork for further research aimed at creating a more thorough understanding of investing behaviours.

CONCLUSION

The aim of this study was to investigate the relationship between stock market participation and entrepreneurship, with a focus on how the distinctive traits of entrepreneurs affect their investment behaviours. By carefully examining interdisciplinary literature that combines economics, psychology, and entrepreneurship, the study seeks to shed insight on the complex factors that lead people to engage in financial markets.

The main focus of the study was the relationship between stock market participation and an entrepreneurial mindset. The study questions were thoughtfully constructed to explore the extent to which entpreneurial activity, financial literacy, and education encourage active stock market engagement.

The empirical study found that although business owners, or entrepreneurs, tend to be risk-takers, they are less likely to be involved in stock market activity. As a result, it deviates from what the study predicted. More accurately, the study rejects the idea that entrepreneurial activities also impact individual investing strategies by discovering that being a business owner does not always indicate active participation in the market.

Additionally, the study's results confirm the basic importance of financial literacy in shaping investing habits, as suggested by authors of earlier studies. A correlation study revealed that those who possess a greater degree of financial literacy are more likely to be able to navigate the complexities of the stock market and engage in it.

The theoretical framework presented in the literature review is mostly in line with the conclusions of this thesis. Prior studies have demonstrated the various ways in which financial literacy affects market participation, the important role that gender dynamics play, age and the complex relationships between wealth and income that influence investing decisions.

By investigating the relationship between stock market participation and entrepreneurship, this study significantly adds to the body of financial literature. It also creates a foundation for more research on the financial participation of entrepreneurs.

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APPENDICES

Appendix 1. Variables description

Variable	Description	Measurement
AGE	Age of reference person	17-95 y.o.
HHSEX	Gender	0-Female 1-Male
EDCl	Education category	0- No high degree 1- High degree/
FINLIT	Number of financial literacy questions answered correctly	Value- 0, 1, 2, 3
SAVRES	Reason for saving: investment	0-No 1- Yes
OCCAT1	Occupation category	0- work for someone else 1- self-employed
INCOME	Total amount of income of household, 2022 dollars	Household income for previous calendar year. Inlcudes wages, self-employment and business income, taxable and tax-exempt interest, dividends, realized capital gains, food stamps and other support programs provided by the government, pension income and withdrawals from retirement accounts, Social Security income, alimony and other support payments, and miscellaneous sources of income.
PIRTOTAL	Ratio of monthly debt payments to monthly income.	Numeric value
HBROK	Having a brokage account	0-No 1-Yes
HSTOCKS	Have stocks	Yes or no

KIDS	Total number of children in household	Includes natural children,step-children, and foster children of household reference person or spouse/partner.
MARRIED	Marital status of reference person	0-neither married nor living with partner 1- married/living with partner
NETWORTH	Total net worth of household, 2022 dollars, the difference between assets and debt	The difference between assets and debt
KNOWL	Respondent's knowledge of personal finances	-1 is not at all knowledgeable. 10 is very knowledgeale.

Source: Alakbarov (2024), author's calculation

Appendix 2. Descriptive statistics

	Mean	Standard Error	Median	Standard Deviation	Minimum	Maximum	Count
AGE	53.22	0.10	54.00	16.24	18.00	95.00	28885
HHSEX	0.78	0.00	1.00	0.42	0.00	1.00	28885
EDCL	0.70	0.00	1.00	0.46	0.00	1.00	28885
MARRIED	0.62	0.00	1.00	0.48	0.00	1.00	28885
KIDS	0.75	0.01	0.00	1.12	0.00	7.00	28885
HBUS	0.27	0.00	0.00	0.45	0.00	1.00	28885
HBROK	0.30	0.00	0.00	0.46	0.00	1.00	28885
HSTOCKS	0.24	0.00	0.00	0.43	0.00	1.00	28885
SAVRES8	0.02	0.00	0.00	0.15	0.00	1.00	28885
YESFINRISK	0.05	0.00	0.00	0.22	0.00	1.00	28885
FINLIT	2.31	0.00	3.00	0.84	0.00	3.00	28885
KNOWL	7.39	0.01	8.00	2.18	-1.00	10.00	28885
OCCAT1	0.22	0.00	0.00	0.41	0.00	1.00	28885
PIRTOTAL	0.45	0.06	0.07	10.18	0.00	569.27	28885
NETWORTH	15601049.05	534540.63	272761.01	90848320.81	-1107620.66	2280387503.00	28885
INCOME	1125236.26	69491.22	92059.30	11810441.70	0.00	815633637.47	28885

Source: Alakbarov(2024), author's calculations

Appendix 3. Correlation Matrix

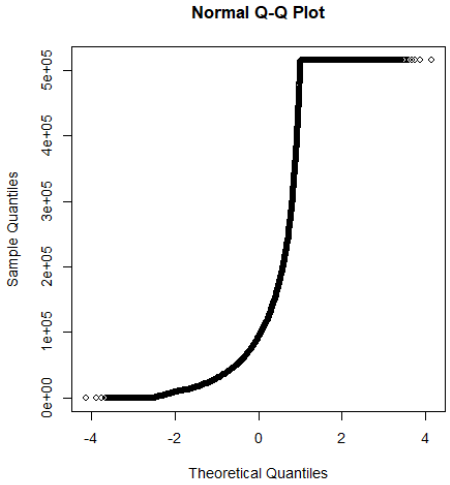
	AGE	HHSEX	EDCL	MARRIED	KIDS	HBUS	HBROK	HSTOCKS	SAVRES8	YESFINRISK	FINLIT	KNOWL	OCCAT1	PIRTOTAL	NETWORTH	INCOME
AGE	1															
HHSEX	-0.01	1.00														
EDCL	0.02	0.03	1.00													
MARRIED	0.04	0.65	0.06	1.00												
KIDS	-0.32	0.07	-0.04	0.23	1.00											
HBUS	0.16	0.25	0.17	0.29	0.05	1.00										
HBROK	0.20	0.21	0.30	0.23	-0.03	0.39	1.00									
HSTOCKS	0.14	0.17	0.24	0.19	-0.03	0.27	0.58	1.00								
SAVRES8	-0.02	0.03	0.00	-0.01	-0.03	0.05	0.04	0.02	1.00							
YESFINRISK	-0.04	0.04	0.02	0.01	0.03	0.08	0.07	0.06	0.05	1.00						
FINLIT	0.14	0.23	0.32	0.23	-0.05	0.27	0.35	0.26	-0.02	0.02	1.00					
KNOWL	0.20	0.15	0.20	0.22	-0.01	0.24	0.27	0.21	0.02	0.06	0.25	1.00				
OCCAT1	0.13	0.19	0.11	0.20	0.04	0.66	0.27	0.20	0.06	0.09	0.18	0.16	1.00			
PIRTOTAL	0.03	0.02	0.02	0.02	-0.01	0.05	0.02	0.02	0.00	0.05	0.01	0.03	0.05	1.00		
NETWORTH	0.13	0.08	0.07	0.11	-0.02	0.25	0.20	0.18	0.05	0.08	0.11	0.13	0.21	0.03	1.00	
INCOME	0.06	0.04	0.04	0.06	-0.01	0.13	0.11	0.07	0.02	0.06	0.06	0.07	0.11	0.00	0.62	1.00

Source: Alakbarov(2024), author's calculations

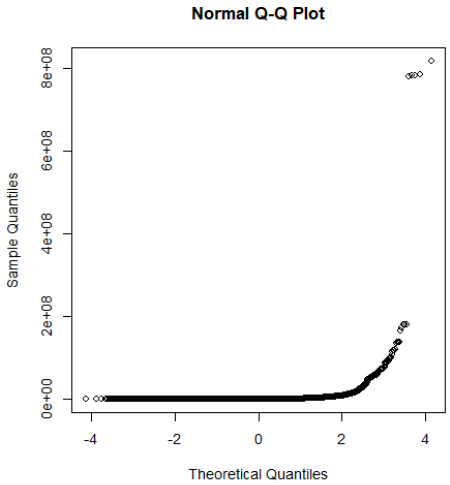
Appendix 4. Data outliers plot

First, quartile 1 (Q1) and quartile 3 (Q3) were calculated and the difference between 3rd and 1st was *interquartile range* (IQR). Then, based on formula (Q1 – 1.5 * IQR for the lower bound, Q3 + 1.5 * IQR for the upper bound), the lower and upper bounds were estimated. Given that the lower bound was a negative value and the income cannot be negative, we only looked at income values that exceeded the upper bound. Out of sample of 28885 observations, 4815 (16.67%) proved to be outliers as they exceed the upper bound value of 514.588. Thus, the outliers were trimmed via substituting the outlier values with the upper bound.

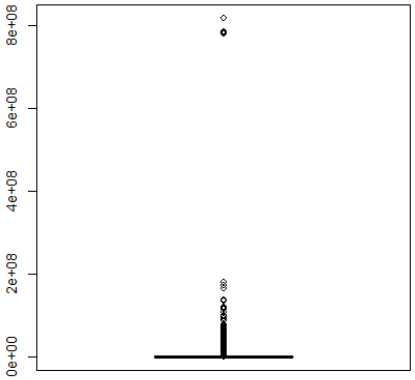
Using graphs below, we can see that the income variable improved statistically. First, we used Q-Q Norm plot to see the distribution. Ideal plot should be 45 degrees. We see that the one after outlier trimming resembles 45-degree line more than that of before. Also, since these variables are categorical, following the ideal linear trend is not mandatory as in time-series analysis. Moreover, the plot after trimming reminds the non-linear trend of logistic regression. Similarly, the boxplot after trimming heads toward center more than that of before.



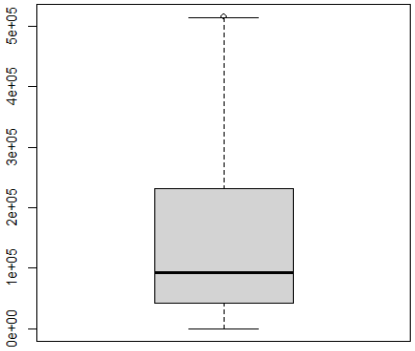
Graph 1. INCOME Q-Q Norm Plot before outlier trimming
Source: Alakbarov (2024), author's own calculations



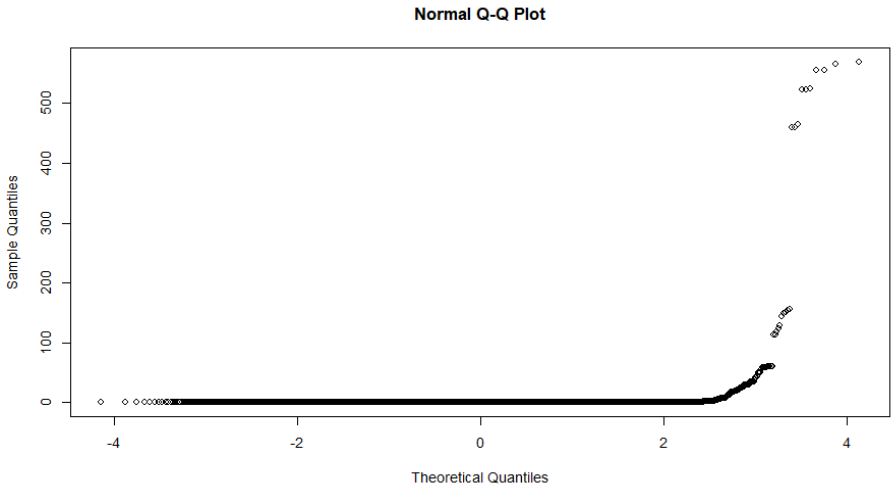
Graph 2. INCOME Q-Q Norm Plot after outlier trimming
Source: Alakbarov (2024), author's own calculations



Graph 3. INCOME Boxplot before trimming
Source: Alakbarov (2024), author's own calculations

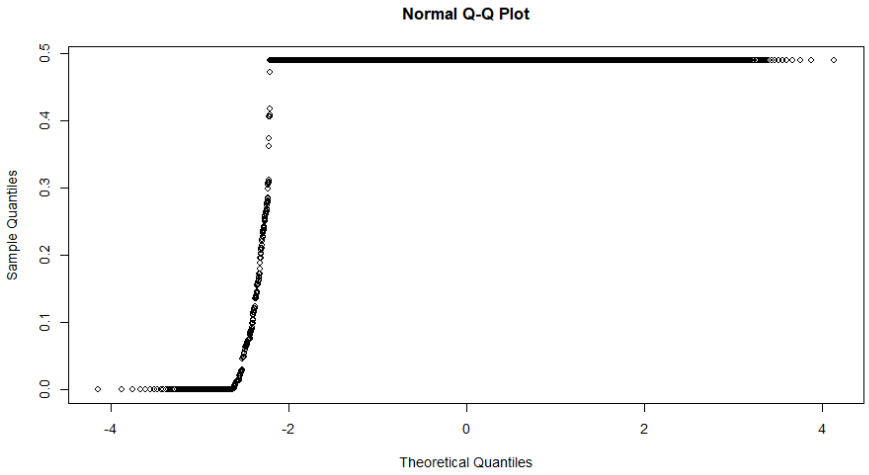


Graph 4. INCOME Boxplot after trimming
Source: Alakbarov (2024), author's own calculations

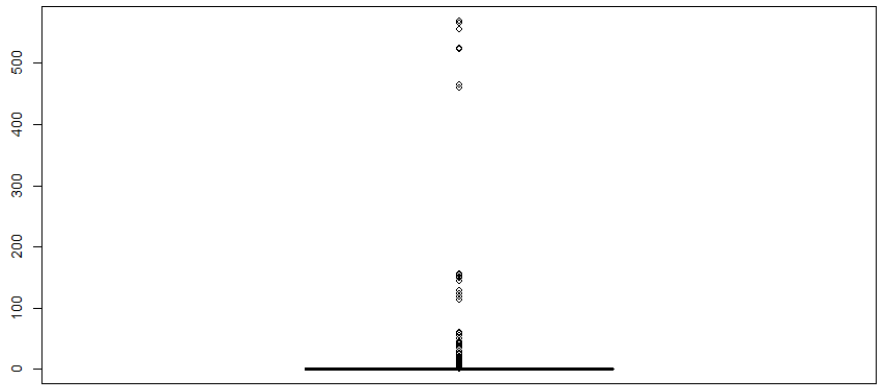


Graph 5. PIRTOTAL Q-Q Norm Plot before trimming

Source: Alakbarov (2024), author's own calculations

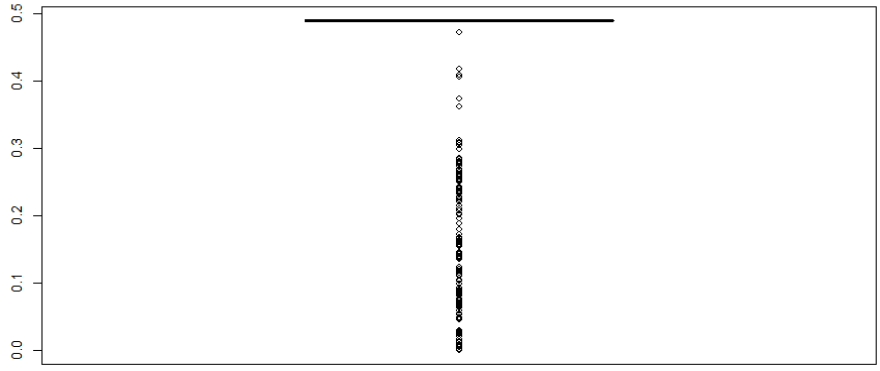


Graph 6. PIRTOTAL Q-Q Norm Plot after trimming
Source: Alakbarov (2024), author's own calculations



Graph 7. PIRTOTAL Boxplot before trimming

Source: Alakbarov (2024), author's own calculations



Graph 8. PIRTOTAL Boxplot after trimming
Source: Alakbarov (2024), author's own calculations

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