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# **Personality traits and crypto market participation**

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## Abstract

This paper is a contribution to the literature on crypto market participation. It is the first paper to study the relationship between personality traits and crypto market participation using survey data from the Netherlands. In total, 166 individuals participated of which 61 are crypto market participants. For the personality traits, the Big Five is used, consisting of conscientiousness, extraversion, agreeableness, neuroticism, and openness to experience. A significant negative relationship is found for both neuroticism and openness to experience regarding crypto market participation. For the other three personality traits no significant relationship is found. Furthermore, being a male and the level of risk tolerance has a significant positive relationship with crypto market participation. The study also shows some differences in the characteristics of crypto market participants compared to stock market participants.

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## Introduction

In the current situation, the inflation rate exceeds the interest rate on a savings account in the Netherlands. As people's savings are growing less than the inflation, their buying power decreases and they are effectively losing money. To try to avoid this decrease in buying power, some people search for alternatives to grow their money. Very common and well-known examples are stocks, shares and bonds. Despite the higher return on stocks compared to risk-free assets, most households do not own stocks, this is also called the stock market participation puzzle (Gardini & Magi, 2007).

Another investment opportunity that has grown extremely in popularity in recent years is cryptocurrencies. It started in early 2009, when the bitcoin network was created (Cretarola & Figà-Talamanca, 2021). Today, there are over 20.000 different cryptocurrencies according to CoinMarketCap. This only includes the cryptocurrencies listed on their website, so the total amount is most likely much higher. The current market cap of these cryptocurrencies is almost €1 trillion, of which more than 40% can be allocated to bitcoin (30-06-22). This shows that there is a lot of money involved, and many people around the world made huge profits trading cryptocurrencies. On the other hand, there are also many people who lost large amounts of money due to cryptocurrencies. For example, because of the Terra project. The TerraUSD was intended as a stable coin representing a value close to \$1, but its price fell to less than \$0.1 within days. Simultaneously, the value of the Terra Luna coin, which is linked to TerraUSD, fell from approximately \$80 to less than \$0.00002 within days. Of course, this situation is bad for the level of trust people have in cryptocurrencies and shows that investing in cryptocurrencies involves great risks.

According to traditional finance theories, most of the individual investors are rational in their financial decision-making, in other words, they do not let their emotions influence their decisions (Vidya, 2021). However, emotions appear to play a role in the general decision-making of individuals' and people differ in how they deal with this (Ahn & Kim, 2021). Cryptocurrencies are known for their high volatility, and a price drop of 20% within hours is not uncommon. Some people panic because of this and decide to sell. Other people handle this situation differently, they do not panic and might even buy more. Previous research showed that there is a relation between the personality traits of an individual and general decision making and investment decision making (El Otman et al., 2020; Chitra & Sreedevi, 2011).

However, as far as I know, there is no existing research about this possible relationship between personality traits and investment decisions with regard to cryptocurrencies. Therefore, this research will focus on the relation between personality traits, and decisions made by individuals regarding crypto market participation. The results could be useful for the individual investor, if they become

more aware of their own personality traits, and which influence this might have on the decisions they make. By knowing pros and cons of their personality traits, they hopefully are better able to deal with the cons, and make better considered choices when investing in cryptocurrencies. Due to the limited time to conduct this research, it will only focus on which personality traits play a role in the decision to enter the crypto market.

There is some previous research about why people enter the stock market, i.e. Kaustia and Knüpfer (2012) and Blaurock et al. (2018). However, as far as I know, there is no previous research about the possible relationship between personality traits and the decision to enter the crypto market. Trading cryptocurrencies became increasingly popular across different age groups (Hasso et al., 2019). There are multiple reasons why an individual might invest in cryptocurrencies. For example, they distrust the government and cryptocurrencies are decentralized, or they have Fear Of Missing Out (Martin et al., 2022). Also a lot of young people buy cryptocurrencies, hoping they can realize huge gains. The volatility of the prices of cryptocurrencies are extreme, and therefore might attract other types of investors compared to stocks and bonds (Baur & Dimpfl, 2021). The goal of this research is to paint a picture of the average investor in the crypto market in the Netherlands. The research question can be formulated as follows: *‘Which personality traits play a role in investing in cryptocurrencies?’*

The research is conducted as follows. It uses a survey to determine the personality traits of the respondent, collecting personal information which will be used as control variables, and information about crypto market participation. Using this data, there will be multiple logistic regressions to study the relationship between the personality traits and crypto market participation. The results show that there is a significant negative relationship between two personality traits and crypto market participation, namely neuroticism and openness to experience. Furthermore, it shows that gender and the level of financial risk taking play a significant role in crypto market participation.

The remainder of this study is divided into different sections. First, there is an overview of the relevant previous literature on this topic. Based on this literature, a hypothesis is developed for each personality trait. Thereafter, the research method is explained, including the data, variables, and methodology. It ends with the results followed by the conclusion, discussion and recommendations for future research on this topic. All regression output can be found in the appendixes.

## Literature overview

### Stock market participation puzzle

Despite the higher return on stocks compared to risk free assets, most households do not own stocks, this is also called the stock market participation puzzle (Gardini & Magi, 2007). According to Gardini and Magi, the key determinants of stockholding are age, wealth, education, and other household characteristics such as marital status. They showed that wealth and education have a positive and significant effect on stock market participation, which is in line with other research. However, age does not affect stockholdings in their research in contrast to previous research. This might be explained by the fact that their research focussed on the Italian market. Mankiw and Zeldes (1991) examined whether the consumption of stockholders differs from the consumption of nonstockholders and found that the consumption of stockholders is more volatile and more highly correlated with the excess return on the stock market. They also found that liquidity constraints play a role in holding stocks, as in many cases the failure of holding some wealth in the form of equity is simply because of the absence of liquid wealth. However, liquidity constraints do not solve the stock market participation puzzle, because many people with a substantial amount of liquid assets also do not hold any stocks. In line with Gardini and Magi, they found that income and educational level are positively related to holding stocks (Mankiw & Zeldes, 1991). The reason behind this is that individuals with a higher level of income are better able to deal with the fixed costs of investing since they have larger portfolios. With regard to educational level, the fixed costs are lower as educational level increases because for more educated individuals' information acquisition and processing are less costly. According to Allen & Gale (1994), transaction costs is an important determinant of market participation. To be active in a market, an investor must initially devote resources to understand the basics of the markets. The result is that in a situation with low costs of entering the market, the number of participants is much higher than in a situation with higher entering costs (Allen & Gale, 1994). Haliassos and Bertaut (1995) stated that 75% of the US households do not hold any stocks despite the equity premium. They found that people who do not have a college degree are significantly less likely to hold stocks compared to people who have a college degree, which is in line with Gardini and Magi (2007) and Mankiw and Zeldes (1991). Van Rooij et al. (2011) and Almenberg and Dreber (2015) both studied the relationship between financial literacy and stock market participation. Van Rooij et al. found that individuals with low financial literacy are much less likely to invest in stocks. Besides that, they also found that education, income, and gender are important predictors of stock market participation, where men are more likely to participate in the stock market compared to woman. Almenberg and Dreber found similar results, indicating that woman are less likely to participate in the stock market compared to men. However, they stated that men score higher than woman on financial literacy, and the difference in participation between men and woman diminishes when they control for this financial literacy. Besides that, they

also found that women are more risk averse compared to men, this remains significant even after controlling for financial literacy. Furthermore, Hurd et al. (2011) found suggestive evidence that optimism about an increase in stock prices leads to an increase in stock holdings, but this was not statistically significant. They also found that men are more likely to participate in the stock market, which is in line with van Rooij et al. (2011) and Almenberg and Dreber (2015).

#### Behavioral biases

The assumption of traditional finance theories is that individual investors are rational in making their decisions, in other words, they do not let their emotions influence their decisions (Vidya, 2021). However, people do not always behave rational. Behavioral economics combines psychology and economics to investigate how individuals actually behave, as opposed to how they would behave if they were being perfectly rational (Thorgeirsson & Kawachi, 2013). In 1995, Simon Herbert came up with the term 'bounded rationality' to give a more realistic view of the problem-solving capabilities of humans.

Behavioral biases have an influence in the investment decision-making of individuals. Examples are overconfidence, the disposition effect, herding effect, endowment effect and loss aversion. When people are overconfident, they are highly optimistic about the trading outcomes and think they can make sound investments based on the information they have (Zahere & Bansal, 2018). The disposition effect means that investors tend to sell stocks early to realize gains and tend to hold losing stocks to delay the losses (Shefrin & Statman, 1985). Herding in the financial market is the tendency to follow the other investors, instead of thinking themselves (Banerjee, 1992). The endowment effects shows that people pay too much emphasis on what they are currently holding, the result is that they do not want to change their position and might miss great investment opportunities (Kahneman et al., 1990). Finally, the loss aversion is a bias that investors value gains and losses differently, individuals are more sensitive to reductions in their well-being than to increases, so they value losses higher than profits (Benartzi & Thaler, 1995). Because of the limited time to conduct this study, these behavioral biases cannot be taken into account. For future research, it would be interesting to include these variables as well. However, in this study risk aversion will be taken into account, which is about 'the extent to which people are willing to take on risk (Grable & Kwak, 2022). A simple example is as follows: an individual gets the opportunity to buy a ticket for the lottery with equal chances of winning €10 or €0, a risk-neutral individual would be willing to pay up to €5 for the ticket, as that is the expected value. Risk-averse individuals would be willing to pay less than €5 and risk-seeking individuals would be willing to pay more than €5 (Charness et al., 2013). Previous research on the relationship between risk aversion and age showed mixed results. Many previous research showed that the level of risk aversion increases with age (e.g. Banks et al., 2020; Blanchett et al., 2018; Brown, 1990; Hallahan et al., 2004; Morin &

Suarez, 1983; Palsson, 1996; Yao et al., 2011). Other studies found contradictory results, as they showed that the level of risk aversion decreases with age (Grable, 2000; Guiso et al., 1996; Wang & Hanna, 1997). Although most previous studies find that the level of risk inversion increases with age, the results are somewhat mixed. Possible explanations could be which method they used to estimate risk aversion or the country of analysis (Blanchett et al., 2018). Mata et al. (2016) state that the propensity for risk taking tends to decline across the life span in the vast majority of countries, this also applies to the Netherlands. Based on previous research, it is plausible that the level of risk aversion increases with age. Furthermore, previous research showed that men take greater financial risk than women and that being single is associated with higher levels of risk tolerance (Grable, 2000).

#### Big five personality traits

Regarding personality traits of individuals, one of the most widely used assessment tool for personality traits is the Five Factor Model, which consists of conscientiousness, extraversion, agreeableness, neuroticism, and openness to experience (Johnsni & Sunitha, 2019). Previous research supports the comprehensiveness of the model and its applicability across different cultures (McCrea & John, 1992). Personality traits play an important role on an individuals' decision-making (Othman et al., 2020). Emotions also appear to play a role in the general decision-making of individuals (Ahn & Kim, 2021), and decisions influenced by emotions lead to irrational thinking and could cause anomalies in the financial markets (Vidya, 2021). Research have shown that personal characteristics of an individual influence their behavior, perception of risk and willingness to take risky decisions (Akhtar & Das, 2019). It could therefore be the case that personality traits influence the behavior and decisions of investors. The score of an individual on these five personality traits can be measured with the usage of a questionnaire, which is based on certain characteristics of the personality traits.

#### Conscientiousness

Conscientiousness is characterized by hard work, self-discipline, organization, and strive for achievement and goal orientation. When making decisions, they have rational decision-making styles, where they use a structured approach and analyze the details before deciding (Othman et al., 2020). These individuals work efficiently and thoroughly (McCrea & John, 1992). Donnelly et al. (2012) state that these individuals are more careful with their savings and have more financial self-control, which could result in a lower probability of buying risky financial assets. Brown and Taylor (2014) found no significant results with regard to conscientiousness and stock market participation. Furthermore, there seems to be a negative relation between conscientiousness and risk taking (Becker et al., 2012; Nicholson et al., 2005; Wong & Carducci, 2013).



### Extraversion

Characteristics of extraversion are high level of confidence, positive emotions, enthusiasm, energy, excitement seeking and social interactions (Othman et al., 2020). McCrae and John (1992) describe extraverted individuals as active, assertive, energetic, enthusiastic, outgoing, and talkative. Brown and Tayler (2014) showed that extraversion is negatively related to stock market participation. However, they state that this is perhaps a surprising result since extraversion has a lot to do with sociability, and previous research of Christiles et al. (2010) showed that socially active individuals are more likely to hold stocks. Besides that, Mayfield et al. (2018) showed that extraversion is related to a higher level of short-term investing. This could be explained by the fact that these individuals have an intuitive decision-making style, where the decisions are based on feelings and instinct (Othman et al., 2020). Moreover, Johnsi and Sunitha showed that extraversion has a significant relationship with overconfidence, Becker et al. (2012) showed that extraversion increases risk taking, and Wong and Carducci (2013) also found a positive relationship between extraversion and risk tolerance, which could increase the likelihood that an individual invests in stocks.

### Agreeableness

Characteristics of agreeableness are cooperation, morality, sympathy, a low self-confidence, and high level of trust in others. These people are very harmonious and cooperative (Johnsi & Sunitha, 2019). These people are also appreciative, have a forgiving nature and are generous and kind to others (McCrea & John, 1992). Brown and Taylor (2014) found that agreeableness is negatively associated with the likelihood of holding shares and also Goldfayn-Frank (2018) showed that agreeable individuals are less likely to make stock market investments. When making a decision, individuals with a high level of agreeableness depend on others for support and guidance (Othman et al., 2020). Besides that, other research showed that a higher level of agreeableness leads to a lower tendency to take risks in general, which could also be a reason for these individuals to not invest (Nicholson et al., 2005).

### Neuroticism

Neuroticism is characterized by anxiety, anger, insecurity, impulsiveness, vulnerability, and self-consciousness (Othman et al., 2020). People who score high on neuroticism are emotionally less stable and have a high level of negative emotions (Johnsi & Sunitha, 2019). Besides that, they also have a high level of self-pity and worry a lot (McCrea & John, 1992). They found a negative relation between neuroticism and risk taking (Becker et al., 2012; Brooks & Williams, 2021; Nicholson et al., 2005). Mayfield et al. (2008) state that individuals with a high level of neuroticism are less likely to engage in short-term investing. This could possibly be explained because these individuals are unwilling to act rapidly, due to their anxiety and emotional instability (Othman et al., 2020).

### Openness to experience

Finally, openness to experience individuals are creative, intellectually curious, impulsive and open to new ideas. They have a wide range of interests and have an imaginative character and also come up with new ideas themselves (McCrea & John, 1992). Because these individuals are more open for new ideas, they are in general more willing to try new financial products (Mayfield et al., 2008). They are also more likely to take risks (Becker et al., 2012). They use intuitive decision-making styles and rely less on the opinions of others (Othman et al., 2020). Brown and Taylor (2014) also showed that openness to experience is positively related to stock market participation.

### Previous research

As far as I know, there is no previous academic research about a possible relationship between personality traits and participating in the cryptomarket. On the internet there is one study about the impact of personality traits on the use of cryptocurrencies. This study, conducted by Sudzina and Pavlicek (2019), uses data from university students from the Czech Republik. The data was collected in the period from December 2017 and March 2018, which might be outdated compared to the current situation, as cryptocurrencies were not that well-known as today. Besides that, only students participated in their research, leading to a low generalizability with regard to the general population. They found that openness to experience, being male, and having a full-time job all had a positive influence on using cryptocurrencies (Sudzina & Pavlicek, 2019).

In contrast to the crypto market, there is quite some previous research on why people enter the stock market. Regarding stock market participation, Kaustia and Knüpfer (2012) stated that asset price bubbles are associated with an increase in participation rates. Blaurock et al. (2018) showed that stock market entry decisions are subject to herding behavior and market risk. First, investors are subject to herding behavior, meaning that they increasingly enter the stock market when the number of active investors increases, which is in line with the research of Kaustia and Knüpfer (2012). Second, with regard to market risk, a higher past volatility in the stock market results in a lower probability that an investor will enter the stock market (Blaurock et al., 2018).

This research is closest to that of Brown and Taylor (2011), who studied the relationship between the Big Five personality traits and stock market participation. They found a positive relationship between openness to experience and stock market participation, a negative relationship between extraversion and agreeableness and stock market participation, and no significant relationship between conscientiousness and neuroticism and stock market participation.

## Hypotheses

Based on previous research and the characteristics of the personality traits, a hypothesis is generated for each personality trait.

### *Conscientiousness*

Conscientiousness is characterized by hard work, self-discipline, organization, and strive for achievement and goal orientation. Brown and Taylor (2014) found no significant results between conscientiousness and stock market participation. Furthermore, there seems to be a negative relation between conscientiousness and risk taking (Becker et al., 2012; Nicholson et al., 2005; Wong & Carducci, 2013). Therefore these individuals might be less likely to invest, leading to the following hypothesis:

H1: 'There is a negative relationship between the level of conscientiousness and the likelihood this person participates in the crypto market.'

### *Extraversion*

Characteristics of extraversion are high level of confidence, positive emotions, enthusiasm, energy, excitement seeking and social interactions. Brown and Tayler (2014) found a negative relation between extraversion and stock market participation. However, Johnsi and Sunitha showed that extraversion has a significant relationship with overconfidence, and Becker et al. (2012) showed that extraversion increases risk taking, which could increase the likelihood that an individual invests in stocks. Christiles et al. (2010) showed that socially active people, which are characteristics of extraversion, are more likely to participate in the stock market. So, the relation between extraversion and stock market participation is not completely clear, but most of previous research would suggest that a higher level of extraversion leads to a higher likelihood of participating. Based on the significant relationship with overconfidence and a higher level of risk taking, the following hypothesis is formulated:

H2: 'There is a positive relationship between the level of extraversion and the likelihood this person participates in the crypto market.'

### *Agreeableness*

Characteristics of agreeableness are cooperation, morality, sympathy, a low self-confidence, and high level of trust in others. These people are very harmonious and cooperative (Johnsi & Sunitha, 2019). Brown and Taylor (2014) found that agreeableness is negatively associated with the likelihood of holding shares which is in line with Goldfayn-Frank (2018). Nicholson et al. (2005) showed that a higher level of agreeableness leads to a lower tendency to take risks, which could lead to a lower level of stock market participation. Therefore, the following hypothesis is formulated:

H3: 'There is a negative relationship between the level of agreeableness and the likelihood this person participates in the crypto market.'

#### *Neuroticism*

Neuroticism is characterized by anxiety, anger, insecurity, impulsiveness, vulnerability, and self-consciousness. People who score high on neuroticism are emotionally less stable and have a high level of negative emotions (Johnsi & Sunitha, 2019). Previous research found a negative relation between neuroticism and risk taking (Becker et al., 2012; Brooks & Williams, 2021; Nicholson et al., 2005). Because these people have a pessimistic view of the world, the expectation is that they are less likely to invest in stocks, because they do not have positive expectations. Altogether, the following hypothesis can be formulated:

H4: 'There is a negative relationship between the level of neuroticism and the likelihood this person participates in the crypto market.'

#### *Openness to experience*

Openness to experience individuals are creative, intellectually curious, impulsive and open to new ideas. Brown and Taylor (2014) showed that openness to experience is positively related to stock market participation. They also have a higher level of risk taking (Becker et al., 2012). As these people are more curious and open to new ideas, and have an intuitive decision-making style, the following hypothesis is formulated:

H5: 'There is a positive relationship between the level of openness to experience and the likelihood this person participates in the crypto market.'

### **Research method**

#### *Data*

This research uses self-generated data. For collecting the data a survey is used, which could be completed by anyone aged 18 years or older, the minimum age is 18 because for most crypto exchanges the minimum age to register is 18 years. However, cryptocurrency usage is most popular with young adults, as 31% people between 18 and 29 have used it (Perrin, 2021). Therefore, the minimum age to participate in the survey is set as low as logically reasonable. The survey consists of three parts. In the first part there will be some questions about personal information, such as age, gender, employment, level of education and marital status which will be used as control variables (Othman et al., 2020; Chitra & Sreedevi, 2011; Conlin et al., 2015). The second part determines the personality traits of the respondent. To determine the personality traits of the respondents, the short 15-item personality test is used, following Brown and Tayler (2014). The main reason for using the 15-item test instead of the 60-item test from Costa and McCrae (1992) is because a longer survey will

most likely lead to a lower number of respondents. Besides that, the shorter test shows acceptable levels of reliability and validity and captures the personality domains reasonably well (Hahn et al., 2012). In the last part of the survey, questions were asked regarding investing in cryptocurrencies. For example, if they currently hold cryptocurrencies and how long ago and why they started investing. The complete survey in English can be found in Appendix A. Since this research is about crypto market participation in the Netherlands, the survey was presented to the respondents in Dutch. For the translation of the personality test, the work of Denissen et al. (2008) is used. They showed that their Dutch BFI is consistent with the psychometric quality of the English original.

The data was collected between May 12 and June 1 of the year 2022. In total, 203 people started with the survey. However, 37 people did not finish the survey resulting in a total of 166 individuals in the final dataset, consisting of 93 females and 73 males.

### Variables

In this section all the variables used in this research will be presented. Firstly, the dependent variable will be explained, after that the independent variables will be elaborated, and finally the control variables will be discussed.

#### Dependent variable

The dependent variable is crypto market participation (cmp). This indicates whether this person is participating in the crypto market or not, in other words, if he or she is holding any cryptocurrencies at that moment. This is a binary variable which has the value of 1 if that person is currently holding any cryptocurrencies, and a value of 0 otherwise.

#### Independent variables

The independent variables are the five personality traits, consisting of conscientiousness, extraversion, agreeableness, neuroticism and openness to experience. The scores on the personality traits are determined using the 15-item personality test, see Appendix A (Brown & Taylor, 2014). For each personality trait, three questions are asked. The respondent has to choose the answer that describes him or her best. The answers are on a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). For example, for question number one: *'I see myself as someone who does a thorough job'*, the respondent must determine to what extent he or she agree with the statement. After all 15 questions are answered, the score of four questions was reversed, as they were asked in an opposite way. Finally, the score on each personality traits is calculated by adding the three scores related to a certain personality trait, and dividing by three.

### Control variables

The most important control variables used in this research are age, gender, employment status, marital status, educational level, income, and level of risk taking. These are included because previous research showed relationships between these variables and stock market participation, as elaborated in the literature overview.

Age is included as a control variable and is measured as the respondents age in years (e.g. 36 years old). For the variable gender, a distinction is made between males and females, where males have the value 1 and females the value 0. Employment status is divided into 6 different groups, namely employed on contractual basis (1), work in own business/self-employed (2), student (3), unemployed (4), retired (5), and unable to work (6). For marital status, the respondent had to choose between four options, unmarried (1), married (2), divorced (3), and widowed (4). The variable educational level is based on the Dutch school system and can roughly be divided into 5 levels from low to high. Regarding income, the Centraal Planbureau (CPB), a Dutch government organization, determined that the yearly median gross income for 2022 in the Netherlands is €38.000 including holiday allowance (CPB, 2021). In this research, less than €10.000 is labelled a low, between €10.000 and €37.999 as medium/low, between €38.000 and €65.999 as medium/high, and everything above €66.000 as high. Besides that, also the option 'prefer not to answer' was displayed to the respondents, in order to prevent that people who do not want to tell their income quit the survey. Finally, the level of financial risk taking is included as a control variable. The respondent had to answer the question '*I do not mind to take risk financially*', to score this variable the 7-point Likert scale is used, meaning that a high score reflects a high level of financial risk taking.

Furthermore, the survey asked to the participants who are currently holding cryptocurrencies how many years ago, and why they started investing, where 'because of own research' has the value 0, and because of 'others people telling them about it' has the value 1. Some general questions are whether their expectation about the value of cryptocurrencies in the next 5 years is positive (1) or negative (0) and if they are currently holding any stocks (smp), yes (1) or no (0). Finally, the respondents had to imagine they won €50.000 in a lottery, and were asked if they would invest a part of that money in cryptocurrencies (lotc), and stock respectively (lots). This way the willingness to participate is measured.

## Descriptive statistics

Table 1 shows the descriptive statistics of the dataset divided into two groups, namely a group for individuals who are participating in the crypto market, and a group of individuals who are not participating. The descriptive statistics of the whole dataset can be found in Appendix B. More than a third (36.75%) of the respondents are currently holding cryptocurrencies. Regarding the personality scores, the mean score on conscientiousness, extraversion, and agreeableness are more or less the same between the two groups. The score on neuroticism and openness to experience is quite higher for individuals who do not own cryptocurrencies compared to the individuals who do own cryptocurrencies. If we look at age, the mean of people holding cryptocurrencies is slightly lower than the mean of people who do not hold cryptocurrencies, and also males are more likely to participate in the crypto market compared to females. Regarding employment, there are no big differences between the two groups. The dataset consists mostly of married and unmarried respondents, and there are no big differences between the two groups. For educational level it is interesting to see that for people who participate in the crypto market a larger percentage of the sample completed a level 5 educational level. This supports previous research which showed that individuals with a higher level of education are more likely to participate in the crypto market. For income there also are no big differences between people who participate in the crypto market and people who do not. People who invested in cryptocurrencies, started on average about two and a half years ago and approximately two out of three started because of other people telling them about it. It is interesting to see the difference between the two groups about the expectation of the value of cryptocurrencies in the next five years. As expected, people who invested in cryptocurrencies are more positive than people who have not invested. Almost 87% of the people who invested in cryptocurrencies is positive, compared to almost 47% of the people who are not invested in cryptocurrencies. On the other hand, it is quite surprising that almost half of the people who are not holding cryptocurrencies at the moment is positive about the future price of cryptocurrencies. Possible explanations for this could be that they think that the risks are too high, or they are negative about the price in the short term, but positive about the price in five years. Another interesting point is the level of financial risk a person is willing to take. As expected, people who invested in cryptocurrencies are more willing to take financial risks. On a scale from 1 (do not want to take financial risks) to 7 (do not mind to take financial risk), people who invested in cryptocurrencies have an average score of 4.79, and people who are not invested have an average score of 3.13, which is clearly lower. Finally, people participating in the crypto market on average also participate more in the stock market, and are willing to invest a (slightly) larger part of their money in cryptocurrencies and stocks in case they win money in a lottery.

**Table 1: Descriptive statistics for crypto market non-participants and participants.**

VARIABLES	CMP No					CMP Yes				
	N	mean	sd	min	max	N	mean	sd	min	max
Conscientiousness	105	5.263	0.944	3	7	61	5.186	0.942	2.667	6.667
Extraversion	105	5.194	1.074	1	7	61	5.240	0.980	2.667	7
Agreeableness	105	5.432	0.901	1.667	7	61	5.448	0.873	3	7
Neuroticism	105	4.387	1.263	2	7	61	3.503	1.253	1.333	6.333
Openness	105	4.571	1.106	2	7	61	4.208	1.190	2	7
Age	105	35.05	15.68	18	85	61	32.69	13.74	18	71
Gender	105	0.314	0.466	0	1	61	0.656	0.479	0	1
<i>Employment</i>										
Contract	105	0.495	0.502	0	1	61	0.590	0.496	0	1
Self-employed	105	0.067	0.251	0	1	61	0.066	0.250	0	1
Student	105	0.381	0.488	0	1	61	0.328	0.473	0	1
Retired	105	0.048	0.214	0	1	61	0.016	0.128	0	1
Unable	105	0.010	0.098	0	1	61	-	-	-	-
<i>Marital</i>										
Unmarried	105	0.619	0.488	0	1	61	0.672	0.473	0	1
Married	105	0.352	0.480	0	1	61	0.311	0.467	0	1
Divorced	105	0.010	0.098	0	1	61	-	-	-	-
Widowed	105	0.019	0.137	0	1	61	0.016	0.128	0	1
<i>Education</i>										
Lvl 1	105	0.010	0.098	0	1	61	-	-	-	-
Lvl 2	105	0.057	0.233	0	1	61	0.049	0.218	0	1
Lvl 3	105	0.381	0.488	0	1	61	0.443	0.501	0	1
Lvl 4	105	0.476	0.502	0	1	61	0.377	0.489	0	1
Lvl 5	105	0.076	0.267	0	1	61	0.131	0.340	0	1
<i>Income</i>										
Low	105	0.305	0.463	0	1	61	0.262	0.444	0	1
Middle/Low	105	0.381	0.488	0	1	61	0.328	0.473	0	1
Middle/High	105	0.219	0.416	0	1	61	0.311	0.467	0	1
High	105	0.067	0.251	0	1	61	0.066	0.250	0	1
N/A	105	0.029	0.167	0	1	61	0.033	0.180	0	1
cmpy	0	-	-	-	-	61	2.410	1.575	0	8
why	0	-	-	-	-	61	0.656	0.479	0	1
expectation	105	0.467	0.501	0	1	61	0.869	0.340	0	1
smp	105	0.114	0.320	0	1	61	0.328	0.473	0	1
lotc	105	1.362	0.652	1	6	61	2	0.983	1	6
lots	105	1.829	0.925	1	5	61	1.918	1.069	1	5
risk	105	3.133	1.551	1	6	61	4.787	1.603	1	7



## Methodology

For analyzing the data, the program STATA is used. Using regression analysis, possible relationships between personality traits and investing in cryptocurrencies will be examined. The dependent variable is if they participate in the cryptomarket or not, which is measured using a dummy variable. Following Conlin et al. (2015), who studied personality traits and stock market participation, to regress the dummy variable a logistic regression will be used. The assumptions for a logistic regression are elaborated in Appendix D, furthermore the distribution of the scores on the personality traits can be found in Appendix D. This leads to the following basic form of regression:

$$CMP_i = \alpha + \beta_i PTS_i + \gamma_i Controls_i + \varepsilon_i \quad (\text{equation 1})$$

Where CMP is crypto market participation and PTS refers to the personality trait score of the individual on a specific personality trait. Following previous research, the most important control variables are also included in the logistic regressions. These include age, gender, employment status, marital status, educational level, income, and level of financial risk taking. Because there are five different personality traits, for each personality trait the above regression will be run. To see whether the relationship between personality traits and crypto market participation is different from the relationship between personality traits and stock market participation, the same will be done with stock market participation as dependent variable. Leading to the following form of regression:

$$SMP_i = \alpha + \beta_i PTS_i + \gamma_i Controls_i + \varepsilon_i \quad (\text{equation 2})$$

But first, there will be a simple logistic regression for each personality trait, to see the standalone effect on crypto market participation without any potential collinearity issues.

## Results

Before performing a simple logistic regression for each personality trait, a simple regression has been done to see the relationship between personality traits and risk taking, gender and risk taking, and age and risk taking. The results are shown in table C1. The coefficients regarding the personality traits are in line with previous research, but only for neuroticism this relationship is significant. Meaning that people with a higher score on neuroticism have a lower score on risk taking. It also shows that males are more likely to take risks and that the level of risk tolerance decreases with age.

The results of the simple logistic regressions for each personality trait are presented in table C2. The results show that there is a significant relationship between two personality traits and crypto market participation, namely neuroticism and openness to experience. There is a negative relationship between the score on neuroticism and crypto market participation, which is significant at the 1% level. Furthermore, there is a negative relationship between the score on openness to experience and crypto market participation, significant at the 10% level. With regard to the other three personality traits,

there is a small negative relationship for conscientiousness, a small positive relationship for extraversion, and a small positive relationship for agreeableness and crypto market participation. However, none of these relationships are significant at 10% at least. The simple logistic regressions show that there is a significant relationship between two personality traits and crypto market participation.

To see what the combined effects of the personality traits are, a logistic regression with crypto market participation as dependent variable and all five personality traits as independent variables is shown in table C3. This regression shows that there is still a negative relationship between neuroticism and crypto market participation at the 1% level, and a negative relationship between openness to experience and crypto market participation at the 5% level. In contrast to the separate regression, conscientiousness now also shows a significant negative relationship regarding crypto market participation at the 10% level. Extraversion and agreeableness still show a (small) positive relationship, however, this relationship is not significant.

The correlation table, table C4, shows the relationship between the independent variables and most important control variables. A score of 1 indicates that there is a perfect positive linear relationship between two variables, a score of -1 indicates there is a perfect negative linear relationship, and a score of 0 indicates no linear correlation. The table shows that the scores between the independent variables are close to zero, which means that there is no sign of strong correlation between the independent variables. Furthermore, there are no alarmingly high scores between the independent variables and the control variables.

Now, *equation 1* will be used to check whether the relationship between certain personality traits and crypto market participation also holds when control variables are used. Table C5 shows the outcome of the regressions combined into one table. Starting with conscientiousness, a higher score on this personality trait increases the likelihood this person is participating in the crypto market. In contrast to the logistic regression using all the personality traits as independent variables, the relationship is not significant when adding the control variables. Furthermore, gender and the level of risk taking play a significant role in the likelihood this person participates in the cryptomarket. Being a male and having a higher level of risk taking both increases the likelihood of participating in the cryptomarket. So regarding conscientiousness, we have to reject hypothesis 1, meaning that there is no significant negative relationship between the level of conscientiousness and the likelihood of crypto market participation.

For extraversion, the hypothesis was that there is a positive relationship between the level of extraversion and the likelihood this person participates in the crypto market. For the simple logistic regression there was indeed a small positive relationship between extraversion and cryptomarket participation, however, this was no significant relationship. When adding the control variables, there

is a small non-significant negative relationship between extraversion and crypto market participation, therefore hypothesis 2 is rejected. Furthermore, gender and the level of risk taking again play a significant positive role in the likelihood this person participates in the cryptomarket.

Regarding agreeableness, the expectation was that there is a negative relationship between the level of agreeableness and crypto market participation. However, the results show that there is a non-significant positive relationship, therefore hypothesis 3 also needs to be rejected. Again, there is a significant positive relationship between being male and the level of risk taking and the likelihood of participating in the crypto market.

Hypothesis 4 stated that there is a negative relationship between the level of neuroticism and crypto market participation, and this hypothesis is accepted. There is indeed a negative relationship between neuroticism and cryptomarket participation at the 5% level. Also the level of risk taking significantly increases the likelihood of crypto market participation.

Finally, openness to experience shows a surprising result. There is namely a significant negative relationship at the 1% level between the level of openness to experience and crypto market participation, while a positive relationship was expected. There are no clear reasons to explain this result, but it might be the case that the influence of personality traits on crypto market participation is different from the influence of personality traits on stock market participation.

The results of the regressions using *equation 1* are mostly not in line with the expectations based on previous research regarding personality traits and stock market participation (Brown & Taylor, 2014). Therefore, *equation 2* will be used to see whether the relationship between personality traits and stock market participation is in line with previous research. In Table C6 the results are shown. Brown and Taylor (2014) found non-significant positive relationship for conscientiousness, a significant negative relationship for extraversion, a significant negative relationship for agreeableness, a non-significant negative relationship for neuroticism, and a significant positive relationship for openness to experience and the likelihood of participating in the stock market. First of all, none of the relationships between the personality traits and stock market participation showed in table C6 is significant at the 10% level at least. However, there is a positive relation for conscientiousness and openness to experience, and a negative relation for extraversion, agreeableness and neuroticism and stock market participation. This is in line with the results of Brown and Taylor (2014). This shows that personality traits may have a different influence on crypto market participation compared to stock market participation. Furthermore, being a male significantly increases the likelihood of participating in the stock market. And also being a student, having a Middle/High income, and having a high level of risk taking significantly increases the likelihood of participating in the stock market, while for crypto market participation no significant relationship was found for these variables.

We now know which personality traits play an important role in crypto market participation. Since the goal of this research is to paint a picture of the average investor in the crypto market in the Netherlands, a logistic regression is run including all variables, and with crypto market participation as dependent variable. The results are shown in table C7. There are six variables with a significant relationship with crypto market participation. Starting with neuroticism and openness to experience, a high score on these personality traits decreases the likelihood a person participates. There is a difference between males and females, where males have a higher likelihood of participating. Another important factor is the expectation about the future price of cryptocurrencies, where a positive expectations leads to a higher likelihood of participating. Finally, people with a higher level of risk taking are more likely to participate and also people who would invest a higher amount of money in cryptocurrencies in case they win the lottery, are more likely to participate.

### **Conclusion and discussion**

This is the first research to study the relationship between personality traits and crypto market participation. The main contribution of this research is that there is a significant relationship between two personality traits and crypto market participation. Namely a negative relationship between neuroticism and cryptomarket participation, and a negative relationship between openness to experience and crypto market participation. These relationships remain significant in different regressions with different control variables. For conscientiousness, extraversion, and agreeableness no significant relationship is found. Regarding gender and risk taking, males are more likely to participate and a higher level of risk taking also increases crypto market participation, which is in line with previous research. In contrast with previous research, there is no significant relationship on participation for age, education, income, and marital status. A possible explanation for this is the fact that these variables were not perfectly evenly distributed among the different categories. Regarding income, this might not play a significant role because the entry costs for crypto market participation are low. The goal of this research was to create a picture of the average crypto investor. This can be described as follows: the average crypto investor is most likely a male with a low score on neuroticism and openness to experience. This person does not mind to take financial risks, has a positive expectation about the future price of cryptocurrencies, and is willing to invest a sufficient part of their money in case they win the lottery. To conclude, this research brings new insights into which personality traits and characteristics play a significant role in crypto market participation.

Furthermore, this research shows that there might be differences in which determinants play a role in participating in the crypto market compared to the stock market. It would be interesting to explore this in more depth in future research.

Of course, this research also has its limitations. First of all, the number of respondents is too low to create a reliable picture of the average crypto investor, but it can be seen as a good starting point for future research since some significant results were found. Besides that, only the most important variables obtained from the literature are used in this research, so there is a possibility that variables are missing which might change the results. For future research, I would suggest to expand the number of variables. It would be interesting to add behavioral biases as control variables, for example a variable which measures overconfidence, as this might increase the likelihood of participating because they overestimate the price in the future. Another interesting control variable to add is a so called 'crypto fear & greed index', this measures the level of fear or greed in the crypto market at that moment. If there level of fear is high, people might be less likely to participate in the crypto market, and vice versa. Also, it would be a good addition to use data from different countries, which makes it possible to study differences between countries. Finally, as I found some differences between the determinants of crypto market and stock market participation, future research could focus more on this, to study whether the characteristics of the average crypto market participant significantly differ from the characteristics of the average stock market participant.

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**Appendix A**

Control:

**Age**

-Open question (answer in years)

**Gender:**

-Male (1)

-Female (2)

**Employment:**

-Employed on a contractual basis (1)

-Work in own business/Self-employment (2)

-Student (3)

-Unemployed (4)

-Retired (5)

-Unable to work (6)

**Marital status:**

-Unmarried (1)

-Married (2)

-Divorced (3)

-Widowed (4)

**Educational level: (Dutch school system)**

-Basisonderwijs (1)

-Vmbo, mbo-1, lagere technische school (2)

-Havo, vwo, mbo-2, mbo-3, mbo-4, middelbare technische school, hbs, mms (3)

-Hbo, wo bachelor, hogere technische school (4)

-Wo master, wo doctor (5)

**Income (gross annual income, including holiday allowance)**

-Less than €10.000

-Between €10.000 and €37.999

-Between €38.000 and €65.999

-More than €66.000

-I prefer not to say

**Personality:** (All answers on 7 item Likert scale: 1. strongly disagree, 2. disagree, 3. somewhat disagree, 4. neither agree nor disagree, 5. somewhat agree, 6. agree, 7. strongly agree)

1. I see myself as someone who does a thorough job

2. I see myself as someone who tends to be lazy<sup>1</sup>

3. I see myself as someone who does things efficiently

4. I see myself as someone who is talkative

5. I see myself as someone who is outgoing, sociable

6. I see myself as someone who is reserved<sup>1</sup>

7. I see myself as someone who is sometimes rude to others<sup>1</sup>

8. I see myself as someone who has a forgiving nature
9. I see myself as someone who is considerate and kind to almost everyone
10. I see myself as someone who worries a lot
11. I see myself as someone who gets nervous easily
12. I see myself as someone who is relaxed, handles stress well<sup>1</sup>
13. I see myself as someone who is original, comes up with new ideas
14. I see myself as someone who values artistic, aesthetic experiences
15. I see myself as someone who has an active imagination

<sup>1</sup>Score on this item is reversed

To calculate the personality traits scores:

*Conscientiousness: questions 1-2-3*

*Extraversion: questions 4-5-6*

*Agreeableness: questions 7-8-9*

*Neuroticism: questions 10-11-12*

*Open to experience: questions 13-14-15*

Crypto:

**Are you currently holding cryptocurrencies?** (In case of no, it automatically skips the next two questions)

-Yes (1)

-No (0)

**How long ago did you start investing (approximately)?**

-Open question (answer in years)

**Why did you start investing?**

-Because of my own research (0)

-Because of other people telling me about it (1)

**What is your expectation about the value of cryptocurrencies in the next 5 years?**

-Negative (0)

-Positive (1)

**Do you currently own any stocks?**

-Yes (1)

-No (0)

**Imagine you won €50.000 in a lottery, would you use some of that money to buy cryptocurrencies?**

-No (1)

-Yes, up to a maximum of €10.000 (2)

-Yes, around €20.000 (3)

-Yes, around €30.000 (4)

-Yes, around €40.000 (5)

-Yes, €50.000 (6)

**Imagine you won €50.000 in a lottery, would you use some of that money to buy stocks?**

- No (1)
- Yes, up to a maximum of €10.000 (2)
- Yes, around €20.000 (3)
- Yes, around €30.000 (4)
- Yes, around €40.000 (5)
- Yes, €50.000 (6)

**I do not mind to take risk financially**

-Measured on 7 item Likert scale: 1. strongly disagree, 2. disagree, 3. somewhat disagree, 4. neither agree nor disagree, 5. somewhat agree, 6. agree, 7. strongly agree

**-Which 2 words do you think of by the word cryptocurrencies?**

-Open answer

**-Which 2 words do you think of by the word stocks?**

-Open answer

**Appendix B****Table B1****Descriptive Statistics of whole dataset**

Variable	Obs	Mean	Std. Dev.	Min	Max
Conscientiousness	166	5.235	.941	2.667	7
Extraversion	166	5.211	1.038	1	7
Agreeableness	166	5.438	.888	1.667	7
Neuroticism	166	4.062	1.327	1.333	7
Openness	166	4.438	1.148	2	7
Age	166	34.181	14.998	18	85
Gender	166	.44	.498	0	1
<b>Employment</b>					
Contract	166	.53	.501	0	1
Self	166	.066	.249	0	1
Student	166	.361	.482	0	1
Retired	166	.036	.187	0	1
Unable	166	.006	.078	0	1
<b>Marital status</b>					
Unmarried	166	.639	.482	0	1
Married	166	.337	.474	0	1
Divorced	166	.006	.078	0	1
Widowed	166	.018	.134	0	1
<b>Education</b>					
Lvl 1	166	.006	.078	0	1
Lvl 2	166	.054	.227	0	1
Lvl 3	166	.404	.492	0	1
Lvl 4	166	.44	.498	0	1
Lvl 5	166	.096	.296	0	1
<b>Income</b>					
Low	166	.289	.455	0	1
Middle/Low	166	.361	.482	0	1
Middle/High	166	.253	.436	0	1
High	166	.066	.249	0	1
N/A	166	.03	.171	0	1
cmp	166	.367	.484	0	1
cmpy	61	2.41	1.575	0	8
why	61	.656	.479	0	1
expectation	166	.614	.488	0	1
smp	166	.193	.396	0	1
lotc	166	1.596	.846	1	6
lots	166	1.861	.978	1	5
risk	166	3.741	1.758	1	7

**Appendix C****Table C1: Simple regression with risk as dependent variable, and the personality traits as independent variables, combined in one table.**

VARIABLES	(1) Risk	(2) Risk	(3) Risk	(4) Risk	(5) Risk	(6) Risk	(7) Risk
Conscientiousness	-0.230 (0.145)						
Extraversion		0.149 (0.132)					
Agreeableness			-0.178 (0.154)				
Neuroticism				-0.393*** (0.0988)			
Openness					0.0744 (0.119)		
Gender						1.392*** (0.253)	
Age							-0.0207** (0.00901)
Constant	4.944*** (0.770)	2.966*** (0.700)	4.709*** (0.848)	5.336*** (0.422)	3.411*** (0.548)	3.129*** (0.168)	4.448*** (0.336)
Observations	166	166	166	166	166	166	166
R-squared	0.015	0.008	0.008	0.088	0.002	0.155	0.031

Standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table C2: Simple logistic regression of each personality trait with crypto market participation as dependent variable, combined in one table.**

VARIABLES	(1) cmp	(2) cmp	(3) cmp	(4) cmp	(5) cmp
Conscientiousness	-0.0880 (0.171)				
Extraversion		0.0440 (0.157)			
Agreeableness			0.0209 (0.182)		
Neuroticism				-0.553*** (0.139)	
Openness					-0.281* (0.144)
Constant	-0.0832 (0.907)	-0.772 (0.833)	-0.657 (1.004)	1.634*** (0.558)	0.693 (0.647)
Observations	166	166	166	166	166

Standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table C3: Logistic regression with crypto market participation as dependent variable, and all personality traits as independent variables.**

VARIABLES	(1) cmp
conscientiousness	-0.367* (0.204)
extraversion	0.0287 (0.181)
agreeableness	0.141 (0.219)
neuroticism	-0.643*** (0.150)
openness	-0.384** (0.164)
Constant	4.673** (1.841)
Observations	166
Standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1	

**Table C4: Correlation matrix between independent variables and most important control variables.**

Pairwise correlations												
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) conscientiousness	1.000											
(2) extraversion	0.172**	1.000										
(3) agreeableness	0.217***	0.181**	1.000									
(4) neuroticism	-0.233***	-0.181**	-0.063	1.000								
(5) openness	-0.037	0.160**	0.098	-0.030	1.000							
(6) age	0.285***	0.032	0.189**	-0.216***	0.057	1.000						
(7) gender	-0.136*	-0.020	-0.100	-0.406***	-0.010	-0.175**	1.000					
(8) employment	-0.063	-0.099	-0.107	0.265***	0.095	-0.042	-0.184**	1.000				
(9) marital	0.334***	0.050	0.279***	-0.125*	0.029	0.765***	-0.211***	-0.075	1.000			
(10) education	0.025	0.083	0.037	0.005	0.001	-0.231***	-0.021	-0.032	-0.078	1.000		
(11) income	0.109	0.065	0.076	-0.358***	-0.029	0.468***	0.135*	-0.334***	0.329***	0.135*	1.000	
(12) risk	-0.123	0.088	-0.090	-0.296***	0.049	-0.176**	0.394***	-0.098	-0.175**	0.065	0.088	1.000

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

**Table C5: Logistic regression for each personality trait including control variables with crypto market participation as dependent variable, combined in one table.**

VARIABLES	(1) cmp	(2) cmp	(3) cmp	(4) cmp	(5) cmp
Conscientiousness	0.103 (0.228)				
Extraversion		-0.0302 (0.198)			
Agreeableness			0.190 (0.240)		
Neuroticism				-0.356** (0.180)	
Openness					-0.529*** (0.200)
Age	-0.00379 (0.0298)	-0.00352 (0.0297)	-0.00306 (0.0298)	-0.0120 (0.0306)	0.00897 (0.0315)
Gender	0.905** (0.440)	0.897** (0.439)	0.915** (0.442)	0.577 (0.470)	1.043** (0.460)
<i>Employment</i>					
Self-employed	-0.945 (0.916)	-0.921 (0.909)	-1.003 (0.932)	-0.893 (0.921)	-0.807 (0.953)
Student	-0.175 (0.657)	-0.212 (0.656)	-0.181 (0.656)	-0.0500 (0.664)	-0.166 (0.673)
Retired	-0.895 (1.648)	-0.914 (1.654)	-0.908 (1.653)	-0.824 (1.795)	-1.087 (1.677)
Unable	-	-	-	-	-
<i>Marital status</i>					
Married	0.752 (0.737)	0.807 (0.729)	0.749 (0.735)	0.838 (0.727)	0.752 (0.748)
Divorced	-	-	-	-	-
Widowed	1.435 (1.753)	1.540 (1.739)	1.320 (1.757)	1.466 (1.845)	1.175 (1.785)
<i>Education</i>					
Lvl 2	-0.654 (1.242)	-0.682 (1.244)	-0.563 (1.241)	-0.635 (1.288)	-1.127 (1.284)
Lvl 3	-0.0908 (0.717)	-0.114 (0.730)	-0.0647 (0.719)	0.0454 (0.730)	-0.206 (0.753)
Lvl 4	-0.526 (0.686)	-0.507 (0.687)	-0.496 (0.682)	-0.362 (0.689)	-0.478 (0.714)
Lvl 5	-	-	-	-	-
<i>Income</i>					
Middle/Low	-0.293 (0.626)	-0.309 (0.627)	-0.382 (0.636)	-0.314 (0.637)	-0.283 (0.644)
Middle/High	-0.139 (0.790)	-0.148 (0.791)	-0.152 (0.789)	-0.258 (0.802)	-0.547 (0.835)

High	-0.910 (1.131)	-0.964 (1.144)	-0.909 (1.136)	-0.972 (1.132)	-1.476 (1.171)
N/A	0.354 (1.230)	0.244 (1.217)	0.200 (1.223)	0.0734 (1.217)	0.739 (1.257)
Risk	0.593*** (0.129)	0.592*** (0.130)	0.596*** (0.129)	0.558*** (0.130)	0.676*** (0.143)
Constant	-3.345* (1.776)	-2.643 (1.665)	-3.863** (1.878)	-0.993 (1.572)	-1.137 (1.443)
Observations	163	163	163	163	163

Standard errors in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table C6: Logistic regression for each personality trait including control variables with stock market participation as dependent variable, combined in one table.**

VARIABLES	(1) smp	(2) smp	(3) smp	(4) smp	(5) smp
Conscientiousness	0.162 (0.294)				
Extraversion		-0.00622 (0.242)			
Agreeableness			-0.0781 (0.278)		
Neuroticism				-0.208 (0.218)	
Openness					0.0403 (0.205)
Age	0.0372 (0.0377)	0.0365 (0.0377)	0.0358 (0.0378)	0.0322 (0.0378)	0.0360 (0.0377)
Gender	1.292** (0.548)	1.269** (0.546)	1.269** (0.546)	1.081* (0.583)	1.261** (0.547)
<i>Employment</i>					
Self-employed	-0.184 (1.054)	-0.128 (1.043)	-0.0996 (1.043)	-0.0827 (1.047)	-0.135 (1.044)
Student	2.460*** (0.940)	2.399** (0.932)	2.396** (0.933)	2.506*** (0.945)	2.401*** (0.932)
Retired	-	-	-	-	-
Unable	-	-	-	-	-
<i>Marital status</i>					
Married	0.132 (0.883)	0.208 (0.884)	0.252 (0.895)	0.226 (0.865)	0.205 (0.881)
Divorced	-	-	-	-	-
Widowed	-	-	-	-	-



<i>Education</i>					
Lvl 2	-0.800 (1.745)	-0.736 (1.738)	-0.773 (1.736)	-0.714 (1.746)	-0.719 (1.735)
Lvl 3	-0.775 (0.796)	-0.767 (0.802)	-0.769 (0.797)	-0.747 (0.806)	-0.766 (0.797)
Lvl 4	-0.733 (0.710)	-0.678 (0.706)	-0.679 (0.705)	-0.611 (0.707)	-0.685 (0.706)
Lvl 5	-	-	-	-	-
<i>Income</i>					
Middle/Low	0.507 (0.728)	0.467 (0.728)	0.495 (0.734)	0.483 (0.729)	0.454 (0.729)
Middle/High	1.963* (1.070)	1.943* (1.065)	1.945* (1.065)	1.897* (1.071)	1.972* (1.073)
High	0.952 (1.347)	0.908 (1.353)	0.911 (1.340)	0.928 (1.345)	0.927 (1.342)
N/A	-	-	-	-	-
Risk	0.444*** (0.155)	0.438*** (0.156)	0.435*** (0.155)	0.420*** (0.156)	0.436*** (0.155)
Constant	-7.218*** (2.434)	-6.278*** (2.171)	-5.881** (2.315)	-5.282*** (2.024)	-6.468*** (1.934)
Observations	151	151	151	151	151

Standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

**Table C7: Logistic regression with crypto market participation as dependent variables and all other variables as independent variables.**

VARIABLES	(1) cmp
Conscientiousness	0.00357 (0.258)
Extraversion	0.0161 (0.223)
Agreeableness	0.152 (0.270)
Neuroticism	-0.381* (0.197)
Openness	-0.473** (0.207)
Age	-0.0218 (0.0312)
Gender	1.090** (0.538)
Employment	-0.101

	(0.248)
Marital status	0.276
	(0.626)
Educational level	0.0951
	(0.299)
Income	-0.131
	(0.303)
Expectation	1.635***
	(0.584)
smp	0.438
	(0.593)
lotc	0.557*
	(0.302)
lots	-0.377
	(0.281)
Risk	0.486***
	(0.167)
Constant	-1.338
	(3.166)
Observations	166

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## Appendix D

### Assumptions for logistic regressions

*#1: The dependent variable must be a binary variable.*

This assumption is met because the dependent variable crypto market participation has the value 0 or 1.

*#2: Observations are independent from each other.*

Since the observations are from a random sample, and people were allowed to only participate once, this assumption is most likely met.

*#3: No multicollinearity between explanatory variables.*

To test for this the Variance Inflation Factor is used:

**Table D1**

Variance inflation factor

	VIF	1/VIF
Age	3.469	.288
Marital	2.703	.37
Income	1.766	.566
Neuroticism	1.634	.612
Gender	1.505	.664
Risk	1.293	.773
Conscientiousness	1.281	.781
Employment	1.234	.81
Education	1.227	.815
Agreeableness	1.158	.863
Extraversion	1.13	.885
Openness	1.065	.939
Mean VIF	1.622	.

There are no alarmingly high scores for the explanatory variables, so this assumption is met.

*#4: There are no extreme outliers.*

Looking at the descriptive statistics table there are no extreme minimum or maximum scores on the variables.

*#5: There is a linear relationship between explanatory variables and the logit of the response variable.*

To test this assumption, the Box-Tidwell test is used:

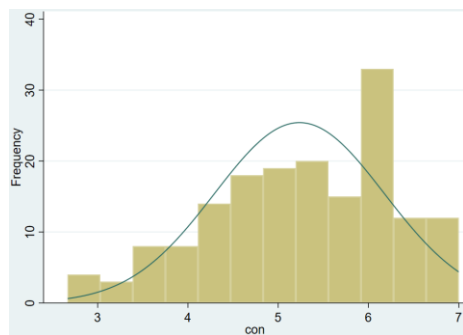
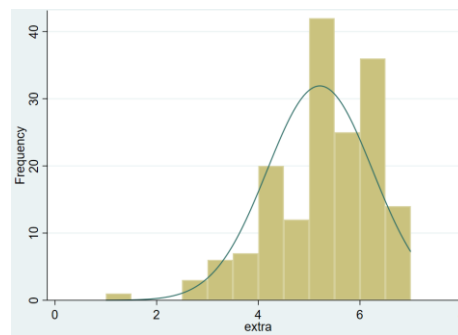
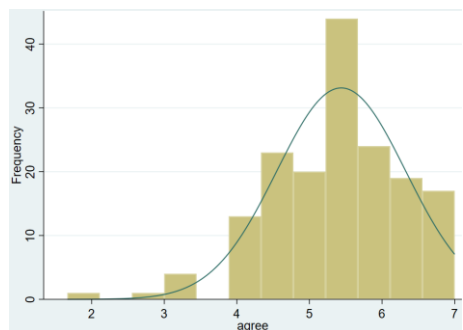
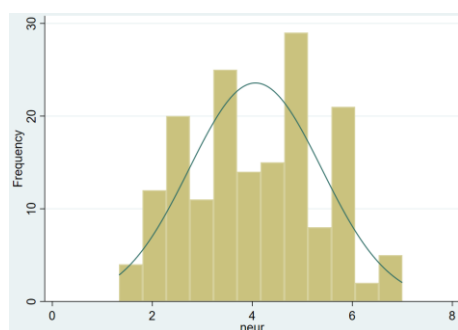
**Table D2**

Conscientiousness	P = 0.957
Extraversion	P = 0.325
Agreeableness	P = 0.906
Neuroticism	P = 0.980
Openness to experience	P = 0.250

Since all p-values are  $>0.05$ , all independent variables are linearly related to the logit of the outcome variable and the assumption is satisfied.

*#6: The sample size is sufficiently large.*

Since the total number of respondents is 166, and some answers are only chosen once, this assumption is not fully met. This also shows one of the limitations of this research, namely a quite small sample size.

**Distribution of the scores of the dependent variables****Figure D1: Conscientiousness****Figure D2: Extraversion****Figure D3: Agreeableness****Figure D4: Neuroticism****Figure D5: Openness to experience**