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DETERMINANTS OF FINANCIAL LITERACY: STUDY AMONG UNIVERSITY STUDENTS OF ESTONIA

Bachelor's thesis

Programme of International Business Administration, Finance

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Tallinn 2022

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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TABLE OF CONTENTS

ABSTRACT

In the modern world, almost everything depends on money, and financial unawareness about how to spend or invest money can lead to various problems. A low level of financial literacy would negatively affect not only consumers of financial services, but also a country and society. Due to the low level of financial literacy, a significant part of people often cannot pay bills even with high wages. There is also a great risk of falling for the tricks of frauds and losing the accumulated savings. Therefore, it is worth paying special attention to the formation of knowledge in the field of finance. The problem is that due to the low level of financial literacy, students do not know how to dispose of their money.

The purpose of the paper is to analyze the level of financial literacy among university students in Estonia and define the determinants of financial literacy and the extent to which they affect one's financial literacy score. The questionnaire was created in order to collect necessary data, and 103 responses were gathered. For the representation of results correlation, regression and descriptive statistics were used. The analysis of the collected information reflected respondents' lack of knowledge about investments, savings, and economical statements of the country. Moreover, respondents could easily spend money, make impulsive purchases, as they had the opinion that money should be spent, and such results show that some aspects of financial literacy should be studied more. After all, future research suggestions were made.

Keywords: Financial literacy, finance, investments, savings, financial behaviors, education.

INTRODUCTION

Financial literacy is one of the most important skills in today's society. It is defined by PACFL as "the ability to use knowledge and skills to manage financial resources effectively for a lifetime of financial well-being". With the constant development of monetary innovations and, in general, the importance of finances to every aspect of one's life, students are expected to be knowledgeable and make sound financial decisions.

Numerous factors have an effect on the levels of financial literacy. These elements include socio-economic and demographic variables such as gender, age, marital status, education level and education field and employment status. The purpose of this paper is to analyze the level of financial literacy among university students of Estonia and define the determinants of financial literacy and the extent to which they affect one's financial literacy score.

The following hypotheses have been formulated:
H1: Students majoring in mathematics, business, economics or finance show higher levels of financial literacy.
H2: Students that are currently employed have higher levels of financial literacy.
H3: Students from Tallinn University of Technology have higher levels of financial literacy.

The findings of the study will be useful to understand which socio-economic and demographic variables have a more significant effect on financial education. Understanding what may be the cause for lower financial literacy scores will help to improve on said points and support the social groups that need it the most.

The research is structured in the following way: firstly a description of the term financial literacy is given. The problem of inconsistency in its definition is discussed. Then, the theoretical background on socio-demographic variables and their effects on financial literacy is presented. Ways to measure financial literacy levels are discussed and it is described which one is going to

be used in this paper. The following is a review of previous research done on the topic. The second chapter is dedicated to the data and the methodology that was applied to the study. Descriptive statistics are shown alongside a regression model that gives an overview of the obtained results. The last chapter summarizes everything discussed previously and draws conclusions.

1. THEORETICAL FRAMEWORK

1.1. Financial literacy

Financial literacy is a skill of high significance for any person in our progressively complex world. In spite of its importance, multiple researches worldwide have found evidence that a decent part of the world's population still lacks knowledge on the matter and consequently is quite financially illiterate. (Lusardi, Mitchell, 2011; Atkinson, Messy, 2012)

Despite the fact that the field of financial literacy has been under tremendous attention in recent years and a great deal of research has been done on the matter, there is still a lack of consistency in how it is defined. Authors view the topic from different standpoints; take diverse approaches to the subject, attaching distinct connotations to it.

According to Remund (2010) financial literacy is a: "measure of the degree to which one understands key financial concepts and possesses the ability and confidence to manage personal finances through appropriate short-term decision-making and sound, long-range financial planning, while mindful of life events and changing economic conditions." The definition highlights that understanding the nature and implications of financial literacy is a complicated subject.

Others refer to financial literacy as fundamental skills and knowledge that people require in order to thrive in today's society (Mahdzan & Tabiani, 2013). The term can be explained as the ability of a person to comprehend and put to use financial information and skills in their daily lives (Ibrahim, Harun & MohamedIsa, 2009). Lusardi and Mitchell (2014) described the term as "people's ability to process economic information and make informed decisions about financial planning, wealth accumulation, debt, and pensions".

Taking all of that into consideration it is safe to say that there is no right or standard definition to financial literacy.

It is important to mention that there are some gaps in key components regarding financial literacy. The main concern is that such terms as financial literacy and financial education and even financial knowledge are often used as interchangeable terms or synonyms in literature and mass media. However, as stated by Mccormeck (2009) and Huston (2010), financial literacy encompasses far more than just financial education, therefore using these terms as synonyms can cause complications.

This factor is properly covered by the definition of financial literacy suggested by the OECD. By the Organization for Economic Co-Operation and Development (OECD, 2013) financial literacy has been defined as a combination of awareness, knowledge, skill, attitude, and behavior required to make financial decisions and ultimately achieve individual financial well-being. Thereby, the OECD addresses financial literacy as a multidimensional concept that represents not only knowledge, but also skills, attitudes and obtained experience.

Financial knowledge refers to information and concepts obtained by an individual with the intention of being able to compare financial products and services and make sound, thoughtful financial decisions. Consumers can manage their finances and respond effectively to news and events that may affect their financial condition if they have a basic understanding of financial concepts and the capacity to apply numerical skills to financial difficulties.

Financial knowledge can be assessed either objectively by the means of survey questions or subjectively through asking respondents to judge their own knowledge against the knowledge of their peers (OECD, 2016).

Financial behavior regards financial decisions and actions. A person’s life, financial situation and well-being can be both positively and negatively affected by their financial behavior. Some types of behaviors can have little to no correlation to the financial knowledge of a person, therefore it is important to differentiate between the two terms. Such behaviors include but are not limited to delaying bill payments, not planning for future expenditures, or choosing financial products without researching the market.

Individuals' time preferences and readiness to make planned saves are two factors that influence their financial attitudes toward long-term financial planning. One survey question, for example,

inquiries about short-term choices such as "living for today" and spending money. Such choices are more likely to encourage actions that can lead to a loss of financial stability and well-being.

1.2. Socio-economic and demographic variables

An important component connected to the issue of financial literacy is the study of the link between it and socioeconomic and demographic characteristics.

While some people aim to improve their financial management skills, others participate in dangerous practices. To further understand why such behavior disparities emerge, it is necessary to examine people's socioeconomic and demographic characteristics, bearing in mind their impact on financial literacy. Researches have shown relationships and impacts of socioeconomic and demographic characteristics with/on people's financial literacy levels in this setting. Gender, age, marital status, employment, number of dependent family members, educational level of a person and her/his parents and income are the primary factors under investigation.

1.2.1. Gender

There is a great amount of previous studies that have tried to link these variables to the financial literacy levels. According to the findings of Atkinson and Messy (2012), women have lesser financial literacy levels than men. It is further confirmed by finding by the OECD (2013), and Brown and Graf (2013). Such differences might be rooted in centuries of unequal access to education and the fact that finance is still male-dominated field, both education and work vice. It has been concluded that to this day parents keep separate expectations for their sons and daughters. Where boys are expected to work and provide for the family, girls are raised to be financially dependent. It is oftentimes further supported by the fact that parents provide more financial support to their daughters, even at university age (Edwards, Allen and Hayhoe, 2007). A study by GFLEC (2017) revealed that only in two of the researched countries - South Korea and Russian Federation - the percentage of women saving for old age is higher than the percentage of men. The same research found that the financial literacy gap is not restricted to a few nations, but occurs globally, in both emerging and developed economies, and is unrelated to a country's GDP level. Moreover, the gender gap in financial literacy should not be overlooked due to its special threat towards women, as they are more likely to become economically

vulnerable. This happens because women oftentimes have longer lifespans, shorter work experiences and some other factors.

Lusardi and Mitchell (2011) state that women are significantly more likely to choose “do not know” when answering the questions. This is further confirmed in a study done by Hasler and Lusardi (2017) where the research showed that in both major advanced economies and major emerging economies women are 5 to 7 percent more likely to answer that they do not know the answer.

Calamato (2010) explains the major difference in terms of gender is explained by the fact that males perceive money as a source of power and feel that possessing money will make them more socially acceptable, whilst women appear to have a more passive attitude toward money.

1.2.2. Age

Age has been linked to financial literacy in several studies. As a person grows older, they gather more and more knowledge rooted from practical life experiences (Agarwal et al., 2009). As a result, age has been proven to be an essential component in explaining financial literacy in several studies. Not only general life experience, but people also obtain higher forms of education, possibly additional education and work experience, all of which is only possible with time.

Financial literacy is greater among people in the middle of their life cycle, and it is lower among the young and elderly, according to Atkinson and Messy (2012). Research has shown that financial literacy to age correlation follows an inverted U shape. There are a couple of reasons that can explain such interconnection. Firstly, a person's memory, ability to learn and analytical skills decline when they move towards their elderly years. Aside from that, another explanation is in the fact that the majority of analyzed research on the matter was conducted in the past 20 years. Respondents to the surveys who fell into the older age groups had significantly less access to education in general, let alone financial education, than we have nowadays. A lot of them grew up having very different goals and concerns.

As stated by Ansong and Gyensare (2012) in their paper on the determinants of financial literacy among working students, financial literacy is positively predicted by respondents' age and job experience.

1.2.3. Marital status

Previous studies have also found correlation between marital status and levels of financial literacy. According to Calamato (2010), people who have lower financial literacy levels are prone to make risky or plain bad financial decisions, which in the long run can lead to debts and overall jeopardizing the well-being of their relationship. Thus there are several studies proving that people in relationships are more aware and cautious of their financial decisions, whereas single people tend to be more financially illiterate in comparison to married individuals (Brown and Graf, 2013). Furthermore, individuals living in cohabitation with their partner are usually more careful and aware about their spendings and budgeting as they are responsible for more than just themselves or completely the opposite - they put all the responsibility on their partner and are completely unaware of the financial behaviors and situation in their household.

1.2.4. Education

Both basic and advanced financial literacy has been proven to be connected to the level of obtained education of a person. Individuals with higher education tend to have higher financial literacy scores. To no surprise, there is a positive influence of subjects and courses related to finance and economics of day to day financial decisions. That applies to both higher education programs and specialized courses or seminars. Students from the courses of economics, business administration, finances, accounting tend to showcase higher financial knowledge levels.

However, when it comes to individuals with higher education in fields that have nothing to do with finance, there is a large proportion that displays low levels of more advanced financial knowledge (Van Rooij, Lusardi and Mitchell, 2007). As a conclusion, better educated people may not have the necessary information and abilities to make great investment decisions. It is also worth mentioning that Lusardi et al. (2009) in their survey discovered that parents' education level was a major predictor of financial literacy among young adults in the United States. Not only in the United States, but in general multiple studies have pointed out that parents have a substantial effect on their children's knowledge, attitudes, and financial conduct.

According to Clarke et al. (2005), the financial role is most typically played by parents. It has long been known that parents play an important influence in their children's socialization. As a result, a study (Jorgensen, 2007) discovered that parents had a considerable impact on their children's financial decisions. According to Calamato (2010), virtually all teens learn about personal money management from their parents, and 87 percent of pupils learn how to handle money from their parents. Mandell (2008) discovered that a person's financial literacy is proportional to their parents' educational degrees. Judging by these factors, parents' education can have a big impact on their children's literacy.

On the topic of financial education it should be taken into account that not many countries have financial education as part of the compulsory curriculum for children. Although it is becoming more common there is still a long way to go before it becomes part of official school programs.

Moreover, research studying university students' financial literacy levels (Cull and Whitton, 2011) has revealed that contrary to popular opinion, business students do not score better than everybody else. Research showed that those who study sciences (mathematics, physics, and chemistry) displayed higher results than both business students and students from other educational fields.

1.2.5. Work experience

Knowledge of any kind is bound to grow with experience. Gaining work experience is one of the most direct ways of learning about legalities and finances. With employment comes the need to understand and manage taxes, keep track of one's personal finances, budget and perhaps also manage savings. The more experience an individual has the more familiar they become with managing their finances. Therefore work experience is believed to be directly correlated with financial literacy.

1.2.6. University

This research looks at students from three universities - Tallinn University, Tartu University and Tallinn University of Technology. Each of the universities is best known for different subjects. Namely, Tallinn University of Technology has the biggest range of technical, math related

subjects as well as well-known faculties related to finance and business. Both are believed to be pre-determinants of higher financial literacy levels. Tartu University also has a wide range of technical faculties, alongside their most famous faculty - medicine. It has a tough admission competition and medical students especially are subjected to a diverse and difficult program which will likely develop their knowledge in various directions. Out of the three universities Tallinn University has the biggest variety of social sciences and fields within humanities, which are slightly less related to calculus, math and other skills that are believed to be linked with high financial literacy scores.

1.3. Measuring financial literacy

Given the range of conceptual definitions, it is expected that the methodologies used to test financial literacy vary quite significantly.

1.3.1 Objective measuring

The objective measurements are based on tasks that evaluate the respondents' real financial knowledge and abilities.

Huston (2010) lists four curriculum categories based on the financial literacy literature and recommends three to five items in each category for a total of 12–20 items. Money basics (which refers to the fundamental concepts of personal finance management); borrowing (which involves bringing future resources into the present through various types of loans); investing (which involves transferring present resources into the future through a variety of saving and investment products); and resource protection (through risk management techniques or insurance products). The OECD (2013) paper suggests a comprehensive method to developing a financial literacy metric. First, it defines 75 financial literacy elements after mapping the topic categories. Then, after administering the questionnaire in the field testing, it keeps 40 items for the main survey, spanning four distinct subject categories than Huston (2010) specified. Money and transactions, planning and managing wealth and income, risk and reward (the capacity to manage, balance, and hedge risks), and the financial landscape are the topics covered (including the understanding of the regulatory framework, rights and obligations in financial markets, the relevant sources of information and the financial environment in general).

The most extensively used and well-known knowledge-based financial literacy measure asks survey respondents three to five questions about four fundamental concepts: numeracy (interest), compound interest, inflation, and risk diversification. Lusardi and Mitchell (2011) were the first to employ these questions, and many others have subsequently followed suit.

These questions are used in one of two ways to create a financial literacy score. The first technique involves adding together the number of right replies to arrive at a score. The number of accurate replies might vary from 0 to the maximum number. Another way is to divide the total number of questions asked by the proportion of accurate answers. Scores might vary from 0 to 100 percent in this situation. These "scores" have the benefit of offering a quick, easy, and objective assessment of a person's cognitive financial ability. They also serve as a "benchmark" for comparisons by evaluating one's understanding of a few key financial literacy concepts that should, for the most part, be universally understood across target audiences and geographic areas (Hizgilov, Silber, 2020). Despite these benefits, some flaws have been uncovered, including probable errors and sensitivity to question design and wording (Lyons et al., 2019).

Without any form of standards, these sorts of results are impossible to comprehend. What does it actually mean if a responder answers three questions correctly and gets a 60% on a test if the researchers only ask five questions? Similarly, how do researchers assess the economic and financial implications of a positive association between financial literacy and a certain financial outcome? Furthermore, since these questions include both numeracy and financial literacy, determining whether they are testing for financial literacy, numeracy, or both is challenging.

To address these problems, some researchers have chosen to utilize more complete financial literacy assessments with extra items covering a wider range of financial topics (OECD, 2017). However, many of the constraints previously described still apply to these methods. Other studies have chosen to employ subjective assessments of people's self-reported financial knowledge and abilities. In these circumstances, respondents may be asked to rate how "knowledgeable" or "competent" they believe they are when it comes to their money on a Likert scale.

Overall, this body of work implies the multidimensional character of financial literacy, but it has never before been presented in the context of a structured multidimensional framework—that is, until now. The building of complete financial literacy indices, which comprise a blend of

objective and subjective knowledge measures, as well as experience indicators, is starting to emerge as a way to directly model and more rigorously assess the multidimensionality of financial literacy. From their own recent study, the authors present a few instances of these indexes (Lyons et al., 2019). The authors created these indices by adding the number of right answers to the objective knowledge-based questions, as well as the supplementary indicators for subjective financial knowledge and experience, which were built as binary measures with 0 or 1 values.

1.3.2 Subjective measuring

Individuals' financial confidence level is measured by subjective financial literacy, which assesses their self-assessed or perceived financial knowledge (French, Mckillop, 2016; Bellofatto et al., 2018). There is agreement among researchers on the items for the subjective financial literacy tests. Several studies use a single question and a Likert scale to determine how people estimate their financial literacy level (Lusardi and Mitchell, 2007)

Other researchers look at both objective and subjective measures of financial literacy. The comparison of the two measures may be used to determine a person's confidence in their financial expertise. When test-based and self-assessed financial literacy are compared, the research shows that people are overconfident about how much they truly know.

1.4 Previous studies on financial literacy levels

This thesis utilizes a questionnaire developed by OECD/INFE (2013) which was successfully employed in 14 countries, among which there is Estonia. This is done to enable comparison between different countries and also to see if there are any improvements in the results respondents from Estonia show. Since the survey held within the frameworks of this research paper was aimed at students of Estonian universities it is reasonable to compare it to the results of Estonian general public.

Out of the 14 countries that were analyzed Estonia has shown a fairly low overall financial literacy score that has put it on the 10th place.
However, when looking at data regarding financial knowledge Estonia has shown great results which put it in top 3 counties by the average score. This score was based on 8 questions that

required some general knowledge and calculation skills. Out of the questions Estonia's best result was in a question observing division - 93% correct response rate and the worst result was in a question regarding compound interest with only 31% correct response rate.

When it comes to financial behavior a couple of aspects are being observed. As an example, Estonia showed a very low percentage of people who have at least some responsibility for financial decisions in their household and have a budget. These two factors indicate fairly poor financial behavior; however Estonia showed the highest result when it comes to making informed product decisions. Around 67% of respondents stated that they seek information and advice before committing to a purchase. Despite that, overall financial behavior scores showed that Estonia has the lowest average levels of financial behavior out of the participating countries. The highest possible score for this division was 9, and only 27% of the respondents have gotten 6 or more, which is the lowest result and also worse than the next country by 11%.

Financial attitude scores were not much higher than financial knowledge or behavior. 46% of respondents from Estonia had an average score over 3 (out of 5) which put Estonia in 12th place with only Poland and Armenia below it. Overall, Estonia had the biggest drop in high score percentages when comparing knowledge and behavior - from 61% to 27%.

Several methodologies have been used to investigate the relationship between socio-demographic characteristics and consumer financial literacy.

Presented analysis showed that in Estonia male respondents had higher knowledge scores but lower behavior and attitude scores than female respondents. To put this into perspective, 13 out of 14 countries' results showed higher knowledge scores for men and only one country had the same percentage for both men and women. However when it comes to the behavior, Estonia along with only two other countries - Czech Republic and Norway - had results that showed that women had higher percentages of high behavior scores. Scores for financial attitude were either equal or higher for women in all countries except for Poland and Albania. Overall average score for men and women is practically identical in Estonia, difference being as small as 0.2 points.

As rightfully stated by OECD, financial literacy does not come with a certain income level, as income does not influence the capability of an individual to obtain knowledge, display certain behaviors or establish attitudes. However, depending on the income people might face very

different situations that may lead to actions that are deemed financially illiterate but sometimes cannot be avoided - for example, low income is oftentimes associated with borrowing money.

Unsurprisingly all countries have shown correlation between higher level of education and higher financial literacy scores. Results from Estonia were not as dramatic as in some other countries - namely Germany - but they were steady. This segment also showed that people with less than complete secondary school education rarely had any high scores in the presented questionnaire.

The results raise some serious concerns. Although the majority of individuals seemed to have some fundamental financial knowledge, awareness of other, more common financial concepts such as compound interest and diversification was missing across large segments of the population in every nation.

According to socio-demographic analysis, disparities in opportunity may be hindering people from becoming more financially educated. Low levels of education and income, in particular, are linked to lower levels of financial literacy, implying that some people are now excluded from activities and learning opportunities that may enhance their financial well-being. The research also emphasizes the importance of assisting women in many of the nations surveyed.

2. DATA AND METHODOLOGY

2.1. Data collection description

The questionnaire used for this research was heavily inspired by the OECD/INFE questionnaire of adult financial literacy (OECD, 2013). This was done to allow for the results to be compatible with studies of other countries. The questionnaire provides questions regarding chosen socioeconomic and demographic variables (gender, age, education level, work situation, and other information) as well as questions to assess financial literacy one three different levels - financial knowledge, financial behavior and financial attitudes.

Scores for several indices of financial literacy are calculated using the instructions from OECD. The financial knowledge score is based on responses to seven questions that reflect the subject's understanding of basic financial knowledge (or awareness) such as interest rate calculation and compound interest rate calculation, risk and return evaluation, inflation effect, and the benefits of financial diversification. Based on the number of right responses, this indication goes from 0 to 7.

The financial behavior score spans from 0 to 9 and is based on nine questions regarding household budgeting, saving, thoughtful purchases, bill payments, financial affairs, long-term financial objectives, and borrowing. The financial attitude score goes from 1 to 5 and is based on the respondent's replies to five questions concerning money, saving, and spending. A higher score indicates more cautious and deliberate activity. Because the final score for financial literacy is the sum of three scores, it ranges from 1 to 21.

This was a cross sectional research using a survey where the primary purpose was to identify the relationship between the variables. A questionnaire was used to obtain primary data.

Undergraduate university students of Tartu University, Tallinn University and Tallinn University of Technology were the target group for this study. A self-administered questionnaire was utilized to gather data using a survey approach. The sample size for this survey was limited to 103 people due to time restrictions.

Aside from questions aimed to assess financial literacy levels, the respondents were asked about their gender, age, marital status, whether they are currently employed, what academic field they are studying at university and whether they have ever taken any course, be that at school, university or in their free time, that had to do with finance.

The research used correlation, and multiple regression analysis. To characterize the respondents and assess the central tendency and dispersion, descriptive statistics were utilized.

2.2. Data and descriptive statistics

Responses of 103 university students were collected using the questionnaire described in section 2.1, 60 of whom were women and 43 men. In terms of age distribution most of the participants fell into the 18-26 age range, with only 5 respondents being 27 or older. Average age of the participants ended up being 22.5 years. More than half of the respondents have taken a course that had to do with finance in their life. At the same time, on average, respondents assessed their financial literacy levels at 3.22, with only 2 people thinking it was a 1 and only 6 respondents assessing it at 5. The participants are divided between Tallinn University, Tartu University and Tallinn University of Technology in quantities of 17, 24 and 62. 58.3% of students are currently formally employed, 35 part-time and 25 full-time. 15 are either self-employed or freelance and 28 currently are unemployed. As for marital status the majority of respondents are single, the second biggest portion are living with a partner or are in a relationship but do not live with their significant other. Among all respondents 35 are currently studying a major related to finance - economics, business, marketing, finance or accounting. A big part of respondents, 17.5% to be exact, are computer science students and 14.6% are medical students. There are also students from fields such as linguistics, natural sciences, engineering, music, arts, journalism, architecture, environmental studies and interdisciplinary studies.

Table 1. Descriptive statistics

	Mean	Standard deviation	Min	Max
Age	22,48	2,53	19	30
Gender	0,58	0,50	0	1
In a relationship	0,56	0,50	0	1
Formally employed	0,58	0,50	0	1
Education field is related to finance	0,34	0,48	0	1
University	1,56	0,76	1	3
Students of Tartu University	0,23	0,42	0	1
Students of TalTech	0,60	0,49	0	1
Students of Tallinn University	0,17	0,37	0	1
Have taken a finance course	0,63	0,48	0	1
SAFL	3,22	0,86	1	5

Source: calculations compiled by the author

Table 2 represents the percentages of correct responses to the questions that assess financial knowledge scores. For comparison the scores of Estonian respondents provided by OECD (2013) are also included. Both datasets show that the lowest percentage of correct responses falls onto the question about compound interest. That being said, students have shown a very high number

of correct responses to the question regarding calculation of interest, the definition of inflation and the division of a sum.

Table 2. Percentages of correct answers to financial knowledge questions.

	Division	Time-value of money	Interest paid on loan	Calculation of interest plus principle	Compound interest	Risk and return	Definition of inflation	Diversification
This research	91%	61%	89%	96%	55%	84%	91%	55%
OECD 2013	93%	86%	84%	64%	31%	72%	85%	57%

Source: calculations compiled by the author

The average score for financial knowledge ended up being 5.3 out of 7 or 75.2 out of a 100. Table 3 shows the division of scores across all respondents. If we consider scores of 4 and above as high scores, then 92% of the respondents have gotten a high score.

Table 3. Scores for financial knowledge by the number of respondents that got them.

Score	1	2	3	4	5	6	7
Number of respondents	2	2	3	22	25	29	20
Percentage	2%	2%	3%	21%	24%	28%	19%

Source: calculations compiled by the author

For simplicity of interpretation all further results have been equated to a hundred.

Financial behavior revealed to be the weakest section of the questionnaire. The average for it being only 54.9 out of a 100. Table 4 shows the division of scores across all respondents. Only 57% of participants have gotten a high score.

Table 4. Scores for financial behavior by the number of respondents that got them.

Score	1	2	3	4	5	6	7	8	9
Number of respondents	3	11	12	20	16	15	13	10	3
Percentage	3%	11%	12%	19%	16%	15%	13%	10%	3%

Source: calculations compiled by the author

Financial attitude showed slightly better results with average being 63.1 out of a 100. The percentage of high scores here was 86%.

Table 5. Scores for financial attitude by the number of respondents that got them.

Score	1	2	3	4	5
Number of respondents	4	10	58	26	5
Percentage	4%	10%	56%	25%	5%

Source: calculations compiled by the author

Overall average financial literacy level revealed to be 63.6 out of a 100, whereas self-assessed literacy level was 64.5. Tables 6 and 7 show the division of scores across all respondents.

Table 6. Scores for financial literacy by the number of respondents that got them.

Score	1-5	6-10	11-15	16-21
Number of respondents	2	13	62	26
Percentage	2%	13%	60%	25%

Source: calculations compiled by the author

Table 7. Scores for self-assessed financial literacy by the number of respondents that got them.

Score	1	2	3	4	5
Number of respondents	2	17	46	32	6
Percentage	2%	17%	45%	31%	6%

Source: calculations compiled by the author

In confirmation to the analyzed research, the survey data shows that respondents tend to be slightly over-confident when assessing their financial literacy themselves.

2.3. Determinants of financial literacy

As shown on Graph 1, in the section of financial knowledge gender did not show any difference - both men and women showed an average of 75 points. However, when it comes to behavior and attitude there are slight differences - women showed better results for both behavior and attitude. Overall average financial literacy score ended up being quite similar with a slight lead from women - 63.8 to 63.3. This goes directly against theoretical research, where huge majority of surveys revealed that women get lower results than men.

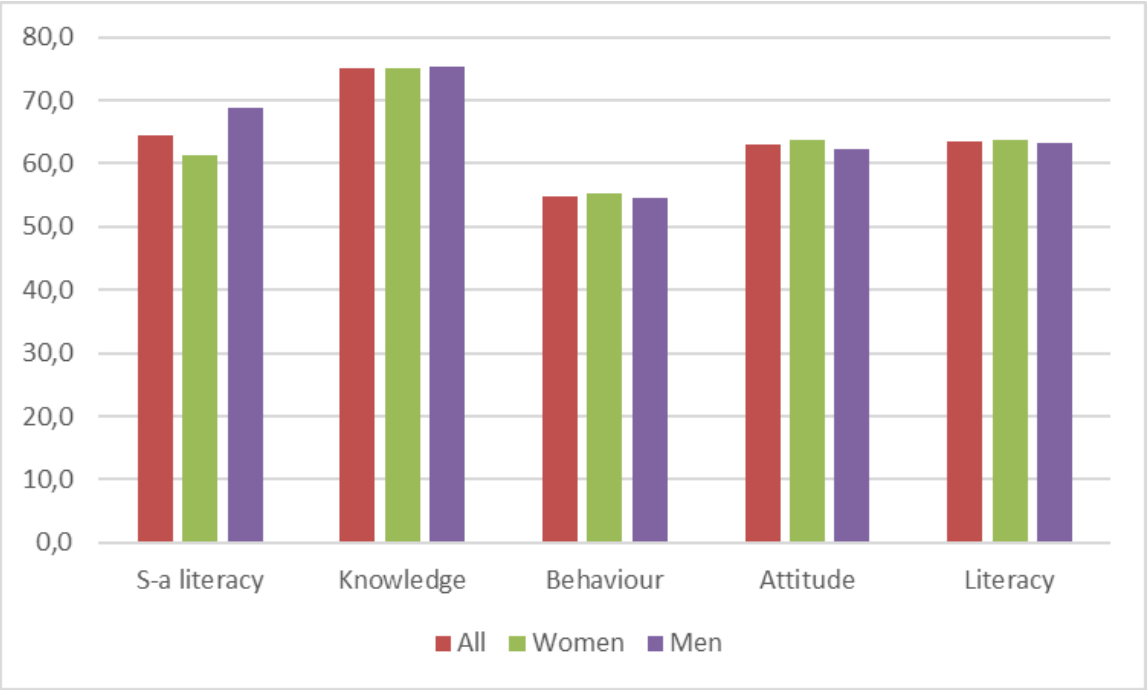

Figure 1. Scores in each section by gender.

Source: calculations compiled by the author

When looking at age there is a clear difference in financial literacy scores, especially between respondents that fall into the 21-23 and 24-26 groups. The 21-23 group displayed almost the highest average among age groups - 67.6, with only one age group being higher, whereas 24-26 showed the lowest results - 52.8. The age group 24-26 displayed lowest results in both behaviour and attitude scores and second lowest in knowledge with only respondents between the ages 27-29 being lower. Financial knowledge scores have shown surprising results, steadily declining as age went up, aside from the oldest group that showed a high result again. This contradicts all previous research that was analyzed, as scores are supposed to go up at the researched ages. The reason for such high results of younger respondents might be that in Estonia quite a lot of middle and high schools have economics as an elective subject allowing teenagers to obtain basic theoretical knowledge. Since this age group has probably just finished school the information is still fresh in their minds. It is also worth mentioning that self-assessed financial literacy shows that the older the respondents were the more overconfident they became, estimating their literacy levels quite a bit higher than they ended up being.

Respondents were asked to provide information whether they are formally employed - part-time or full-time, self-employed, do freelance work or are unemployed and the results showed the following information. Self-employed individuals displayed the lowest results in all three

sections - knowledge, behavior, and attitude - and consequently lowest results in financial literacy. Nevertheless they were exactly right with their self-assessed literacy levels.

Marital status revealed to have no correlation with the scores for financial literacy. Respondents who stated that they have a partner, whether they live with them or not, showed almost exactly the same levels of financial literacy as individuals who stated that they are currently single. On the other hand, respondents who live with their partner have displayed slightly higher results, than the ones that are in a relationship, but do not live with their significant other.

Next section demonstrates scores of individuals by their academic field. The academic fields were grouped the following way - economics, business, finance and marketing were grouped together, as they all are believed to predetermine good calculus skills and developed logic. The rest of the subjects were grouped together. Since there were two fields of education with a lot of responses - medicine and computer science - they were also analyzed separately. Medical students showed scores higher than finance students, which was both surprising and understandable, considering the difficulty of admission into the faculty.

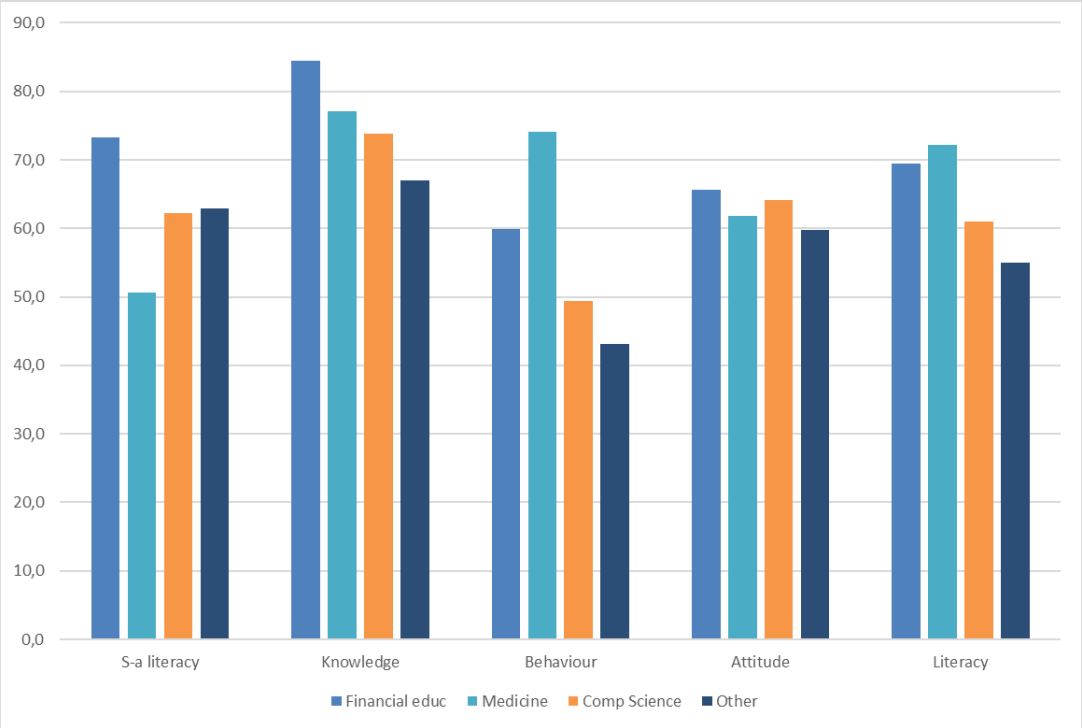

Figure 2. Scores by education field.

Source: calculations compiled by the author

The finance group showed quite high results in all sectors with a 69.5 average financial literacy score, which is substantially higher than the overall mean. Respondents from the medical field have also shown even higher levels of financial literacy, with the average being as high as 72.2. The remaining faculties showed noticeably lower results with an average of 55.1. It is also worth mentioning, that medical students are incredibly non-confident, self-assessing their literacy as low as 50.7, whereas finance students are overly confident with 73.3.

Finally, there is a notable difference in scores of respondents that have and have not taken a course that was associated with finance, accounting or related to said topics. The average scores of individuals who have taken a course (or multiple courses) are higher in all aspects and therefore their financial literacy score is higher - 65.5 to 60.5. The biggest difference in scores is in behaviors and the smallest is in attitudes. People who have not taken a course related to finance in their lives have also assessed their financial literacy almost the lowest out of all the different subcategories.

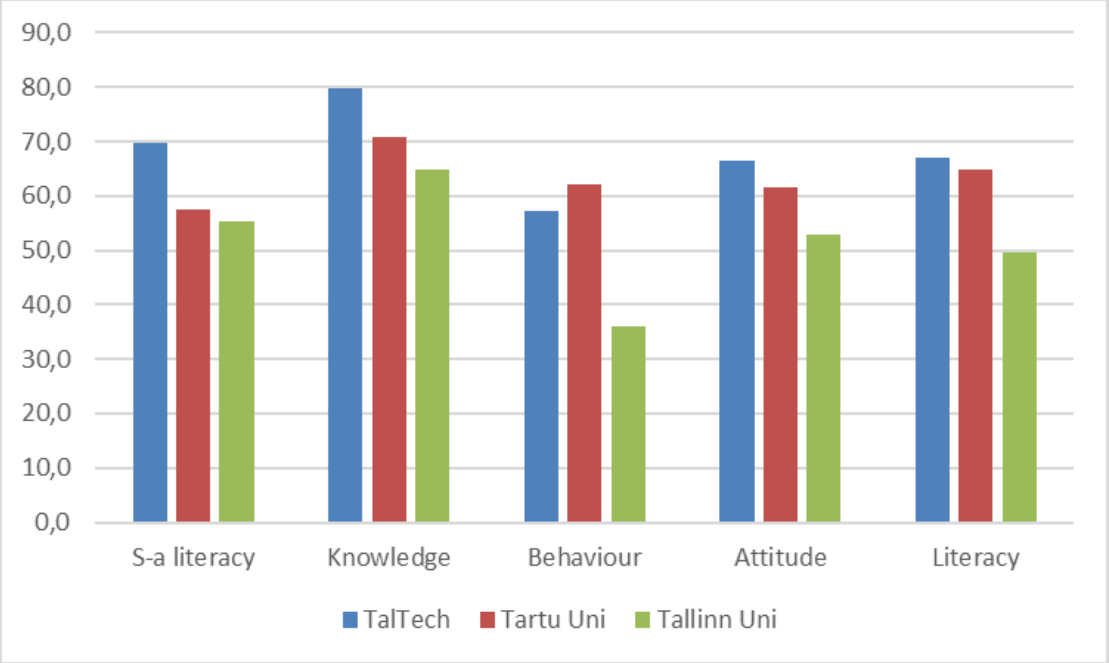

Figure 3. Scores by university.

Source: calculations compiled by the author

There is a clear difference in scores obtained by respondents from different universities. Unsurprisingly, students from Tallinn University of Technology showed the highest results, with their average financial literacy score being 67.0. Considering that between the three universities

Tallinn University of Technology is the one with the biggest range of finance related faculties and courses this result was quite expected. Tallinn University on the other hand showed very low results, reason for which might be the fact that respondents from that university were people pursuing education in subjects very unrelated to math and any sort of calculations.

2.4. Regression model

Because the primary goal of this project is to define the key determinants affecting undergraduate students' financial literacy levels, a separate study of the major socio-demographic characteristics and their influence on financial literacy levels was conducted using a regression model.

Gender, age, marital status, education level and field, work status, and university are among the socio-demographic and economic variables and factors used in the current study. This set of variables is treated as an independent variable in the research, while financial literacy is treated as a dependent variable to see how various things affect it.

Table 8. Regression model

	Coefficients	Standard Error	t Stat	P-value
Intercept	3,9968E-15	2,51349E-15	1,590138093	0,115310451
Age	1,73694E-16	8,61185E-17	2,016918038	0,046683966
Gender	-2,61261E-16	3,84527E-16	-0,679434998	0,498606015
MS	5,01776E-16	3,69682E-16	1,357316349	0,178074739
Employment	-1,04825E-16	3,68084E-16	-0,284786239	0,776462194
Field	-6,24962E-16	5,80351E-16	-1,076868624	0,28441706
Uni	-2,03575E-16	2,8755E-16	-0,70796314	0,480797616
Course	1,34875E-16	4,62072E-16	0,291892212	#NUM!

SAFL	-2,86617E-16	2,4169E-16	-1,18588607	0,238788729

Source: calculations compiled by the author

This research used a linear regression model to investigate the determinants of financial literacy. The regression equation is the following:

$$Financial\ literacy = \beta 1 + \beta 2 \cdot age + \beta 3 \cdot age^2 + \beta 4 \cdot gender + \beta 5 \cdot marital\ status + \beta 6 \cdot employment\ status + \beta 7 \cdot field\ of\ education + \beta 8 \cdot university\ of\ attendance + \beta 9 \cdot course\ related\ to\ finance + u$$

Where $\beta 1$ is intercept and u is residual (error). Since the scores for financial literacy are not distributed linearly by age there is a need to add an age^2 variable into the model.

Table 9. Correlation matrix

	FL	Knowledge	Behaviour	Attitude
FL	1			
Knowledge	0,67231	1		
Behaviour	0,85112	0,27056	1	
Attitude	0,52345	0,19463	0,25902	1
Age	-0,21423	-0,27206	-0,12438	-0,04417
Gender	0,01582	-0,01067	0,01458	0,04084
MS	-0,00537	-0,03211	0,00367	0,02394
Employment	-0,03806	-0,05463	0,00483	-0,06453
Field	0,30804	0,30247	0,20350	0,14929
Uni	-0,39417	-0,30660	-0,27009	-0,30033

TalTech	0,28483	0,29153	0,13375	0,25402
Tartu Uni	0,04811	-0,12463	0,17519	-0,04902
Tallinn Uni	-0,43036	-0,24248	-0,37588	-0,27913
Course	0,16289	0,19411	0,03774	0,19641
SAFL	0,17487	0,09238	0,10279	0,24816

Source: calculations compiled by the author

From the correlation matrix it is noticeable that there is a noticeable relationship between the university and financial literacy. Since Tallinn University was equated to a 3 and Tallinn University of Technology to a 1, and there is negative correlation, we can conclude that students from Tallinn University of Technology showed highest results and students from Tallinn University - lowest.

The field of education has the biggest impact on the knowledge scores, which have to do with actual mathematics and general knowledge, rather than decision making.

There is also a positive correlation between taking a course related to finance and financial literacy scores.

4. DISCUSSION

In accordance with the theoretical part of the paper, it is important to be financially literate, because almost all key areas of human's live are connected with finance in one way or another. A financially literate person knows how to earn money in different ways, how to optimally spend it, postpone, accumulate, save and multiply. The survey was made to collect data and understand how financially literate people are. Based on analyzed data, the average score for financial knowledge was 5.3 out of 7 or 75.2 out of a 100. , and, as the author noticed, the result is high which means that the biggest part of respondents knows how to appeal with money. However, the average financial behavior was only 54.9 out of a 100, and the financial attitude's average result was 63.1 out of a 100. Therefore, it was assumed that respondents had the lack of knowledge about investments, savings, and economical statements of the country. Moreover, respondents could easily spend money, make impulsive purchases, as they had the opinion that money should be spent, and such results show that some aspects of financial literacy should be studied more.

The surprising was the financial knowledge result that the 18-20 age group displayed the highest average among age groups - 80.5, while the 27-29 age group showed one of the lowest results - 57.1, which was supposed to be vice versa, as it was highlighted in the theoretical part that as a people grow older, they gather more and more knowledge rooted from practical life experiences. The analyzed results could have such statistics due to the changes in the financial world, and the tendency of young people to get more interested in investments, thoughtful spendings and savings. Furthermore, self-employed individuals had the lowest results in all three sections - knowledge, behavior, and attitude - and consequently lowest results in financial literacy. Such results might be connected with the fact that these people did not work for someone or quitted, for example, and self-employment could mean that a person is a freelancer or tutor, and his or her income may not be as stable as a person's, who works full-time. The author's personal example showed that people, who are freelancers, have a different understanding and sense of financial literacy due to the fact that they need to find enough clients to close monthly spendings,

but it is not always possible. Thus, at the end of a month these people could borrow money from family or friends, or not pay rent on time, and due to the lack of financial literacy, such people do not know how to act properly and do not have the lack of money at the end of a month.

The finance group of respondents from the study got high results in all sectors with a 69.5 average of the financial literacy score, which is higher than the overall mean. It was expected that students from this field will have high results due to the field of study, however, respondents from the medical field had shown even higher results, with the average being as high as 72.2. The author supposes that respondents from a medical field had such results due to the tight connections with math, ability to think and think out of the box.

Based on the results obtained from the questionnaire and subsequent analysis it can be determined that the first hypothesis, that states that students, whose academic field has to do with business, economics, marketing, accounting or finance have higher levels of financial literacy, is completely confirmed. Despite that, the second and third hypotheses cannot be verified by the research. There is no significant correlation between financial literacy scores of formally employed and unemployed individuals, however self-employed individuals showed extremely poor financial knowledge. When analyzing the third hypothesis it was discovered that Tartu University students showed almost the same results as Tallinn University of Technology students, whereas respondents from Tallinn University showed significantly lower scores.

It was revealed that there is a noticeable correlation between gender and financial literacy score among university student of Estonia.

4.1. Recommendations

The author highly recommends conducting further research on financial literacy, especially among school and university students due to the fact that the earlier a person starts to financially educate himself, the easier it will be to make decisions related to spendings in future. Moreover, the latest studies showed that if young people learn how to invest and save money, it will be possible for them to buy a property at the end of school or university studies because of the growing popularity of cryptocurrencies and NFTs. The author thinks that it is important to promote financial literacy at schools or even have special lessons where children will be able to

understand how to save money and wisely spend them, as not all parents provide enough information on this topic to teach them financial literacy.

Considering a noticeable difference in financial literacy scores by university, it is also a necessity to address the availability of courses to students of all faculties. Finances fall into a category of skills that are beneficial for everybody, regardless of the occupation; therefore it would be extremely helpful for students to be able to take an introductory course. Formal financial education in schools is still a very new concept; however with rapid development of financial technology field it seems to be a very logical step. Individuals should be exposed to basic financial education early on, to be able to expand on the knowledge though practical experiences and by their early twenties, when most of us have to make first independent financial decisions have a good base for conscious decision making.

Moreover, this paper could become a basis for the future research and analysis of financial literacy in Estonia.

CONCLUSION

The main objective of this research was to study which socio-economic and demographic variables have an effect on financial literacy scores of undergraduate students of three Estonian universities - Tallinn University, Tartu University and Tallinn University of Technology. Analysis of theoretical work has given an overview on the matter and studies that have already been carried out helped to develop hypotheses and make a decision regarding which questionnaire to use. A questionnaire developed by OECD (2013) was utilized to measure financial literacy levels. The particular questionnaire was used due to it being relatively short and precise and having all the necessary aspects. Moreover, using this questionnaire allowed the data to be comparable with the data collected previously in both Estonia and other countries.

The following hypotheses were established:
H1: Students majoring in marketing, business, economics or finance show higher levels of financial literacy.
H2: Students that are currently employed have higher levels of financial literacy.
H3: Students from Tallinn university of Technology have higher levels of financial literacy.

The first hypothesis was developed due to the assumption that students from the faculties of marketing, business, economics or finance are receiving formal financial education within their curriculum. The second hypothesis is based on the idea that formally employed individuals have to manage and deal with their finances more closely and have more experience with taxes, salary changes and budgeting. The third hypothesis was developed through the idea that Tallinn University of Technology has the widest variety of finance related courses and faculties that give the students more chances to get at least some formal education in finance.

Responses from 103 university students were collected and analyzed. The descriptive statistics and correlation analysis showed that there is a relatively strong correlation between the field of study being related to finance and higher financial literacy scores. However, it also showed that medical students have very good financial knowledge despite the lack of finance related courses in their program.

Employment status of the respondents revealed to have absolutely no correlation to the financial literacy scores, although previous research states that employed individuals normally are more financially literate and their scores only grow with the increase of years of experience.

Tallinn University of Technology has a number of faculties related to finance, therefore it was expected that students from this university will display high financial literacy scores, which they did. Tartu University has shown results not much lower than Tallinn University of Technology. Tallinn University however showed significantly lower results.

Considering the sample of this paper is very small and there were only 103 respondents to the questionnaire it is hard to consider the result as very representative of the entire population of undergraduate students of Estonia.

The objective of the study set by the author was achieved. The answer to the stated research question has been received. In the following research, more respondents can be added to the sample and additional variables can be measured.

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APPENDICES

Appendix 1. Questionnaire

How old are you?	below 18	18-20	21-23	24-26	27-29	30 and above
What is your gender?	Male	Female	Refuse to answer			
What is your marital status?	Married	Single	Separated/ Divorced	Living with a partner	Widowed	In a relationship but not living together
What is your employment status?	Full-time employee	Part-time employee	Self-employed	Freelancer	Unemployed	
What academic field are you studying at university? *						

Appendix 1. Continuation

Have you ever taken a course (at school, university or in your free time) that was associated with finances, accounting or related to said topics?	yes	no				
How would you assess your financial literacy level?	1 - very low	2	3	4	5 - very high	

*List of education fields the respondents could choose from:

- History
- Linguistics and languages
- Philosophy
- Religion
- Arts
- Literature
- Economics
- Geography
- Interdisciplinary studies
- Political science
- Psychology
- Sociology
- Natural sciences (biology, chemistry, physics)
- Computer sciences
- Mathematics/statistics
- Business

- Education
- Engineering and technology
- Environmental studies and forestry
- Journalism
- Law
- Medicine
- Military sciences
- Marketing and management
- Finances and accounting
- Architecture and design
- Music

Financial knowledge

Imagine that five brothers are given a gift of $1000. If the brothers have to share the money equally, how much does each one get? (answer only a number)	Open answer (Correct answer: 200)			
Now imagine that the brothers have to wait for one year to get their share of the X. In one year's time will they be able to buy:	More than they could buy today	The same amount as they could buy today	(Correct answer) Less than they could buy today	
You lend X to a friend one evening and he gives you X back the next day. How much interest has he paid on this loan? (answer only a number)	Open answer (Correct answer: 0)			

Appendix 1. Continuation

Suppose you put $100 into a savings account with a guaranteed interest rate of 2% per year. You don't make any further payments into this account and you don't withdraw any money. How much would be in the account at the end of the first year, once the interest payment is made? (answer only a number)	Open answer (Correct answer: 102)			
and how much would be in the account at the end of five years? Would it be:	(Correct answer) More than $110	Exactly $110	Less than $110	It is impossible to tell from the given information
An investment with a high return is likely to be high risk.	(Correct answer) True	False		
High inflation means that the cost of living is increasing rapidly.	(Correct answer) True	False		

Appendix 1. Continuation

It is usually possible to reduce the risk of investing in the stock market by buying a wide range of stocks and shares.	(Correct answer) True	False		

Financial behaviour

Who is responsible for day to day money management decisions in your household?	You, personally	You, jointly with another person	Someone else from your household	You do not know	
Do you have a household budget?	Yes	No	You do not know		
Before I buy something I carefully consider whether I can afford it.	1 - Never	2	3	4	5 - Always
I pay my bills on time.	1 - Never	2	3	4	5 - Always
I keep a close personal watch on my financial affairs.	1 - Never	2	3	4	5 - Always
I set long term financial goals and strive to achieve them.	1 - Never	2	3	4	5 - Always

Appendix 1. Continuation

Have you been actively saving or buying investments in the past year?	Yes	No			
When you need to make a financial product choice, you make it...	after gathering some info	after shopping around and using independent info or advice	none of the above (you do not base your decision on anything)		
Sometimes people find that their income does not quite cover their living costs. In the last 12 months, has this happened to you?	Yes	No			
If you answered "YES" to the previous question, then what did you do to make ends meet the last time this happened?	Took money from your savings	Cut expenses	Borrowed money informally (from family members, friends etc.)	Borrowed money formally (from a bank)	Fallen behind on payments

Financial attitude

I find it more satisfying to spend money than to save it for the long term	1 - Completely agree	2	3	4	5 - Completely disagree
I tend to live for today and let tomorrow take care of itself	1 - Completely agree	2	3	4	5 - Completely disagree
Money is there to be spent	1 - Completely agree	2	3	4	5 - Completely disagree

Appendix 2. Data from the questionnaire

Variable		Frequency	Percentage
How old are you?	below 18	0	-
	18-20	22	21.4
	21-23	49	47.6
	24-26	27	26.2
	27-29	3	2.9
	30 and above	2	1.9

Appendix 2. Continuation

What is your gender?	Male	43	41.7
	Female	60	58.3
	Refuse to answer	0	-
What is your marital status?	Married	2	1.9
	Single	57	55.3
	Separated/divorced	1	1
	Living with a partner	22	21.4
	Widowed	0	-
	In a relationship but not living together	21	20.4
What is your employment status?	Full-time employee	25	24.3
	Self-employed	10	9.7
	Unemployed	28	27.2
	Part-time employee	35	33.9
	Freelancer	5	4.9

Appendix 2. Continuation

What academic field are you studying at university?	Architecture and design	2	1.9
	Arts	5	4.9
	Business	18	17.5
	Computer sciences	18	17.5
	Economics	5	4.9
	Education	1	1
	Engineering and technology	4	3.9
	Environmental studies and forestry	1	1
	Finances and accounting	5	4.9
	Interdisciplinary studies	1	1
	Journalism	1	1
	Law	4	3.9
	Linguistics and languages	7	6.8
	Marketing and management	5	4.9

	Mathematics/ statistics	2	1.9
	Medicine	15	14.6
	Music	2	1.9
	Natural sciences (biology, chemistry, physics, Earth sciences, space sciences)	3	2.9
	Political science	2	1.9
	Psychology	2	1.9
Have you ever taken a course (at school, university or in your free time) that was associated with finances, accounting or related to said topics?	Yes	65	63.1%
	No	38	36.9%
How would you assess your financial literacy level? 1 - very low 5 - very high	1 - very low	2	1.9%
	2	17	16.5%
	3	46	44.7%
	4	32	31.1%
	5 - very high	6	5.8%

Appendix 2. Continuation

Imagine that five brothers are given a gift of $1000. If the brothers have to share the money equally, how much does each one get? (answer only a number	200 (Correct answer)	94	91.3
	Other	9	8.7
Now imagine that the brothers have to wait for one year to get their share of the X. In one year's time will they be able to buy:	More than they could buy today	11	10.7
	The same amount as they could buy today	25	24.3
	Less than they could buy today (Correct answer)	67	65
You lend X to a friend one evening and he gives you X back the next day. How much interest has he paid on this loan? (answer only a number)	0 (Correct answer)	92	89.3
	Other	11	10.7

Appendix 2. Continuation

Suppose you put $100 into a savings account with a guaranteed interest rate of 2% per year. You don't make any further payments into this account and you don't withdraw any money. How much would be in the account at the end of the first year, once the interest payment is made? (answer only a number)	102 (Correct answer)	99	96.1
	Other	4	3.9
and how much would be in the account at the end of five years? Would it be:	More than $110	57	55.3
	Exactly $110	35	34
	Less than $110	5	5.8
	It is impossible to tell from the given information	6	4.9

Appendix 2. Continuation

An investment with a high return is likely to be high risk.	True (Correct answer)	88	85.4
	False	15	14.6
High inflation means that the cost of living is increasing rapidly.	True (Correct answer)	94	91.3
	False	9	8.7
It is usually possible to reduce the risk of investing in the stock market by buying a wide range of stocks and shares.	True (Correct answer)	56	54.4
	False	47	45.6

Variable		Frequency	Percentage
Who is responsible for day to day money management decisions in your household?	You, personally	34	33
	You, jointly with another person	30	36.9
	Someone else from your household	38	28.1
	You do not know	1	1
Do you have a household budget?	Yes	44	42.7
	No	38	36.9
	You do not know	21	20.4
Before I buy something I carefully consider whether I can afford it. 1 - Never 5 - Always	1 - never	0	-
	2	5	4.9
	3	34	33
	4	36	35
	5 - always	28	27.2

Appendix 2. Continuation

I pay my bills on time. 1 - Never 5 - Always	1 - never	1	1
	2	4	3.9
	3	12	11.7
	4	30	29.1
	5 - always	56	54.4
I keep a close personal watch on my financial affairs. 1 - Never 5 - Always	1 - never	2	1.9
	2	15	14.6
	3	33	32
	4	25	24.3
	5 - always	28	27.2
I set long term financial goals and strive to achieve them. 1 - Never 5 - Always	1 - never	8	7.8
	2	29	28.2
	3	27	26.2
	4	23	22.3
	5 - always	16	15.5

Appendix 2. Continuation

Have you been actively saving or buying investments in the past year?	Yes	36	35
	No	67	65
When you need to make a financial product choice, you make it... (multiple choice question)	after gathering some info	84	81.6
	after shopping around andusing independent info or advice	44	42.7
	none of the above (you don't base your decision on anything)	9	8.7
Sometimes people find that their income does not quite cover their living costs. In the last 12 months, has this happened to you?	Yes	42	40.8
	No	61	59.2

If you answered "YES" to the previous question, then what did you do to make ends meet the last time this happened? (multiple choice question)	Took money from your savings	26	61.9
	Cut expenses	27	64.3
	Borrowed money informally (from family members, friends etc.)	19	45.2
	Borrowed money formerly (from a bank)	2	4.8
	Fallen behind on payments	3	7.1
Variable		Frequency	Percentage
I find it more satisfying to spend money than to save it for the long term 1 - Completely agree 5 - Completely disagree	1 - completely agree	14	13.6
	2	21	20.4
	3	41	39.8
	4	19	18.4
	5 - completely disagree	8	7.8

Appendix 2. Continuation

I tend to live for today and let tomorrow take care of itself 1 - Completely agree 5 - Completely disagree	1 - completely agree	3	2.9
	2	14	13.6
	3	26	25.2
	4	36	35
	5 - completely disagree	24	23.3
Money is there to be spent 1 - Completely agree 5 - Completely disagree	1 - completely agree	11	10.7
	2	22	21.4
	3	36	35
	4	26	25.2
	5 - completely disagree	8	7.8

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