THE EFFECT OF PERSONALITY CHARACTERISTICS, PESSIMISM AND PROCRASTINATION TOWARDS STUDENT'S INVESTMENT DECISION

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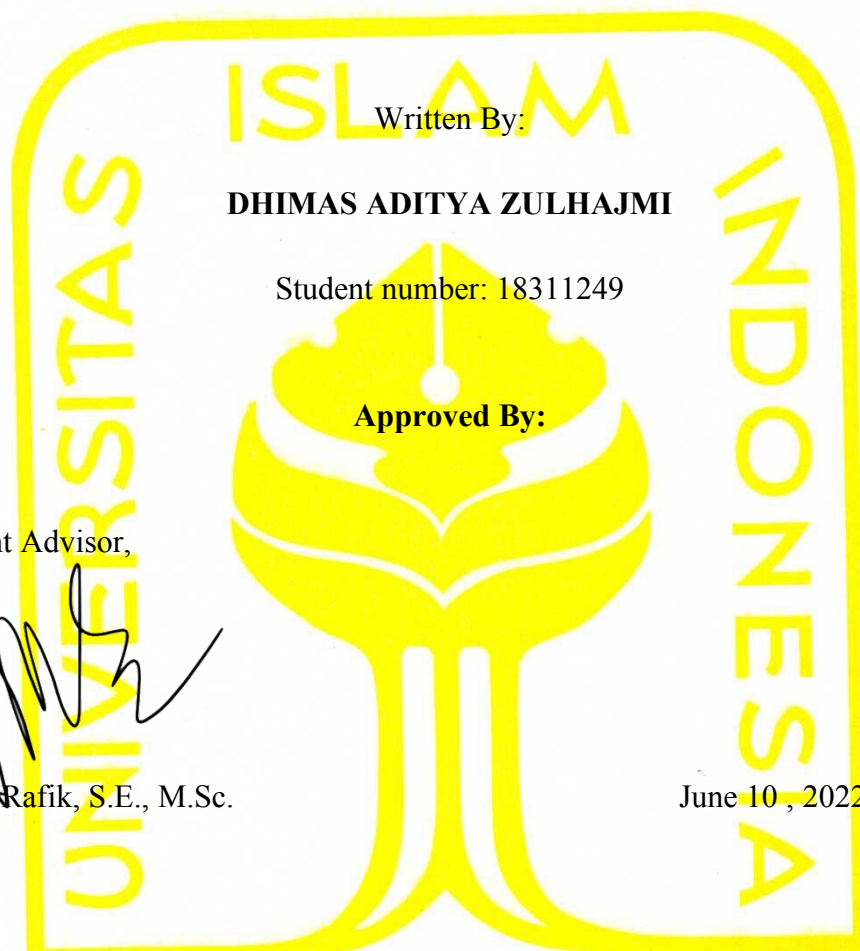
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APPROVAL PAGE

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iii

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MOTTO

"Senajan balungan kere, ora kendo nyambut gawe, senaja dalan ra alus, sing penting wani terus"
Balungan Kere – Ndarboy Genk

"Urip iku urup"
(Be useful to someone else every time)
Javanese Proverb

I dedicate this research to my family, my parents, whose love has always been devoted to me, my mom Rita Ekawati and my dad Cahyono and my older brothers, sister-in-law, and nephews, namely Dhany Wicaksono, Ariza Dwi Cahyo, Nofi Refiyanti, Hazen and Farez, With support, love, and sincere prayers, all these obligations are finally completed.

OFFERING PAGE

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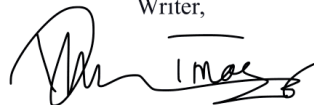
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THE EFFECT OF PERSONALITY CHARACTERISTICS, PESSIMISM, AND PROCRASTINATION ON STUDENT'S INVESTMENT DECISION

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ABSTRACT

The research explores the effect of active students' personality traits and behavioral constraints on their decision to be involved in the stock and cryptocurrency market. The data of personality characteristics and behavioral constraints include Big Five personality traits (Neuroticism, Extraversion, Conscientiousness, Openness to Experience, Agreeableness), pessimism, and procrastination. Using Structural Equation Modelling (SEM) analysis method in SmartPLS v3.2.9., it analyses 212 active Indonesian students under 30. The study found extraversion positively influences students to invest in the stock market as their risk tolerance moderates it. A similar result also found that risk tolerance positively affects openness to experience personality regarding the cryptocurrency acquisition.

Keywords: Personality Characteristics, Big Five Personality Traits, Pessimism, Procrastination, Investment Decision, Stock Market, Cryptocurrency Market.

EFEK KARAKTER PRIBADI, PESIMISME DAN PROKRASTINASI TERHADAP KEPUTUSAN INVESTASI PELAJAR

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ABSTRAK

Penelitian ini mengeksplorasi pengaruh karakter pribadi dan kendala perilaku dari pelajar sekolah dan universitas aktif terhadap keputusan untuk memulai investasi pada pasar saham dan pasar mata uang kripto. Kepribadian dan kendala perilaku yang digunakan adalah Big Five Personality Traits yang termasuk *neuroticism, extraversion, conscientiousness, openness to experience* dan *agreeableness*, dan kendala perilaku yaitu pesimisme dan prokrastinasi. Menggunakan metode analisis Structural Equation Modelling pada aplikasi SmartPLS v3.2.9., penelitian ini meneliti 212 pelajar sekolah dan universitas aktif yang tersebar di Pulau Jawa. Penelitian ini menemukan adanya pengaruh *extraversion* secara positif pada keputusan pelajar untuk berinvestasi pada pasar modal atas pengaruh moderasi toleransi resiko. Hasil yang sama juga ditemukan adanya pengaruh toleransi resiko secara positif pada kepribadian *openness to experience* yang membuat pelajar berinvestasi pada instrument mata uang kripto.

Keyword: Karakter pribadi, Big Five Personality Traits, pesimisme, prokrastinasi, keputusan investasi, pasar saham, pasar mata uang kripto

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

CHAPTER 1
INTRODUCTION

1.1 Research Background

Researchers have discussed rationality and irrationality in decision-making have been discussed by researchers in a long time (Kahneman & Riepe, 1998; Opaluch & Segerson, 1989; Simon, 1993; Wendy et al., 2014). Rational decisions seem too good to be true from the perspective of behavioural finance. Gambetti & Giusberti (2012) explained how bold financial decisions in certain conditions have to be appropriately placed with the options of aggressive or conservative manners. Financial decision is considered complex as many determinations correlates to the individual.

Several researchers explicitly report how it is difficult to justify investors' behaviour based on rational theories, as investors are unpredictable (Sharpe, 1964; Lintner, 1965). Durand et al. (2008) scientifically proved how personality influences an individual's investment decisions.

Personality traits are a determining factor in an individual investment decision (Akhtar et al., 2018). According to the Cambridge Dictionary, personality shows the kind of person they are, and traits are the characteristics that produce a particular type of behaviour. Two point-of-view shows how traits are described as definitions of people's thoughts, feelings, and behaviours and explain the background of perspectives, feelings, and actions the way they do (Jayawickreme et al., 2019). Several

1

studies agreed on how financial decisions are influenced by personality. In the study by R. B. Durand et al. (2008), Piotrowska (2019), and Oehler et al. (2018) affirmed personality traits to take part in investment behaviour in an investor's financial decision.

Personality traits that scholars widely use are Norman's Big Five Personality Traits, as they could act as the base that explains the general personal characteristics of how an individual would behave (Abood, 2019). The ability to form into a hierarchy makes Norman's Big-Five Personality Traits own its vast cross-cultural replicability and can be discussed through a robust cross-questionnaire (Akhtar & Das, 2020). Norman's Big-Five Personality Traits depict personality at the broadest level of abstraction (Gosling et al., 2003), including neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness.

Firstly, neuroticism is the feelings of anxiety that overly depicts an investor's emotions over information. A higher degree of neuroticism would focus more on negative rather than positive information (Noguchi et al., 2006). It is confirmed by Durand et al. (2019) that Myopic Loss Aversion (MLA), a bias whereas investors become too sensitive to any short-term losses as the expected outcomes mismatched the actual returns, has high correlations with neuroticism. This would lead to careless financial decisions with a higher loss rate.

On the other hand, extraversion is bold and socially active individuals that have a tendency over positive information compared to

negative information (Noguchi et al., 2006). Like neuroticism, extraversion also affects an individual's decision-making as it is interconnected with an individual's emotional expression (Oehler et al., 2018). The propensity of an extrovert to pull over risks makes them optimistic compared to neuroticism; it has been found that a sociable individual has better portfolio returns (R. B. Durand et al., 2008).

Third, openness to experience relates to an individual's creativity and curiosity. Willingness towards unconventional thoughts and values, high sensitivity to emotions, and tendency to experience something as their interests are shown within an individual with high openness to experience outcome (Costa & McCrae, 2008). The study by Hunter & Kemp (2004) shows how investors of e-commerce companies, specified as risky investments, exhibit a substantial positive score of openness of experience compared to established companies' investors. In their conclusion, Nga & Ken Yien (2013) stated, "openness in individuals promotes greater willingness to embrace unconventional rules of thumb prescribed in financial decision making." This would depict how an individual with the openness of experience affects their financial decision-making (R. B. Durand et al., 2008).

Agreeableness relates to how sympathetic (R. B. Durand et al., 2008) and the kindness over others; in simple words, people with agreeableness are friendly and straightforward (Kristjánsson, 2006). Agreeable investors easily connect with other investors and understand

them through their emotions while making financial decisions (Cheng, 2018). Zarri (2017) found that agreeableness shows risk-averse behaviour and refusal to hold stocks that investors consider risky assets. Therefore, Zarri concludes that people with fewer agreeableness scores tend to be impolite and aggressively take the risk to their advantage.

Lastly, conscientiousness is how people are thorough, responsible, and trustworthy (R. B. Durand et al., 2008). However, at the same time, George & Zhou (2001) links conscientiousness with low creative behaviour as they avoid extraordinary thinking and stay responsibly and safely in their comfort zone. It is proven through empirical study that individuals with lower conscientiousness will pursue higher risks (McGhee et al., 2012) and has a considerable connection to perceived investment performance (Akhtar et al., 2018).

In addition to personality traits, empirical studies show that behavioural constraints such as pessimism and procrastination influence financial decisions (Piotrowska, 2019). This kind of behaviour driving individuals to see themselves in unoptimistic views and leads them to see the future negatively and would retrieve undesirable outcomes over what they will do (Gupta & Maheshwari, 2021). The feeling of pessimism would likely push them to depression, anxiety, and disappointment. Pessimistic investors feel agitated about the upcoming outcomes as they discern regard worst situations (Joo et al., 2017). It is also found that pessimism becomes

one behaviour in cryptocurrency systems, showing how Ethereum investors tend toward pessimism (Aspembitova et al., 2021).

Steel (2007) defines procrastination as 'voluntarily delaying an intended course of action despite expecting to be worse off for the delay.' Steel also reports that it would eventually decrease performance and lead to a higher procrastination rate. From a time perspective, individuals with regretful past experiences tend to be pessimistic, which leads to high procrastination levels (Zabelina et al., 2018). Piotrowska (2019) also empirically approves procrastination negatively mediating most retirement saving decisions. Therefore, high procrastination would only think narrower in the period and less concerned about preparing for their future through considerable financial decisions.

Risk tolerance considers how an individual can bear the risk from the investment process. Risk tolerance is the willingness of investors toward risks in their portfolio, which every individual has a tolerance. Their comfort towards losses is incredibly defined by how high their risk tolerance is. It is supported by a study that shows investors with low financial literacy prefer investments with fewer risks, while financially high-literate investors prefer riskier instruments (Samsuri et al., 2019). Risk tolerance would also determine whether an individual would pick their investment instruments, having the tendency over high-risk assets (high volatility) or low-risk assets (low volatility).

Risk tolerance is also proven to have considerable interrelations with the Big Five personality traits, behavioural constraints, and investment behaviour. In their result, Nga & Ken Yien (2013) found conscientiousness to be substantially affected by risks, while extraversion, agreeableness, and neuroticism show negative relations to risks. Another evidence shown by Steel (2007) also considers procrastination as risky behaviour while individuals are still intentionally procrastinating, which gives the conclusion that high procrastinators would bear higher risk. It is also found that pessimism positively correlates to risk tolerance (Benmansour et al., 2007). In a nutshell, risk tolerance through the influences of psychological factors is considered viable to affect an individual's investment behaviour (Massol et al., 2015).

From time to time, the shifts between one instrument to the other might happen. We can see it from the shifts from the capital market to cryptocurrency, as it is more attractive to investors (Emerling, 2020). This ever-changing situation in the financial world requires investors to differentiate and create suitable decisions, especially on what instruments of investment they would pick (Ahmad, 2020; Gambetti & Giusberti, 2012). This phenomenon noticed, the researcher includes investment behaviour in cryptocurrency as a dependent variable due to the current situation; many young investors are interested in joining cryptocurrency investments.

Young investors, which can be assumed as students, are willing to take more risks by settling on long-term assets such as stocks (Aren &

Aydemir, 2015). The previous studies also show that older investors are likely to avoid long-term assets as they think they have less time to be pleased with the return. Another evidence found by Umboh & Atahau (2019) also approves that students are putting a higher interest in stock investment. This leads to the phenomenon of student investment activities getting more popular, which the increase can see in the Single Identification (SID) of investors in Indonesia. The data by Indonesia Central Security Depository (KSEI) shows a 199.43% increase in stock investors' SID from 2018 to March 2021, with an average of 45.2% increase each year. The demographics of investors' occupation held students as the second-largest, covering 27.1% and 7.72% differences, with employees as the largest. As an emerging country, Indonesia has proven its economic capabilities by showing high development in its economy compared to other established developing countries (Hidayah & Kustina, 2020).

Mandell & Klein (2009) investigated matters that would encourage students to start investing, mainly financial knowledge and personal beliefs. Most of the respondents also show a moderate amount of risk tolerance, which explains that most of the students did not take consent to the risks of investment. The financial knowledge would also support Becchetti et al. (2012), which showed that improving financial education would drastically enhance students' investment behaviour.

This study focuses on how personality traits included in the Norman's BFT and behavioural constraints would likely influence students,

especially in Java Island, on their investment decision to invest in stocks and cryptocurrency markets. Until 2020, Java Island held 151,650,200 individuals, or 56.25% of Indonesia's total population, based on Badan Pusat Statistik (BPS) Data. The Kustodian Sentral Efek Indonesia (KSEI) December 2021 capital market statistics state that the number of investors in Java Island reaches 69.83%, dominating the number of investors compared to the other Indonesia's central Islands. The number of investors under 30 years old also dominates Indonesia's capital market by 60.02%. It interests the researcher to focus on students aged under 30 on Java Island.

A considerable lack of studies examining the correlation between students' saving behaviour and personality traits. An empirical study by Hidayah & Kustina (2020) shows the results of positive correlations between three of four behavioural biases that might influence investment decisions – neuroticism, extraversion, and openness – especially in the context of Indonesia Stock Exchange investment. Taking other examples of one emerging country, in this case, Pakistan, Nauman Sadiq & Used Azad Khan (2019) stated that all of Norman's Big 5 Personalities are related to short-term and long-term investment decisions.

1.2 Problem Formulation

It is rare to find any literature measuring the impact of personality traits on the student's investment decision in the stocks and cryptocurrency markets. Most studies of personality traits' impact on investment decisions broadly included all investors, especially in the Indonesian context. The

8

example of a study conducted by Hidayah & Kustina (2020) was not specifying its subject to students. Other research by Kusumaningrum et al. (2019) and Utami & Sirine (2016) were only putting consent on the relation of financial literacy to the young investors' investment decisions.

1.3 Research Questions

Referring to identified problems above, the research questions in this study are formulated as follows:

1. Do personality traits influence the probability of students investing in both the stock market and cryptocurrency market?

2. Do behavioural constraints influence the probability of students investing in both the stock market and cryptocurrency market?

3. Do risk tolerance moderate the influence of personality traits on the probability of students investing in the stock market and cryptocurrency market?

4. Do risk tolerance moderate the influence of behavioural constraints on the probability of Indonesia's students investing in the stock market and cryptocurrency market?

1.4 Research Objectives

Referring to the research questions above, the research objectives in this study are formulated as follows:

1. To investigate the influence of personality traits of Indonesian students on the probability of investing in both the stock market and cryptocurrency market.

2. To investigate the influence of behavioural constraints of Indonesian students on the probability of investing in both the stock market and cryptocurrency market.

3. To analyse the moderating effect of risk tolerance on the influence of personality traits of Indonesian students on the probability of investing in the stock market and cryptocurrency market.

4. To analyse the moderating effect of risk tolerance on the influence of behavioural constraints of Indonesian students on the probability of investing in the stock market and cryptocurrency market.

1.5 Research Contribution

1. Theoretical Contribution: It would give more information related to the student's financial behaviour, especially for understanding the effect of psychological aspects on young generations' investment behaviour concerning their preparation for their future.

2. Practical Contribution: To gain students' insights and indirectly give motivations to prepare well for their future to achieve financial freedom. The result would also be useful for companies, especially securities companies, targeting new investors within the active student's age.

CHAPTER 2
LITERATURE REVIEW

2.1. Key Literatures

2.1.1. Life Cycle Theory of Consumption

A theory developed by Modigliani and Brumberg in the '50s called Life Cycle Theory of Consumption explains the choices of an individual's spending in stages. It is limited by how much time the individual can earn financial resources. The theory came from the life cycle hypotheses of saving that make us understand individual factors and their aggregate saving and wealth-holding behaviour. It was found by Modigliani (1986) that due to high productivity growth and more extensive lifetime resources, youngers tend to have more wealth compared to older individuals. Rationally, this means young individuals can prepare for their non-productive stage to reach financial freedom in the future.

On the contrary, it was also found that the constant rate of saving in the major age group, while the younger and older individuals tended to have lower savings or even dissaving (Modigliani, 1986). The savings that young people had collected throughout the time would be used to finance their retirement in the future (Piotrowska, 2019). It is also found that access to credit becomes one of the essential parts of raising the liquidity of consumption profile in young households, influencing the development of financial markets (Alexandre et al., 2020).

Deaton (2011), in his study, illustrates how life-cycle theory, in the context of wealth, is passed around from the retirees to their children and would also be used to prepare for their retirement. Deaton also explains that theory is derived

explicitly from the broad underlying basis of issues related to consumption and savings, as people are devising their preparedness for an uncertain future. Financial independence preparation that requires full of consistency and forbearance is becoming one of the most challenging financial decisions during an individual's busy times, as personality is the essential factor that restrains us.

2.1.2. Investment and Financial Independence

Investment is a way an individual could reach financial independence, regardless of the investor's luck or unlucky; as long as they reinvest dividends, they achieve substantial growing dividends complementing the investor's income (Spaht, 2014). Spaht also specifies, using the S&P Dividend Aristocrats Index data, whether investors are lucky, unlucky, or average investors, reinvestment of dividend and dollar-cost averaging strategy can help investors' portfolio performance at least surpass the current inflation rate.

Baker & Ricciardi (2014) classified investors into two types, overconfident investors who aggressively trade and overestimate their skills and status quo investors who show less portfolio management attention. Overconfidence is also believed to influence investors to take a risk (Pahlevi & Oktaviani, 2018). An empirical study found that young adults are shifting from financial dependence to independence within the age of 18-23 years old, where it also found that several psychological factors such as economic self-efficacy, money management ability, and decision-making ability took effect on young adults financial independence (Xiao et al., 2014).

2.1.3. Personal Characteristics and Financial Decision

The behaviour of investors in managing their investments has become one viral topic to be studied in the behavioural finance literature (Ahmad, 2020; Akhtar & Das, 2020; R. Durand et al., 2013; Gambetti & Giusberti, 2012; Oehler et al., 2018). Especially in psychological manners, it drives someone toward specific behaviour, attitude, and way of thinking that directly and substantially influences any decision-making process (Sarwar & Afaf, 2016), including financial decisions. Behavioural finance is defined by Sahi (2012) as "*the behaviour of people making investment decisions*," referring to Tseng's (2006) explanation that behavioural finance "*investigate how people act and interact in the process of making financial decisions and interpret these actions based on established psychological concepts and theories*."

The study of Kahneman & Riepe (1998) stated that because the outcomes of certain decisions are uncertain, the decision-making is tended to gamble, as it has an identity of the judgment of probabilities. It is also explained that an entirely rational way of thinking to create an optimal financial decision is undoubtedly inapplicable as investors might turn around at a certain period imprecisely. The statements are aligned with the *Prospect Theory*, where Kahneman & Tversky (1979) stated that "decision-making under risk can be viewed as a choice between prospects or gambles." The theory would also criticize the *Expected Utility Theory*, where Kahneman and Tversky exhibit several empirical effects that are unattainable behaviours in utility theory through prospect theory experiments.

Deaton (2011) states that in the decision-making process under uncertainty, even if we know a better-off decision, it does not mean that we are about to do it and would often appreciate help in doing better as life is complicated. In the study by Chmelíková (2017), students' financial decisions are mainly influenced by the information provided by the financial institution that offers them financially literate friends and relatives and even their own experiences. This means a decision would occur from their reaction to certain information they received, passing through their personality.

2.1.4.   Big Five Personality Traits and Investment Behaviour

Many scholars use the relevance of the five primary personality factors as a measuring tool extracted from various personality theories (Costa & McCrae, 2013). A commonly used personality taxonomy by scholars, the Big-Five Personality Traits (De Bortoli et al., 2019), is associated with investment period selections, the investor's attitude towards risk, and their portfolio performance (Lai, 2019). Borghans et al. (2008) define personality traits as thoughts, feelings, and behaviour patterns. Big-Five Personality traits categorize personalities into five major dimensions that may represent personality on a broad level of abstraction: extraversion, neuroticism, conscientiousness, openness to experience, and agreeableness (De Bortoli et al., 2019). Big-Five Personality Traits arguably provided a comprehensive and universal personality theory and contributed by presenting the traits as a more popular personality description (Abood, 2019). Hilton (2001) considered personality a relevant psychological characteristic as it

may provide more information to understand the psychological causes of irrationality.

Piotrowska (2019), referring to the work of Caliendo et al. (2014), explains the variables indicating the extent of each personality: extraversion indicates individuals are assertive, dominant, ambitious, and energetic; agreeableness as relating to being cooperative, forgiving, and trusting; conscientiousness as encompassing two distinct aspects, being achievement-oriented and being hard-working; emotional stability (opposite to neuroticism) as relating to self-confidence, optimism and the ability to deal with stressful situations; and openness to experience as relating to an individual's creativity, innovativeness, and curiosity.

Lai (2019), in his study, confirms how personality traits affect individual investment behaviours. A study also found that personality traits make investment decision-making more difficult (Baker & Ricciardi, 2014). As neuroticism is correlated with pessimism (Marshall & Brown, 2004), it is found that neuroticism has a tremendous negative effect on an individual's investment behaviour due to emotional interactions (Oehler et al., 2018). Extraversion and openness, however, have a positive effect on short-term and long-term investment intentions, respectively (Mayfield et al., 2008). Regarding conscientiousness, it is proven through empirical study that individuals with lower conscientiousness will pursue higher risks (McGhee et al., 2012) and has a considerable connection to perceived investment performance (Akhtar et al., 2018). Lastly, agreeableness to the study by Zarri (2017) has a negative association with stock holding and affects financial risk tolerance.

2.1.5.   Pessimism and Procrastination and Investment Decision

A considerable lack of literature studies the relation between pessimism and investment decision. Pessimism may be described oppositely from optimism, where pessimists anticipate adverse outcomes (Michael F Scheier et al., 2001). Scheier also states that pessimistic attributes carry the sense of continual adverse outcomes in the future. Pessimism was substantially significant in each financial decision as it affects investors' rationality (Joo et al., 2017).

Ludwig & Zimper (2006) argue that pessimistic individuals would tend to liquidize uncertain investment projects as they attain more information within their pessimistic view, which gains the feeling of distrust of the project. In general, a study by Norem & Cantor (1986) shows how pessimist estimations levels are always lower than optimistic in certain risky academic conditions. Other studies add that pessimists tend to be unsure of their coping capabilities towards some misfortunes, even though they depict optimism about how they would not experience those misfortunes (Blanton et al., 2001). This would show how in certain financial events, pessimists are likely to stay in a comfortable position and neglect inopportune future probabilities while being unsure of how they should prepare and adequately handle any undesirable economic events.

A study found that procrastination was affected by pessimism as procrastination has a positive association with anxiety and depression (Piotrowska, 2019). Task averseness, task delay, self-efficacy, and impulsiveness can predict procrastination precisely (Steel, 2007). In his study, Steel states that individuals who dislike the task or expect the delay of reward rather than punishment are likely

to procrastinate. Steel also states that procrastination is likely to be found at a younger age and tends to act against their original intention. The statements supporting the empirical evidence where procrastination as a voluntary action delay may complicate retirement saving as it influences the decision of retirement saving within highly educated, non-poor of mobile working age, regardless of their income (Piotrowska, 2019).

2.1.6. Risk Tolerance and Financial Decision

Hoffmann & Post (2012) describes risk tolerance and perception as the tendency of investors to perceive risks and their explication of investment risks. This would determine how risks are one main factor influencing the financial decision, as investors do not want to lose their money. The consideration of stocks as a risky asset was found that the level of investor's exposure to stocks was negative and statistically significant (R. B. Durand et al., 2008). In contrast with pessimistic investors, it is proven that investors with considerably high-risk tolerance would have better portfolio performance (Akhtar & Das, 2020), confirming the statement of "high risk, high return." Risk tolerance is considered an essential factor that influences financial decisions, savings, and investment choices, as it can precisely evaluate individual risk behaviour and investment instrument allocation regarding the risk level that the investor could bear (Nauman Sadiq & Used Azad Khan, 2019).

In the study of Massol et al. (2015), it is found that psychological biases such as overconfidence and cognitive dissonance are positively affecting students' risk tolerance. Other empirical studies found that risk tolerance would also

determine by the level of education, whether the higher the tolerance, the higher the level of study that investors are in (Ramudzuli & Muzindutsi, 2015). From Indonesia's perspective, the study of Yohnson (2008) accepts that risk tolerance still influences students' financial decisions. However, Johnson assumed that Indonesian students have a different investment style than international students.

2.2 Previous Research & Hypothesis Formulation

No literature discusses the relation between neuroticism and stocks and cryptocurrency acquisition. Costa and McCrae describe neuroticism leads individuals "*to experience a moderately high level of negative emotion and occasional episodes of psychological distress*" (Costa & McCrae, 2008). High neuroticism that is emotionally unstable is found to be unable to manage their profit target and cut-loss points (Hidayah & Kustina, 2020). Neuroticism was found to escalate the influence of procrastination towards retirement saving, which was also significantly negatively, directly and indirectly, to retirement saving decisions (Piotrowska, 2019). R. B. Durand et al. (2008) found that neurotic investors tend to rely on someone with financial expertise for investment advice, supporting the findings by Ahmad (2020) that individuals with neuroticism are risk-averse, pessimistic, and show a substantial propensity towards herding behaviour and the findings by (Aren & Aydemir, 2015) where investors with emotional stability are more risk-taking than emotionally unstable investors. Therefore, the researcher hypothesizes:

H1a: neuroticism negatively affects the probability of Indonesian students investing in the stock and cryptocurrency markets.

There is a lack of research finding the correlation between extraversion and the decision to be involved in stocks and cryptocurrency investment. As Noguchi et al. (2006) explain, extraversion tends to positive information. Costa & McCrae (2008) illustrates how extrovert individuals are active in social interactions and exuberant. A study by Mayfield et al. (2008) found that extraversion within undergraduates leads to the intention to invest independently. A study by Nauman Sadiq & Used Azad Khan (2019) found the positive impact of extraversion on the individual intention for short-term investment. Therefore, the researcher hypothesizes:

H1b: extraversion positively affects the probability of Indonesian students investing in the stock and cryptocurrency markets.

There is a lack of research finding the correlation between openness to experience and the investment decision on stocks and the cryptocurrency market. Costa & McCrae (2008) illustrates how individuals with openness are "enjoy novelty and variety" and also "willing to consider new ideas and values, and may be somewhat unconventional in their views." Hopfensitz & Wranik (2012) conclude that openness to experience would likely choose an unstable market, as new information is used in decision-making. Any evidence found by Hunter & Kemp (2004) exhibits how investors who invest in risky e-commerce companies show a substantial score on experience seeking. They also found that e-commerce investors are younger than those who invest in established companies. Therefore, we hypothesize:

H1c: openness to experience positively affects the probability of Indonesian students investing in the stock and cryptocurrency markets.

Piotrowska (2019) defines agreeableness as cooperative, forgiving, and trusted. A significant negative correlation exists between agreeableness and risk tolerance, which would substantially affect an investor's investment decision (Pak & Mahmood, 2015). Mayfield et al. (2008) found that agreeableness does not affect investment intentions. Therefore, the researcher hypothesizes:

H1d: agreeableness negatively affects the probability of Indonesian students investing in the stock and cryptocurrency markets.

Costa & McCrae (2008) defines conscientious individuals to be "reasonably efficient and generally sensible and rational in making decisions" but at the same time "occasionally hasty or impetuous and sometimes acts without considering all the consequences." Conscientiousness was empirically found to weaken the effect of procrastination and positively affect retirement savings indirectly (Piotrowska, 2019). Similar to the evidence above, a well-organized individual has short-term and long-term financial goals that positively impact their short-term and long-term investment intention (Nauman Sadiq & Used Azad Khan, 2019). On the contrary, it is also found that high conscientiousness would avoid being involved in risk-taking investments (McGhee et al., 2012). Therefore, the researcher hypothesizes:

H1e: conscientiousness negatively affects the probability of Indonesian students investing in the stock and cryptocurrency markets.

Very little empirical research confirms pessimism would affect investment decisions in stocks and the cryptocurrency market. Pessimism depends on their

occupation and investment experience, which differ significantly in their financial decision-making (Joo et al., 2017). Pessimism drives the feeling of negative feelings and unoptimistic views over their future, expecting to retrieve undesirable outcomes over what they will do (Gupta & Maheshwari, 2021). Blanton et al. (2001) found that pessimists "reserve their pessimism about their coping ability for those events that they perceive as unlikely." Similarly, it is also found that pessimistic investors would feel agitated about their future as they perceive the worst situation (Joo et al., 2017). Ludwig & Zimper (2006) argue that pessimistic individuals would tend to liquidize uncertain investment projects as they attain more information within their pessimistic view, which gains the feeling of distrust of the project. Joo et al. (2017) also found that pessimism within investors' financial decisions would influence investment experience. Therefore, the researcher hypothesizes:

H2a: Pessimism negatively affects the probability of Indonesian students investing in both the stock market and cryptocurrency market.

There is a considerable lack of evidence studying the procrastination relationship between stocks and cryptocurrency investment decisions. Steel (2007) discussed procrastination to be linked with a conscientiousness that deputizes responsibility, which gives understanding related to performance and motivation of individuals. A study by Piotrowska (2019) empirically discovered that procrastination indirectly reduces retirement savings. Piotrowska also found that the higher the procrastination due to the positive association with pessimism, the more it would prevent someone from saving for retirement. This would expect

21

students to postpone their decision to invest in stocks and the cryptocurrency market. Therefore, the researcher hypothesizes:

H2b: procrastination negatively affects the probability of Indonesian students investing in both the stock market and cryptocurrency market.

The less financially literate the investor is, the lower their risk tolerance is (Samsuri et al., 2019). A study by Pak & Mahmood (2015) found that agreeable undergraduates as potential investors have a negative relationship with risk tolerance. It is similar to the result that individuals are showing high agreeableness likely to avoid risks as agreeableness strongly correlates with risk-averse (Jiang et al., 2020). On the contrary, (K & Kakkakunnan, 2020) found that agreeable and conscientious people take more risks than others. Related to neuroticism, Mayfield et al. (2008) found neurotic investors less likely to be involved in short-term investment. It is also similar to the conclusion that neurotic individuals are likely to have a higher frequency of postponement in retirement saving decisions (Piotrowska, 2019), which supports evidence where high neuroticism was found to take the least possible risk (K & Kakkakunnan, 2020). Another piece of evidence supporting previous findings also discovers anxious investors would avoid risky investments as they have lower incitement (Ferreira, 2019). It is also found that a negative influence of conscientiousness on risk tolerance (Pak & Mahmood, 2015) supports Pak and Mahmood's findings that investors with a high level of conscientiousness would respond substantially to lose. Therefore, the researcher hypothesizes:

H3a: The higher the tolerance towards risk, the weaker the effect of neuroticism, agreeableness, and conscientiousness towards the probability of Indonesian students investing in both the stock market and cryptocurrency market.

R. B. Durand et al. (2008) found that extroverted investors have more confidence in risky investments, which leads to better portfolio returns. Risk tolerance was also positively correlated with extraversion and openness to experience (Pak & Mahmood, 2015). Mayfield et al. (2008) found that extraversion and openness to experience would encourage investors for short periods. However, in the more extended period, they would only be influenced by openness to experience. Jiang et al. (2020) found that low openness and extraversion would lead to higher individual risk aversion, supporting the evidence that openness to experience may foster investors to a risk-taking decision as it challenges dominant responses by taking into account new information (Hopfensitz & Wranik, 2012). Previous statements also support that (K & Kakkakunnan, 2020) found that extroverted individuals take more risks than others. Therefore, the researcher hypothesizes:

H3b: The higher the tolerance towards risk, the stronger the effect of extraversion and openness to experience towards the probability of Indonesian students investing in both the stock market and cryptocurrency market.

There is a considerable lack of research regarding the analysis of the risk tolerance effect on the relationship between pessimism to the investment decision. Pessimism is part of negative emotions that leads to emotional instability and the feeling of guilt (R. B. Durand et al., 2008). It has been found that pessimism

prevents investors from saving for retirement (Piotrowska, 2019). It is aligned with the findings by Weinstock & Sonsino (2014) that shows risk tolerance to be negatively exhibited by pessimism. On the contrary, Benmansour et al. (2007) empirically prove that optimism positively interrelates with risk aversion. Therefore, the researcher hypothesizes:

H4a: The higher the tolerance towards risk, the weaker the effect of pessimism towards the probability of Indonesian students investing in both the stock market and cryptocurrency market.

There is no empirical study exploring the influence of risk tolerance on the relationship between procrastination and stocks and cryptocurrency acquisition. A study by Thaler & Benartzi (2004) found that procrastination is becoming a cause of households to delay savings, even when they understand their future spending would be higher than their current expenses. Procrastination is also found to complicate people saving for retirement with different income levels. Therefore, the researcher hypothesizes:

H4b: The higher the tolerance towards risk, the weaker the effect of procrastination on the probability of Indonesian students investing in both the stock market and cryptocurrency market.

2.3 Research Model

Based on the research model below, there are five research attributes: personality traits, behavioural constraints, risk tolerance, investment behaviour in the stocks market, and investment behaviour in the cryptocurrency market. Personality traits and behavioural constraints have several constructs: neuroticism, extraversion, openness to experience, agreeableness, conscientiousness, pessimism, and procrastination. The uniqueness of the personality and behaviour of each individual would directly influence their investment behaviour and decision-making in stocks and cryptocurrency markets. Risk tolerance would also affect the investment behaviour and decision-making of young investors.

Figure 2.1 Research Model
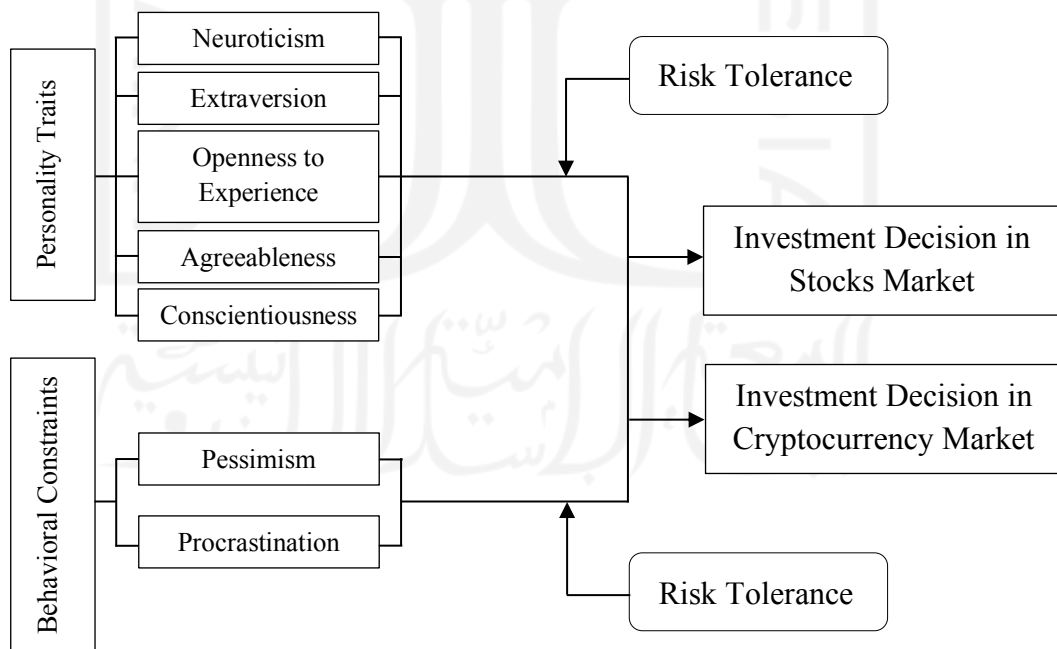
Source: Author

CHAPTER 3

RESEARCH METHODS

3.1 Research Strategies

A survey approach would be implemented in this study by spreading online questionnaires to social media to be filled by respondents fulfilling the written classification. The location of Java Island was chosen as it held the most number of investors throughout Indonesia, achieving several 69.83% of total Indonesian investors. Based on the same resource, investors under 30 also accounted for 60.02% of the total investors in Indonesia. Researchers believe that it would help the validity and reliability of the data to achieve the desired result.

3.2 Population and sample

The population is defined by Banerjee & Chaudhury (2010) as "an entire group about which some information is required to be ascertained." The population of the respondents is mainly active students of high schools and universities on Java Island, as the study aims to understand the effect of personality characteristics and behavioural constraints on students' investment decisions. The population is geographically restricted to students studying in high schools and universities on Java Island. With non-probability and judgment sampling, this study targets 200 individual respondents who are still attending formal education from 17 to 30 years old.

3.3 Instruments and data collection

       To collect the data, the researcher uses a questionnaire. Spread the questionnaire, and it is administered online to reach broader respondents according to the specific requirements of respondents. It also supports the government policy of health protocol of social distancing due to the current COVID-19 Pandemic.

3.4 Variables and the measurements

1. Investment Decision

       The investment decision is the decision of an individual to enter the investment activity. It shows how investors are willing to put their money into investment instruments, especially in the stocks and cryptocurrency markets. To measure the decision, the study uses the current investment portfolio ownership indicator in the stocks and cryptocurrency markets. Confirming the ownership of stocks and cryptocurrency determines the respondents as an investor.

2. Neuroticism

       Neuroticism is defined as emotional insecurity, anxiety, and instability, which causes an individual to tend to feel guilty about their activity. To measure the level of neuroticism within a student's personality, this study adapting Gosling et al. (2003) uses the indicators of anxiety, angry hostility, depression, self-consciousness, impulsiveness, and high vulnerability, which were found to negatively correlates with emotional stability. This study also adopted the measures used in Lai's (2019) study,

where he used four questions (i.e., I seldom feel lonely or blue). The researcher then simplified the questions into five items to be answered by the respondents, as stated in the table below.

3. Extraversion

A socially active and extroverted individual tends to positive information, which would influence their financial decision. Extraversion is depicted in several indicators by adapting Gosling et al. (2003) and Lai's (2019) measurement of extraversion. Gosling uses the indicators of warmth, gregariousness, assertiveness, activity, excitement seeking, and positive emotions to represent the extroverted individual. This study also adopted the measures used by Lai, where he used four questions (i.e., I am a very active person). The researcher then simplified the questions into four items to be answered by the respondents, as stated in the table below.

4. Conscientiousness

Conscientiousness trait can be described as rational, sensible, and thorough decision-maker. In this study, the indicators of conscientiousness were adapted from Gosling et al. (2003) and Lai's (2019) study. Gosling uses the indicators of competence, order, dutifulness, achievement, striving, self-discipline, and deliberation, while Lai uses three questions (i.e., I continue my job until everything is perfect). The researcher then integrated both measurements into four items to be answered by the respondents, as stated in the table below.

5. Openness to Experience

Openness to experience is defined as creativity, curiosity, and the tendency to try new experiences to gain information. This study adapted the measurement used by Gosling et al. (2003) and Lai's (2019) study, where the higher the openness score, the students are more likely to have the openness to experience trait. Gosling uses the indicators of fantasy, aesthetics, feelings, actions, ideas, and values. Lai, in his study, uses three questions (i.e., I often enjoy playing with theories or abstract ideas). The researcher then simplified the items into four to be answered by the respondents, as stated in the table below.

6. Agreeableness

Agreeableness may be defined as a trustworthy, friendly, and straightforward personality. The current study adapted the measurement used by Gosling et al. (2003), where he used the indicators of trust, compliance, altruism, straightforwardness, modesty, and tended-mindedness. This study also adopted the measures used by Lai (2019), where he used three questions (i.e., I am on good terms with nearly everyone). The researcher then integrated both measuring items into four to be answered by the respondents, as stated in the table below.

7. Pessimism

Pessimism is the behaviour that will influence an individual to depression, anxiety, disappointment, and negative expectancy of outcomes. This study adapted M. F. Scheier et al. (1994) work of revised Life Orientation Test (LOT-R) items which was a modification of a previous

Life Orientation Test (LOT), which measures individual differences in the dimension of optimism and pessimism. Several researchers criticized the LOT as it impairs the integrity of the optimism construct. Based on six scored items and four filler items in LOT-R, the researcher uses three items included in LOT-R items (i.e., I rarely count on good things happening to me) and adds one item to show direct responses of respondents as a pessimist (I see myself as a pessimist).

8. Procrastination

Procrastination may be defined as task aversiveness and conscious postponement of intended actions. This study adopts the work of Tuckman (1991), who developed the procrastination method to measure procrastination tendencies. Out of 30 item statements on the procrastination, this study picked four items that are likely to be easily understood by respondents, which are I delay making tough decisions, I keep putting off improving my working habit when something is too tough to tackle, I believe in postponing it, and I avoid doing those things which I expect to do poorly.

9. Risk Tolerance

Risk tolerance can be defined as evaluating the risk level that an individual could bear. Investors could be categorized as aggressive (able to bear a high level of risk), moderate (able to bear a medium level of risk), and conservative (able to bear a low level of risk or even none). To measure risk tolerance, this study uses several questions that are likely to be used in

measuring investors' risk tolerance. It evaluates which investment instruments with certain risk levels are probably proper for them. The questions show the willingness of risk-taking.

Table 3.1 Measures of Variables

Constructs/Variables	Items/Indicators	Type of data	Type of Question	Scale/Given Answers
Investment Decision	1. Do you invest in any portfolio assets of stocks market? 2. Do you invest in any portfolio assets of cryptocurrency market?	Behaviour	Dichotomous Question	Yes or No
Neuroticism adapted from Gosling et al. (2003) and Lai (2019)	1. I see myself easily upset 2. I see myself as an anxious person 3. I see myself easily depressed 4. I see myself as a vulnerable person 5. I seldom feel lonely and sad)*	Opinion	Rating Questions	7 Likert scale. 1 is strongly disagree and 7 is strongly agree.)*This item was reverse scored before scoring and analyses
Extraversion adapted from Gosling et al. (2003) and Lai (2019)	1. I see myself as an optimist person 2. I see myself as an enthusiastic person 3. I see myself easy to make friends 4. I see myself as a very active person	Opinion	Rating Questions	7 Likert scale. 1 is strongly disagree and 7 is strongly agree.
Conscientiousness adapted from Gosling et al. (2003) and Lai (2019)	1. I see myself as a careful person 2. I continue my job until everything is perfect	Opinion	Rating Questions	7 Likert scale. 1 is strongly disagree and 7 is strongly agree.

Constructs/Variables	Items/Indicators	Type of data	Type of Question	Scale/Given Answers
	3. I always do things in order 4. I see myself full of calculation			
Openness to experience adapted from Gosling et al. (2003) and Lai (2019)	1. I see myself as a creative 2. I see myself to have high curiosity 3. I have many ideas 4. I often enjoy playing with theories or abstract ideas	Opinion	Rating Questions	7 Likert scale. 1 is strongly disagree and 7 is strongly agree.
Agreeableness adapted from Gosling et al. (2003) and Lai (2019)	1. I am on good terms with nearly everyone 2. I see myself as warm person 3. I see myself as a straight-forward person 4. I trust everyone	Opinion	Rating Questions	7 Likert scale. 1 is strongly disagree and 7 is strongly agree.
Procrastination adapted from Tuckman (1991)	1. I delay making tough decisions 2. I keep putting off improving my working habit 3. When something's too tough to tackle, I believe in postponing it 4. I avoid doing those things which I expect to do poorly	Opinion	Rating Questions	7 Likert scale. 1 shows weak attributes and 7 shows strong attributes.
Pessimism adapted from Scheier et al., (1994)	1. I see myself as a pessimist 2. I expect everything to go not according to plan	Opinion	Rating Questions	7 Likert scale. 1 shows weak attributes and 7 shows strong attributes.

Constructs/Variables	Items/Indicators	Type of data	Type of Question	Scale/Given Answers
	3. Things that are not good at are always on my mind 4. I rarely count on good things happening to me			
Risk Tolerance	1. I see myself comfortable in investing in stock market 2. Protecting my portfolio is more important to me than high return)* 3. I'm not comfortable to invest in high-risk assets even though it's offering high return)* 4. I'm willing to take more risks to have a comfortable future	Opinion	Rating Questions	7 Likert scale. 1 is strongly disagree and 7 is strongly agree.)*This items were reverse scored before scoring and analyses
Age		Attribute	Category Questions	Manually filled by respondents with the range of 15-30 years old
Gender		Attribute	Category Questions	Male or Female
Source of Income		Attribute	Category Questions	3 options are given: Parents or Self-earnings or Business
Level of Income		Attribute	Category Questions	4 options (in IDR) are given: <1 million, 1-3 million, 3-5

Constructs/Variables	Items/Indicators	Type of data	Type of Question	Scale/Given Answers
				million, >5 million.
Institution of education		Attribute	Category Questions	Private or public university
The period of time of investment	How long that you have possess any asset portfolio in stock or cryptocurrency?	Attribute	Category Questions	4 periods of time are given: <1 year; 1-2 years; 2-3 years; >3 years.

3.5 Data Analysis Technique

3.5.1 Measurement Test (Validity and Reliability)

To effectively evaluate the measurement, the researcher would use the reflective measurement model, a high inter-correlation measurement model where each direction of the arrow is from the construct to the indicator variables. To test the validity, the researcher uses concurrent validity, where the indicator can be judged valid as it is associated with the pre-existing indicator. For reliability, internal consistency is chosen as the questionnaires have to show consistent results over time.

3.5.2 Structural Model Test

Figure 3.1 Research Structure
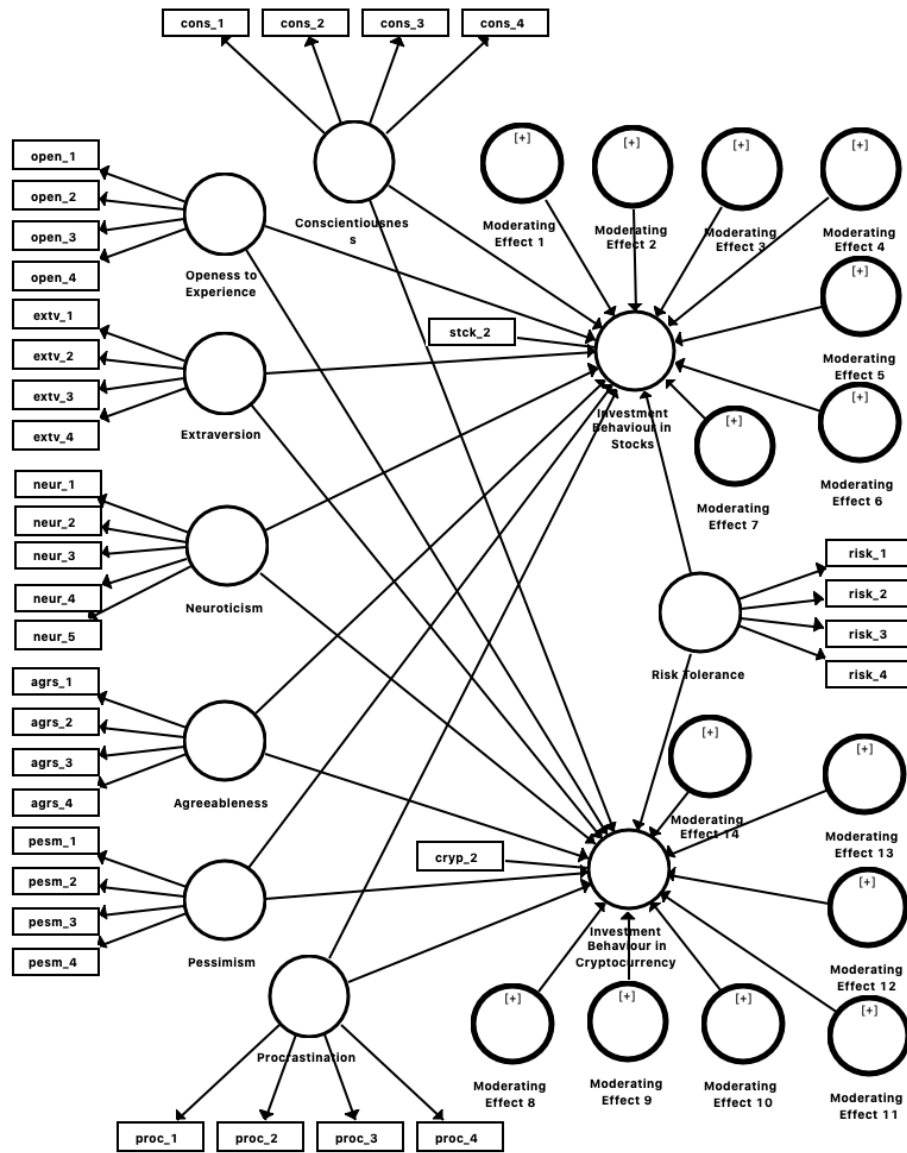
Source: Author

The structural model above would be tested following the PLS-SEM systematic evaluation through the tests of Coefficients of Determinations (R²) and the size and significance of path coefficients (construct coefficient).

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Descriptive Statistics

To understand how the personality characteristics, pessimism, and procrastination may affect the student's investment behaviour, the questionnaire that is distributed through an online form to be filled by students that are following several qualifications, which are:

a. Active high school or university student aged 17 – 30 years old.

b. Currently a student of any high school or university in Java Island.

222 responses were obtained as the students of high schools and universities throughout Java Island fulfilled the questionnaire containing the variables of Extraversion, Neuroticism, Agreeableness, Conscientiousness, Openness to Experience, Pessimism, Procrastination, and Risk Tolerance. Ten responses were considered invalid, as respondents could not fulfil the criteria of "*currently a student of any high school or university in Java Island.*"

Table 4.1 Demographic profile of respondents

Data	Frequency	Percentage	Total
Gender:			
Female	116	54.7%	212
Male	96	45.3%	
Age:			
18 - 20	124	58.49%	212
21 - 23	84	39.62%	
24 - 26	4	1.89%	
Source of Income:			
Monthly Allowance	181	85.4%	212
Salary	14	6.6%	
Business Income	17	8%	

Data	Frequency	Percentage	Total
Income Group:			
< 1 Million Rupiah	80	37.7%	212
1 – 3 Million Rupiah	89	42%	
3 – 5 Million Rupiah	27	12.7%	
> 5 Million Rupiah	16	7.5%	

Source: Primary Data, 2021-2022

Based on the analyses provided in Table 4.1, the age of respondents is between 18 years old to 26 years old. The 18 to 20 is dominated by 124 respondents (58.49%), while the age group of 24 to 26 held the lowest number for only four respondents (1.89%). From a gender perspective, the female respondents held the highest number of 116 respondents (54.7%) compared to males with 96 respondents (45.3%).

Based on their income source, 181 students (85.4%) receive their income from monthly allowance, 14 students (6.6%) receive a salary from their job, and 17 students (8%) take their business income as their primary source of income. The student's monthly income is dominated by 1 - 3 million Rupiah of 89 students (42%), and only 16 students (7.5%) receive more than five million Rupiah.

Descriptive statistics of the data are presented in Table 4.2. In contrast, Table 4.3 describes the percentage of respondents each particular response on seven and two-point scales that measure the study variable. Table 4.2 shows each indicator's mean, standard deviation, and median. Table 4.2 also presents two statistics, skewness and excess kurtosis (presented as kurtosis), which provide insights into the shape of the distribution. In Table 4.3, the four dependent variables: *experience in stock market investment, current possession of stocks in the portfolio, experience in cryptocurrency market investment, and current possession of*

cryptocurrency in the portfolio, are measured on a two-point scale, Yes or No. Personality characteristics, behavioural constraints, and risk tolerance are measured on a seven-point scale, where 1 = strongly disagree; 2 = rather disagree; 3 = slightly disagree; 4 = neutral; 5 = slightly agree; 6 = rather agree; 7 = strongly agree. *N* is the number of total respondents.

Table 4.2 Descriptive Statistics of Data

Variable	*Indicator*	*Mean*	*Median*	*SD*	*Kurtosis*	*Skewness*
Neuroticism	neur_1	4.377	4	1.466	-0.452	-0.132
	neur_2	4.802	5	1.532	-0.519	-0.408
	neur_3	3.929	4	1.807	-0.887	0.111
	neur_4	3.571	3	1.817	-0.907	0.289
	neur_5	4.118	4	1.657	-0.819	-0.227
Extraversion	extv_1	4.604	5	1.468	-0.315	-0.400
	extv_2	5.052	5	1.289	-0.104	-0.536
	extv_3	4.995	5	1.506	-0.235	-0.609
	extv_4	4.542	5	1.445	-0.455	-0.298
Conscientiousness	cons_1	5.335	6	1.341	-0.130	-0.607
	cons_2	5.288	5	1.224	0.662	-0.721
	cons_3	5.019	5	1.356	-0.239	-0.377
	cons_4	5.080	5	1.460	0.125	-0.672
Openness to Experience	open_1	4.684	5	1.292	-0.082	-0.253
	open_2	5.679	6	1.091	0.051	-0.587
	open_3	5.132	5	1.256	-0.210	-0.453
	open_4	5.321	5	1.190	-0.204	-0.423
Agreeableness	agrs_1	5.491	6	1.188	-0.488	-0.599
	agrs_2	5.627	6	1.204	1.257	-1.012
	agrs_3	5.274	5	1.278	0.166	-0.661
	agrs_4	4.349	4	1.596	-0.473	-0.129
Pessimism	pesm_1	3.759	4	1.570	-0.676	0.227
	pesm_2	4.061	4	1.688	-0.795	-0.085
	pesm_3	4.519	5	1.591	-0.742	-0.148
	pesm_4	3.547	3	1.776	-0.910	0.258
Procrastination	proc_1	4.288	4	1.523	-0.499	-0.294
	proc_2	3.373	3	1.642	-0.422	0.392
	proc_3	4.175	4	1.483	-0.413	-0.286
	proc_4	4.415	5	1.501	-0.575	-0.303
Risk Tolerance	risk_1	3.840	4	1.778	-0.735	-0.004
	risk_2	3.741	4	1.730	-0.583	0.296

| | risk_3 | 3.995 | 4 | 1.744 | -0.808 | 0.109 |
| | risk_4 | 4.858 | 5 | 1.507 | -0.073 | -0.531 |

Source: Primary Data, 2021-2022

Table 4.3 Percentage of participants who selected each response category

Variable	n	Percentage of participant who selected the score (%)								
		No = 0	Yes = 1	1	2	3	4	5	6	7
				Score						
Dependent Variable measured by a single item										
Experience in Stock Market investment	212	66	34	-	-	-	-	-	-	-
Current possession of stocks in portfolio	212	72,2	27,8	-	-	-	-	-	-	-
Experience in Cryptocurrency Market investment	212	80,2	19,8	-	-	-	-	-	-	-
Current possession of cryptocurrency in portfolio	212	84,4	15,6	-	-	-	-	-	-	-
Independent Variable measured by a single item										
Extraversion	212	-	-	8,02	11,04	16,07	20,85	19,43	14,43	9,53
Neuroticism	212	-	-	1,77	6,25	9,79	21,11	25,94	23,94	11,20
Conscientiousness	212	-	-	1,42	1,77	7,90	18,04	25,83	27,24	17,81
Openness to Experience	212	-	-	0,59	1,42	7,19	19,10	27,59	27,71	16,39
Agreeableness	212	-	-	1,65	2,95	7,43	17,81	22,17	29,36	18,63
Pessimism	212	-	-	8,02	14,03	18,28	20,87	18,40	12,03	8,37
Procrastination	212	-	-	7,31	10,50	17,45	23,35	21,82	13,92	5,66
Risk Tolerance	212	-	-	10,85	10,14	14,86	28,18	13,56	12,15	10,26

Source: Primary Data, 2021-2022

The descriptive analysis of responses would picture respondents' perspectives towards the variables: personality traits, behavioural constraints, and risk tolerance. Likert scale of 1 to 7, where 1 as the lowest score, and 7 as the highest score, were used in the questionnaire, which to measure the interval are:

Interval = ((Maximum Score – Minimum Score) / Number of Class)

= ((7 – 1) / 5) = 1.2

Based on the calculation above, we achieve the scorings of the variables with the intervals that are shown in the table below:

Interval	Class
1.00 – 2.20	Strongly Disagree
2.21 – 3.40	Disagree
3.41 – 4.60	Neutral
4.61 – 5.80	Agree
5.81 – 7.00	Strongly Agree

Table 4.4 Personality Traits Variable Analysis

No.	Variables	Indicators	Mean	Class
1	I see myself easily upset	neur_1	4.38	Neutral
2	I see myself as an anxious individual	neur_2	4.80	Agree
3	I see myself easily depressed	neur_3	3.93	Neutral
4	I see myself as a vulnerable individual	neur_4	3.57	Neutral
5	I seldom feel lonely and sad	neur_5	4.12	Neutral
6	I see myself as an optimist individual	extv_1	4.60	Neutral
7	I see myself as an enthusiastic individual	extv_2	5.05	Agree
8	I see myself easy to make friends	extv_3	5.00	Agree
9	I see myself as a very active individual	extv_4	4.54	Neutral
10	I see myself as a careful individual	cons_1	5.33	Agree
11	I continue my job until everything is perfect	cons_2	5.29	Agree

12	I always do things in order	*cons_3*	5.02	Agree
13	I see myself full of calculation	*cons_4*	5.08	Agree
14	I see myself as a creative	*open_1*	4.68	Agree
15	I see myself to have high curiosity	*open_2*	5.68	Agree
16	I have many ideas	*open_3*	5.13	Agree
17	I am on good terms with nearly everyone	*open_4*	5.32	Agree
18	I see myself as warm individual	*agrs_1*	5.49	Agree
19	I see myself as warm individual	*agrs_2*	5.63	Agree
20	I see myself as a straight-forward person	*agrs_3*	5.27	Agree
21	I trust everyone	*agrs_4*	4.35	Neutral

Table 4.4 shows respondents' tendency from each indicator to each variable. Neuroticism, with a total mean of 4.160, is categorized as neutral by the respondents. It shows how respondents feel between agree and disagree to reflect themselves as individuals with neuroticism traits. Indicator *neur_2* has the highest mean of 4.80 as the respondents agree that they are considered anxious people. While indicator *neur_4* has the lowest mean, it depicts the respondents being neutral to consider themselves vulnerable.

Extraversion as the second personality trait receives the agreed criteria with a total mean of 4.797. Most respondents describe themselves as enthusiastic individuals, as *extv_2* has the highest mean of 5.05. On the other hand, the respondents are neutral about reflecting themselves as an active person, as shown by the indicator *extv_4* with a mean of 4.54.

Conscientiousness with a total mean of 5.18 shows how the respondents are thorough and trustworthy individuals. The indicator *cons_1* achieves the highest

mean value of 5.33, where the respondents are cautious. The lowest mean value of 5.02 achieved by *cons_4* shows how students do their job on its disposition.

Fourth is Openness to Experience, which attained a total mean of 5.20, depicting the respondents agreed to have the curiosity to try new experiences. *open_2* achieves the highest mean value of 5.68, which the respondents consider themselves as an individual with high curiosity. While *open_1* attains the lowest mean value of 4.68, it shows how the respondents are included as individuals with creativity.

Last, the respondents agreed to consider themselves as students with an agreeableness personality, with a total mean of 5.185. The *agrs_2* indicator shows how warm the respondents are toward other individuals, attaining the highest mean value of 5.63. *agrs_4*, on the other hand, achieves the lowest mean value of 4.35, which shows that not every respondent puts much credence on someone else.

Table 4.5 Behavioural Constraints Variable Analysis

No.	Variable	Indicators	Mean	Class
1	I see myself as a pessimist	*pesm_1*	3.76	Neutral
2	I expect everything to go not according to plan	*pesm_2*	4.06	Neutral
3	Things that are not good at are always on my mind	*pesm_3*	4.52	Neutral
4	I rarely count on good things happening to me	*pesm_4*	3.55	Neutral
5	I delay making tough decisions	*pesm_1*	4.29	Neutral
6	I keep putting off improving my working habit	*pesm_2*	3.37	Neutral
7	When something's too tough to tackle, I believe in postponing it	*pesm_3*	4.17	Neutral
8	I avoid doing things which I expect to do poorly	*pesm_4*	4.42	Neutral

Behavioural constraints variable analysis are illustrated in Table 4.5. Based on the analysis, there is no mean value surpassing the value of 4.61, which shows how the respondents were considered pessimist or individuals with procrastination. *pesm*_4 achieve the lowest mean value of 3.55, where the respondents were in between of expecting and not expecting good things happened on their life. While *proc*_2 attained the lowest mean value of 3.37, showing how students being neutral on the indicator of "I keep putting off improving my working habit."

Table 4.6 Risk Tolerance Variable Analysis

No.	Variable	Indicators	Mean	Class
1	I see myself comfortable investing in stock market	*risk_1*	3.84	Neutral
2	Protecting my portfolio is more important to me than high return	*risk_2*	3.74	Neutral
3	I'm not comfortable to invest in high-risk assets even though it's offering high return	*risk_3*	4.00	Neutral
4	I'm willing to take more risks to have a comfortable future	*risk_4*	4.86	Agree

Risk tolerance, with a total mean of 4.11, illustrating that not every respondent has a high risk tolerance. The indicator *risk_2*, with the lowest mean value of 3.74, shows students' confidence in their risk tolerance is between protecting their portfolio and achieving high returns. On the other hand, students wants a great future by taking more risks, as shown by *risk*_4, achieving the highest mean value of 4.86.

4.2 The Result of Analysis

4.2.1 Outer Model Evaluation

An assessment of convergent and discriminant validity is required to reveal that reflective indicators depict all the constructs. This is the first requirement before continuing to the next steps of bootstrapping and further analyses. Convergent validity is the first of all. Convergent validity will ensure that the correlation between each indicator in one construct positively correlates. The convergent validity assessment's results are presented below:

Table 4.7 Model 1 Convergent Validity

Constructs	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Neuroticism	0.718	0.569	0.247
Extraversion	0.858	0.896	0.685
Conscientiousness	0.764	0.828	0.553
Openness to Experience	0.820	0.878	0.645
Agreeableness	0.707	0.775	0.473
Pessimism	0.748	0.822	0.536
Procrastination	0.817	0.716	0.415
Risk Tolerance	0.286	0.430	0.426

It is shown that several constructs, Neuroticism, Agreeableness, Procrastination, and Risk Tolerance cannot fulfil the required measurement to achieve the data reliability and validity to further analyses. To make further analyses, the assessment of outer loadings is also necessary.

Table 4.8 Model 1 Outer Loadings

No	Variable	Indicators	Outer Loadings
1	Neuroticism	neur_1	0.386*
2		neur_2	0.192*
3		neur_3	0.590*
4		neur_4	0.267*
5		neur_5	0.793
6	Extraversion	extv_1	0.909
7		extv_2	0.824
8		extv_3	0.703
9		extv_4	0.861
10	Conscientiousness	cons_1	0.792
11		cons_2	0.903
12		cons_3	0.643*
13		cons_4	0.596*
14	Openness to Experience	open_1	0.759
15		open_2	0.702
16		open_3	0.886
17		open_4	0.852
18	Agreeableness	agrs_1	0.521*
19		agrs_2	0.624*
20		agrs_3	0.897
21		agrs_4	0.653*
22	Pessimism	pesm_1	0.830
23		pesm_2	0.646*
24		pesm_3	0.674*
25		pesm_4	0.769
26	Procrastination	proc_1	0.473*
27		proc_2	0.956
28		proc_3	0.402*
29		proc_4	0.600*
30	Risk Tolerance	risk_1	0.900
31		risk_2	-0.552*
32		risk_3	0.240*
33		risk_4	0.729

Outer loading value < .70

As provided in the table above, several indicators for several constructs score below the acceptable score of outer loadings, which are 0.708 or 0.70. This causes the Average Variance Extracted (AVE) of Neuroticism, Agreeableness, Procrastination, and Risk Tolerance to scores below 0.50 and fails to explain more than half of the variance of its indicators. Hair et al. (2011) explain that all indicators with very low outer loadings, below 0.40, are required to be eliminated. In this stage, deletion of several indicators is needed for re-estimation.

Re-estimation (called *Model 2*) was done by deleting several indicators from Neuroticism, Agreeableness, Procrastination, and Risk Tolerance latent variable. The deleted indicators are *neur_1, neur_2, neur_4, agrs_1, proc_3, risk_2* and *risk_4*. After the deletion of those indicators, there are changes in the values of Cronbach Alpha, Composite Reliability, and AVE. *Model 2* convergent reliability and outer loadings are as follow:

Table 4.9 Model 2 Convergent Validity

Constructs	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Neuroticism	0.145	0.696	0.538
Extraversion	0.858	0.896	0.685
Conscientiousness	0.764	0.828	0.553
Openness to Experience	0.820	0.878	0.645
Agreeableness	0.609	0.768	0.534
Pessimism	0.748	0.822	0.538
Procrastination	0.730	0.786	0.564
Risk Tolerance	0.646	0.843	0.730

Table 4.10 Model 2 Outer Loadings

No	Variable	Indicators	Outer Loadings
1	Neuroticism	neur_3	0.637*
2		neur_5	0.818
3	Extraversion	extv_1	0.909
4		extv_2	0.824
5		extv_3	0.703
6		extv_4	0.861
7	Conscientiousness	cons_1	0.792
8		cons_2	0.903
9		cons_3	0.643*
10		cons_4	0.596*
11	Openness to Experience	open_1	0.759
12		open_2	0.702
13		open_3	0.886
14		open_4	0.852
15	Agreeableness	agrs_2	0.584*
16		agrs_3	0.910
17		agrs_4	0.657*
18	Pessimism	pesm_1	0.830
19		pesm_2	0.646*
20		pesm_3	0.674*
21		pesm_4	0.769
22	Procrastination	proc_1	0.555*
23		proc_2	0.963
24		proc_4	0.676*
25	Risk Tolerance	risk_1	0.921
26		risk_4	0.781

* Outer loadings value < .70

The deletion of several indicators above allows *Model 2* to reach convergent validity as all AVE ranges between 53% to 73%, above the recommended level of .05 (Hair et al., 2013). On the other hand, Neuroticism composite reliability is still below the threshold value of 0.708. It is still considered acceptable as the changes after the indicators deletion towards *NEUR* composite reliability, from 0.569 in

Model 1 to 0.696 in *Model 2*, are still above the recommended level of .6 (Fornell & Larcker, 1981). Thus, the all-composite reliability of *Model 2* was considered reliable, as any other deletion of its indicators might alter the research's result. The elimination of *the agrs_1* indicator, even though it is still above the suggested threshold value, it significantly increases the composite reliability and the AVE value of *AGRS*. Similarly, *PROC* AVE values were also increased to the suggested threshold value as its *proc_3* indicator was eliminated.

The last step to evaluate the measurement model is the discriminant validity analysis. Discriminant validity measures validate that a reflective construct is strongly related to its indicators. The Fornell-Larcker criterion was used to measure the discriminant validity of the reflective model. It compares the square root of the AVE values with the latent variable correlations. Specifically, the square root of each construct's AVE should be greater than its highest correlation with any other construct, as it is based on the idea that a construct shares more variance with its associated indicators than with any other constructs. Table 4.11 shows each variable are having higher variance on its own compared to the other constructs (e.g. *AGRS* -> *AGRS* = .731; *CONS* -> *AGRS* = .256). It is concluded that (presented in Table 4.12) all constructs in *Model 2* are fulfilling the suggested reflective measurement model reliability and validity recommended value and are allowed to continue to the structural model assessment.

Table 4.11 Model 2 Fornell-Larcker Criterion

	AGRS	CONS	EXTV	NEUR	OPEN	PESM	PROC	RISK
AGRS	**0.731**							
CONS	0.256	**0.744**						
EXTV	0.411	0.385	**0.828**					
NEUR	-0.122	-0.035	-0.261	**0.733**				
OPEN	0.360	0.552	0.553	0.045	**0.803**			
PESM	-0.007	-0.162	-0.349	0.247	-0.147	**0.734**		
PROC	-0.049	-0.137	-0.212	0.263	-0.166	0.494	**0.751**	
RISK	0.140	0.142	0.137	0.128	0.252	-0.009	0.065	**0.854**

Table 4.12 Summary for Reflective Measurement Models

Latent Variable	Indicators	Loadings	Indicator Reliability	Composite Reliability	AVE	Discriminant Validity?
NEUR	neur_3	0.637	0.406	0.696	0.538	Yes
	neur_5	0.818	0.669			
EXTV	extv_1	0.909	0.826	0.896	0.685	Yes
	extv_2	0.824	0.679			
	extv_3	0.703	0.494			
	extv_4	0.861	0.741			
CONS	cons_1	0.792	0.627	0.828	0.553	Yes
	cons_2	0.903	0.815			
	cons_3	0.643	0.413			
	cons_4	0.596	0.355			
OPEN	open_1	0.795	0.632	0.878	0.645	Yes
	open_2	0.702	0.493			
	open_3	0.886	0.785			
	open_4	0.852	0.726			
AGRS	agrs_2	0.584	0.341	0.768	0.534	Yes
	agrs_3	0.910	0.828			
	agrs_4	0.657	0.432			
PESM	pesm_1	0.830	0.689	0.822	0.538	Yes
	pesm_2	0.646	0.417			
	pesm_3	0.674	0.454			
	pesm_4	0.769	0.591			
PROC	proc_1	0.555	0.308	0.786	0.564	Yes
	proc_2	0.963	0.927			

	proc_4	0.676	0.457			
RISK	*risk_1*	0.921	0.848	0.843	0.730	Yes
	risk_4	0.781	0.610			

4.2.2 Structural Model Evaluation

The coefficient of determination, usually called the R² value, is the standard measuring tool to evaluate the structural model. It measures the model's predictive accuracy and is calculated as the squared correlation between a specific endogenous construct's actual and predicted values. Table 4.13 shows the R Square value of both dependent variables, *STCK* and *CRYP*. The R² value of *the STCK* variable is 0.284 or 28.4%, explaining that the personality traits (*NEUR, EXTV, CONS, OPEN, AGRS*) and behavioural constraints (*PESM, PROC*) describe STCK at the level of 28.4%, while the rest influenced by other factors outside the study variable. Consecutively, the R² value of *CRYP* is 0.299 or 29.9%, explaining that the personality traits and behavioural constraints have a weak significance level of 29.9%, while other factors outside the study variable influence the rest.

Table 4.13 R Square (R²)

Items	*R Square (R²)*	*R Square Adjusted*
STCK	0.284	0.229
CRYP	0.299	0.245

4.3 Hypothesis Testing

To prove how hypotheses are being accepted or rejected, we can use the t-statistics and *p*-value. Critical accepted results are where the t-value is higher than 1.96, or the significance level (*p*-value) is under 0.05. The author uses bootstrapping subsamples of 5,000 and a two-tailed significance level of 0.05 (5%) for the bootstrapping testing. The hypotheses of personality traits and behavioural constraints' variable are as follow:

Table 4.14 Path Coefficient

Construct	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values (p)
NEUR -> STCK	0.104	0.110	0.080	1.305	0.192
NEUR -> CRYP	-0.034	-0.014	0.065	0.526	0.599
EXTV -> STCK	0.045	0.055	0.110	0.404	0.686
EXTV -> CRYP	0.036	0.023	0.082	0.439	0.661
CONS -> STCK	0.102	0.098	0.078	1.309	0.191
CONS -> CRYP	0.010	0.024	0.089	0.110	0.912
OPEN -> STCK	0.044	0.052	0.084	0.522	0.602
OPEN -> CRYP	0.105	0.088	0.095	1.106	0.269
AGRS -> STCK	0.012	0.010	0.097	0.122	0.903
AGRS -> CRYP	-0.050	-0.031	0.090	0.548	0.583
PESM -> STCK	-0.017	-0.003	0.099	0.172	0.863
PESM -> CRYP	0.052	0.039	0.089	0.579	0.562
PROC -> STCK	0.033	0.024	0.090	0.368	0.713
PROC -> CRYP	0.104	0.077	0.096	1.091	0.275

* $p < .10$. ** $p < .05$. *** $p < .01$.

Table 4.15 Hypotheses Testing Results

Hypothesis	Sub-Hypothesis	Subject	Expected Sign	Resulted Sign	Significant
H1	a	Neuroticism	Negative	Positive (S) Negative (C)	Not Significant
	b	Extraversion	Positive	Positive (S & C)	Not Significant
	c	Openness to Experience	Positive	Positive (S & C)	Not Significant
	d	Agreeableness	Negative	Positive (S) Negative (C)	Not Significant

53

	e	Conscientiousness	Negative	Positive (S & C)	Not Significant
H2	a	Pessimism	Negative	Negative (S) Positive (C)	Not Significant
	b	Procrastination	Negative	Positive (S & C)	Not Significant

Note: (S) = STCK; (C) = CRYP

Neuroticism, as an emotional stability personality trait, has no significance in a student's investment decision in stocks and cryptocurrency. The T-statistics value of 1.305 and 0.526 and *p*-value of 0.192 and 0.599 for *STCK* and *CRYP*, respectively, shows how students' neuroticism does not significantly make them feel uncomfortable getting involved in any investment activity in the stocks market and cryptocurrency market. Therefore, hypothesis **H1a,** where neuroticism negatively affects students to invest in the stock and cryptocurrency markets, is rejected.

Extraversion, a socially-active individual, also statistically proven that even though students are showing a high tendency towards extraversion personality traits (*mean = 4.797)*, it has no significance to invest in stock and cryptocurrency market. With the T-statistics value of 0.404 and 0.439 and *p*-value of 0.686 and 0.661 for *STCK* and *CRYP*, we cannot describe how extroverted students are unconfident in investing in the stock and cryptocurrency market. Thus, hypothesis **H1b**, where extraversion positively affects students to invest in the stocks and cryptocurrency markets, is rejected.

Openness to experience, where individuals are eager to try new things, shows that there is no significance for students to be curious to invest in stocks and the cryptocurrency market. With the t-statistics value of 0.522 and 1.106 and *p*-value of 0.602 and 0.269 for *STCK* and *CRYP*, respectively, it is unable to describe how students with high curiosity (*mean = 5.20)* are willing to invest in stocks market and cryptocurrency market. Therefore, it rejects hypothesis **H1c**, where openness to experience positively affects students investing in the stock and cryptocurrency markets.

Agreeableness, a friendly and kind personality trait, has no significant implication for students' investment decision to invest in stocks and the cryptocurrency market. With the t-statistics value of 0.122 and 0.548 and *p*-value of 0.903 and 0.583 for *STCK* and *CRYP*, respectively, it concludes how agreeableness traits have a nonsignificant effect on students to invest in stocks and the cryptocurrency market. Therefore, the hypotheses **H1d** where agreeableness negatively affects students to invest in stocks market and cryptocurrency market are rejected.

Conscientiousness, a well-aware and well-organized personality trait, are nonsignificant to students involved in the stock market and cryptocurrency market. With the t-statistics <1.96 and *p*-value > .05 respectively in *STCK* (1.309 and 0.191) and *CRYP* (0.110 and 0.912), it shows how conscientiousness has no significant influence on avoiding investing their money in stocks and cryptocurrency market. Therefore, it rejects hypothesis **H1e**, where conscientiousness negatively affects students investing in the stocks and cryptocurrency markets.

One of the behavioural constraints, pessimism, was also found to have no significance towards investment in stocks and the cryptocurrency market. The t-statistics of 0.172 and 0.579 and *p*-value of 0.863 and 0.562 for *STCK* and *CRYP*, respectively, show how pessimist students are not likely to avoid investing in stocks and cryptocurrency. Therefore, hypothesis **H2a**, where pessimism negatively affects students to invest in stocks and the cryptocurrency market, is rejected.

Procrastination was also found to be nonsignificant to individual investment decisions in stocks and cryptocurrency markets. The t-statistics of 0.368 and 1.091 and *p*-value of 0.713 and 0.275 for *STCK* and *CRYP*, respectively, show how procrastination does not significantly affect students to invest in the stock market and cryptocurrency market. Therefore, hypotheses **H2b**, where pessimism negatively affects students to invest in stocks and cryptocurrency markets, are rejected.

This research also analyses the moderation variable, a variable where it directly affects the relationship between the exogenous and endogenous latent variables but in a different way. Risk tolerance (*RISK*) in this research acts as a continuous moderating variable where it is metrically measured. It could change the strength of the relationship between personality traits and behavioural constraints towards students' investment decisions in stocks and the cryptocurrency market.

Table 4.16 Path Coefficient (*Risk Tolerance* as moderation variable)

Construct	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values (p)
NEUR*RISK -> STCK	0.116	0.103	0.066	1.762	0.078*
NEUR*RISK -> CRYP	0.070	0.058	0.074	0.945	0.345
EXTV*RISK -> STCK	-0.050	-0.029	0.089	0.562	0.574
EXTV*RISK -> CRYP	-0.019	-0.045	0.108	0.178	0.859
CONS*RISK -> STCK	0.075	0.084	0.062	1.197	0.231
CONS*RISK -> CRYP	-0.031	0.006	0.092	0.339	0.735
OPEN*RISK -> STCK	0.043	0.040	0.082	0.519	0.604
OPEN*RISK -> CRYP	0.287	0.264	0.103	2.792	0.005***
AGRS*RISK -> STCK	0.030	0.022	0.063	0.471	0.638
AGRS*RISK -> CRYP	-0.087	-0.063	0.075	1.151	0.250
PESM*RISK -> STCK	-0.052	-0.025	0.074	0.709	0.479
PESM*RISK -> CRYP	0.090	0.071	0.089	1.006	0.315
PROC*RISK -> STCK	-0.076	-0.055	0.066	1.146	0.252
PROC*RISK -> CRYP	-0.068	-0.033	0.088	0.773	0.440

*p < .10. ** p < .05. *** p < .01.

Table 4.17 Hypotheses testing result (*Risk Tolerance* as moderation variable)

Hypothesis	Sub-Hypothesis	Subject	Expected Sign	Resulted Sign	Significant
H3	a	Neuroticism	Weaker	Positive (S & C)	Significant (S)
		Agreeableness		Positive (S) Negative (C)	Not Significant
		Conscientiousness		Positive (S) Negative (C)	Not Significant
	b	Extraversion	Stronger	Negative (S & C)	Not Significant
		Openness to Experience		Positive (S & C)	Significant (C)

				Negative (S)	Not
H4	a	Pessimism	Weaker	Positive (C)	Significant
	b	Procrastination	Weaker	Negative (S & C)	Not Significant

Note: (S) = STCK; (C) = CRYP

Hypotheses **H3a** states that the effect of neuroticism, agreeableness, and conscientiousness towards the probability of investing in stocks and cryptocurrency market is weaker as the moderating variable, *RISK*, shows two significance. *RISK*, as the moderator between *NEUR* to *STCK* and *CRYP* based on the T-statistics of 1.762 and 0.945 and *p*-value of 0.078 and 0.345 for *STCK* and *CRYP*, respectively, are only showing significance toward student's investment decision in stocks market after it is moderated with *RISK*. *RISK* does not affect the relationship between *NEUR* and *CRYP*. Similarly, *RISK* also has no significant effect on the relation between *AGRS* to *STCK* and *CRYP*, with the t-statistics value of 0.471 and 1.151 and *p*-value of 0.638 and 0.250 for *STCK* and *CRYP*, respectively. *CONS*, similar to *NEUR* and *AGRS*, also shows how *RISK* gives no significance by its t-statistics value of 1.197 and 0.339 and *p*-value of 0.231 and 0.735 for *STCK* and *CRYP*, respectively. Therefore, the moderating effect of *RISK* only significantly affects the relation between *NEUR* and *STCK*, while *NEUR* and *CRYP*, *AGRS*, and *CONS* were nonsignificant. It is concluded that hypotheses **H3a** are rejected.

RISK on hypotheses **H3b** was expected to significantly affect the positive relationship between *EXTV* and *OPEN* towards *STCK* and *CRYP*. *RISK* as the moderating variable between *EXTV* to *STCK* and *CRYP* with the t-statistics value of 0.562 and 0.178 and *p*-value of 0.574 and 0.859 for *STCK* and *CRYP*,

respectively, are not showing any significance between student's investment decision in stocks and cryptocurrency market towards extraversion personality trait. Similarly, RISK has no significant influence on *OPEN* to *STCK*, shown by the value of T-statistics = 0.519 and *p*-value = .604. On the other hand, *RISK* significantly affects the relationship between *OPEN* to *CRYP* with the t-value = 2.792 and *p* = .005. Thus, the moderating effect of *RISK* towards *EXTV* to *STCK* and *CRYP* and *OPEN* to *STCK* has no significant effect (t-statistics value <1.96; *p* > .05) while *RISK* has a significant effect (t-statistics value >1.96; *p* < .05) towards the relation between *OPEN* to *CRYP*. We can conclude that RISK influences students with openness to experience only to invest in the cryptocurrency market, where it is accepted partly of the hypotheses **H3b**. In contrast, the non-significance of *RISK* moderation towards *OPEN* to *STCK*, *EXTV* to *STCK*, and *EXTV* to *CRYP* reject hypothesis **H3b.**

NEUR relationship towards *STCK* and *CRYP*, moderated by *RISK*, attained a T-statistics value of 0.709 and 1.006 and *a p*-value of 0.479 and 0.315 for *STCK* and *CRYP*, respectively. Based on the value, it shows how *RISK* has no significant effect (T-statistics value <1.96; *p* > .05), and therefore the hypotheses **H4a** where *RISK* will weaken the relationship between *PESM* to *STCK* and *CRYP* are rejected.

PROC relationship towards *STCK* and *CRYP*, moderated by *RISK*, attained T-statistics values of 1.146 and 0.773 and *p*-value of 0.252 and 0.440 for *STCK* and *CRYP*, respectively. Based on the value, it shows how *RISK* has no significant effect (T-statistics value <1.96; *p* > .05), and therefore the hypotheses **H4b** where *RISK* will weaken the relationship between *PROC* to *STCK* and *CRYP* are rejected.

4.4 Control Variable

The further analysis was conducted in which income was included as a control variable and analysed in a separated model (Check Appx. 3). The inclusion of student's income level (*INCM*) may give more insight regarding the students' investment decisions in stocks and cryptocurrency market. It was found that income level is positive and statistically significant to the investment decisions in stocks market, but found nonsignificant to the investment decisions in cryptocurrency market. Which we can conclude that the higher the income, students are likely investing in stocks market.

4.5 Discussion

Contrary to the previous studies in the hypothesis formulation, this study found that almost all personality traits and behavioural constraints are nonsignificant to either student's decision to invest in stocks and cryptocurrency markets.

The neuroticism traits are not found to influence students' decisions to invest in the stocks and cryptocurrency markets. The result contradicts the evidence that neurotic individuals are likely to avoid high-risk investment instruments as they lose their confidence and instead follow professional advice (Ahmad, 2020). It shows how students' pessimistic and emotional instability personality does not influence their decision to invest in stocks and cryptocurrency. This study also cannot be consistent with the findings that highly neurotic individuals would hold

less risky assets within their portfolio (Mayfield et al., 2008; Oehler et al., 2018). On the other hand, the moderation effect of *RISK* influencing neurotic students to invest in the stock market is positive and statistically significant ($p < .10$). It indicates that the higher the student's risk tolerance, the more emotionally unstable they are likely to invest in the stock market. The finding is consistent with previous studies where neurotic individuals are likely eager to take risks (R. Durand et al., 2013; R. B. Durand et al., 2008). The result cannot denote the negative significance of neuroticism to students' decisions on stocks and cryptocurrency acquisition as proposed in the hypotheses, which failed to support the evidence that neurotic individuals tend to avoid risk (Nicholson et al., 2005). Both direct and moderated results of neuroticism towards investment decisions of students (except *NEUR*RISK -> STCK*) were found non-significant, based on its $p > .05$ on *STCK* and *CRYP*. There is no tendency for students to have neuroticism traits (*mean = 4.160*). The indicator of *neur_2* that states "*I see myself as an anxious individual*" failed to indicate that neurotic students invest in stocks and the cryptocurrency market. Thus, it cannot support the findings by Piotrowska (2019), where neuroticism, directly and indirectly (procrastination as mediator), undermines the decision to invest for retirement.

Extraversion traits have no significance towards students' decision to invest in stocks market and cryptocurrency market, even after moderated by risk tolerance, and the respondents show a high tendency to have extraversion traits (mean = 4.797). The results are contrary to Mayfield et al. (2008) and Nga & Ken Yien (2013), where extroversion leads undergraduates to invest on their own and be less

risk-averse, which those findings support the evidence by Nicholson et al. (2005), where extroverts are risk-taker. An interesting finding by R. B. Durand et al. (2008) shows a positive and statistically significant relationship between extraversion and stock exposure. This study would assume that extroverts are likely to invest in the stock market.

Openness to experience was found to have no direct significance on students' investment decisions in stocks and the cryptocurrency market. The evidence contradicts the study result of a substantial score of experience seeking by young participants in e-commerce investments (Hunter & Kemp, 2004). However, after it is moderated by *RISK*, it shows a positive and statistically significant towards *CRYP*, which explains that students with high curiosity tend to invest in the cryptocurrency market (*OPEN*RISK -> CRYP*; *p*-value = .005). The finding supports De Bortoli et al. (2019) statement that high openness to experience scores would exhibit higher risk propensity, as cryptocurrency is considered a high-risk instrument (Binda, 2020). On the other hand, Risk Tolerance has no significant effect on moderating the relationship between Openness to Experience and investment decisions in the stock market, which makes the hypotheses **H1c** are rejected and hypotheses **H3a** are partially accepted.

Mayfield et al. (2008) found the evidence that agreeableness has no significant effects on investment intentions, which is similar to the data that this study found. Even when the result is positively related to the decision in the stocks market and negatively related to cryptocurrency investment, as the respondents showed a high agreeableness score based on the study's descriptive statistics (*mean*

= *5.185*), there is no significant effect found between agreeableness and student's investment decision in stocks and cryptocurrency market. Risk tolerance is the moderating variable also did not change the relationship strength of agreeableness to the student's decision to invest in stocks and cryptocurrency market, which cannot provide a similar result where low agreeableness likely shows high-risk aversion (Jiang et al., 2020) and a contradicting result where higher agreeableness leads to less wealth in his or her securities (R. B. Durand et al., 2008). However, this study found that there are changes where agreeableness traits are likely to invest in the cryptocurrency market, though it is not significant.

Conscientiousness, where an individual shows high cautiousness to make any rational decisions, was found to have no significant effect on the student's investment decisions in both stocks and cryptocurrency markets. As students are showing high conscientiousness levels (*mean = 5.18*), the study result cannot support the previous studies of Piotrowska (2019) where the conscientiousness supports the retirement saving as it weakens the procrastination effect nor the study of McGhee et al. (2012) where a high level of conscientiousness leads to lower risk tolerance. Risk tolerance is the moderating variable also did not influence the relationship of conscientiousness to the students' investment decision in stocks and cryptocurrency market, even when a study found that procrastination trait would make such individuals avoid risk as they are considered as a rational thinkers (Nga & Ken Yien, 2013). Eventually, the statistical result found that the negative effect of conscientiousness to invest in cryptocurrency changes to positive after it is moderated by risk tolerance, but both results are found nonsignificant.

Previous studies found that pessimism would feel despair for their future as they are experiencing wrong financial decisions regarding their investment (Joo et al., 2017). This study cannot find the relationship between Pessimism and the investment decision in stocks and the cryptocurrency market, even when Risk Tolerance moderates the relationship. On the other hand, it was found that there is a negative relation between pessimism and students' decision to invest in the stocks market and negative relation between students' decision to invest in the cryptocurrency market, though all results are nonsignificant. Those results are likely caused by the neutral side of students toward pessimism. The study result is also inconsistent with the Weinstock & Sonsino (2014) study, which shows how pessimism negatively exhibits risk tolerance. We may conclude that pessimist students would likely avoid stocks investment but are likely to start to invest in cryptocurrency instruments.

Procrastination is also found to have no significant effect on its relationship with the students' investment decisions in the stocks market and cryptocurrency market, though statistically, there is a positive relationship between procrastination with student's probability of investing in the stocks market and cryptocurrency market, before and after it moderated by risk tolerance. The study where procrastination hinders the household's saving even when they know the increasing expenses in the future (Thaler & Benartzi, 2004) and how procrastination would prevent someone from investing in preparing for their retirement cannot be supported by the result of this study.

CHAPTER 5

CONCLUSION

5.1 Conclusion

Evidence from literature found that psychological factors influence an investor's mind before any investment decisions are conducted (Gupta & Maheshwari, 2021). This study explores personality traits with the commonly used personality taxonomy, big-five personality traits, pessimism, and procrastination included as behavioural constraints, to the probability of students to invest in stocks market and cryptocurrency market. None of all personality traits and behavioural constraints are found statistically significant to exhibit the student's decision to invest in stocks and the cryptocurrency market. In contrast, we can conclude that personality traits (extraversion, neuroticism, conscientiousness, openness to experience, and agreeableness), pessimism, and procrastination cannot determine the probability.

The use of risk tolerance as moderating variable is meant to find the relationship changes caused by risk tolerance towards students' investment decisions in the stocks market and cryptocurrency market. This study evidence shows neurotic students with high-risk tolerance would probably invest in the stock market. Similar results also found that risk-seeker creative students have a high probability of investing in cryptocurrency. The decisions of students to invest in stocks and cryptocurrency market may also be affected by their income level, as it was found that the higher the income,

the students more likely investing in stocks market. It gives a sense where students with income level lower than 3 million Indonesian Rupiah (IDR) per month are having lower probability to start investing in stocks market, which also indicated by small percentage of respondents who experienced stocks and cryptocurrency investment.

5.2 Recommendation & Implication

The researcher believed that this research is far from a definition of perfect and flawless in its making. There were still several things that were taken into account when the researcher conducted this study, as listed below:

- The limited time they invested and the difficulty in finding the respondents made the sample of 212 students unable to represent the whole population of students in Indonesia, or non-specifically, whole students worldwide.

- This research does not guarantee the same result and findings when the framework is tested on another different platform because respondents' behaviour might differ from time to time.

Based on the overall results of this study, the researcher proposes several suggestions that are expected to be useful for future research, namely:

- Increasing the sample size to increase the power of the statistical test. The nonsignificant direct and moderated effect were caused by the small sample size ($n = 212$).

- Increase the robustness of the study by doing the Pearson correlation as Norman (2010) found that the Pearson correlation was highly robust with respect to violations of assumptions.

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APPENDICES

Appx. 1 Lists of Distributed Questions

Kuesioner Penelitian

No	Questions	Options	Indicators
1.	Apakah anda pernah berinvestasi di saham?	Ya; Tidak.	
2.	Apakah saat ini anda memiliki saham dalam portfolio investasi anda?	Ya; Tidak.	
3.	Apakah anda pernah berinvestasi di mata uang kripto?	Ya; Tidak.	
4.	Apakah saat ini anda memiliki mata uang kripto dalam portfolio investasi anda?	Ya; Tidak.	
5.	Sudah berapa lama anda berinvestasi di instrument saham?	Tidak Pernah; Kurang dari 1 Tahun; 1 Tahun – 2 Tahun; 2 Tahun – 3 Tahun; Lebih dari 3 Tahun.	
6.	Sudah berapa lama anda berinvestasi di instrument mata uang kripto?	Tidak Pernah; Kurang dari 1 Tahun; 1 Tahun – 2 Tahun; 2 Tahun – 3 Tahun; Lebih dari 3 Tahun.	
7.	Apakah anda sedang mengikuti Pendidikan formal di sekolah/universitas di salah satu Provinsi di Pulau Jawa?	Ya; Tidak.	
8.	Apa kategori sekolah/universitas anda?	Negeri; Swasta.	
9.	Nama		
10.	Jenis Kelamin	Pria; Wanita.	
11.	Usia		
12.	Sumber Pendapatan	Orang Tua; Bekerja (Gaji); Bisnis (Pendapatan Usaha).	
13.	Pendapatan Per Bulan	Kurang dari 1 Juta Rupiah; 1 – 3 Juta Rupiah;	

		3 – 5 Juta Rupiah; Lebih dari 5 Juta Rupiah	
	Kepribadian		
14.	Saya gampang merasa kecewa		*neur_1*
15.	Saya gampang merasa gugup		*neur_2*
16.	Saya gampang merasa depresi		*neur_3*
17.	Saya orang yang rapuh		*neur_4*
18.	Saya jarang merasa kesepian dan sedih		*neur_5*
19.	Saya adalah orang yang percaya diri		*extv_1*
20.	Saya adalah orang yang antusias		*extv_2*
21.	Saya adalah orang yang mudah mendapatkan teman		*extv_3*
22.	Saya orang yang aktif		*extv_4*
23.	Saya orang yang berhati-hati		*cons_1*
24.	Saya mengerjakan sesuatu sampai benar-benar sempurna		*cons_2*
25	Saya mengerjakan sesuatu sesuai dengan urutan		*cons_3*
26	Saya orang yang penuh pertimbangan		*cons_4*
27	Saya adalah orang yang kreatif		*open_1*
28	Saya adalah orang yang gampang penasaran		*open_2*
29	Saya mempunyai banyak ide		*open_3*
30	Saya suka berlajar dengan teori dan ide-ide baru		*open_4*
31	Saya memiliki hubungan yang baik dengan banyak orang		*agrs_1*
32	Saya adalah orang yang ramah		*agrs_2*
33	Saya adalah orang yang terus terang		*agrs_3*
34	Saya gampang percaya		*agrs_4*

	dengan orang lain		
35	Saya adalah orang yang pesimis		*pesm_1*
36	Saya berekspektasi semua hal tidak berjalan sesuai rencana		*pesm_2*
37	Kecurigaan selalu ada di pikiran saya		*pesm_3*
38	Saya jarang mengharapkan sesuatu yang baik terjadi pada saya		*pesm_4*
39	Saya selalu menunda keputusan yang sulit		*proc_1*
40	Saya malas melakukan hal-hal yang meningkatkan kinerja		*proc_2*
41	Disaat suatu hal terasa sangat sulit untuk dilakukan, saya akan menundanya		*proc_3*
42	Saya menghindari hal yang saya tidak kuasai		*proc_4*
Toleransi resiko			
43	Saya nyaman berinvestasi di instrument saham dan mata uang kripto		*risk_1*
44	Bagi saya, keamanan portofolio investasi lebih penting daripada tingkat keuntungan yang tinggi		*risk_2*
45	Saya merasa tidak cocok berinvestasi di asset beresiko tinggi meskipun keuntungannya juga tinggi		*risk_3*
46	Saya bersedia menerima resiko lebih untuk masa depan yang lebih baik		*risk_4*

Appx. 2 Demographic Profile of Respondents

Data	Frequency	Percentage	Total
Gender:			
Female	116	54.7%	212
Male	96	45.3%	
Age:			
18	39	18.4%	212
19	25	11.7%	
20	60	28.3%	
21	65	30.7%	
22	12	5.7%	
23	7	3.3%	
24	3	1.4%	
25	1	0.5%	
Source of Income:			
Monthly Allowance	181	85.4%	212
Salary	14	6.6%	
Business Income	17	8%	
Income Group:			
< 1 Million Rupiah	80	37.7%	212
1 – 3 Million Rupiah	89	42%	
3 – 5 Million Rupiah	27	12.7%	
> 5 Million Rupiah	16	7.5%	

Source: Primary Data, 2021-2022

Appx. 3 Income as Control Variable

Construct	Model 1 (No Control Variable)			Model 2 (Income as Control Variable)		
	Original Sample (O)	Standard Deviation (STDEV)	P Values (p)	Original Sample (O)	Standard Deviation (STDEV)	P Values (p)
NEUR -> STCK	0,072	0.080	0,192	0,100	0,079	0,205
NEUR -> CRYP	-0.034	0.065	0,599	-0,037	0,064	0,563
EXTV -> STCK	0.045	0,076	0,686	0,041	0,113	0,713
EXTV -> CRYP	0.036	0.082	0,661	0,034	0,082	0,682
CONS -> STCK	0,071	0.078	0,191	0,111	0,080	0,165
CONS -> CRYP	0.010	0.089	0,912	0,015	0,090	0,864
OPEN -> STCK	0.044	0.084	0,602	0,042	0,084	0,620
OPEN -> CRYP	0,073	0.095	0,269	0,104	0,098	0,288
AGRS -> STCK	0.012	0.097	0,903	0,001	0,096	0,988
AGRS -> CRYP	-0.050	0.090	0,583	-0,057	0,092	0,535
PESM -> STCK	-0.017	0.099	0,863	0,008	0,098	0,931
PESM -> CRYP	0.052	0.089	0,562	0,069	0,090	0,440
PROC -> STCK	0.033	0.090	0,713	0,025	0,085	0,771
PROC -> CRYP	0.072	0.096	0,275	0,099	0,093	0,289
NEUR*RISK -> STCK	0,081	0.066	0.078*	0,105	0,065	0,104
NEUR*RISK -> CRYP	0.070	0.074	0,345	0,063	0,073	0,388

Construct	Model 1 (No Control Variable)			Model 2 (Income as Control Variable)		
	Original Sample (O)	Standard Deviation (STDEV)	P Values (p)	Original Sample (O)	Standard Deviation (STDEV)	P Values (p)
EXTV*RISK -> STCK	-0.050	0.089	0,574	-0,037	0,090	0,677
EXTV*RISK -> CRYP	-0.019	0,075	0,859	-0,010	0,106	0,921
CONS*RISK -> STCK	0.075	0.062	0,231	0,093	0,066	0,158
CONS*RISK -> CRYP	-0.031	0.092	0,735	-0,019	0,090	0,836
OPEN*RISK -> STCK	0.043	0.082	0,604	0,025	0,082	0,766
OPEN*RISK -> CRYP	0,287	0,072	0.005***	0,275	0,103	0,008***
AGRS*RISK -> STCK	0.030	0.063	0,638	0,027	0,061	0,664
AGRS*RISK -> CRYP	-0.087	0.075	0,250	-0,089	0,075	0,235
PESM*RISK -> STCK	-0.052	0.074	0,479	-0,039	0,074	0,597
PESM*RISK -> CRYP	0.090	0.089	0,315	0,099	0,090	0,272
PROC*RISK -> STCK	-0.076	0.066	0,252	-0,073	0,065	0,262
PROC*RISK -> CRYP	-0.068	0.088	0,440	-0,067	0,085	0,431
INCM -> STCK	-	-	-	0,118	0,061	0,055*
INCM -> CRYP	-	-	-	0,082	0,071	0,248