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"Master Thesis U.S.E."

Investor Demographics and their Impact on the Intention to Invest in Cryptocurrencies: *An Empirical Analysis of crypto investors and non-crypto investors.*

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Abstract

The present study aimed to identify the background of crypto investors. Demographic and personal features were examined in relation to the effect they pose on investment frequency, intention to invest in cryptocurrencies and investment preference of crypto over non-crypto investments. Educational level was identified to demonstrate a negative relationship with intention to invest in cryptocurrencies, while crypto literacy was identified to demonstrate a positive relationship. Furthermore, two aspects of the theory of planned behavior (subjective norm, perceived control) were identified to demonstrate a positive relationship with intention to invest in cryptocurrencies. Two aspects of financial behavior (herding behavior, risk perception) were identified to pose an effect to investment preference of crypto over non-crypto investments. Finally, crypto literacy and attitude towards cryptocurrencies were identified to positively affect the selection of crypto over non-crypto investments.

1. Introduction

The concept of cryptocurrencies is relatively new as the bitcoin first appeared in 2009, being the first decentralized cryptocurrency. A cryptocurrency is defined as a decentralized system without a central authority, which uses cryptography in order to manage transactions, increase supply and prevent fraud. The transactions which have been confirmed are stored digitally and are recorded in the cryptocurrency accounting system, which is known as Blockchain. For the cryptocurrency processing and transactions conduction the use of powerful computers in terms of specifications and memory is required (Gandal & Halaburda, 2014).

The most popular cryptocurrency is bitcoin, which appeared in 2009 and was created by a computer scientist with the pseudonym "Satoshi Nakamoto". According to Nakamoto (2008), the cost of intermediation in the real currency market increases transaction costs, limits the minimum transaction size and reduces the feasibility of simple, daily transactions. At the same time, a wider cost arises regarding incapability to conduct non-refundable payments for non-refundable services. As a result of these factors, marketers are demanding more and more information to check the creditworthiness of their customers, while a certain percentage of fraud is accepted as inevitable. Instead, the introduction of an electronic payments system based on the cryptographic proof allows two parties to directly transact without the need for an intermediary third party. In addition, transactions that are not practically applicable for reversal protect sellers from fraud while common escrow mechanisms are applied to protect buyers. The Bitcoin network is a peer-to-peer network which manage and observe the creation of new Bitcoins (mining) and cryptocurrency transactions. The network includes a large number of computers connected to each other via the internet and performs multiple and repetitive mathematical calculations aimed at mining new cryptocurrencies but also at verifying the correctness of bitcoin transactions.

The Bitcoin system provides an upper limit to the amount of money in circulation, equal to 21 million Bitcoins, thereby excluding the risk that arises from increasing the number of coins to the extent that the currency is devalued. On its merits, Bitcoins include the absence of regulation of the money supply by a central bank or a government, and the facilitation of small and frequent transactions (Cocco et.al., 2017). On the other hand, there is always the risk of system collapse, the increase in money laundering of illegal activities, tax evasion and cybercrime, and variation of the value of virtual currencies (Richter et.al., 2015).

Cryptocurrencies have foreseen an increasing popularity as an investment choice. However, not everything is perfect in their digital environment. The fact that they are decentralized virtual coins, consists of them unprotected from any regulatory authority. Non-interference by a third party therefore implies problems, such as speculative activities, financing of terrorist organizations, drug trafficking, money laundering, hacking, fraud, investing in risky cryptocurrencies or bubbles. In economics, a bubble is the phenomenon in which the prices of some of assets in the market, grow so large that they far exceed their fundamental value, the present value of the expected income during the future from the specific assets. The calculation of the fundamental value, is difficult to predict since it is related to expectation and therefore the subjective judgment of everyone. That's why when it is recognized it is too late. An upward course of prices that is not based on a strong reason, but rather on the expectations of consumers can easily collapse and hit historic lows in the market. The bubble does not only appear in cryptocurrencies, but also in other assets such as bonds, stocks, real estate, commodities, metals, foreign currency, and all in one sector of the economy or even in a country.

Taking into account the high risk of cryptocurrency investments, it is interesting to examine the demographic background of investors that engage in cryptocurrencies. Investor demographics can provide significant insight in relation to the perceptions that shape the influence of the perceived risk and perceived value related to the adoption of a cryptocurrency investment decision. Socio-demographic factors (such as gender, income, age), as well as behavioral factors (such as attitude, perceived risk, financial literacy) can provide significant insights both towards the direction of evaluating the motives behind investing on cryptocurrencies, as well as towards the identification of factors that contribute towards a successful investment (in other words, an investment with higher returns). Furthermore, the identification of potential patterns related to investor demographics (such as frequency and speculation of investment decisions) can provide valuable information in relation to which demographic groups undertake the most prudent decisions in relation to an investment decision on cryptocurrencies. The present study is going to assess the impact of investor demographics on the intention to invest in cryptocurrencies.

Finally, a study of potential differences in attitudes towards risk, loss and skewness between crypto and non-crypto investors would provide significant insights in relation to the manner through which these groups should be assessed. More precisely, in case that particular differences are identified, an implication would be that crypto investors and their motivations

towards engaging in such an investment should be assessed under a different approach than traditional investors.

The present study examined the impact of a broad range of demographic factors and related aspects in order to identify a potential impact on the intention of an individual to invest in cryptocurrencies. More precisely, five research hypotheses were formulated and examined. The first hypothesis examined whether men demonstrate a higher investment frequency on cryptocurrencies. The second hypothesis examined the impact that several socio-demographic factors (gender, income, age, and education), financial literacy and cryptocurrency literacy pose to the decision of an individual to invest in cryptocurrencies. The third research hypothesis examined the impact that behavioral factors related to the theory of planned behavior (attitude, subjective norm, and perceived control behavior) have on the decision to invest in cryptocurrencies. The fourth hypothesis examined the impact of behavioral factors related to the financial behavior (illegal attitude, herding behavior, perceived risk) to the selection between a crypto or a non-crypto investment choice. Finally, the fifth hypothesis examined the impact of attitudes towards cryptocurrencies and crypto literacy on the selection between a crypto or a non-crypto investment.

According to the results obtained, gender was not found to have any statistically significant effect to investment frequency on cryptocurrencies. Intention to invest in cryptocurrencies was found to be related to cryptocurrency literacy and one sociodemographic factor (educational level). Two behavioral factors related to the theory of planned behavior (perceived control behavior, subjective norm) were found to be related to the intention to invest on cryptocurrencies, but the third examined factor (attitude towards cryptocurrencies) was not found to demonstrate any significant relationship. Two behavioral factors related to the theory of financial behavior (herding behavior, perceived risk) were found to be related to the selection of a crypto over a non-crypto investment, but the third examined factor (illegal attitude) was not found to demonstrate any significant relationship with all control variables included, only when the control variable age were added independently, the illegal actions were related to the investment selection of a crypto over non-crypto investment. Lastly, the attitude towards cryptocurrencies and cryptocurrency literacy were found to be related with the investment selection of a crypto over non-crypto investment.

The main contribution of the present thesis to the existing literature is that it identified several factors that can provide potential explanations in relation to the behavior of individuals that

engage in crypto investments. The identified factors that shape crypto investors behavior can be used for profiling purposes, as well as to assess several incidents that occur in the market and construct forecasting models for crypto investments.

2. Literature review

In economics, currencies have to do specifically with assets that are widely used and at the same time accepted by the whole society as a common means of payment, while modern economies consider as the most common version of currency coins and cryptocurrencies (Abel et al., 2021). Primary and advanced societies used money as a medium of exchange, as a measure of values (unit of economic value assessment) and as a means of hoarding (method of wealth preservation) (Abel et al., 2021). A cryptocurrency cannot be considered either as a reliable accounting unit, or a stable storage means of value (Burda & Wyplosz, 2013). Ongoing tests will prove whether the distributed recording technology can replace existing payment and record keeping mechanisms (Burda & Wyplosz, 2013).

Changes in policy as well as in the economic environment arising either from changes in consumer confidence or from ups and downs in the prices of markets bring different consequences in the short term and other effects on medium term (Blanchard, 2021). Cryptocurrencies are traded in exchanges with potentially different prices crossing different trade spaces (Giudici et al., 2020), which may end up being a possible source of deficiency (Plastun et al., 2022). So even if the return on money is low, the population prefers to use it as a means of transactions, when at the same moment there are assets, such as real estate, bonds, and stocks that yield significantly better performance than currencies (Abel et al., 2021).

Innovations tend to appear in clusters in defined periods. Clusters cause a rupture in the static equilibrium and thus trigger its development process, prices and profits increase, and economic initiatives (for profit) seem unable to succeed in a static economy (Screpanti et al., 2005). As the process of diffusion of innovations proceeds, prices tend to adjust to costs, profits are gradually eliminated and the economy as a whole approaches a new equilibrium (Screpanti et al., 2005).

Investors put their capital into decentralized cryptocurrencies that for better or worse are plagued by volatile prices, value fluctuations, fluctuations in returns. They take risks, they wish to get their initial capital, and multiply their money. If this is a bubble, unfortunately it is revealed in hindsight. As the price of one cryptocurrency evolves, the more its market capitalization increases, and it pulls the attention of many who think that they will make a lot

of money quickly. Reasoning in stock price manipulation exists when market participants with a high position in interest contracts have incentives to push the underlying market in a certain direction so as to affect the value of their contracts before they expire (Chow et al., 2003, Plastun et al., 2022). The demand in crypto is still great, although it fluctuates greatly in its price and in addition, other digital currencies with increasing reputation are being released at the same time. And the speculative behavior of this virtual coin (profit or loss of investors) is only concerned with price fluctuations (Kristoufek, 2013).

In addition, cryptocurrencies constitute a new type of investment, a factor of diversification of an investment portfolio with a lot of risk. The supervision and portfolio investment management are very specialized in the case of cryptocurrency market because of the high correlation between tools (Mazanec, 2021, Plastun et al., 2022). Cryptocurrencies can bring a lot of profit, but they can also cause massive damage. Many lose everything through risking investing in digital coins' bubbles. They are persuaded, deceived, take risks. The result more often is losses. Cryptocurrencies consist of an asset class of high volatility, where very high returns can be surpassed by large losses. Ante et al. (2022) examined cases of successful investments in cryptocurrencies and analyzed whether they can be explained from the same factors that explain successful investments in other assets. Their sample was consisted of German investors. The majority (56%) recorded profit from the investment in cryptocurrencies. A significant part of the sample (29%) recorded losses, while the remaining part of the sample had even results. The average profit of the sample was 300%. The research assessed socio-demographic factors. Net income, cryptocurrency knowledge and ideological motivation for investing in cryptocurrencies demonstrated a positive relationship with the acquisition of profit from this investment.

Stix (2021) examined the case of Austrian investors in relation to their intention to buy cryptocurrencies. Crypto investors were found to demonstrate on average a higher degree of financial knowledge, and a higher tolerance to risk in relation to non-investors. Factors such as a distrust towards the banking system or conventional currencies were not found to influence a decision to invest in cryptocurrencies. On the other hand, an expectation for higher profit, as well as a belief towards the advantages of cryptocurrencies for payments were found to strongly influence an investment decision. Perceptions related to the high volatility of such assets or the risks of fraud and online theft were found to act as reducing factors towards investing in crypto.

Xi et al. (2020) investigated the socio-demographic features of cryptocurrency investors and the factors that contribute towards relevant investment decisions, focusing on a sample consisted of Australian and Chinese investors, while conducting a comparison with investors that chose to invest in other coins. Differences between investors from the two markets were observed on factors such as age, gender, education, occupation, and investment experience.

Cryptocurrency investor demographics in the UK were cautious according to a research by Wang (2023). They were identified as low net-worth individuals. They tended to prefer investments of higher risk, while demonstrating a weak financial resilience towards losses. Specific features that would contribute towards a crypto investment decision were found to be a high level of digitalization, a positive attitude towards risk, and a low attachment to established brands. Furthermore, cryptocurrency investors were found to demonstrate negative emotions (e.g., distrust towards the banking system, dissatisfaction with their financial situation). Cross-investment links were identified between cryptocurrencies, crowdfunding and peer-to-peer lending.

Santoso & Modjo (2022) invested the features of Indonesian crypto investors, as well as the main driving factors behind their decisions. According to their findings, male individuals of younger age with a positive attitude towards risk and a previous experience in equity investing demonstrate higher probabilities of investing to cryptocurrencies. On the other hand, no relationship between higher financial literacy and income and investing in cryptocurrencies was identified. According to the research results, Indonesian crypto investors were profit-seeking individuals which were willing to accept higher risk levels.

Investors' stock market participation decisions were identified to be influenced by their money attitudes (Nadeem et al., 2020). Risk attitudes were identified to partially mediate the identified relationship between money attitudes and stock market participation. Furthermore, the role of financial knowledge and financial self-efficacy as positive moderating factors of the relationship between money attitudes and stock market participation was further confirmed. More precisely, different attitudes towards money were identified to result in different investment decisions.

Investment decisions have been identified to be sharply influenced by risk perception. More precisely, a relevant study (Agarwal et al., 2022) identified that in times of higher political uncertainty, households tend to reduce their participation to stock markets to a significant extent, and reallocate their funds to lower risk investment options, since they perceive a

situation with a higher risk in general. Investors' sentiments have been identified as a contributing factor towards predicting the stock market. More precisely, positive emotional tendencies were identified to increase the tendency to invest, while negative emotional tendencies were identified as a contributing factor towards reducing participation to the stock market (Jin et al., 2020). The existence of a potential relationship between a positive attitude towards risk and sentiments was studied on Alempaki et al. (2019). It was found that the better investors feel (i.e., the lower levels of fear they demonstrate), the higher the risk they are willing to undertake.

Personal traits have been identified to shape investors' behavior in relation to their stock market participation. More precisely, a compliant personality was found to demonstrate significant potential to engage in herding behavior, being influenced by social motivating factors. On the other hand, investors with a detached personality type were found to not being influenced at all by any motivating factor related to herding behavior (Kumari et al., 2020). Towards examining the influence of personality traits on stock market participation, the theory of planned behavior was proved to be a helpful tool (Lai, 2019). More precisely, the investment intentions were found to be significantly affected by subjective norm, attitude, and perceived behavioral control. Furthermore, subjective norm was identified to significantly affect attitude. People that have an open and agreeable personality tend to have influences related to subjective norms. Neurotic people tend to hold a negative stance towards stock investment. The personality traits of agreeableness, extroversion, conscientiousness and openness were identified to influence the perceived behavioral control. Finally, prior stock trading experiences pose a significant effect to the relationship between attitude and stock investment intention, and to the relationship between extroversion and subjective norm, attitude and perceived behavioral control. Another study based on the theory of planned behavior (Akhtar & Das, 2019) identified the attitude as being responsible for partial mediation between financial knowledge and investment decision, while financial self-efficacy was identified to mediate between personality treats and investment intention.

He et al. (2018) investigated the effect that investor risk compensation has on stock market returns, and the role of investor sentiment towards influencing the link between investor risk compensation and stock returns. Stock returns were found to be positively affected by current investor risk compensation, but negatively affected by past investor risk compensation. Furthermore, the positive effect that was identified is sustained under different current

sentiment states. On the other hand, the negative effect is also sustained under different past sentiment states.

3. Research Questions

1. Men engage more frequently in cryptocurrency trading, being more speculative.
2. Socio-demographic factors (gender, income, age, and education), financial literacy and cryptocurrency literacy are related to the decision to invest in cryptocurrencies (Sukumaran et al., 2022, Pham et al., 2021).
3. Behavioral factors related to the theory of planned behavior (attitude towards cryptocurrencies, subjective norm, and perceived control behavior) are related to the decision to invest in cryptocurrencies.
4. Behavioral factors related to the financial behavior (illegal attitude, herding behavior, perceived risk) are related to the selection between a crypto or a non-crypto investment choice.
5. Personal features (attitude towards cryptocurrencies, financial literacy, cryptocurrency literacy) are related to the selection between a crypto or a non-crypto investment choice.

4. Elicitation methods

In order to measure financial literacy, the method of Hung et al. (2009) was applied. According to this approach, financial literacy is related to three main aspects (portfolio diversification, compound interest and institutional knowledge). Multiple choice questions (which had one correct answer, two false answers and a “don’t know” option) of practical examples related to these issues were used in order to measure these aspects. Under this approach the extent to which participants were in a position to apply in practice their financial knowledge to investment decisions was accurately measured.

Cryptocurrency literacy was measured through multiple choice questions (they had one correct answer, one “don’t know” option and two false answers). The questions were related to key aspects and notions related to cryptocurrencies, aiming to measure whether crypto investors had an actual knowledge of their investment choice. This approach was based on Hidajat et al. (2021). However, instead of using “yes” – “no” questions, the present thesis applied a multiple-choice approach in order to assure that participants had an actual knowledge of the topic of each question, instead of answering a “yes” or “no” due to a misunderstanding.

In order to measure the aspects of behavioral factors related to the theory of planned behavior and financial behavior, a technique based on the Eckel and Grossman method (2002) was applied. This method was designed as a simple framework (thus, not requiring participants to

do complex calculations that would mislead them and result to inadequate results, such as calculating probabilities), which asks research subjects to do single choices from a number of gambles. The number of the presented gambles, from which the participant can select may vary. The gambles are designed so that risk-seeking participants would select those with the highest potential financial outcomes but the lowest probability to occur, risk-neutral participants would select those with medium potential financial outcomes and an average probability to occur, while risk-averse participants would select gambles with the lowest potential financial outcomes, but the highest probability to occur. The stable results that occur from this method (since it has a low difficulty level, being easily completed from all subjects), as well as the fact that the tasks can be completed during a short time was the main reasons for its choice, taking into account the high number of participants in the present study with different backgrounds as well as the time constraints, since the questionnaires had to be gathered during one week.

5. Research methodology

The data gathering process used a questionnaire in order to collect the data from the respondents. A questionnaire-based survey design is a proper choice in cases where there are cost and time constraints, there is a necessity to reach a high number of respondents, respondents should have as much time as they need in order to fill the questions. The questionnaire included demographic features (age, gender, income, educational level, investment experience). The measurement of financial literacy took place through multiple choice tests, as explained on the elicitation methods section. Four questions were used in the corresponding field. The first question gathered responses about each participants' number of assets in its portfolio. The other three questions were tests that measured participants' knowledge about portfolio diversification, compound interest, and inflation rate. The measurement of behavioral factors in relation to the theory of planned behavior (attitude, subjective norm, perceived control behavior), crypto-investments, and behavioral factors related to the financial behavior (illegal attitude, herding behavior, perceived risk, perceived benefit) took place through five scale Likert questions. The respondents' intention to invest in cryptocurrencies, their preference between cryptocurrencies or non-crypto investments and their frequency of trading cryptocurrencies were also measured on a 1-5 Likert scale. The main reason behind the Likert scale questions is that they provide results in a standardized form, reducing the chance of errors and setting feasible the comparability of responses. Finally, the respondents' cryptocurrency literacy was measured through five multiple choice questions that

examined their knowledge about fundamental notions related to cryptocurrencies. The questionnaire is cited on Appendix A.

The questionnaire was distributed to participants online, through the Qualtrics Forms platform. The main reason for selecting an online survey approach is that it set easy to recruit a wide number of respondents on a short time, as well as the fact that research subjects were capable to fill the questionnaire when they had the necessary time, increasing the response rate. 104 responses were gathered. The questionnaire was available to be filled between 01/06/2023 and 07/06/2023. Participants were informed about the privacy and anonymity of their responses.

The researcher applied the following models in order to test the hypotheses. They are based on Ante et al. (2022). Instead of the height of returns from crypto investments, on these models the Intention to invest functions as the dependent variable (with the exception of the first Hypothesis, where the independent variable is Frequency). Answers to the tests that were used to the questionnaire in order to measure Financial Literacy and Cryptocurrency Literacy were represented with the value "1" in case they were correct and "0" in case they were false, or the respondent declared that he/she didn't know the answer. The mean of answers corresponding to the questionnaire field that was related to each of the examined variable was computed in order to construct the corresponding variables. The questions that correspond to each variable are cited in the table below.

Construct variable	**Questions**
Financial Literacy	2.2, 2.3, 2.4
Cryptocurrency Literacy	9.1, 9.2, 9.3, 9.4, 9.5
Attitude (towards cryptocurrency)	8.1, 8.2, 8.3, 8.4
Subjective norm (social pressure)	4.3
Perceived control behavior (towards cryptocurrency)	4.1, 4.2, 4.4
Attitude (towards undertaking illegal actions to generate profit)	3.1
Herding Behavior	3.2, 3.3
Perceived Risk (of a crypto investment)	3.4

The following general regression model is going to be applied in order to examine the aforementioned research hypotheses:

$$Y_i = \beta_0 + \beta_1 X1_i + \beta_2 X2_i + \cdots + \beta_n Xn_i + \varepsilon_i$$

Frequency is the dependent variable (Y) of the first research hypothesis. The independent variables that are going to be incorporated into the model are Gender (X1) as the main independent variable, as well as three control variables, namely Educational Level (X2), Financial Literacy (X3), and Cryptocurrency Literacy (X4).

Intention to Invest is the dependent variable (Y) of the second research hypothesis. The independent variables that are going to be incorporated to the model are Gender (X1), Income (X2), Age (X3), Education (X4), Financial Literacy (X5), and Cryptocurrency Literacy (X6).

Intention to Invest is the dependent variable (Y) of the third research hypothesis. The independent variables that are going to be incorporated to the model are Attitude (towards cryptocurrency) (X1), Subjective Norm (social pressure) (X2), Perceived Control Behavior (towards cryptocurrency) (X3), as the main independent variables and the control variables Age (X4), Income (X5), Education (X6), and Investment Experience (X7).

Investment Selection is the dependent variable (Y) of the fourth research hypothesis. The independent variables that are going to be incorporated to the model are Attitude (towards undertaking illegal actions to generate profit) (X1), Herding Behavior (act based on other decisions) (X2), Perceived Risk (of a crypto investment) (X3), as the main independent variables and the control variables Age (X5), Income (X6), Education (X7), and Investment Experience (X8).

Investment Selection is the dependent variable (Y) of the fifth research hypothesis. The independent variables that are going to be incorporated into the model are Attitude (towards cryptocurrency) (X1), Financial Literacy (X2), and Cryptocurrency Literacy (X3).

6. Results

6.1. Descriptive statistics

The descriptive statistics of the questionnaire are presented in the present section. The sample had a mean age of 29.644 years, with a standard deviation of 8.806 years. The mean investment experience of the sample was 2.96 (within a maximum experience of 5) with a standard deviation of 1.139, indicating an average experience. (Table 1)

Table 1: Age – Investment Experience descriptives

Variable	Obs	Mean	Std. Dev.	Min	Max
Age	101	29.644	8.806	20	68
Investment Experience	101	2.96	1.139	1	5

The majority of the sample (61.39% - 62 persons) were of male gender, while 38.61% (39 persons) were female. The majority of the sample (32.67% - 33 persons) had a yearly income of below 15001 - 30000 €, while 29.7% (30 persons) had a yearly income of below 10000 €. The majority of the sample (49.5% - 50 persons) had completed a M.Sc. degree. 34.65% (35 persons) had completed a B.Sc. degree. (Table 2, Table 3, Table 4)

Table 2: Gender frequencies

Gender	Freq.	Percent	Cum.
Male	62	61.39	61.39
Female	39	38.61	100.00
Total	101	100.00	

Table 3: Yearly income frequencies

Yearly income	Freq.	Percent	Cum.
Below 10000€	30	29.70	29.70
10001 – 15000 €	18	17.82	47.52
15001 – 30000 €	33	32.67	80.20
30001 € or higher	20	19.80	100.00
Total	101	100.00	

Table 4: Educational level frequencies

Educational level	Freq.	Percent	Cum.
High school	2	1.98	1.98
Vocational education	7	6.93	8.91
B.Sc.	35	34.65	43.56
M.Sc.	50	49.50	93.07
Ph.D.	7	6.93	100.00
Total	101	100.00	

Participants had an average of 6.842 assets on their portfolios, with a standard deviation of 6.657, a maximum value of 25 and a minimum value of 0. The majority of the participants (87.13% - 88 persons) provided the correct answer to the question 2.2 that assessed financial literacy. The majority of the sample (69.31% - 70 persons) provided the correct answer to the question 2.3 related to financial literacy. The majority of the sample (75.25% - 76 persons)

provided the correct answer to the question 2.4 that assessed financial literacy. Therefore, the sample seems to maintain a high level of financial literacy. (Table 5, Table 6, Table 7, Table 8)

Table 5: Portfolio assets

Variable	Obs	Mean	Std. Dev.	Min	Max
No. of assets	101	6.842	6.657	0	25

Table 6: Question 2.2. – Financial literacy

Q2.2 (Financial literacy)	Freq.	Percent	Cum.
1 (Correct answer)	88	87.13	87.13
2	8	7.92	95.05
3	2	1.98	97.03
4	3	2.97	100.00
Total	101	100.00	

Table 7: Question 2.3. – Financial literacy

Q2.3 (Financial literacy)	Freq.	Percent	Cum.
1	10	9.90	9.90
2 (Correct answer)	70	69.31	79.21
3	13	12.87	92.08
4	8	7.92	100.00
Total	101	100.00	

Table 8: Question 2.4 – Financial literacy

Q2.4 (Financial literacy)	Freq.	Percent	Cum.
1	13	12.87	12.87
2 (Correct answer)	76	75.25	88.12
3	8	7.92	96.04
4	4	3.96	100.00
Total	101	100.00	

The mean of responses to question 3.1 (participants' intent to use cryptocurrencies in order to engage in illegal activities) was 2.139 with a standard deviation of 1.175. Therefore,

participants disagree with using cryptocurrencies for such activities. The mean of question 3.2 (influence of investment decision to cryptocurrencies from other investors' similar stance) was 3.109 with a standard deviation of 1.122, indicating neutral opinions. The mean of question 3.3 (influence of investment volume decision to cryptocurrencies from other investors' investment volume) was 2.95 with a standard deviation of 1.211, indicating neutral opinions. The mean of question 3.4 (opinion about the risk contained in cryptocurrency investments) was 3.366 with a standard deviation of 1.231, indicating neutral opinions. (Table 9)

Table 9: Financial behavior

Variable	Obs	Mean	Std. Dev.	Min	Max
Illegal attitude	101	2.139	1.175	1	5
Herding behavior–Decision to invest	101	3.109	1.122	1	5
Herding behavior – Investment volume	101	2.95	1.211	1	5
Risk opinion	101	3.366	1.231	1	5

The mean of responses to question 4.1 (contribution of crypto investments towards achieving life goals) was 2.51, with a standard deviation of 1.213. Thus, participants had neutral opinions. The mean of question 4.2 (contribution of crypto investments towards achieving objectives on a shorter time) was 2.574 with a standard deviation of 1.195, indicating neutral opinions. The mean of question 4.3 (people whose opinion was of high value would support crypto investments) was 3.337 with a standard deviation of 1.219, indicating neutral opinions. The mean of question 4.4 (availability of resources in order to engage in crypto investments) was 3.614, with a standard deviation of 1.326, indicating that the sample on average had the necessary resources. (Table 10)

Table 10: Planned behavior

Variable	Obs	Mean	Std. Dev.	Min	Max
Contribution of crypto investments towards achieving life goals	101	2.515	1.213	1	5
Contribution of crypto investments towards achieving objectives on a shorter time	101	2.574	1.195	1	5

People whose opinion was of high value would support crypto investments	101	3.337	1.219	1	5
Availability of resources	101	3.614	1.326	1	5

The mean of question 5.1 (investment frequency to cryptocurrencies) was 2.624, with a standard deviation of 1.427, indicating an average investment frequency of 2-5 times per year. The mean of question 6.1 (intention to invest on cryptocurrencies) was 3.327 with a standard deviation of 1.386, indicating a neutral stance. The mean of question 7.1 (investment preference) was 2.861 with a standard deviation of 1.364, indicating that the sample on average was not sure if it would select a crypto or non-crypto investment. (Table 11, Table 12, Table 13)

Table 11: Investment frequency descriptives

Variable	Obs	Mean	Std. Dev.	Min	Max
Investment frequency	101	2.624	1.427	1	5

Table 12: Intention to invest on cryptocurrencies descriptives.

Variable	Obs	Mean	Std. Dev.	Min	Max
Intention to invest	101	3.327	1.386	1	5

Table 13: Investment preference descriptives

Variable	Obs	Mean	Std. Dev.	Min	Max
Investment preference	101	2.861	1.364	1	5

The means of questions 8.1, 8.2, 8.3, 8.4 (lotteries with different extent of risk) were respectively 4.307 (std. dev. 1.933), 3.277 (std. dev. 1.871), 4.406 (std. dev. 1.834), 3.396 (1.823). Therefore, participants on average tend to prefer a middle extent of risk. (Table 14)

Table 14: Risk lotteries descriptives

Variable	Obs	Mean	Std. Dev.	Min	Max
Lottery 1	101	4.307	1.933	1	6
Lottery 2	101	3.277	1.871	1	6
Lottery 3	101	4.406	1.834	1	6
Lottery 4	101	3.396	1.823	1	6

The majority of the participants (64.36% - 65 persons) provided the correct answer to the question 9.l that assessed cryptocurrency literacy. 69.31% (70 persons) provided the correct answer to the question 9.2 related to cryptocurrency literacy. 76.24% (77 persons) provided the correct answer to the question 9.3 regarding cryptocurrency literacy. Therefore, the sample seems to maintain a high level of cryptocurrency literacy. 29.7% (30 persons) provided the correct answer to the question 9.4 about cryptocurrency literacy. 73.27% (74 persons) provided the correct answer to the question 9.5 considering cryptocurrency literacy. Therefore, it can be concluded that the sample maintains a medium level of cryptocurrency literacy. (Table 15, Table 16, Table 17, Table 18, Table 19)

Table 15: Crypto literacy – Question 9.1 descriptives

Q9.1 (Crypto literacy)	Freq.	Percent	Cum.
1	26	25.74	25.74
2 (Correct answer)	65	64.36	90.10
3	9	8.91	99.01
4	1	0.99	100.00
Total	101	100.00	

Table 16: Crypto literacy – Question 9.2 descriptives

Q9.2 (Crypto literacy)	Freq.	Percent	Cum.
1	20	19.80	19.80
2 (Correct answer)	70	69.31	89.11
3	4	3.96	93.07
4	7	6.93	100.00
Total	101	100.00	

Table 17: Crypto literacy – Question 9.3 descriptives

Q9.3 (Crypto literacy)	Freq.	Percent	Cum.
1	12	11.88	11.88
2 (Correct answer)	77	76.24	88.12
3	11	10.89	99.01
4	1	0.99	100.0
Total	101	100.00	

Table 18: Crypto literacy – Question 9.4 descriptives

Q9.4 (Crypto literacy)	Freq.	Percent	Cum.
1	44	43.56	43.56
2 (Correct answer)	30	29.70	73.27
3	14	13.86	87.13
4	13	12.87	100.00
Total	101	100.00	

Table 19: Crypto literacy – Question 9.5 descriptives

Q9.5 (Crypto literacy)	Freq.	Percent	Cum.
1	14	13.86	13.86
2 (Correct answer)	74	73.27	87.13
3	11	10.89	98.02
4	2	1.98	100.00
Total	101	100.00	

6.2. Hypothesis Analysis

Hypothesis 1

In order to obtain an initial aspect of potential differences between investment frequency to cryptocurrencies among genders, the Mann – Whitney test was applied. According to the results, participants of male and female gender demonstrate differences on their average crypto-investment frequency on a 1% significance level, since the p-value is 0.0043<0.01. The z value is equal to 2.859, thus men demonstrate a higher investment frequency on cryptocurrencies in comparison to women.

The results of the regression that corresponds to the model of Hypothesis 1 are cited on Table 20. The R-Squared is 0.0847, thus the independent variables explain 8.47% of the dependent variable. A negative relationship was identified between investment frequency and gender on a 1% significance level, since the p-value is 0.003<0.01. Thus, men tend to invest more frequently. VIF has a value of 1, indicating that the model demonstrates no multicollinearity.

Table 20: Hypothesis 1 – 1st model (without control variables)

	(1) Investment Frequency
Gender	-0.8490***
	(-3.03)
Constant	3.8007***
	(9.22)
Observations	101
R^2	0.08
Adjusted R^2	0.08
AIC	352.54
BIC	357.77

Level of Significance *0.1, **0.05, *** 0.01

However, the introduction of the control variable of educational level erases the effect of gender to investment frequency. More precisely, the regression model that incorporates educational level is cited on Table 21. The R-Squared is 0.1943, thus the independent variables explain 19.43% of the dependent variable. A negative relationship is identified between educational level and investment frequency on a 1% significance level (p-value = 0.000<0.01), but no statistically significant relationship occurs between gender and investment frequency (p-value = 0.073>0.05). Therefore, gender seems to have no effect on investment frequency, which instead is affected from the educational level. The VIF has values close to 1 (mean VIF = 1.12), implying that the model demonstrates low multicollinearity.

Table 21: Hypothesis 1 – 2nd model (with educational level as control)

	Investment Frequency
Gender	-0.5086*
	(-1.81)
Educational level	-0.4396***
	(-3.65)
Constant	4.6300***
	(10.29)
Observations	101
R^2	0.19
Adjusted R^2	0.18
AIC	341.67
BIC	349.51
Level of Significance	****0.1, **0.05, *** 0.01.***

The application of financial literacy as control variable maintains the effect of gender to investment frequency. More precisely, the regression model that incorporates financial literacy

is cited in Table 22. The R-Squared is 0.1649, thus the independent variables explain 16.49% of the dependent variable. A positive relationship is identified between financial literacy and investment frequency on a 1% significance level (p-value = 0.003<0.01), while a negative relationship occurs between gender and investment frequency on a 5% significance level (p-value = 0.028<0.05). Therefore, gender seems to affect investment frequency, with men demonstrating a higher investment frequency in comparison to women. The VIF has values close to 1 (mean VIF = 1.07), implying that the model demonstrates low multicollinearity.

Table 22: Hypothesis 1 – 3rd model (with financial literacy as control)

	(1) Investment frequency
Gender	-0.6239** (-2.24)
Financial Literacy	1.4238*** (3.07)
Constant	2.3890*** (3.94)
Observations	101
R^2	0.16
Adjusted R^2	0.15
AIC	345.28
BIC	353.13

Level of Significance *0.1, **0.05, *** 0.01

The application of cryptocurrency literacy as control variable erases the effect of gender to investment frequency. More precisely, the regression model that incorporates crypto literacy is cited on Table 23. The R-Squared is 0.4351, thus the independent variables explain 43.51% of the dependent variable. A positive relationship is identified between crypto literacy and investment frequency on a 1% significance level (p-value = 0.000<0.01), but no statistically significant relationship occurs between gender and investment frequency (p-value = 0.064>0.05). Therefore, gender seems to have no effect on investment frequency, which instead is affected by crypto literacy. The VIF has values close to 1 (mean VIF = 1.06), implying that the model demonstrates low multicollinearity.

Table 23: Hypothesis 1 – 4th model (with crypto literacy as control)

	(1) Investment Frequency
Gender	-0.4277*
	(-1.88)
Crypto Literacy	2.9632***
	(7.80)
Constant	1.3625***
	(3.02)
Observations	101
R^2	0.44
Adjusted R^2	0.42
AIC	305.80
BIC	313.64

Level of Significance *0.1, **0.05, *** 0.01

According to the results of the four models, the first hypothesis has to be rejected. At first, gender seemed to influence investment frequency, with men engaging more frequent on crypto investments. However, the introduction of control variables demonstrated that investment frequency is instead influenced by other factors, such as crypto literacy, financial literacy and educational level. Only one of the three models that applied control variables identified gender to demonstrate a relationship to investment frequency. Furthermore, the two models with the highest R-Squared values (thus explaining the highest part of investment frequency) demonstrated no relationship between gender and investment frequency.

Hypothesis 2

In order to obtain an initial aspect of potential differences between intention to invest on cryptocurrencies among genders, the Mann – Whitney test was applied. According to the results, participants of male and female gender demonstrate differences on their average intention to invest on cryptocurrencies on a 5% significance level, since the p-value is 0.0409<0.05. The z value is equal to 2.045, thus men demonstrate a higher intention to invest on cryptocurrencies in comparison to women.

The Kruskal – Wallis test was applied in order to identify potential differences between the intention to invest on cryptocurrencies among yearly income. According to the results, participants demonstrated no differences based on their income levels, since the p-value is 0.7765>0.05.

The Kruskal – Wallis test was applied in order to identify potential differences between intention to invest on cryptocurrencies among age groups. According to the results, participants demonstrated no differences based on their age groups, since the p-value is 0.2373>0.05.

The Kruskal – Wallis test was applied in order to identify potential differences between the intention to invest on cryptocurrencies among educational level. According to the results, participants demonstrated no differences based on their educational level, since the p-value is 0.5601>0.05.

The results of the regression that corresponds to the model of Hypothesis 2 are cited on Table 24. The R-Squared is 0.4834, thus the independent variables explain 48.34% of the dependent variable. A positive relationship was identified between cryptocurrency literacy and the intention to invest in cryptocurrencies on a 1% significance level (p-value = 0.000<0.01). Thus, people with a higher knowledge about cryptocurrencies tend to demonstrate a higher intention to invest. Furthermore, a negative relationship was identified on a 5% significance level between intention to invest in cryptocurrencies and educational level (p-value = 0.011<0.05). In other words, people with a higher educational level tend to demonstrate a lower intention to invest in cryptocurrencies. No other relationships were identified between the intention to invest and the other independent variables. Therefore, the second hypothesis has to be partially accepted, since the intention to invest in cryptocurrencies is related to cryptocurrency literacy and one sociodemographic factor (educational level). The VIF has values close to 1 (mean VIF = 1.37), implying that the model demonstrates low multicollinearity.

Table 24: Hypothesis 2 – Regression model

	(1) Intention to invest
Gender	-0.2477 (-1.12)
Yearly income	-0.0508 (-0.43)
Age	-0.0216 (-1.48)
Educational level	-0.3584** (-2.59)
Financial literacy	-0.0271 (-0.06)
Crypto literacy	3.0433*** (7.72)
Constant	3.8142*** (5.67)
Observations	101
R^2	0.48
Adjusted R^2	0.45
AIC	298.92
BIC	317.22

Level of Significance *0.1, **0.05, *** 0.01

Hypothesis 3

The results of the regression that corresponds to the model of Hypothesis 3 are cited on Table 25. The R-Squared is 0.6160, thus the independent variables explain 61.60% of the dependent variable. A positive relationship was identified on a 1% significance level between intention to invest on cryptocurrencies and subjective norm (through the notion of social pressure) (p-value = 0.000<0.01). In other words, people who consider to a significant extent the opinion of their significant others tend to demonstrate a higher intention to invest in cryptocurrencies if such an action is approved by them. Furthermore, a positive relationship was identified on a 1% significance level (p-value = 0.000<0.01) between intention to invest in cryptocurrencies and perceived control. Therefore, participants who thought to a larger extent that they were able to control their own behavior demonstrated higher intentions to invest in cryptocurrencies. The

attitude towards cryptocurrencies demonstrated no statistically significant relationship with the intention to invest in cryptocurrencies. The VIF has values close to 1 (mean VIF = 1.56), indicating low multicollinearity.

Table 25 – Hypothesis 3 – 1st regression model (without controls)

	(1) Intention to invest
Attitude towards cryptocurrencies	0.1163*
	(1.79)
Subjective norm	0.4916***
	(5.30)
Perceived control	0.5267***
	(4.43)
Constant	-0.2888
	(-0.93)
Observations	101
R^2	0.62
Adjusted R^2	0.60
AIC	262.94
BIC	273.40

Level of Significance *0.1, **0.05, *** 0.01

The introduction of the control variable of age does not result in any difference among previously identified relationships. More precisely, the regression model that incorporates age is cited on Table 26. The R-Squared is 0.6288, thus the independent variables explain 62.88% of the dependent variable. The same relationships between intention to invest in cryptocurrencies, perceived control and subjective norm are identified. The control variable of age seems to pose no effect to the intention to invest. The VIF has values close to 1 (mean VIF = 1.46), implying that the model demonstrates low multicollinearity.

Table 26: Hypothesis 2 – 2nd regression model (with age as control)

	(1) Intention to invest
Attitude towards cryptocurrencies	0.1258*
	(1.95)
Subjective norm	0.5021***
	(5.46)
Perceived control	0.4771***
	(3.95)
Age	-0.0183*
	(-1.82)
Constant	0.3263
	(0.71)
Observations	101
R^2	0.63
Adjusted R^2	0.61
AIC	261.53
BIC	274.60

Level of Significance *0.1, **0.05, *** 0.01

The introduction of the control variable of yearly income does not result in any difference among previously identified relationships. More precisely, the regression model that incorporates age is cited in Table 27. The R-Squared is 0.6164, thus the independent variables explain 61.64% of the dependent variable. The same relationships between intention to invest in cryptocurrencies, perceived control and subjective norm are identified. The control variable of income seems to pose no effect to the intention to invest. The VIF has values close to 1 (mean VIF = 1.52), implying that the model demonstrates low multicollinearity.

Table 27: Hypothesis 2 – 3rd regression model (with yearly income as control)

	(1) Intention to invest
Attitude towards cryptocurrencies	0.1128*
	(1.70)
Subjective norm	0.4873***
	(5.16)
Perceived control	0.5386***
	(4.27)
Yearly income	0.0245
	(0.29)
Constant	-0.3550
	(-0.92)
Observations	101
R^2	0.62
Adjusted R^2	0.60
AIC	264.85
BIC	277.93

Level of Significance *0.1, **0.05, *** 0.01

The introduction of the control variable of educational level does not result in any difference among previous identified relationships. More precisely, the regression model that incorporates age is cited in Table 28. The R-Squared is 0.6161, thus the independent variables explain 61.61% of the dependent variable. The same relationships between intention to invest in cryptocurrencies, perceived control and subjective norm are identified. The control variable of educational level seems to pose no effect to the intention to invest. The VIF has values close to 1 (mean VIF = 1.44), implying that the model demonstrates low multicollinearity.

Table 28: Hypothesis 2 – 4th regression model (with educational level as control)

	(1) Intention to invest
Attitude towards cryptocurrencies	0.1170* (1.78)
Subjective norm	0.4902*** (5.22)
Perceived control	0.5250*** (4.37)
Educational level	-0.0156 (-0.14)
Constant	-0.2270 (-0.42)
Observations	101
R^2	0.62
Adjusted R^2	0.60
AIC	264.92
BIC	278.00

Level of Significance *0.1, **0.05, *** 0.01

The introduction of the control variable of investment experience does not result in any difference among previously identified relationships. More precisely, the regression model that incorporates age is cited on Table 29. The R-Squared is 0.6165, thus the independent variables explain 61.65% of the dependent variable. The same relationships between intention to invest in cryptocurrencies, perceived control and subjective norm are identified. The control variable of investment experience seems to pose no effect to the intention to invest. The VIF has values close to 1 (mean VIF = 1.5), implying that the model demonstrates low multicollinearity.

Table 29: Hypothesis 2 – 5th regression model (with investment experience as control)

	(1) Intention to invest
Attitude towards cryptocurrencies	0.1215* (1.81)
Subjective norm	0.4991*** (5.21)
Perceived control	0.5219*** (4.34)
Investment experience	0.0285 (0.34)
Constant	-0.4044 (-0.88)
Observations	101
R^2	0.62
Adjusted R^2	0.60
AIC	264.82
BIC	277.89
Level of Significance	****0.1, **0.05, *** 0.01***

According to the aforementioned results, the third hypothesis has to be partially accepted, since two behavioral factors related to the theory of planned behavior (subjective norm, perceived control) were found to be related to intention to invest on cryptocurrencies, but the third examined factor (attitude towards cryptocurrencies) was not found to demonstrate a significant relationship.

Hypothesis 4

The results of the regression that corresponds to the model of Hypothesis 4 are cited in Table 30. The R-Squared is 0.2819, thus the independent variables explain 28.19% of the dependent variable. A positive relationship was identified on a 5% significance level between investment selection and illegal attitude (p-value = 0048<0.05). In other words, people who demonstrate a higher illegal attitude tend to prefer crypto over non-crypto investments. A positive relationship was identified between herding behavior and the selection of a crypto over a non-crypto investment on a 1% significance level (p-value = 0.002<0.01). Thus, people who demonstrate higher levels of herding behavior tend to prefer crypto over non-crypto investments. Furthermore, a negative relationship was identified on a 1% significance level between

selection of a crypto over a non-crypto investment and perceived risk of crypto investments (p-value = 0.000<0.01). In other words, people who consider crypto investments as a high-risk investment tend to prefer non-crypto investments. The VIF has values close to 1 (mean VIF = 1.05), indicating low multicollinearity.

Table 30: Hypothesis 4 – 1st regression model (without controls)

	(1) Investment selection
Illegal attitude	0.2050** (2.00)
Herding behavior	0.3620*** (3.21)
Risk perception	-0.3656*** (-3.76)
Constant	2.5570*** (4.60)
Observations	101
R^2	0.28
Adjusted R^2	0.26
AIC	322.88
BIC	333.34
Level of Significance	****0.1, **0.05, *** 0.01***

The introduction of the control variable of age does not result in any difference among previously identified relationships. Specifically, the regression model that incorporates age is cited on Table 31. The R-Squared is 0.3481, thus the independent variables explain 34.81% of the dependent variable. The same relationships between investment selection, illegal attitude, herding behavior and risk perception are identified. The control variable of age demonstrates a negative effect to investment preference on a 1% significance level (p-value = 0.002<0.01). The VIF has values close to 1 (mean VIF = 1.04), implying that the model demonstrates low multicollinearity.

Table 31: Hypothesis 4 – 2nd regression model (age as control)

	(1) Investment selection
Illegal attitude	0.1963** (2.00)
Herding behavior	0.3313*** (3.05)
Risk perception	-0.3818*** (-4.09)
Age	-0.0401*** (-3.12)
Constant	3.9114*** (5.69)
Observations	101
R^2	0.35
Adjusted R^2	0.32
AIC	315.11
BIC	328.19
Level of Significance	****0.1, **0.05, *** 0.01***

The introduction of the control variable of income erases the effect of illegal attitude to the selection of a crypto over a non-crypto investment. Categorically, the regression model that includes income is cited in Table 32. The R-Squared is 0.3179, thus the independent variables explain 31.79% of the dependent variable. The relationship between investment selection and illegal attitude has a p-value of 0.07>0.05, thus it is not statistically significant. The relationships between investment selection, herding behavior and risk perception are identified. The control variable of income demonstrates a negative effect to investment preference of crypto over non-crypto investments on a 5% significance level (p-value = 0.027<0.05). The VIF has values close to 1 (mean VIF = 1.06), implying that the model demonstrates low multicollinearity.

Table 32: Hypothesis 4 – 3rd regression model (income as control)

	(1) Investment selection
Illegal attitude	0.1847* (1.83)
Herding behavior	0.3379*** (3.04)
Risk perception	-0.4058*** (-4.18)
Yearly income	-0.2370** (-2.25)
Constant	3.3838*** (5.15)
Observations	101
R^2	0.32
Adjusted R^2	0.29
AIC	319.69
BIC	332.77
Level of Significance	****0.1, **0.05, *** 0.01***

The introduction of the control variable of educational level erases the effect of illegal attitude to the selection of a crypto over a non-crypto investment. Specifically, the regression model that contains educational level is cited on Table 33. The R-Squared is 0.3054, thus the independent variables explain 30.54% of the dependent variable. The relationship between investment selection and illegal attitude has a p-value of 0.079>0.05, thus it is not statistically significant. The relationships between investment selection, herding behavior and risk perception are identified. The control variable of educational level does not have a statistically significant effect to investment preference of crypto over non-crypto investments on a 5% significance level (p-value = 0.075>0.05). The VIF has values close to 1 (mean VIF = 1.08), implying that the model demonstrates low multicollinearity.

Table 33: Hypothesis 4 – 4th regression model (educational level as control)

	(1) Investment selection
Illegal attitude	0.1814* (1.77)
Herding behavior	0.3110*** (2.70)
Risk perception	-0.3744*** (-3.89)
Educational level	-0.2704* (-1.80)
Constant	3.7449*** (4.36)
Observations	101
R^2	0.31
Adjusted R^2	0.28
AIC	321.53
BIC	334.60
Level of Significance	****0.1, **0.05, *** 0.01***

The introduction of the control variable of investment experience maintains the effect of illegal attitude, herding behavior and risk perception to the investment selection of a crypto over a non-crypto investment. More precisely, the regression model that includes educational level is cited in Table 34. The R-Squared is 0.2821, thus the independent variables explain 28.21% of the dependent variable. The control variable of investment experience does not have a statistically significant effect to investment preference of crypto over non-crypto investments on a 5% significance level (p-value = 0.872>0.05). The VIF has values close to 1 (mean VIF = 1.08), implying that the model demonstrates low multicollinearity.

Table 34: Hypothesis 4 – 5th regression model (investment experience as control)

	(1) Investmet selection
Illegal attitude	0.2056** (1.99)
Herding behavior	0.3612*** (3.18)
Risk perception	-0.3704*** (-3.62)
Investment experience	0.0175 (0.16)
Constant	2.5223*** (4.21)
Observations	101
R^2	0.28
Adjusted R^2	0.25
AIC	324.85
BIC	337.93
Level of Significance	****0.1, **0.05, *** 0.01***

According to the results, the fourth hypothesis has to be partially accepted, since two behavioral factors related to financial behavior (herding behavior, risk perception) were found to be related to intention to invest on cryptocurrencies. The third examined factor (illegal attitude) was initially found to demonstrate a significant relationship with the selection of a crypto over a non-crypto investment, however the introduction of the control variables of age, income and educational level erased its effect. The relationship between herding behavior and investment selection of a crypto over a non-crypto investment is positive, thus subjects who demonstrate a higher extent of herding behavior tend to prefer crypto over non-crypto investments. On the other hand, risk perception demonstrates a negative relationship, thus subjects with a higher risk perception tend to prefer non-crypto investments.

Hypothesis 5

The results of the regression that corresponds to the model of Hypothesis 5 are cited in Table 35. The R-Squared is 0.3317, thus the independent variables explain 33.17% of the dependent variable. A positive relationship was identified on a 5% significance level between attitude towards cryptocurrencies and investment preference of crypto over non-crypto investments (p-value = 0.01<0.05). In other words, people who demonstrate a more positive attitude towards

cryptocurrencies tend to prefer crypto over non-crypto investments. A positive relationship was identified between crypto literacy and the selection of a crypto over a non-crypto investment on a 1% significance level (p-value = 0.000<0.01). Thus, people who demonstrate higher levels of crypto literacy tend to prefer crypto over non-crypto investments. No relationship was identified between the selection of a crypto over a non-crypto investment and financial literacy (p-value = 0.051>0.05). The VIF has values close to 1 (mean VIF = 1.30), indicating low multicollinearity

Table *35*: Hypothesis 5 – 1th Regression model

	(1) Investment selection
Attitude towards cryptocurrencies	0.2222***
	(2.63)
Financial literacy	-0.8217*
	(-1.97)
Crypto literacy	2.1203***
	(4.55)
Constant	1.3147***
	(3.24)
Observations	101
R^2	0.33
Adjusted R^2	0.31
AIC	315.63
BIC	326.09
Level of Significance	***0.1, **0.05, *** 0.01***

7. Conclusion

Gender was not found to pose an effect to investment frequency on cryptocurrencies. This finding comes in contrast to the findings of Hasso et al. (2019). This study identified that men engage more frequently to crypto investments. The introduction of the control variables of educational level, financial literacy and crypto literacy erased the effect of gender to investment frequency. On the other hand, the three aforementioned control variables were identified to affect investment frequency. Thus, they should be considered as shaping factors of the frequency that an individual engages in crypto investment.

Intention to invest in cryptocurrencies was identified to be affected negatively by educational level and positively by cryptocurrency literacy. The latter finding comes as natural, since people with a higher level of knowledge on cryptocurrencies are able to undertake proper related investment decisions. It is relevant to the finding of Ante et al. (2022), according to which crypto literacy was found to be positively related to the height of returns from crypto investments. On the other hand, the negative relationship between the intention to invest in cryptocurrencies and educational level confirms the findings of Benetton & Compiani (2021). Investors of lower education tend to be more optimistic about the future value of cryptocurrencies.

Two aspects of the theory of planned behavior (subjective norm and perceived control) were identified to demonstrate a positive relationship with the intention to invest in cryptocurrencies. On the other hand, attitude towards cryptocurrencies was not identified to demonstrate any statistically significant relationship. These results partially confirm the findings of Pham et al. (2021). However, the fact that no relationship was identified between attitude and intention to invest comes in contrast to the results of the study. This finding is surprising in general, since subjects with a positive attitude towards cryptocurrencies were expected to demonstrate a higher intention to invest. Furthermore, no control variable was identified to pose an effect to intention to invest. Other factors, such as lack of funds, should be examined in order to provide a possible explanation for the finding of the independence between attitude and intention to invest.

Two aspects of financial behavior (herding behavior, risk perception) were identified to pose an effect to the selection of a crypto over a non-crypto investment. These results confirm the findings of Pham et al. (2021). On the other hand, illegal attitude was firstly identified to demonstrate a relationship with investment preference of crypto over non-crypto investments, however the introduction of the control variables of educational level, investment experience and yearly income erased this effect. In that case, only age was a control variable that enables the effect of illegal actions on the selection of crypto over non-crypto investments. Yearly income and age were identified to demonstrate negative relationships with investment preference of crypto over non-crypto investments. This finding comes in contrast to Pham et al. (2021), where no relationships between socio-demographic factors and investment preference was identified. It can be attributed to the fact that individuals of higher income tend to prefer

traditional investment options with lower risk levels, while younger individuals may be hesitant to invest in cryptocurrencies due to the lack of relevant knowledge or funds.

Positive relationships were identified between crypto literacy, attitude towards cryptocurrencies and investment preference of crypto over non-crypto investments. These findings are expected, since subjects with a higher knowledge about cryptocurrencies and a positive attitude towards them have the necessary background in order to engage in such activities. On the other hand, no relationship was identified between financial literacy and investment preference of crypto over non-crypto investments. Therefore, subjects with adequate financial literacy tend to examine all potential aspects of their investment choices and do not select an investment solely based on its category.

The present study had the main limitation that it relied solely on data retrieved through a questionnaire-based survey. The observation of actual crypto trading would set possible to determine a model of cryptocurrency demand that would provide broader insights in relation to its shaping factors. For example, it may be allowed to capture heterogeneities in the beliefs and preferences of investors, while exploring potential short selling by investors with low expectations. Therefore, a future study could follow a relevant research approach.

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9. Appendix

Appendix A

UU Thesis Survey

Start of Block: Introduction

Dear Participants,

We invite you to take part in an important research study that aims to explore the relationship between demographic characteristics, investment choices, and risk attitudes among individuals who invest in cryptocurrencies and those who do not.

Your participation in this study will contribute to the growing body of knowledge in the field of finance and help us gain valuable insights into the factors that influence investment decisions in the rapidly evolving world of cryptocurrencies.

By completing this survey, you will have the opportunity to share your experiences, perceptions, and attitudes towards investments, including both traditional assets and cryptocurrencies. Your input will be confidential, and your responses will be anonymized, ensuring your privacy throughout the study.

The survey will involve a series of questions about your demographic information, investment preferences, risk perceptions, and attitudes towards cryptocurrencies. It should take approximately 15 minutes to complete.

We greatly appreciate your time and effort in participating in this study. Your contribution will be invaluable in advancing our understanding of the complex relationship between investor demographics, risk attitudes, and investment choices in the context of cryptocurrencies.

Thank you for your participation and support.

Sincerely

End of Block: Introduction

Start of Block: Demographics

Q1.1 What is your age?

_____

Q1.2 What is your gender?

1. Male (1)
2. Female (2)
3. Prefer not to say (3)

Q1.3 Your yearly income is:

1. Below 10000 €/year (1)
2. 10001 – 15000 €/year (2)
3. 15001 – 30000 €/year (3)
4. 30001 €/year or higher (4)

Q1.4 Please select the highest level of education you have completed:

1. High school (1)
2. Vocational education (post-high school) (2)
3. B.Sc. (3)
4. M.Sc. (4)
5. Ph.D (5)

Q1.5 How would you rate your investment experience (in every investment form)?

1. Expert (1)
2. More than average experience (2)
3. Average experience (3)
4. Less than average experience (4)
5. Little or no experience (5)

End of Block: Demographics

Start of Block: Financial literacy

Q2.1 At the moment how many assets (stocks, Equity and Cryptos) do you have in your portfolio?

_____

Q2.2 Suppose you had 100 € in your bank account on a 2% yearly interest rate. After three years, how much do you think you would have in your account if you left the money to grow?

1. More than 102 € (1)
2. Less than 102 € (2)
3. 102 € (3)
4. I do not know (4)

Q2.3 Suppose you had a bank account on a 2% yearly interest rate. The yearly inflation rate is 2%. After a year you would be able to buy:

1. More than today (1)
2. The same as today (2)
3. Less than today (3)
4. I do not know (4)

Q2.4 When an investor spreads its investments over different assets, the risk of suffering loses is going to:

1. Increase (1)
2. Decrease (2)
3. Stay the same (3)
4. I do not know (4)

End of Block: Financial literacy

Start of Block: Financial behavior

Q3.1 I may use cryptocurrencies in order to engage in illegal activities.

1. Totally disagree (1)
2. Disagree (2)
3. I do not have an opinion (3)
4. Agree (4)
5. Totally agree (5)

Q3.2 Other investors decisions of investing in cryptocurrencies pose an influence to my own investment decision in cryptocurrencies.

1. Totally disagree (1)
2. Disagree (2)
3. I do not have an opinion (3)
4. Agree (4)
5. Totally agree (5)

Q3.3 Other investors decisions on the investment volume in cryptocurrencies pose an influence to my own investment volume decisions.

1. Totally disagree (1)
2. Disagree (2)
3. I do not have an opinion (3)
4. Agree (4)
5. Totally agree (5)

Q3.4 Cryptocurrency investments contain significant risk.

1. Totally disagree (1)
2. Disagree (2)
3. I do not have an opinion (3)
4. Agree (4)
5. Totally agree (5)

End of Block: Financial behavior

Start of Block: Planned behavior

Q4.1 The use of cryptocurrencies can increase my opportunities to achieve important life objectives.

1. Totally disagree (1)
2. Disagree (2)
3. I do not have an opinion (3)
4. Agree (4)
5. Totally agree (5)

Q4.2 The use of cryptocurrencies can contribute to achieving my objectives on a shorter time.

1. Totally disagree (1)
2. Disagree (2)
3. I do not have an opinion (3)
4. Agree (4)
5. Totally agree (5)

Q4.3 People whose opinion I value will think that I should engage on cryptocurrency investments.

1. Totally disagree (1)
2. Disagree (2)
3. I do not have an opinion (3)
4. Agree (4)
5. Totally agree (5)

Q4.4 I have the necessary resources to engage on cryptocurrency investments.

1. Totally disagree (1)
2. Disagree (2)
3. I do not have an opinion (3)
4. Agree (4)
5. Totally agree (5)

End of Block: Planned behavior

Start of Block: Investment frequency

Q5.1 How many times do you invest on cryptocurrencies (additional investment/portfolio adjustment)?

1. Never (1)
2. 1 time per year (2)
3. 2-5 times per year (3)
4. 5-10 times per year (4)
5. More than 10 times per year (5)

End of Block: Investment frequency

Start of Block: Intention to invest

Q6.1 I intend to invest in cryptocurrencies.

1. Totally disagree (1)
2. Disagree (2)
3. I do not have an opinion (3)
4. Agree (4)
5. Totally agree (5)

End of Block: Intention to invest.

Start of Block: Investment preference

Q7.1 If I had to select between a crypto or non-crypto(stocks and equity) investment I would select:

1. Non-crypto (1)
2. Probably non-crypto (2)
3. I am not sure (3)
4. Probably crypto (4)
5. Crypto (5)

End of Block: Investment preference

Start of Block: Lotteries

Q8.1 The lottery below has six potential prospects. Asset 1 and Asset 2 denote potential outcomes in €. Which of the six potential prospects would you select (you can select only one option)?

*please note: that the asset's percentage indicates the probability that this outcome may happen.

* The option 1 has no risk and the option 6 has significant risk.

1 (1)

2 (2)

3 (3)

4 (4)

5 (5)

6 (6)

	Asset 1	Asset 2
	50%	50%
1	96.0 €	96.0 €
2	80.0 €	128.0 €
3	64.0 €	160.0 €
4	48.0 €	192.0 €
5	32.0 €	224.0 €
6	16.0 €	240.0 €

Q8.2 The lottery below has six potential prospects. Asset 1 and Asset 2 denote potential outcomes in €. Which of the six potential prospects would you select (you can select only one

option)?

*please note that the asset's percentage indicates the probability that this outcome may happen.

* The option 1 has no risk and the option 6 has significant risk.

1 (1)

2 (2)

3 (3)

4 (4)

5 (5)

6 (6)

	Asset 1	Asset 2
	50%	50%
1	16.0 €	16.0 €
2	0.0 €	48.0 €
3	-16.0 €	80.0 €
4	-32.0 €	112.0 €
5	-48.0 €	144.0 €
6	-64.0 €	160.0 €

Q8.3 The lottery below has six potential prospects. Asset 1, Asset 2 and Asset 3 denote potential outcomes in €. Which of the six potential prospects would you select (you can select only one option)?

*please note that the asset's percentage indicates the probability that this outcome may happen.

* The option 1 has no risk and the option 6 has significant risk.

1 (1)

2 (2)

3 (3)

4 (4)

5 (5)

6 (6)

	Asset 1	Asset 2	Asset 3
	50%	49%	1%
1	96.0 €	96.0 €	96.0 €
2	82.1 €	123.9 €	223.0 €
3	68.2 €	151.8 €	350.1 €
4	54.2 €	179.8 €	477.1 €
5	40.3 €	207.7 €	604.2 €
6	26.4 €	220.4 €	684.0 €

Q8.4 The lottery below has six potential prospects. Asset 1, Asset 2 and Asset 3 denote potential outcomes in €. Which of the six potential prospects would you select (you can select only one option)?

*please note that the asset's percentage indicates the probability that this outcome may happen.

* The option 1 has no risk and the option 6 has significant risk.

1 (1)

2 (2)

3 (3)

4 (4)

5 (5)

6 (6)

	Asset 1	Asset 2	Asset 3
	50%	49%	1%
1	16.0 €	16.0 €	16.0 €
2	2.1 €	43.9 €	143.0 €
3	-11.8 €	71.8 €	270.1 €
4	-25.8 €	99.8 €	397.1 €
5	-39.7 €	127.7 €	524.2 €
6	-53.6 €	140.4 €	604.0 €

End of Block: Lotteries

Start of Block: Cryptocurrency Literacy

Q9.1 What is blockchain technology?

1. A digital currency used for online transactions (1)
2. A decentralized ledger that records transactions across multiple computers (2)
3. A type of encryption used to secure online communications (3)
4. A computer programming language used for building websites (4)

Q9.2 What is the purpose of mining in cryptocurrency?

1. To create new cryptocurrencies (1)
2. To verify and validate transactions on the blockchain (2)
3. To prevent double-spending in cryptocurrency transactions (3)

To encrypt and secure user data on the blockchain (4)

Q9.3 What is the difference between a public and private key in cryptocurrency?

1. Public key is used to encrypt data, while the private key is used to decrypt it (1)
2. Public key is shared publicly, while the private key is kept secret (2)
3. Public key is used for sending transactions, while the private key is used for receiving them (3)
4. Public key is longer and more complex than the private key (4)

Q9.4 What is a smart contract in blockchain technology?

1. A legally binding agreement between two parties stored on the blockchain (1)
2. An automated program that executes predefined actions when certain conditions are met(2)
3. A type of cryptocurrency used for secure online payments (3)
4. A protocol for securing communication between different blockchain networks (4)

Q9.5 What is the concept of decentralization in blockchain?

1. The process of distributing computing power across multiple nodes in a network (1)
2. The elimination of intermediaries and central authorities in transactions (2)
3. The encryption of data to ensure privacy and security (3)
4. The ability to modify and update the blockchain in real-time (4)

End of Block: Cryptocurrency Literacy

Start of Block: Captcha

Q10.1 Are you a Robot?

End of Block: Captcha