

Nottingham University Business School

PhD Programme

The psychology of investors' Investment Decision-Making Process: the role of emotion regulation and rumination in investment return

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This thesis is dedicated to my mother, Dr Annie Lai Chooi Seong.

For her endless love, support and encouragement

ABSTRACT

Background The inefficiency of the financial market during the outbreak of Covid-19 was highly driven by market sentiment and behavioural bias. Clearly, the irrationality, sentimental and unpredictable financial market movements have repeatedly suggested that there are limitations and impractical applied theories to the existing financial models. Practitioners, regulators, investors, and academicians must be aware that the financial market performances are consequences of investors' buying and selling decisions, and it is crucial to understand investors' risk and return of the investment decision-making process to promote financial stability and make necessary adjustments accordingly in improving their financial models. Therefore, this study aims to contribute to the literature on the investors' decision-making process from a psychological perspective. The objective is to explore the role of investors' psychological traits, emotions, emotion regulation and affective forecast in the investment decision-making process.

Methods The study is split into three sub-sessions to verify (1) whether investors have the ability to forecast their affective response on their investment return, (2) whether investors' risk decision is affected by their psychological traits, and lastly, (3) how investors' emotions affect their investment return. To ensure that the experimental environment is closely representative of actual reality trading, the study uses a real-time virtual trading platform to measure participants' emotions corresponding to their investment decisions. Participants are allocated with USD1million endowment and are allowed to plan their investment within the 500 stocks and futures from the US Stock Exchange in real-time prices.

Results The findings documented that participants were unable to accurately predict their emotions in both domains of loss and gain, specifically, they overestimated their level of happiness in a monetary gain and overrated sadness in a loss. Evidence revealed that sensation seeking was a significant factor in predicting investors' risk decision, while participants with higher trait impulsiveness contributed to greater risk decision. It also confirmed that emotions had significant effects on investors' portfolio return. Ruminated participants gained higher portfolio return by recognising their trading mistakes which aided in improving their trading skills. Furthermore, regretted participants with a high level of unpleasant emotions led them to further misjudgement and hence lower portfolio return. Lastly, the results suggested that emotion regulation was subjected to an individual's ability, and poor emotion regulation could cause further irrational investment decisions.

Conclusion The research had made a substantial contribution in providing great insight into the role of psychological traits and emotions in the investment decision-making process. These factors contributed to the irrational behaviours that had deviated investors from their investment objectives. The actual experienced emotions were not anticipated by the investors, as shown in the inaccuracy of affective forecasting. Hence, it is recommended for investors to seek suitable emotional regulation strategies to reduce irrational investment behaviour, and to include additional measurements to improve their financial models.

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

1.1.1 The Investment decision-making process

Decision-making is a complicated and confusing process involving the recognition of choices, information gathering, evaluating alternatives, selecting an optimal alternative, implementing the decision and reviewing the decision (Schermerhorn, 2009). Investment decision-making seems to be a much more complicated process with thousands of stocks on the exchange. To begin with, investors need to understand and recognise their financial capabilities and risk tolerance to filter and identify suitable stocks. Investors also need to determine why they are investing and what they want to achieve at the end of the investment term. The process involves identifying investment goals and objectives, which are personal and subjective depending on the investors' financial attitude and needs in different life stages (Levene, 2015). Due to the fact that risk is associated with all investments, investors need to consider their financial risk tolerance and the extent to their willingness to accept risk for a higher potential investment return. This is known as the risk-return tradeoff principle in investment. Therefore, the investment decision is also the decision of the amount of risk accepted or taken by the investors, while the consequence of the investment decision can be evaluated through the return. Hence, several studies on investment decisions were measured by risky asset allocation decisions, risk decisions, the acceptance of investment proposals, and trading volume (Nguyen *et al*., 2019; Nuzula *et al*., 2019; Gambetti *et al*., 2022; Parveen *et al*., 2020).

Furthermore, efforts must be made to understand the stock market and improve skills in making sound investment decisions. Information needs to be explored and gathered from various investment research sites, such as Bloomberg, Yahoo! Finance, Reuters etc., followed by screening from the most miniature news to the most complicated financial information, which brings investors to the stock valuation phase (Kapoor *et al*., 2022).

There are two primary schools of thought on stock valuation that assist investors in analysing and finding the alternatives which offer the highest utility (Ramkumar & Chitra, 2021). A fully rational, risk averse and utility maximising investor would prefer an investment with a higher potential return with the lowest risk. To determine the right time to buy or sell a stock, investors need to work on the fundamental and technical analysis to determine the value of the stock investments (Kapoor *et al*., 2022).

After a portfolio is formed, investors need to review their investment decision. Post-purchase monitoring and actions are required. According to the risk and return tradeoff concept, the consequence of an investment decision, such as a risk decision, is reflected in the investment return. Investors need to review the stocks' performance and subsequently decide to sell, buy additional stock or keep the current position in their portfolio. This decision is also affected by their previous purchases' performance, which refers to the outcome effect (Hibbert *et al*., 2018). Rationally, investors should always justify their buying and selling decisions by comparing the actual return with the predicted expected return. For instance, rational investors may sell stocks that suffered a loss and hold profitable stocks based on the economic outlook.

In reality, humans are not always rational as described by the traditional financial models, whereby individuals have a good understanding of the issues they face. According to Radner (2015), the decision made by individuals is less prone to errors if they are provided with adequate time, enough resources and information. However, more recent literature has emerged that offers contradictory findings on this perspective and that research has yet to reach a consensus on what defines a good investment decision under a highly uncertain financial market. For instance, the higher-risk investment may not be a "right" choice as it is subjected to higher volatility and may result in higher losses.

The "*homo economicus*" assumption also characterises investors as emotionless and capable of making informed investment decisions based on their feasibility. Extensive research found that investment decisions were affected by emotions (Hinvest *et al*., 2021; Nuzula *et al*., 2019). Raut and Kumar (2018) confirmed that the investment decision-making process was repetitive and involved investors' emotions, thoughts and actions in buying and selling an investment. The most recent research published by Hogg and Vaughan (2022) reported that the external environment and how humans perceived information could produce an emotional response that affect their behaviour and hence action. To further recognise the greater interest and the growing body of literature on this perspective, the research aimed to establish the importance of investors' investment decision-making process from a psychological perspective.

1.1.2 The psychological factors

Larsen and Buss (2018) defined psychological traits as a set of characteristics describing how people are different yet similar to each other, which helps explain and predict future behaviour. This psychological mechanism involves information processing activities such as inputting of information from the external environment, the decision rules in considering the options, and the output of behaviour towards an action. These traits influence how humans interact, think, behave, and act in a situation. Several past studies have

documented that personality traits are related to risk-taking, investment decisions and rumour beliefs (Pak & Mahmood, 2015; Gambetti & Giusberti, 2019; Lai *et al.*, 2020). Extroverts are willing to pay a higher price to own investment assets and prefer short-term investment, while conscientious individuals are more responsible for managing their finances. Individuals with openness to experience are prone to engage in long-term investment, while neurotic and extrovert individuals have an intense belief in false rumours. Past studies also indicated a relationship between an investor's behavioural bias and personality traits. Sadi *et al.* (2011) concluded that extroversion and openness are significant to hindsight bias and overconfidence bias while neuroticism is related to random bias.

Emotions are categorised as a state rather than traits (Larsen & Buss, 2018). It is an affective cognition guided by feelings (Hsee & Rottenstreich, 2004). For instance, happiness or sadness at a particular moment or a situation indicates nothing about traits because the emotion does not stay. From the biological perspective, humans are classified as social species and comprised of emotions such as love, trust, moral sense, and empathy (Ebstein *et al.*, 2010). Humans make mistakes, are emotionally influenced, and are not always rational, especially when dealing with money matters. Several past studies have found significant relationships between emotion and money (Baumann *et al.*, 2019; Chitchai *et al.*, 2018; Matz *et al.*, 2016). These findings revealed that money could gain happiness with higher purchasing power, but individuals also experienced negative emotions, such as anger and frustration when they were in a losing frame. The new divergent and neuro-finance studies supported these results. Shiv *et al.* (2005) indicated that emotions were a part of the human neural system that speeded up risky decision-making. They elaborated that humans experienced different neural processes under uncertainties and emotions that could disrupt cognitive processes when investment return would likely experience losses. Therefore, from the cognitive and biological explanations, financial market volatilities are induced by these positive and negative human emotions as well as cognitive biases.

Supported by the fact that humans suffer from limited cognitive capabilities, some actions may be considered rational or irrational (Simon,1956). It is confirmed that psychological factors play a decisive role in the inefficiency of the financial market. A hard fact about the physical financial market is that many unknown risks and decision makers suffer from asymmetric information. For instance, no one would expect an enormous credit bubble; not even the regulators during the 2008 financial crisis. Furthermore, an identical investment appraisal may leave an inconclusive decision. The absence of optimal investment choices increases the challenge of the decision-making process and may affect decision makers' judgement. In reality, uncertainty is far more complicated than one can imagine. Decision makers struggle to consider the worthiness of an investment under uncertainties where not all information is made known. For instance,

with limited resources and cognitive constraints, one may use heuristics to derive quick decisions in their investment, which is viewed as irrational or a form of cognitive bias by some studies (Dhami & Harries, 2010; Moxley *et al.*, 2012). However, Mousavi and Gigerenzer (2014) found that heuristics offer a better solution, as the mathematical model for risk-return tradeoff may not be relevant under uncertainties.

In 2006, Hsee and Hastie had already confirmed that a deviated prediction where decisionmakers had failed to foresee the decision consequences accurately was explained by the individuals' psychological aspects such as the impact bias, projection bias, distinction bias, memory bias and belief bias. In addition, some decision-makers may habitually seek information to compare the actual result to the alternatives in assessing the quality of their decision to ease their concerns.

Such behaviour can produce psychological stress (i.e., regret, rumination & dissonance) when dealing with emotions. These emotional responses are caused by previous investment decisions (Nuzula *et al.*, 2019; Shani & Zeelenberg, 2012). The consequential actions of these negative emotions conclude that an individual's problem-solving skills are exposed to transdiagnostic mental health vulnerability (Watkins & Roberts, 2020). Furthermore, adverse events can impel individuals into self-rumination, affecting future decision-making (Palomäki *et al.*, 2012). These researchers also confirmed that rumination is a critical factor in post-decisional regret. It was found that depressed individuals have a higher chance of experiencing regret and consequently have difficulty making future decisions. Hence, being capable of forgoing undesirable emotions is essential to decision-making.

It is therefore vital to recognise the nonexistence of a perfect capital market whereby investors are a unique entity who is always sensible, and information is paid to receive genuine up-to-date and real-time news and prices of securities. In a real investment setting, there are numerous information that investors have no access to. The financial market is formed by heterogeneous beliefs and hypotheses where every investor has distinguishable behaviour and unique evaluation skills in forming buying and selling decisions. In conclusion, rationality in investment decision-making is inadequate in explaining the phenomenon in the financial market.

1.2 Rationale of the Study

For nearly half a century, extensive studies have been trying to prove and justify the efficiency of the stock markets globally. A handful of researchers emerged with a conclusion that the market reacts and behaves contradictory to the *Efficiency Market Hypothesis (EMH)* founded by Eugene Fama in 1970. Shreds of evidence of market inefficiencies such as the stock market bubble, high volatility, calendar effects etc.,

are illogic and cause significant distortions and breakdowns in the global financial system (Huang *et al*., 2022; Choi, 2021; Shu *et al*., 2020). These phenomena are guided by risks, preferences, and beliefs (Hoang *et al*., 2020; Kim *et al*., 2020). Recent research conducted by Oktay (2021) reported that US and UK stock markets had the most deviation in market efficiency during the COVID-19 pandemic. The global momentum crashes during the outbreak of Covid-19 were evidence of market inefficiency, which was highly driven by market sentiment and behavioural bias, specifically in the China and US stock markets (Vasileiou, 2021; Wu *et al*., 2021; Xu *et al*., 2021). Several studies found that the number of COVID-19 death cases increased the market volatility and reduced returns (Chatjuthamard *et al.*,2021; Uddin *et al*., 2021). The increased market volatility was due to the uncertainty of the pandemic, which induced fear and led to more pessimistic sentiment in the market (Hsu & Tang, 2022; Dash & Maitra, 2022). Clearly, the irrationality, sentimental and unpredictable financial markets have repeatedly suggested that there are limitations and impractical applied theories to the existing financial models.

The historical global financial crisis has also proven that the fast-paced development of the world's financial markets along with investors' psychological traits and behavioural patterns had significantly impacted asset prices. These factors further caused increasing difficulties in forecasting global financial performances through modern financial analysis techniques and financial evolution. For example, the complexity of innovated-instruments known as Asset-Backed Securities (ABS), Collaterise Loan Obligation (CLO) and Collaterise Debt Obligation (CDO) demonstrated the failure of advanced innovative techniques and financial models in deriving the instrument's true value on the pace of the ever-evolving markets. The global financial crisis has magnified the limitations of current financial theories and analytical techniques in providing accurate risk evaluations, predicting, and addressing the financial crisis. Vast off-balance sheet activities like Mortgage-backed securities and Asset-backed securities had caused credit risk to grow and expand unknowingly among financial institutions, and financial models were incapable of capturing the excess risks exposure and alerting the market participants. Investors who invested in the instrument were not aware of the risks they were taking. No investors nor regulators know how huge the credit and liquidity risks were.

"We have no indication that the major, more diversified institutions are facing any funding pressure" said Tim Geithner, the US Treasury Secretary. "I do not expect insolvency or near insolvency among major financial institutions," said Fed Chairman Ben Bernanke (The Telegraph, 2013).

The regulators were trying to *build the thing right* rather than *building the right things* at first. A summary of the US financial history by *The Economist* (Ryder, 2022) found that post-crisis reformation is

shaping modern finance, and it is still based on the pre-crisis framework by merely bandaging or camouflaging it. For instance, improving Basel II to Basel III, and introducing ring-fencing. With the changes in compliance and revamped framework, it is still questionable whether it can keep up with the evolution and effectively prevent the same crisis in the future by using the same economic models. It had also been reported in the literature that policies used by the regulators to promote market stability and growth were also affected by investors' behaviours. Monetary policy was influenced by the investors' way of behaving, fundamentals of stock valuations and noise traders (Gagnon, 2004).

Several economists evaluated these financial events and published articles on the post-financial crisis. These research conclusions were similar, and all agreed that there was clear evidence that current existing economics and financial theories had failed to explain these phenomena and current global financial performances. For instance, the *New York Times magazine* published an article called "How did economists get so wrong?" (Krugman, 2009). *The Economists* article on "What's wrong with Finance?" and "What are economists getting wrong today?" on *Bloomberg* (Buttonwood, 2015; Kennedy, 2018).

It was hence beyond doubt that the financial market performances were consequences of investors' buying and selling decisions, and the market inefficiency was mainly caused by the active noise in the market, investors' behavioural biases and the biased stock recommendation from the analyst (Shanaev *et al.*, 2021; Guo *et al.*, 2020; Ramiah *et al.*, 2015). Therefore, practitioners, regulators, investors and academics must understand how psychological traits and emotions can affect investors' investment decisions to promote financial stability and make necessary adjustments to improve their financial models.

Over decades, practitioners, and regulators have been trying to understand investors' investment behaviour through the psychometric instrument of risk assessment to provide financial advice and promote suitable financial products. However, the risk profiling requirement framework set by the regulators was based on homo economicus whereby individuals in the market are homogeneous with stable and consistent preferences and contain adequate cognitive abilities in resolving issues across situations (Klement, 2018). The assumption was proven unrealistic as investors' psychological traits and emotional states were essential to risk profiling assessment which is agreeable across practitioners, regulators and academics (Davies & Brooks, 2014). Numerous researchers had developed different psychometric instruments trying to capture and evaluate investors' financial risk tolerance, which is defined as 'the maximum amount of uncertainty someone is willing to accept when making a financial decision that entails the possibility of loss' (Grable, 2000). According to the UK Financial Services Authority (FSA) in 2011, the analysis reported that 54% of the investor-profiling questions had failed to measure investor risk attitude correctly, raising the concern on

risk profiling regulation compliance. According to Davies (2018), most multiple risk scenario questions were inaccurate measurements of risk tolerance. For instance, the questions focused on different aspects such as risk preference, investment horizon and spending behaviour. Hypothetical questions were also found to be unrealistic which were not connected to investors' current financial situation and did not consider investors' psychological and emotional states (Davies, 2018). For instance, 70% of the questionnaires were reported measuring the anticipated behaviour under various market conditions, such as "what if the market is expected to plunge, and if you lost or gain a certain amount of money" (Rice, 2005). However, these anticipated behaviours might not be how they would react in real life as it varies along with their emotional state. Hence, the accuracy of the measurements was highly dependent on how well investors perceived themselves under the situation, which raised a serious question about investors' ability to predict their emotional responses under different market circumstances.

Therefore, this study seeks to contribute to the behavioural finance literature by investigating investors' affective forecasting ability and how psychological traits and emotions affect investors' decision-making process which has not been documented in prior research.

1.3 Research Gap

This section identifies the research variables that were not previously covered or identified by the previous studies. Based on detailed literature, the current research can identify the unobserved variables related to the investment decision-making process. In general, research is the result of the addition to the existing fund knowledge. The investigator has to begin where others have left and filled by the current research. Recent studies conducted by various researchers in distinct places related psychological factors to investment decisions. Individual's regret, optimism, overconfident, demographic, financial literacy, personality traits, optimism, self-control, client trust and risk perception were found to be associated with investment decisions (Tauni *et al.*, 2017; Pyles *et al.*, 2016 in China & USA respectively; Nguyen *et al.*, 2019 in Australia; Aren & Zengin, 2016 in Istanbul, Turkey; Strömbäck *et al.*,2017 in Sweden). Financial decision-making may also refer to investment decision-making in some literature. For example, research on household context conducted by Johnston *et al.* (2016); and Yusof (2015) examined the relationship between demographic and risk tolerance on financial decision-making respectively in Australia and Malaysia.

Based on the above literature, psychological factors in investment decision-making are still far under-examined and overlooked. To the researcher's best knowledge, no research had examined the psychological factors, including psychological traits and emotions in the investment decision-making process. The study introduces new emotional factors such as affective forecasting, rumination and emotion

regulation which had not been covered in past literature. Considering the significance of emotions in money matters, it is vital to unify modern finance with the psychological factors to better understand the process of investors' decision-making, which relates to the asset pricing in the financial market. Hence, this study will extend the under-examined decision-making framework from the affective-cognitive system perspective by proposing to include psychological traits and emotions, such as financial anxiety, impulsiveness, sensation seeking, rumination, regret, and emotion regulation, using the Partial Least Square Structural Equation Modelling.

Investment decision has been studied in various countries such as by Tauni *et al.* (2017); Pyles *et al.* (2016) in China and USA respectively; Nguyen *et al.* (2016) in Australia; Aren and Zengin (2016) in Istanbul, Turkey; and Strömbäck *et al.* (2017) in Sweden. However, to the knowledge of the researcher, there are no known past studies which had examined the psychological factors of impulsiveness, sensation seeking, financial anxiety, emotion regulation, regret, and rumination and how they jointly operate and influence the investment decision-making process in the Malaysian financial context. Malaysia is known as a unique nation with multi-ethnicity and religiosity, the distinct cultural background and values will enhance the existing behavioural knowledge and contribute to the Asian literature on finance, as supported those psychological traits and emotions were significantly different across cultures (Shrira *et al*., 2018; Zhou *et al*., 2021). The results of this research are utmost important to justify the importance of the psychological traits and emotions influences in the investment decision-making process. Hence, this study examines the existing problems in emerging markets with multicultural societies such as Malaysia rather than the well-covered developed markets.

1.4 Research Questions and Objectives

This research aims to investigate three aspects of investment decision-making process in the Malaysian Stock Market: 1. Affective forecasting 2. Psychological traits 3. Emotions

The principal research questions are as follow:

1. Do investors experience affective forecasting error in the investment decision-making process?
2. Do impulsiveness, sensation seeking and financial anxiety affect risk decision?
3. Do rumination, regrets, and emotion regulation affect portfolio return?

The objectives of the study are as follow:

1. To investigate whether investors able to predict their emotion accurately in reaction to their portfolio performance in the investment decision-making process.

2. To determine the relationship between impulsiveness and investors' risk decision in the investment decision-making process.
3. To examine the relationship between sensation seeking and investors' risk decision in the investment decision-making process.
4. To examine the impact of financial anxiety on investors' risk decision in the investment decision-making process.
5. To explore the types of emotions that investors experience during the investment decision-making process.
6. To explore the effect of rumination on investors' portfolio return in the investment decision-making process.
7. To examine how regret affects investors' portfolio return in the investment decision-making process.
8. To explore the interaction of emotion regulation on investors' portfolio return in the investment decision-making process.

CHAPTER TWO

LITERATURE REVIEW

2.1 Theoretical framework

Despite the recent rapid development of behavioural finance study, there is still missing a unified theory which can explain the investors' investment decision-making process. Classical bounded rational theory and prospect theory pointed out that investors in the market are not always rational and can be extremely sensitive to losses over gains. However, these theories further explain of the origin of rationality and psychological reasons for irrational behaviours. It has remained unclear from these theories on the complexity of the causes and effects of the investors' decision-making and behaviour. To address these inadequacies, integrating knowledge across interdisciplinary boundaries is extremely crucial.

The study of psychology in economics can be traced back to the early 1930s. John Maynard Keynes as one of the most influential economists pointed out that the markets in which he studied were far from rational behaviour. Instead, he argued that many of the factors that drove markets one way or another actually resulted from what he called the "animal spirit". People who made financial decisions were making choices based on a "spontaneous urge" (Middleton, 1996).

Most behavioural economists agreed with the idea of the "guiding animal spirit" (De Grauwe, 2011; Rapetti, 2012). While some rational appraisals are indeed possible, the market's inherent uncertainty and riskiness make it a prime environment for investors to make emotional and risk-taking decisions which were driven by factors other than pure rationality. Several psychological biases that affect an investor's behaviour and subsequently decision-making have been previously researched on globally. Such a list of biases includes personality traits, overconfidence, risk tolerance, risk-taking attitudes, heuristics, cognitive dissonance, home bias, sensation seeking attitude, competence effect, herding, etc.

2.1.1 The Theories

Research on behavioural psychology can be traced back to as early as in the 1900s by John B. Watson, who believed that all human behaviours are learned from a stimulus-response (the Learning Theory). For example, a child who is not afraid of a rat is taught to be fearful will eventually be afraid and develop phobia of similar objects. From a behaviourist perspective, human personality is developed through learned responses in numerous situations, including an individual's locus of control and expectancy for

success (Rotter's Social Learning Theory). Therefore, how they respond to an event depends on the learned experience which is reflected through their personality. Bandura's model of reciprocal determinism proposed that human behaviour is influenced by the physical environment, the previously reinforced response (personality) and mental process (Ciccarelli & White, 2009). Similarly, the Activating-Beliefs-Consequences Model developed by Albert Ellie stated that rational and irrational behaviours are consequences of investors' belief in an active event. (Ahmad *et al.*, 2017). An active event refers to external forces that can be caused by the changes in the economic environment or asymmetric information. Investors in the market may have unique thoughts over financial market events which caused them to be optimistic or pessimistic. These thoughts are the key elements of human behaviour and emotions.

Market uncertainties in reality are far more complicated than can be imagined. The hard fact about the physical financial market is because not all risks are known. Decision-makers struggle in considering the worth-taking of an investment under uncertainties where not all information is made known. For instance, as stated in the earlier chapter, generally no one would expect a huge credit bubble; not even the regulators during the 2008 financial crisis. Therefore, it is not logical to expect thoughtful decisions to be derived through careful analysis and in a logical flow where all information is made known perpetually.

For instance, the abnormal market phenomena as a result of disposition effects exist in various stock markets (Pelster & Hofmann, 2018; Gemayel & Preda, 2018; Dierick *et al.*, 2019; Hermann *et al.*, 2019). Investors have the tendency to hold on to losing stocks under unfavourable market conditions because they refused to admit their mistakes and expecting a rebound soon. Furthermore, irrational behaviour such as panic selling during a market collapse is a result of their cognitive bias. Strong negative emotion such as fear can prompt the investors to believe that they are in a threat and prices will further decline in a short period. These beliefs shape each investor with different thinking, decision-making and hence react or behave differently. It is therefore important to acknowledge that human have different cognitive capabilities and cognitive constraints under the same economic condition.

These distinctions have a direct impact on their decision-making process and serve as fundamental in understanding human irrational and rational behaviour. Decision-makers may lack in comprehension of processing vast information in a short time period which induce judgement error. These human characteristics are referred to as '*the principle bounded rationality*' by Herbert Simon (Bendor, 2015). As Velupillai and Kao (2014) cited a quotation by Simon in 1956: "*The capacity of the human mind for formulating and solving complex problems is very small compared with the size of the problems whose solution is required for objectively rational behaviours in the real world - or even for a reasonable*

approximation to such objective rationality." Simon also argued that not all market participants are maximiser, there are also *satisficers* who just make a 'good enough' decision (Basel & Brühl, 2013).

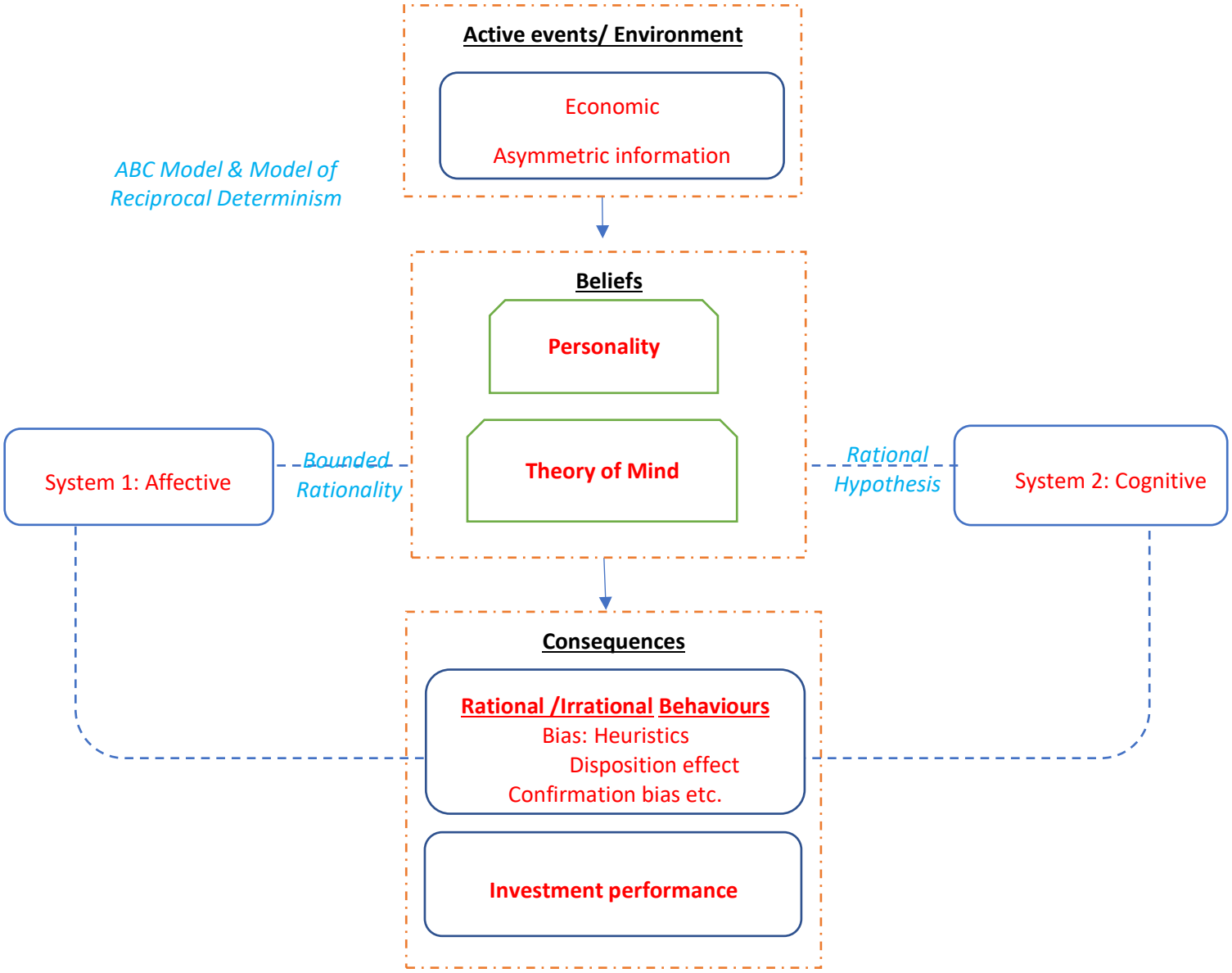
The characteristics of bounded rationality can be explained by the role of affective and intuitive in decision-making in the Theory of Mind. Kahneman (2003) described human cognitive as separated into two systems, documented as System 1 and System 2. System 1 (intuition) refers the affective cognition. In this mode, human value things by feelings instead of reasoning and it is extremely sensitive to the presence or absence of a stimulus (Hsee & Rottenstreich, 2004). System 1 is also affected by habit and belief and enables individuals in making a decision fast, automatic and effortless. Klein (2015) reported that many past studies had discovered that most people follow their instinct when making decisions. According to Gigerenzer and Gaissmaier (2015), intuition is a useful nonrational method in deriving a decision under uncertainty or optimisation. Heuristics is a System 1 process which simplifies decisions. In contrast, System 2 (analytic thinking) is slower, rule-based and effortful. Hence, information is carefully processed and subjected to lesser errors. Kruglanski and Gigerenzer (2011) suggested that effortful analysis (System 2) may not necessarily be more accurate than the 'simple-mind' judgement in System 1. Sometimes a heuristic decision can be more effective. Zhong and Wang (2018) reported that individual investors depended heavily on System 1 in decision-making, whereas institutional investors adopted System 2 in the bond market, and this is due to their different cognitive abilities and an unique set of analytical skills.

The Prospect Theory and Cumulative Prospect Theory, founded by Kahneman and Tversky in 1979 and 1992 respectively were results of cognitive bias. Both theories represent the value function and weight function that describe the risk attitude and behaviours of decision-makers (Wang *et al.*, 2020). The authors discovered that investors in the market value risks and uncertainties differently. Investors make decisions based on their perception on gains and losses and are more sensitive to losses over gains, which result in a S-shaped value function (Son & Nguyen, 2019; Campos-Vazquez & Cuilty, 2014; De Castro *et al.*, 2016). For the same probability of an outcome, investors may see a lower chance of losses and a higher chance of gains (Kaluszka & Krzeszowiec, 2012). With relevance to the Prospect Theory, past studies found that bonds with greater values are found to be more appealing to investors and hence lead them to overvaluing the bonds and resulted in lower returns, and vice versa (Zhong & Wang, 2018). Trepel *et al.* (2005) pointed out that the decision behaviour disorder of overweight low probabilities events and overweight high probabilities events are guided by both cognitive and affective conditions. This reflected an inverse S-shape weighting function as emotionally driven investors determined to realise the smaller gains. They are also afraid of the greater chance that gains may not be realised. It is a common non-logical perception that

distorted judgements which lead to behavioural bias and decision errors (Klos *et al.*, 2005; Ganegoda & Folger, 2015; Nguyen *et al.*, 2016).

In conclusion, to understand investor decision-making better, it is necessary to review theories across interdisciplinary boundaries to analyse the role of investor behaviour on decision-making. Bandura's Model of Reciprocal Determinism and the Activating-Beliefs-Consequences Model explain the interdependent relationships between human behaviour, cognition, personal characteristics and the external environment. Both models confirmed that physical surrounding have a direct impact on human reactions through personal factors such as traits and thought process. In this regard, rational and irrational behaviour are reaction of human reflective thoughts and observational learning. Furthermore, Theory of Mind clarifies that human rationality depends strongly on human brain connectivity involving interaction between cognitive thinking and emotional system. It is an important component of adaptive functioning in the learning process and this is in line with the Bounded Rational Theory and the Prospect Theory, which explains individual as unique with dissimilar cognitive capacities and emotional responses in the process of problem solving and decision-making (Ochsner & Phelps, 2007). Figure 2.1 shows the unified theoretical framework of Activating-Beliefs-Consequences Model, The Theory of Mind, Rational and Bounded Rationality.

Figure 2. 1 Unified theoretical framework of Activating-Beliefs-Consequences Model, The Theory of Mind, Rational and Bounded Rationality



2.2 Operational Variables

Investors' trading decisions result from studying and observing past resemble trends of historic recurrence in the financial markets. Studies revealed that even knowledgeable and experienced investors can unconsciously repeat their trading mistakes like holding an under-diversified portfolio and exhibit disposition bias (Koestner *et al.*, 2017). Therefore, this study aims to understand and explore the process of how psychological traits of the investors may shape their investment decision. The independent variables of the study include impulsiveness, sensation seeking and financial anxiety and rumination, regrets and emotion regulation. The operational framework is presented in Figure 2.2.

2.2.1 Affective forecast in decision-making process

Affective forecast involves an individual prediction of their feelings toward a future event (Wilson & Gilbert, 2005). Studies revealed that former emotional experiences are not useful in predicting future affective under similar events. A blend of inconsistent memories on one's past and present emotions affected their inability to realise the extent of their emotional mis-forecast. This is because human memory is error-prone and insensitive to past events (Hsee & Hastie, 2006). These misbelieves are irrelevant to the number of emotional encounters. Historical affective forecast errors did not improve an individual's affective forecast ability (Ayton *et al.*, 2007; Meyvis *et al.*, 2010). Specifically, the inaccuracy of estimation is referred to as affective forecasting errors (AFEs) or affective misforecasting (AMF) in the literature.

To date, several studies found that individuals often overestimate the intensity and the duration of an emotional event and these results are tested based on various emotion-eliciting states, the presidential election (Lau *et al.*, 2016; Meyvis *et al.*, 2010), a football game (Wilson *et al.*, 2000), exam performance (Finkenauer *et al.*, 2007, Levine *et al.*, 2012), gambling task (Kermer *et al.*, 2006), and health state scenario (Walsh & Ayton, 2009). Finkenauer *et al.* (2007) pointed out that the magnitude of overestimating emotions in a negative event is greater than a positive event. Triggered emotion will gradually return to its base level after the event and that most individuals underestimate the speed of emotional recovery. The emotion is found to last longer than expected as they fail to adapt or rationalise the facts within the predicted time frame (Wilson & Gilbert, 2008). The inconsistency may be caused by a shift in the perception of an event or a changed to an event output such as the importance of the event, the frequency of thinking about the event, or surprise from the event (Lench *et al.*, 2019; Verduyn *et al.*, 2009). On the other hand, Buechel *et al.* (2017) suggested that the over- and under-estimation of an emotion depends on the scale and duration of the event.

Most of the investors in the market overestimated their risk absorption capability and underestimate the risk they included in their portfolio. The analysis by UK Financial Services Authority (FSA) reported that the investor-profiling questions failed to measure investor risk attitude correctly and the mismatched of risk profile could be due to the inconsistency of memories or focalism effects. In practice, many risks profiling psychometrics in the industry are based on hypothetical scenarios of market events which aim to measure an investor's ability to withstand financial risk and their emotions related to financial loss (Klement, 2018). Regardless of market experience, professional financial advisers should recommend a suitable financial product based on individual investor's averse to losses and financial capabilities. It is therefore extremely crucial to understand investor's ability to predict their emotions regarding money matters and their investment performance for decision-making to accurately measure their risk tolerance and avoid mis-profiling.

Although extensive studies had been carried out, but no single study has investigated the affective forecast concerning investment. In general, investors in the market are characterised as risk-averse under rational conditions. The discomfort of monetary losses is twice of the satisfaction of an equal-sized gain. Kermer *et al.* (2006) suggested that risk aversion is a type of affective forecasting error as an individual may not suffer as much as they had imagined because habitually, they will minimise and rationalise a negative event. It is therefore extremely crucial to understand investors' ability to predict their emotions regarding money matters. The hypotheses are formulated as follow:

H1: There is a statistical difference between pre-investment emotion forecast and post investment emotion when the portfolio is positive and above average.

H2: There is a statistical difference between pre-investment emotion forecast and post investment emotion when the portfolio is negative and below average.

2.2.2 Impulsiveness

Impulsiveness is the tendency to act on a notion or urge, displaying behaviour characterised by little or no forethought, reflection, or consideration of the consequences (Patton *et al*, 1995). It is a feature of impairment in cognitive and behaviour found in the literature. In economics, impulse purchase is a popular researched area that reveals consumer with impulsive traits would purchase without forethought. It is an unexpected strong urge that associated with self-esteem, financial knowledge and materialism. A rational consumer with greater financial awareness and mindfulness demonstrated less impulsive in purchase decision while low in self-esteem would induce impulse buying behaviour (Mette *et al.*, 2019; Dhandra, 2020).

Similarly, impulse buying or selling behaviour applies in stocks trading. More studies remain to be done in exploring the traits in the investment field. Crowd panic and herding is a typical example of impulsiveness. Investors who believe in a continuation of a bullish trend in the stock markets will probably induce impulsive buying, causing stocks to be overpriced. Correspondingly, fear of further decline in asset values will push investors to exit the market and sell impulsively, resulting in panic selling and the collapse of asset prices (Lu *et al.*, 2018; Van den Berg *et al.*, 2018). Such phenomena can be explained by the Adaptive Expectation hypothesis indicating investor's expectation is adjusted according to recent information, causing them to be short-sighted and overreact to the newly released information. Such behaviour resulted from the sensitivity of an impulsive individual toward rewards and losses. They are less appreciative of delayed rewards and will make speedy decisions in seeking for risky instant rewards (Schmidt *et al.*, 2017; Baumann & Odum, 2012). Furthermore, impulsiveness and risk-taking do partly share similar activation patterns in the same region of the brain (Pletzer & M. Ortner, 2016). Therefore, individuals with higher traits of impulsiveness may suffer from a cognitive impairment in decision-making. This led to the following hypothesis:

H3: Portfolio risk increases with higher level of impulsiveness.

2.2.3 Sensation seeking

Sensation seeking is defined as "the seeking of varied novel, complex, and intense sensations and experiences, and the willingness to take physical, social, legal, and financial risks for the sake of such experience" (Zuckerman, 1994). Sensation seeking is a stable personality trait that will not alter much over time. Zuckerman (1994) theorises that having a high level of sensation seeking will lead to poor perceptions of risky situations and engagement in risky behaviour. These seekers aim to pursue a new level of sensation through exploratory propensity, behaving lively and cheerfully under uncertainties. Excitement seekers are normally less fearful and more well-controlled under perilous environment as well as able to expedite healing and recovery process of post-event stress and trauma (Breivik *et al.*, 2017). Sensation seeking is found to be a key personality variable in determining risky behaviour under various studies, including attitudes on the road (Qu *et al.*,2020; Lemarié *et al.*, 2019), extreme sports (Baretta *et al.*, 2017), crime and sexual behaviour (Horvath & Zuckerman, 1993), risk-taking behaviour (Bonnaire & Barrault, 2018; Humphreys *et al.*, 2013), and monetary reward (Zheng *et al.*, 2019).

From the neuro-finance perspective, Kruschwitz *et al.* (2012) conducted an experimental study to examine the relationship between financial reward, risk and sensation seeking using functional magnetic

resonance imaging (fMRI) concluded that under uncertainties, high sensation seekers (HSS) are more sensitive to rewards and are less sensible in monetary punishments. Whereas low sensation seekers (LSS) show less sensitive to rewards at the same time higher sensibility in monetary punishments. A homeostatic imbalance in the decision of gain and loss can explain such impairment of judgement. Similarly, Xu *et al.* (2020) added that high sensation seeking is related to behavioural and neural insensitivity, which promotes risk seeking behaviour when dealing with financial losses. This is consistent with the characteristic of an investor's behaviour bias under the disposition effect. Signalling error in striatum (located in front of the thalamus in each cerebral hemisphere of the brain) expects prices to increase when it is lower than the buying price (Brooks *et al.*, 2012). This evaluation bias is likely related to risk attitude toward losses (Zheng *et al.*, 2019) and to gender effects (Copping *et al.*, 2014). Hence, sensation seeking is associated with a higher tendency to engage with risky events and hence can influence an individual's behaviour, including decision-making. The fourth hypothesis reads:

H4: High sensation seekers have a high portfolio risk.

2.2.4 Financial Anxiety

Financial anxiety is defined as "a psychosocial syndrome whereby individuals have an uneasy and unhealthy attitude toward engaging with and administering their personal finances in an effective way". It is measured by 10 items in the Financial Anxiety Scale (FAS) formulated by Shapiro and Burchell (2012). An individual with higher financial anxiety traits displays unconscious bias to financial loaded words, whether positive or negative. Habitual avoidance is a common approach to cope with financial phobia (Shapiro & Burchell, 2012); however, financial anxiety would be able to reduce with the help of a financial adviser (Heo *et al.*, 2015). This unhealthy attitude is highly associated with negative emotions, especially when there is an insufficient fund (Gasiorowska, 2014); particularly with investors who are more conservative with money-related decisions. For instance, they would rather hold their funds in interest bearing instruments and avoid high uncertainty instruments. Hence, individuals with higher financial anxiety trait prefer lower risk profile (Gambetti & Giusberti, 2012; Gambetti & Giusberti, 2019). Thus, formulated the fifth hypothesis:

H5: Portfolio risk are lower for investors with higher level of financial anxiety.

2.2.5 Rumination

Capability to forgo undesirable emotion is an important aspect of decision-making. The tendency of an individual to repetitively thinks about a negative situation of post-decision-making is known as

rumination. These negative events drive an individual into repetitive higher order thinking of counterfactual analysis to seek for a solution to the cause, the meaning and implications of the situation (Dey *et al.*, 2018). These authors proposed that ruminating negative thoughts are key factors of post-decisional regret and depressed individuals have a higher chance of experiencing regret and consequently have difficulty in making a decision.

Studies highlighted that such recurrent thoughts do indeed influence personal mental health, psychological well-being and cognitive functioning related to monetary concern are associated with anxiety disorder, social anxiety and posttraumatic stress disorder (Watkins, 2008; De Bruijn & Antonides, 2020). Financial stress is a key factor to promote cognitive pressure, leading to a poor financial decision (Mani *et al.*, 2013). For instance, monetary loss induces negative emotions and pushes individuals into self-rumination which will affect future decision-making (Palomäki *et al.*,2012). Although there are no detailed investigations of the effect of posttraumatic stress on investors mental health, it is believed that there is an association as reported that the post-crisis trauma in 2008 affected the retail investors and financial advisors' cognitive judgement (Bradley & Sonya, 2012). Reoccurring self-reflection on their investment mistakes may cause overthinking and hence influences their decision. On the contrary, experienced decision-makers are found to have a lower propensity to self-rumination through demonstration of better emotional regulation. As individuals resolved their rumination, it generates higher posttraumatic growth or personal growth (Watkins, 2008; Dey *et al*., 2018). This proposes the sixth hypothesis:

H6: Investors with higher tendency of rumination have better portfolio return.

2.2.6 Regret

Regret is a complex negative emotion which is widely used in cross-disciplinary studies. Post decisional regret refers to a feeling of sorry over a decision made under uncertainty, especially where losses are involved (Lee & Sturm, 2017). It is a type of backwards-looking emotional pain from an experienced individual who wishes to alter their past decision based on the current outcome (Das & Mohapatra, 2017).

In the economic context, this unpleasant self-blaming affective is derived from the loss of a better forgone outcome, the opportunity cost and the poor decision made (Connolly & Zeelenberg, 2002; Baule *et al.*, 2019). Huang and Zeelenberg (2012) found that investor will experience regret if the expectation on investment is below the expected returns with and without counterfactual comparison. While the feeling of regret will eventually disappear when the returns of investment are beyond the expectation. A similar experiment was carried out in examining the emotions of individuals with different emotional development

stage. Habib *et al.* (2012) attested that children have a lower emotional effect as compared to adults in a computerised monetary gambling task. His research concluded that when children made an incorrect decision, they felt regret and then reassessed their original choice.

The complexity of the financial system caused investors to struggle in making the right investment decisions. There are many identical options in the market with similar inconclusive and limitation of existing financial models and cognitive capabilities. The absence of optimal choices increases the challenge of the decision-making process and may affect decision-makers' judgement. Therefore, the tendency of regret comprises the outcome of the prior decision and also the process of decision-making. Coping with such negative emotion brings both positive and negative consequences to our daily decisions, for instance, it may stimulate an individual to think productively, at the same time, may lead to decision avoidance to avoid future regret (Buchanan *et al.*, 2016). An individual can act irrationally and deviate from their risk tolerance level, particularly intensifying risk-taking or status quo which distorts decision-making (Zeelenberg & Beattie, 1997). Status quo is a common irrational behaviour found on investors where they prefer to stay on what they have decided. Disposition effect is where investors insist on holding on to the losing stocks, believing that the holding prices will return to its reference point, which is an irrational regret aversion behaviour. Investors may use dollar-cost averaging strategy to reduce accountability and regret (Bateman *et al.*, 2015). There is not much known about regret because of limited research on regret in the financial area. It remains a shortfall in research on the effect of regret on future investment decision-making. The seventh hypothesis in this study is:

H7: There is a negative association between regret and portfolio return.

2.2.7 Emotion regulation

Emotion regulation is defined as the ability of an individual to influence the emotion they are experiencing, control their desired emotion in terms of when and how they convey them (Li *et al.*, 2018). Studies had proven that analytical thinking and intuitive are an inextricable cognitive process that explain human behaviour development (Dorn *et al.*, 2020). Plutchik (1994) classified human emotions into eight primary categories comprising four negatives, two positives, and two neutral emotions, which are anger, disgust, anticipation, sadness, surprise, fear, trust and joy. As reported by Roszkowski and Grable (2008), an individual with a happy mood has a different financial risk tolerance score. They are found to have a higher financial risk tolerance level as compared to an individual who is not happy. There is a significant relationship between sadness and a sense of helplessness (Garg & Lerner, 2013). It indicates that the emotion of an individual during risk tolerance assessment is an important factor to consider, as it has a

direct impact on their investment decision-making. Additionally, the feeling of anger will increase one's risk-taking while a feeling of disgust will decrease one's risk-taking (Fessler *et al.*, 2004). It is therefore important to understand and accept the fact that humans are not affectionless but instead have feelings and can be subjected to emotional bias. The way individuals deal with an emotional response from an active event is a vital mental process in deciding their decision-making, behaviour and communication. As long as individuals are aware of their emotional states, they will be able to manage them by not letting their emotions to overrun through the down-regulate or up-regulate techniques which promote better decision making (Jerčić & Sundstedt, 2019). For instance, investors should recognise their emotional changes and monitor them efficacious especially during volatile markets performance. As suggested by Peterson (2011), investors who experienced losses may feel anxious and often behave irrationally in making unwise investment decisions, particularly risk avoidance behaviour like hesitating to trade and regarded higher financial threats in investment choices. It is important to control their anxiety by reflecting a more sensible decision. Furthermore, emotion regulation is found related to risk decision. Reducing one's negative emotion promotes less risk-taking behaviour (Morawetz *et al.*, 2020). Hence, this study will further investigate the relationship between emotion regulation and investment decision through:

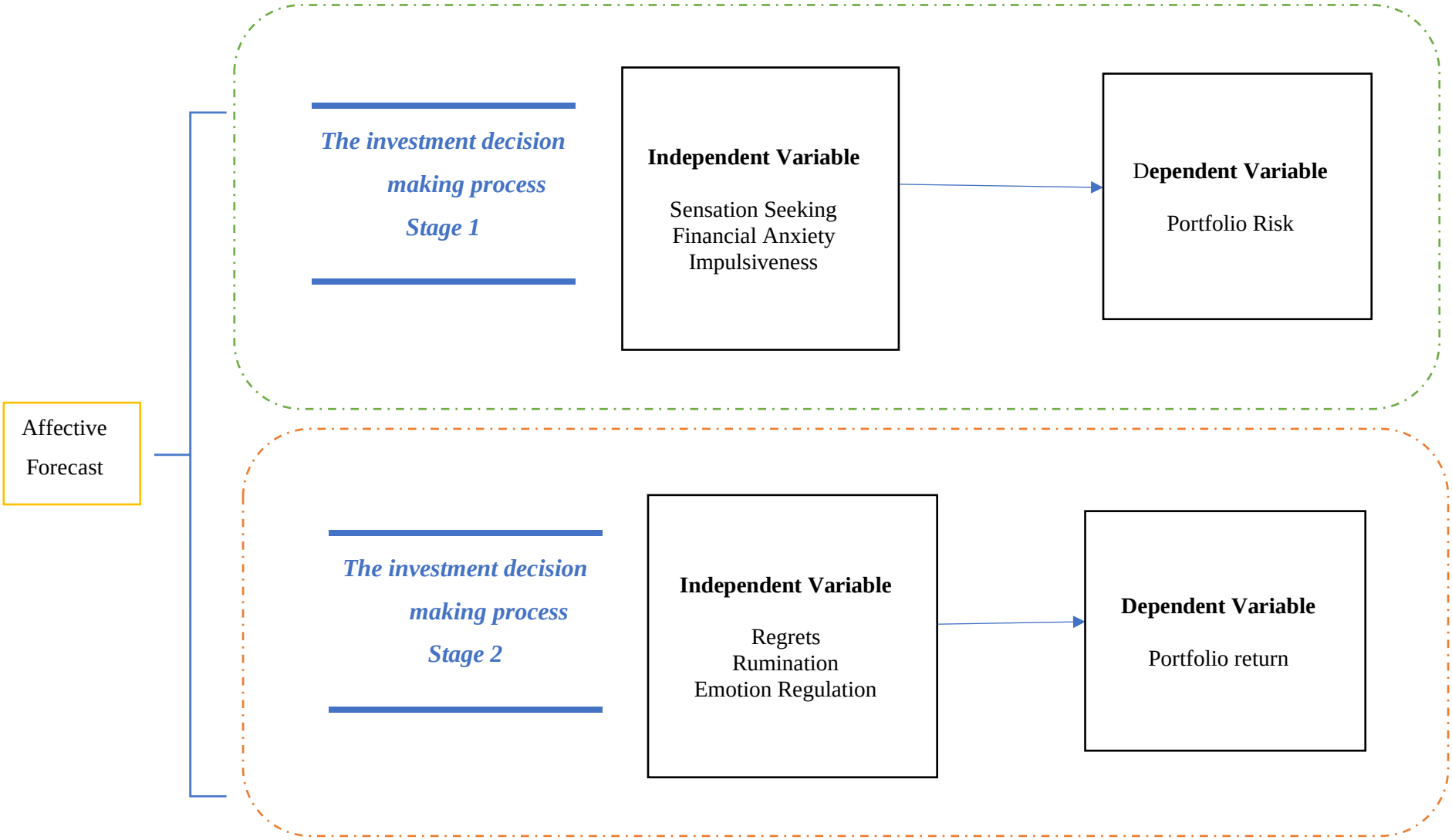
H8: An investor with higher emotional regulation ability improves portfolio return.

Table 2. 1 Summary of hypothesis statements

No.	Research Questions	Research Objectives	Hypotheses	Main supporting literature
1	Do investors experience affective forecasting error in the investment decision-making process?	RO1: To investigate whether investors able to predict their emotion accurately in reaction to their portfolio performance in the investment decision-making process.	H1: There is a statistical difference between pre-investment emotion forecast and post-investment emotion when the portfolio is positive and above average.	Kermer *et al.* (2006); Finkenauer *et al.* (2007)
			H2: There is a statistical difference between pre-investment emotion forecast and post-investment emotion when the portfolio is negative and below average.	
2	Do impulsiveness, sensation seeking and financial anxiety affect risk decision?	RO2: To determine the relationship between impulsiveness and investors' risk decision in the investment decision-making process.	H3: Portfolio risk increases with higher level of impulsiveness.	Pletzer & M. Ortner (2016); Schmidt *et al.* (2016)
		RO3: To examine the relationship between sensation seeking and investors' risk decision in the investment decision-making process.	H4: High sensation seekers have a high portfolio risk.	Xu *et al.* (2019)

		RO4: To examine the impact of financial anxiety on investors' risk decision in the investment decision-making process.	H5:	Portfolio risk are lower for investors with higher level of financial anxiety.	Gambetti & Guisbetrti (2012, 2019)
3	Do rumination, regrets, and emotion regulation affect investment return?	RO5: To explore the types of emotions that investors experience during the investment decision-making process. (Descriptive study)	Do rumination and regrets affect investment return?		
		RO6: To explore the effect of rumination on investors' portfolio return in the investment decision-making process.	H6:	Investors with higher tendency of rumination have better portfolio return.	Palomäki *et al.* (2012)
		RO7: To examine how regret affects investors' portfolio return in the investment decision-making process.	H7:	There is a negative association between regret and portfolio return.	Huang & Zeelenberg (2012); Buchanan *et al.* (2016)
		R08: To explore the interaction of emotion regulation on investors' portfolio return in the investment decision-making process.	H8:	An investor with higher emotional regulation ability improves portfolio return.	Jerčić & Sundstedt (2019)

Figure 2. 2 Conceptual Framework of the Study



CHAPTER THREE

METHODOLOGY

Experimental study in investment research has been very much documented in the past two decades and is an increasingly popular approach in assessing an investor's behaviour; such as disposition effects (Braga & Fávero, 2017; Liêu & Pelster, 2020), risk-taking (Ciccarelli *et al.*, 2020; Razen *et al.*, 2020), and investment judgement (Murphy *et al.*, 2016; Lench *et al.*, 2019). Sekaran and Bougie (2016) indicated that experimental design is useful in indicating the causal effects between the variables of interest while keeping other variables that might influence the relationship controlled. Hence, to achieve the objectives of this study, an experimental research design was adopted to explore how psychological factors affect an investor's investment decision.

3.1 Data collection

3.1.1 Pilot testing

A pilot test on the questionnaires was conducted between March to April 2020 through Google Form (n=134) to evaluate the reliability and consistency of the questionnaires through snowball sampling methods from personal contacts (undergraduates, postgraduates from University Colleges & working adults). The pool of respondents consisted of 44% age 27 and above, 22.4% age 24-26, 17.2% age 18-20 and 16.4% age 21 to 23. Data was compiled and analysed using SPSS version 27. Internal consistency test was conducted, and Cronbach's Alpha values were above 0.70, which is considered as satisfactory.

3.1.2 The Experiment

Experimental research was conducted between 16 February 2021 to 2 April 2021 using nonprobability convenience sampling method through Microsoft Teams and the Financial Trading System (FTS), online browser version which is subscribed by the University of Nottingham Malaysia (UNM). The study used an online electronic survey hosted on Qualtrics.com. The system allowed participants to engage in the trading activities in any place with internet access at their convenience. Participants were required to trade based on the US trading hours (Malaysian standard time); 19 February 2021 to 5 March 2021 from 10.30 p.m. to 4.00 a.m. and 8 March 2021 to 31 March 2021 from 9.30 p.m. to 5.00 a.m. The first questionnaire was distributed on 16 February 2021 and trading commenced on 19 February 2021. Participants filled in the second questionnaire on 4 March 2021 and the last survey was distributed on 1 April 2021.

3.2 Experimental design

This study consisted of 3 main parts: (1) a pre-task questionnaire on psychological traits (sensation seeking, financial anxiety, & impulsiveness), affective forecasting, and demographic information (age & gender), (2) making an investment decision on a stock trading experiment, and (3) a post-task questionnaire on emotions (regret & rumination), emotion regulation and affective forecasting.

3.2.1 Participants

The study recruited final year undergraduates and postgraduates in finance, accounting, and investment as a proxy to the nonprofessional retail investors. Although the samples have lesser trading experience, they are well trained in accounting, business and finance. It is believed that the difference is unlikely to affect the result of the experiment as these participants possess a good understanding of the financial market, corporate reporting and analysis which enable them to reach informed investment decision. Furthermore, psychological traits are genetic dominance traits that tend to be stable across adulthood with improved emotional stability (Costa & McCrae,1999; Roberts *et al.*, 2006; Caprara *et al.*, 2013). Therefore, the sample of students are set to be an appropriate subject in this study as there is no reason to suspect a different result would occur between the students and the nonprofessional retail investors. In the past, similar experimental setting using students as sample were found (Meissner & Wulf, 2017; Harding & He; 2016).

104 final year undergraduates and postgraduates with basic knowledge in finance and investment from Nottingham University Business School (NUBS) took part voluntarily in the first phase of the experiment, 85 students in Phase 2 and 73 students in the last phase. Four students were dropped from the study in Phase 1 and Phase 2 as they did not trade, while three students' portfolio performance were positive but below the average at t=2, which did not meet the pre-set performance scenario in the study. Therefore, the final effective number of participants were 100 in Phase 1, 81 in Phase 2, and 70 in Phase 3. Participants in Phase 1 also participated in Phase 2 and Phase 3. Participants were not assigned into treatment or control group because there is no experimental treatment in this study.

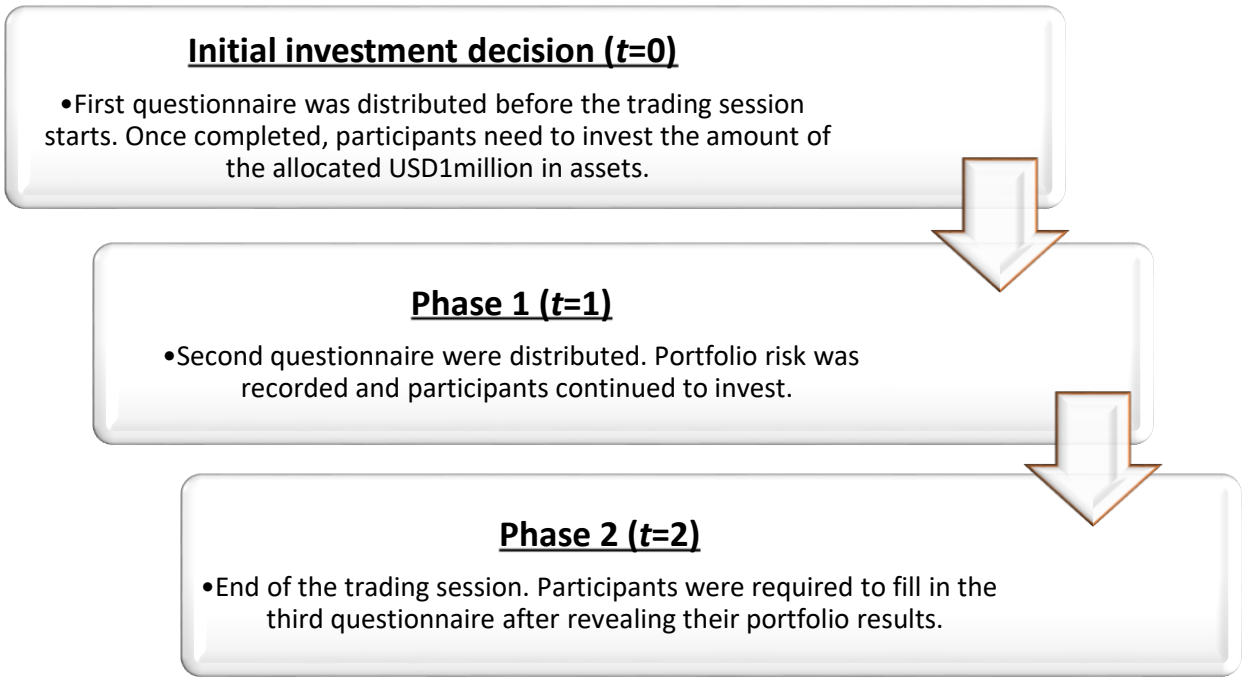
3.2.2 Design

The experimental study was designed according to the investment setting, where the participants were familiar and comfortable to capture their emotional aspects in the investment decision-making process. The study decided to use the US Stock Market with USD1million endowment rather than the Malaysian Stock Market because it is the core financial market and investment settings for their hands-on practical sessions in several modules of their studies. Subsequently, participants were more familiar with the US

stocks. To ensure that the trading environment induces the same feeling as in real trading platform, the study uses the peer pressure method where trading results are available to keep them engaged in the investment period. This will spur the necessary emotional responses in this study.

Prior to the stock trading experiment, experimental instruction was given to the participants to explaining the experimental procedure. Each participant was then asked to fill in the first questionnaire. On the first day of the experiment (t=0), participants were asked to create a portfolio and invest the USD1million endowment (which was set by the researcher in the trading system) in assets. The portfolio was created from the FTS trading system (FTS Real Time Client) using FTS 500 stocks and future case. The trades were based on real-time prices from the US Stock Exchange. The participants were allowed to create a portfolio over two weeks from t=0 to t=1. Two weeks later after the portfolio creation (t=1), participants were asked to fill in the second questionnaire containing questions on regret, rumination and emotion regulation. Portfolio risk was recorded. Participants continued to invest for another four weeks from t=1 to t=2. Four weeks later was the end of the experiment (t=2) whereby participants were asked to fill in the third questionnaire which consisted of questions measuring emotions based on their portfolio result.

Figure 3. 1 Flowchart of the experimental procedure



*Price movement in the stock market is independent and subject to market forces.

3.3 Variables measurements

Three sets of questionnaires were designed to assess the participant's sensation seeking, financial anxiety, impulsiveness, affective forecasting, regret, rumination, and emotion regulation at t=0, t=1 and t=2. The first set of questionnaires was divided into 2 parts which consisted of basic questions on Part 1: demographic and Part 2: psychological traits and affective forecasting. The second set comprised of emotions and emotion regulation questions. The third set measured the affective forecasting again. Investor's risk capacity was a controlled variable in this study. These variables were as follow:

3.3.1 Independent Variables

Impulsiveness (IM) was measured by the Brief Barratt Impulsiveness Scale (BIS-11), created by (Patton *et al.*, 1995). The brief version of the questions consists of subscale Non-Planning, Attentional and Motor Impulsiveness with 8 items utilised. Each of the items is based on a 7-point scale ranging from 1 (*never*) to 7 (*every time*). The variable is obtained through the average response to these items. A higher value indicates a higher tendency to impulsivity. Sensation-seeking (SS) was measured by the Brief Sensation-Seeking Scale (BSSS), (Hoyle *et al.*, 2002). The instrument contains subscale of Thrill and Adventure Seeking (TAS), Experience Seeking (ES), Boredom Susceptibility (BS), and Disinhibition (DIS). Each of the items is measured by a 7-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The reliability of the scale in this study, Cronbach's Alpha are 0.702 and 0.796.

Financial anxiety was measured by 10 items from the Financial Anxiety Scale (FAS) formulated by Shapiro and Burchell (2012). Furthermore, 5 items in the Regret Scale by Schwartz *et al.* (2002) were included to assess the participant's regret. While rumination used 22 items from the Rumination Reponses Scale (RRS) by Nolen-Hoeksema and Morrow (1991). Each of the items is based on a 7-point scale ranging from 1 (*never true*) to 7 (*always true*), 1 (*strongly disagree*) to 7 (*strongly agree*) and 1 (*never*) to 7 (*every time*) respectively. In this study, Cronbach's alpha of Regret scale, FAS and RRS are 0.714, 0.844 and 0.944, indicating satisfactory internal consistency.

Emotion regulation was assessed by 10 items in the emotion regulation questionnaire designed by Gross and John (2003) based on a 7-point scale ranging from 1 (never) to 7 (every time). Cronbach's alpha of the scale in this study is 0.792, which is a reasonably acceptable consistency value.

Finally, affective forecasting was utilised to quantify the participant's prediction of their feeling towards their trading results. Participants were asked to predict their level of happiness at the end of the

trading period based on two scenarios, above-average return and below average return, on a 7-point scale ranging from 1 (*not happy*) to 7 (*very happy*) at *t*=0, followed by indicating their level of happiness based on their actual trading result at t=2. Less accurate affective prediction would result in affective forecasting errors. Additional emotional question was imposed to measure participant's emotion predictive ability. They were asked to select three emotion terms that best described their emotional state based on the scenarios at *t*=0, and at the end of the trading session, *t*=2. The questions comprised 16 emotion terms and were adopted from the Geneva Emotion Wheel 1.0 (Scherer, 2005). Internal consistency test was not conducted on these single items as the interpretation is not meaningful.

3.3.2 Descriptive Variables

Basic demographic information was included in the questionnaire, including gender and age. The biological age of the respondents was divided into three groups, age 18 to 20, 21 to 24, and 25 and above.

3.3.3 Open-ended questions

The second set survey began with two open-ended questions. These questions were designed to understand the effects of the participant's emotions on investment decision during the investment process. The questions on regret and rumination were as follow:

"Investors often look back and imagine how they could have done things differently to transform the current situation whether it is a decision they wish they hadn't made or a decision they should have made but didn't. Have you ever felt sorry and wish you could alter your past investment decision during the investment process?"

And,

"Have you been mentally replaying your past investment decision trying to understand the cause to your poor investment choice and wish you could have made a better decision?"

3.4 Method of analysis

Data collected from the experiment was analysed using Smart-PLS software version 3.3.3, SPSS version 26 and R-studio version 1.4.1106, R 3.0.1+. The study adopted Partial Least Square Structural Equation Modelling (PLS-SEM) to explore investors' behaviours and emotions in investment decision-making because PLS-SEM has been widely applied in social sciences, business research including marketing, and management field (Hair *et al.*, 2017; Henseler *et al.*, 2015) in behavioural context. Investors' behaviours and emotions are unobservable variables which required proxies to measure.

Open-ended questions were analysed by using text mining approach using R-studio version 1.4.1106, R 3.0.1+. Text mining fitted in this study because the approach aids in detecting the positive and negative sentiment using machine learning technique and identifies the key emotional text described by the participants. Lastly, SPSS version 26 was used to compute the normality test and to perform the independent samples t-test analysis.

3.4.1 Research Question Model 1: Wilcoxon Signed Ranks Test

Firstly, the study seeks to explore participants' feelings predictability during the investment process. Wilcoxon Signed Ranked Test was utilised to test the significant differences between two independent samples which are the predicted feelings and actual feelings. Test of normality and effect size were computed. To compare the 16 predicted emotions and 16 actual emotions experienced, a frequency table was generated.

3.4.2 Research Question Model 2: PLS-SEM

Table 3.1 presents the tests of normality of the constructs. Kolmogorov-Smirnov and Shapiro-Wilk test revealed all variables except FA were statistically significant (*sig* <.05), indicating the assumption of normality was violated. Besides exploring the data characteristics, PLS-SEM was employed to perform the analysis because variance-based SEM allowed the model to focus on estimation and prediction of both latent and observed variables which aid in explaining the variation of the independent variable on the dependent variable as compared to covariance-base SEM (Ramayah *et al.*, 2018).

Behaviours, emotions and traits are complex latent variables that cannot be observed directly. Therefore, this study aimed to explore how these psychological traits and emotions are related in the investment decision-making process through PLS-SEM.

Table 3. 1 Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
SS	.145	800	.000	.933	800	.000
FA	.098	100	.019	.977	100	.079
IM	.190	800	.000	.912	800	.000
Regret	.212	405	.000	.929	405	.000
Rumination	.178	1782	.000	.939	1782	.000

Emotion Regulation	.164	810	.000	.939	810	.000

a. Lilliefors Significance Correction

3.4.1.1 Reflective Measurement Model

Reflective measurement assessments were performed to measure the internal consistency, convergent validity and discriminant validity of the instruments before proceeding with the structural model. To compute the internal consistency of the data, Composite reliability (CR) was adopted rather than the widely used Cronbach's alpha. The shortcoming of Cronbach's alpha assumes all indicators have the same factor scores which is unsuitable in this study because each indicator has different explanatory power on the variance of a construct and the number of indicators is sensitive in establishing a construct. Hair *et al.* (2017) proposed that CR should be equal to and greater than 0.70. Convergent validity was evaluated by using factor loading and Average Variance Extracted (AWE). It was advised that the items loading size to be at least 0.70 and these constructs should achieve account for at least 50% of the assigned indicator's variance AWE (Ramayah *et al.*, 2018).

Table 3.2 presents the constructs and indicators of the PLS-SEM in Stage 1. Figure 3.2 shows a Hierarchical Latent Variable Model formed by first and second order constructs with the results of the reflective measurement (AVE & Loadings). The study chose the repeated indicators approach to form the second order constructs because it has the lowest bias in measurement model estimation and applicable to reflective-reflective higher order construct (Sarstedt *et al.*, 2019). Loadings of the constructs range from 0.40 to 0.89 with CR and AWE scored greater than 0.69 and 0.50 after items deletion. Items IM7 with low loadings was dropped. Variable FA was removed from the model as more than 20% of the items were dropped to achieve adequate AWE score.

Although some items displayed loads below the suggested value, 0.708 by Hair *et al.* (2017); Hulland and Byrne stated that model with loadings scores of 0.40 and 0.50 are acceptable as long AWE score is greater than 0.50. Table 3.3 summarises the values of convergent validity, internal consistency reliably and discriminant validity generated by SMART-PLS. AVE and CR of the second order constructs, impulsiveness and sensation seeking, was computed manually because the software does not distinguish second order construct from the first order construct. The formula of AVE and Composite reliability are as follow:

$$AVE = \frac{\sum_i^M l_i^2}{M},$$

Where l_i loadings of the lower-order component i of a higher order construct measured with M lower-order components.

$$\rho c = \frac{(\sum_{i=1}^{M} l_i)^2}{(\sum_{i=1}^{M} l_i)^2 + \sum_{i=1}^{M} var(e_i)},$$

Where e_i represents the error of the lower-order component i, and var (e_i) indicates the variance of the measurement error, which is computed by $1 - l_i^2$ (Sarstedt *et. al.*, 2019).

Overall, all reflective constructs achieved the minimum threshold values as suggested by these authors and have met the reliability and convergent validity requirements.

The analysis reported that all the constructs exhibited satisfactory discriminant validity whereby the Cross-loadings showed that each indicator's loadings were higher than items of other constructs in the model and the square root of the AVE was greater than the correlations for all reflective constructs (Fornell & Lacker criterion, Table 3.5). The Heterotrait-Monotrait ratio of correlations (HTMT) in Table 3.6 shows that all values were below the threshold of 0.90, $HTMT_{.90}$ as proposed by Gold *et al.* (2001).

3.4.1.2 Assessment of Structural Model

Structural analysis was performed to explore the relationships between constructs by examining the model's collinearity (VIF), and assessing the significance of path coefficients, the R^2 value, the f^2 effect size. One-tailed test with alpha level of 5% was used to examine the hypothesised structural model relationship. R^2 is reported in this study to explain the extent of variance in construct accounted by the predictors.

3.4.3 Research Question Model 3

Analysis 1: Text mining using R Language

Regret and rumination texts were analysed by the machine learning algorithm approach, text mining. Text mining required extraction of text using bags-of-words (BoW) model and converted into numbers using Natural Language Processing (NLP) package, and TM package. The steps of analysis were as follow:

Step 1: Text Processing and text mining: irrelevant information such as symbols, numbers, white spaces were removed, and sentences were transformed into lowercase. Bag of words and stop-word removal applied to eliminate unwanted words. Lastly, SnowballC library was used to stem text.

Step 2: Construct WordCloud and frequency graph: the WordCloud package was utilised to create a graphical presentation on the cloud of words according to the frequencies. Frequencies graph was generated by the ggplot2 package.

Step 3: Sentiment analysis: the Syuzhet package, get_nrc_sentiment was used to extract the participant's emotional intent in their investment decisions. The extracted words were classified into eight emotions (anger, fear, sadness, disgust, surprise, anticipation, trust, & joy) according to Plutchik's wheel of emotions (Kwartler, 2017). The packages further categorised the frequencies of these emotions into positive and negative sentiment.

Analysis 2: PLS-SEM (Reflective Measurement Model)

Constructs and indicators of the Stage 2 model are presented in Table 3.7. The repeated indicators approach was used to form the second order construct (Rumination & Emotion regulation) and AVE value and loadings were generated manually. The reflective model assessments described in Table 3.8 indicated that all the constructs met the satisfactory level of loadings, CR and AVE after item deletion (Items RE1, RG1, RG2, SU2, D8 and D12 with low loadings were subsequently dropped). It was recommended by the literature to further drop the items until the AWE reaches the recommended level. Overall, reliability and convergent validity were well-established.

Discriminant validity was achieved as shown by the Cross-loadings and Fornell-Lacker criterion (Table 3.9) which fulfilled the minimum thresholds suggested by Chin (1998), and Fornell and Larcker (1981). The diagonal values showed the square root of AWE are greater than the correlations of all constructs and HTMT assessment (Table 3.10) also showed a strong discriminant validity. The reflective measurement model with AVE and loadings is thus considered well-established.

Table 3. 2 Indicators for Measurement Model (Stage 1)

Variables	Latent constructs	Label	Indicator
Impulsiveness	Attentional	IM3	I don't "pay attention"
		IM5	I concentrate easily
	Non-planning	IM1	I plan tasks carefully
		IM4	I am self-controlled
		IM6	I am a careful thinker
		IM7	I say things without thinking
	Motor Impulsiveness	IM2	I do things without thinking
		IM8	I act on the spur of the moment
Sensation Seeking	Experience Seeking	SS1	I would like to explore strange places
		SS5	I would like to take off on a trip with no pre-planned routes or timetables
	Boredom Susceptibility	SS2	I get restless when I spend too much time at home
		SS6	I prefer friends who are excitingly unpredictable
	Thrill & Adventure Seeking	SS3	I like to do frightening things
		SS7	I would like to try bungee jumping
	Disinhibition	SS4	I like wild parties
		SS8	I would love to have new and exciting experiences, even if they are illegal
Financial Anxiety		FA1	I prefer not to think about the stare of my personal finances
		FA2	Thinking about my personal finances can make me feel guilty
		FA3	I am worried about the debt I will have when I complete my university education
		FA4	Thinking about my personal finances can make me feel anxious
		FA5	I get myself into a situation w I do not know where I'm going to get the money to bail myself out
		FA6	Discussing my finances can make my heart race or make me feel stressed
		FA7	I do not make a big enough effort to understand my finances
		FA8	I do not think I am doing as well as I could academically because I worry about money
		FA9	I find opening my bank statements unpleasant
		FA10	I would rather someone else who I trusted kept my finances organized
Portfolio Risk	Portfolio Risk	VOL	Portfolio standard deviation obtained from the FTS trading system

Table 3. 3 Summary of Higher Order Constructs' Measurement Model (Stage 1)

Higher Order Constructs (HOC)	Average Variance Extracted (AVE)	Composite Reliability (CR)	Lower Order Constructs (LOC)	Items	Convergent Validity		Internal Consistency Reliability	Discriminant Validity
					Loadings	Average Variance Extracted (AVE)	Composite Reliability (CR)	Fornell and Lacker Criterion
					> 0.40	> 0.50	0.60 – 0.90	Square root of AVE > LVC?
Impulsiveness	0.676	0.725	Attentional	IM3	0.813	0.690	0.817	Yes
				IM5	0.849			
			Non-planning	IM1	0.759	0.539	0.777	
				IM4	0.652			
				IM6	0.784			
			Motor Impulsiveness	IM2	0.975	0.625	0.756	
				IM8	0.548			
Sensation Seeking	0.720	0.813	Experience Seeking	SS1	0.651	0.545	0.703	Yes
				SS5	0.817			
			Boredom Susceptibility	SS2	0.532	0.532	0.682	
				SS6	0.884			
			Thrill and Adventure Seeking	SS3	0.890	0.690	0.815	
				SS7	0.766			
			Disinhibition	SS4	0.875	0.715	0.834	
				SS8	0.815			

Table 3. 4 Summary of Constructs' Measurement Model (Stage 1)

Constructs	Items	Loadings	Convergent Validity	Internal Consistency Reliability	Discriminant Validity
			Average Variance Extracted (AVE)	Composite Reliability (CR)	Fornell and Lacker Criterion
		> 0.40	> 0.50	0.60 – 0.90	Square root of AVE > LVC?
Financial Anxiety	FA2	0.647	0.529	0.847	Yes
	FA3	0.834			
	FA4	0.776			
	FA6	0.611			
	FA10	0.743			
Portfolio Risk	VOL	1.000	1.000	1.000	Yes

Table 3. 5 Discriminant Validity using Fornell and Lacker Criterion (Stage 1)

	Financial Anxiety	Impulsiveness	Portfolio Risk	Sensation Seeking
Financial Anxiety	0.727			
Impulsiveness	0.096	0.548		
Portfolio Risk	-0.113	0.210	1.000	
Sensation Seeking	0.003	-0.036	-0.055	0.572

Table 3. 6 HTMT Criterion (Stage 1)

	Financial Anxiety	Impulsiveness	Sensation Seeking	Portfolio Risk
Financial Anxiety				
Impulsiveness	0.275			
Sensation Seeking	0.367	0.476		
Portfolio Risk	0.112	0.287	0.185	

Table 3. 7 Indicators for Measurement Model (Stage 2)

Variables	Latent constructs	Labels	Indicators
Regret (RG)	Regret (RG)	RG1	Whenever I make a choice, I'm curious about what would have happened if I had chosen differently
		RG2	Whenever I make a choice, I try to get information about how the other alternatives turned out
		RG3	If I make a choice and it turns out well, I still feel like something of a failure if I find out that another choice would have turned out better
		RG4	When I think about how I'm doing in life, I often assess opportunities I have passed up
		RG5	Once I make a decision, I don't look back
Rumination (RU)	Depression-related	D1	Think about how alone you feel
		D2	Think " I won't be able to do my job if I don't snap out of this."
		D3	Think about your feelings of fatigue and achiness
		D4	Think about how hard it is to concentrate
		D5	Think about how passive and unmotivated you feel
		D6	Think about how you don't seem to feel anything anymore
		D7	Think "Why can't I get going?"
		D8	Think "I won't be able to concentrate if I keep feeling this way."
		D9	Think about how sad you feel
		D10	Think about all your shortcomings, failings, faults, mistakes
		D11	Think about how you don't feel up to doing anything
		D12	Think about how angry you are with yourself
	Brooding	B1	Think "What am I doing to deserve this?"
		B2	Think "Why do I always react this way?"
		B3	Think about a recent situation, wishing it had gone better
		B4	Think "Why do I have problems other people don't have?"
		B5	Think "Why can't I handle things better?"
	Reflection	R1	Analyse recent events to try to understand why you are depressed.
		R2	Go away by yourself and think about why you feel this way
		R3	Write down what you are thinking about and analyse it
		R4	Analyse your personality to try to understand why you are depressed
		R5	Go someplace alone to think about your feelings

Emotion Regulation (ER)	Reappraisal	RE1	I control my emotions by changing the way I think about the situation I'm in
		RE2	When I want to feel less negative emotion, I change the way I'm thinking about the situation
		RE3	When I want to feel more positive emotion, I change the way I'm thinking about the situation
		RE4	When I want to feel more positive emotion (such as joy or amusement), I change what I'm thinking about
		RE5	When I want to feel less negative emotion (such as sadness or anger), I change what I'm thinking about
		RE6	When I'm faced with a stressful situation, I make myself think about it in a way that helps me stay calm
	Suppression	S1	I control my emotions by not expressing them
		S2	When I am feeling negative emotions, I make sure not to express them
		S3	I keep my emotions to myself
		S4	When I am feeling positive emotions, I am careful not to express them
Portfolio Return (R)	Return	R	Treynor Ratio obtained from the FTS trading system

Table 3. 8 Summary of Measurement Model (Stage 2)

					Convergent Validity		Internal Consistency Reliability	Discriminant Validity
Second Order Constructs	Average Variance Extracted (AVE)	Composite Reliability (CR)	First Order Constructs	Items	Loadings	Average Variance Extracted (AVE)	Composite Reliability (CR)	Fornell and Lacker Criterion
					> 0.40	> 0.50	0.60 – 0.90	Square root of AVE > LVC?
Emotion Regulation	0.758	0.736	Reappraisal	RE2	0.507	0.522	0.842	Yes
				RE3	0.648			
				RE4	0.846			
				RE5	0.741			
				RE6	0.819			
			Suppression	S1	0.838	0.717	0.884	
				S3	0.850			
				S4	0.852			
Rumination	0.894	0.924	Depression-related	D1	0.679	0.504	0.910	Yes
				D2	0.657			
				D3	0.651			
				D4	0.770			
				D5	0.793			
				D6	0.661			
				D7	0.768			
				D9	0.712			
				D10	0.746			
				D11	0.640			
			Brooding	B1	0.788	0.584	0.875	
				B2	0.770			
				B3	0.723			
				B4	0.777			

	B5	0.759			
Reflection	R1	0.821	0.557	0.833	
	R2	0.799			
	R4	0.700			
	R5	0.653			
Regret	RG3	0.896	0.543	0.770	Yes
	RG4	0.460			
	RG5	0.783			

Table 3. 9 Discriminant Validity using Fornell and Lacker Criterion (Stage 2)

	Emotion regulation	Regret	Rumination	Return
Emotion regulation	0.600			
Regret	-0.140	0.737		
Rumination	-0.126	0.578	0.670	
Return	-0.255	-0.250	0.069	1.00

Table 3. 10 HTMT Criterion (Stage 2)

	Emotion regulation	Regret	Rumination	Return
Emotion regulation				
Regret	0.325			
Rumination	0.333	0.766		
Return	0.312	0.216	0.088	

CHAPTER FOUR

RESULTS AND DISCUSSION

This chapter begins by investigating the investors' affective forecasting ability in the investment decision-making process (RQ1) in Section 4.1. It is then followed by examining the relationships between psychological traits such as impulsiveness, sensation seeking and financial anxiety on risk decision (RQ2) in Section 4.2, and lastly the analysis of the impact of the investors' emotions and emotion regulation on investment performance (RQ3) in Section 4.3. The final framework of the study is presented in Figure 4.9.

4.1 Research Question Model 1: affective forecasting in the investment decision-making process

4.1.1 Results

Related samples non-parametric measure was utilised to compare the predicted happiness (n = 35) and the actual happiness (n = 35) when participants' positive portfolio performance is above average and below average. Table 4.1 showed that Shapiro-Wilk statistics were significant, indicating normality assumption was violated in both situations. Wilcoxon Signed Ranked Test statistics indicated that the median of differences between the forecasted level of happiness and the actual level of happiness is not equal to zero in both gain and loss domains in Table 4.2. There is a significant difference between the forecasted level of happiness and the actual level of happiness when participants achieved above average portfolio performance and below average portfolio performance.

Ranked results further supported that these participants failed to predict their happiness accurately. 22 participants overestimated their level of happiness when they had above average portfolio performance (Sum of Ranks = 304), whilst 4 participants experienced higher level of actual happiness than predicted (Sum of Ranks = 47) and 9 participants reported having the same level of forecasted happiness and actual happiness. The findings also suggested that 22 participants underestimated their level of happiness when their portfolio performance is below average (Sum of Ranks = 311.50). 4 participants overrated their happiness, and 9 participants accurately predicted their happiness. These findings supported H1 and H2, and the effects are considered as "medium to large" in magnitude, r = 0.3968, r = 0.4220 (Lachenbruch & Cohen, 1989).

16 emotions were provided for them to describe their feelings in the emotional scenes. The frequencies of the forecasted emotions and actual emotions on the portfolio performance shown in Table 4.3 and Table 4.4 further confirmed the differences. Satisfaction (27.6%), surprise (19%) and happiness (14.3%) were the top three chosen best described emotions if they achieved a positive above average portfolio. Interestingly, their actual feelings were surprised (21%), satisfied (20%), and relief (14.3%). Participants overestimated their feelings; the actual satisfaction was 6.6% lesser, and they did not expect to feel anxious (5.7%) and contempt (1.9%).

Participants predicted to feel sadness (29.5%), anxiety (21%), and shame/guilt (20%) assuming they obtained a negative below average portfolio performance, however, their top actual feeling was sadness (16.2%), shame/guilt (15.2%), and hope (13.3%). The results were inconsistent. Only 1% of the participants foresee hope and the actual feeling of hope in a negative below average portfolio performance is thirteen times higher than predicted, ranked third. Sadness was overestimated. The actual sad feeling was reported lesser by almost half, instead, they have stronger feeling for other emotions. Emotion such as satisfaction (3.8%), pride (1%), happiness (1%) and hostility (1%) were not anticipated. Accordingly, this study confidently concludes that participants could not predict their emotion well.

Table 4. 1 Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Above average performance	Forecasted Happiness	.310	35	.000	.746	35	.000
	Actual Happiness	.234	35	.000	.884	35	.002
Below average performance	Forecasted Happiness	.277	35	.000	.860	35	.000
	Actual Happiness	.187	35	.003	.895	35	.003

Table 4. 2 Wilcoxon Signed Ranked Test

Ranks

			N	Mean Rank	Sum of Ranks
Above average performance	Actual Happiness - Forecasted Happiness	Negative Ranks	22[a]	13.82	304.00
		Positive Ranks	4[b]	11.75	47.00
		Ties	9[c]		
		Total	35		
Below average performance	Actual Happiness - Forecasted Happiness	Negative Ranks	4[a]	9.88	39.50
		Positive Ranks	22[b]	14.16	311.50
		Ties	9[c]		
		Total	35		

a. Actual Happiness < Forecasted Happiness
b. Actual Happiness > Forecasted Happiness
c. Actual Happiness = Forecasted Happiness

s

Hypothesis	Z	Asymp. Sig. (2-tailed)	Effect Size	Decision
H1 Positive Above average performance	-3.320	.001	-0.3968	Supported
H2 Negative Below average performance	-3.531	.000	-0.4220	Supported

Table 4. 3 Frequency Table on Emotions

Above average portfolio performance						
Forecast emotions				Actual emotions		
		Frequency	Percent		Frequency	Percent
Valid	Satisfaction	29	27.6	Surprise	22	21.0
	Surprise	20	19.0	Satisfaction	21	20.0
	Happiness	15	14.3	Relief	15	14.3
	Relief	14	13.3	Happiness	13	12.4
	Interest	10	9.5	Interest	12	11.4
	Hope	7	6.7	Hope	6	5.7
	Pride	4	3.8	Anxiety	6	5.7
	Elation	4	3.8	Sadness	5	4.8
	Sadness	1	1.0	Pride	2	1.9
	Disgust	1	1.0	Contempt	2	1.9
				Elation	1	1.0
	Total	105	100.0	Total	105	100.0

Table 4. 4 Frequency Table on Emotions

Below average portfolio performance						
Forecast emotions				Actual emotions		
		Frequency	Percent		Frequency	Percent
Valid	Sadness	31	29.5	Sadness	17	16.2
	Anxiety	22	21.0	Shame/guilt	16	15.2
	Shame/guilt	21	20.0	Hope	14	13.3
	Surprise	10	9.5	Surprise	13	12.4
	Disgust	5	4.8	Anxiety	12	11.4
	Anger	4	3.8	Interest	12	11.4
	Boredom	4	3.8	Boredom	7	6.7
	Interest	3	2.9	Relief	5	4.8

Relief	2	1.9	Satisfaction	4	3.8
Contempt	2	1.9	Pride	1	1.0
Hope	1	1.0	Happiness	1	1.0
			Hostility	1	1.0
			Disgust	1	1.0
			Contempt	1	1.0
Total	105	100.0	Total	105	100.0

4.1.2 Discussion

Affective forecasting is an important aspect of decision-making. Most psychometric instruments assume survey respondents are able to accurately predict their emotions in a hypothetical situation. However, for individuals to accurately predict their emotions, it requires them to understand the magnitude of their emotional change in the context. The last model assesses whether participants understand their emotions under different investment scenarios. It was found that participants failed to predict their emotions on their investment performance and the result called attention to the magnitude of the difference. The findings are consistent with the literatures of different contexts (Levine *et al.*, 2012; Finkenauer *et al.*, 2007; Kermer *et al.*, 2006).

Participants mispredicted their emotions in both domains of gain and loss. When human brains generate mental simulations of the pre-hypothesise events, individuals will form affective reactions which set as a prediction ground for decision. However, mental simulations are heavily influenced by memories of one's past and hence result in emotional experience which is error prone. Furthermore, individuals with unique traits differ in how they memorise past events (Toffalini *et al.*, 2015). Individuals who are insensitive to the past events may have a different preview content by using a comparable past event that is irrelevant to the number of emotional encounters (Gilbert & Wilson, 2009; Hsee & Hastie, 2006; Ayton *et al.*, 2007; Meyvis *et al.*, 2010). Mental stimulation errors lead to the deviation between anticipated affect and experienced affect which causes affecting forecasting errors.

Results found that participants were more likely to overestimate happiness in a positive investment event than sadness in a negative investment event. Monetary gain may not necessarily lead to a higher level of happiness. The diminishing of experienced happiness can be explained by focalism. Participants have an excessive focus on the outcome of the future event and hence, fail to recognise the impact of other events

or thoughts that may occur (Gilbert & Wilson, 2009; Wilson *et al*., 2000). Specifically, anxiety and contempt are not anticipated in the affective prediction indicating unforeseen thoughts exist. Instead of rejoicing on their achievement, gainers are also afraid of losing money and are more conservative in their decision. This finding is consistent with the Prospect Theory and the Cumulative Prospect Theory, which state that individuals are risk-seeking during losses and risk-averse in the domain of gains (Son & Nguyen, 2019; Lippi *et al*., 2018).

More participants reported sadness than anticipation despite achieving a positive above-average portfolio return. According to the literature, personal expectation of a future event formed part of affective forecasts in different contexts (Patrick *et al*., 2006; Bonus *et al*., 2020). The results indicated that participants failed to realise and include their expectations in the prediction. A high level of expectation leads to disappointment and sadness when the actual portfolio performance falls short of their expectations. Participants concentrated on the predicted affective consequences and neglected other factors that could reverse their portfolio.

Contrary to the above, actual discomfort of monetary loss was reportedly less severe than anticipated. Participants have better capacity to cope with capital loss than have been assumed. The deviation of affective forecast reflected the dissimilarity of thoughts. Participants underestimated their thoughts and behavioural outcome which influenced their experienced affect. Sadness has been overestimated by almost fifth per cent and participants have thirteen times higher hope and four times higher interest than anticipated when they suffer a loss, indicating losing position may trigger irrational behaviours. Participants also clung on to losing stocks in hope that prices will reverse. Indirectly, they are exposed to higher risk by holding on to those risky positions. This behaviour is consistent with the Prospect Theory which states that investors are less risk-averse in a losing position (Sheng *et al*., 2021). Additionally, a few unanticipated emotions are reported, such as satisfaction, pride, happiness, and hostility reported. Participants do not experience anger as predicted. Instead of grasping at the negative consequences, some participants may have executed a contingency loss reduction plan, hoping to cut losses and recover their capital loss. These unanticipated thoughts and actions diminish the predicted sadness and broaden the magnitude of the affective difference.

Succinctly, investors are not always rational as assumed by the fundamentalist. The present study has proven affective forecasting errors in the investment context. Participants are not able to predict their emotions accurately on the hypothetical investment scenarios and the affective forecasting errors are caused

by memory impairment, mental stimulation errors and focalism. The deviation of affect and unanticipated experienced emotions confirmed human's cognition is complex and heterogeneous which possess unpredictable behaviour and are diverse.

4.2 Research Question Model 2: the effect of impulsiveness, sensation seeking and financial anxiety on risk decision in the investment decision-making process

4.2.1 Results

To ensure the model stability and to avoid misleading findings, latent collinearity test was conducted and displayed in Table 4.5. The test indicated no lateral multicollinearity and all inner Variance Inflator Factor (VIF) values for independent variables were less than 5 and 3.3 as suggested by Hair *et al.* (2017) and Diamantopoulos and Siguaw (2006) respectively. Table 4.6 presents a summary of the hypothesis testing of the investors' psychological traits on portfolio risk.

Table 4. 5 Latent Collinearity Assessment

Constructs	Financial Risk Tolerance (VIF)	Portfolio Risk (VIF)	Collinearity problem? (VIF>5)
Financial Anxiety	1.095	1.045	No
Impulsiveness	1.513	1.012	No
Sensation Seeking	1.143	1.232	No

Impulsiveness (t *=2.156, p=0.016*), and sensation seeking (t *=1.672, p=0.047*) was reported significant to portfolio risk with t -value $\geq$ 1.645, significant at 5% level of significance. A positive relationship was found between impulsiveness, and portfolio risk. In other words, participants who reported higher levels of impulsiveness also reported significantly higher levels of risk taking. The significant negative relationship between sensation seeking and portfolio risk were inconsistent with the literature and the proposed hypothesis, H4 in this study. However, the three predictor variables explained 11.6% of variances in portfolio risk which is weak as suggested by Lachenbruch and Cohen (1989). The size effect (f^2) of sensation seeking (0.172), and impulsiveness (0.058) have a small effect on producing R^2 in portfolio risk (Lachenbruch & Cohen, 1989). Therefore, Hypothesis 3 was supported.

Results also suggested that the proposed hypothesis (H5) was not supported, financial anxiety was not significant in predicting portfolio risk (t *=0.574, p=0.283*).

Table 4. 6 Hypothesis Testing

Hypothesis	Relationship	Std Beta	Std. Error	$t-value$	$p-value$	Decision	$R2$ (FRT)	$f2$ (FRT)	$R2$ (Portfolio risk)	$f2$ (Portfolio risk)
H3	Impulsiveness - > Portfolio Risk	0.228	0.106	2.156*	0.016	Support	0.264		0.116	0.058
H4	Sensation Seeking -> Portfolio Risk	-0.156	0.094	1.672*	0.047	Do not Support				0.022
H5	Financial Anxiety - > Portfolio Risk	-0.091	0.158	0.574	0.283	Do Not Support				0.009

**p<0.05. **p<0.01*

4.2.2 Discussion

The second part of the study is designed to understand how investors' psychological traits are related to their risk decision. Statistical analysis indicated that the experiment participants with high trait impulsiveness have higher risk in their portfolio. The result suggests that higher risk-taking is a spur-of-the-moment decision guided by emotions where socio-emotional network (ventral tegmental area dopamine neurons, nucleus accumbens, medial prefrontal cortex) dominates the cognitive control network. Past research had confirmed that impulsive individuals exhibited cognitive distortion when there is a decline in reasoning and problem-solving ability during their emotional acceleration which will probably cause them to behave irrationally and affect decision-making (Stange *et al.*, 2017; Steinberg, 2008). Therefore, impulsiveness predicts their risk-taking. It is also reported that high impulsive individuals have difficulties in comprehending the events and information around them, and hence their responses to external and internal stimuli are rapid and lacking consideration (Mobini *et al.*, 2006). Lack of impulsive control may cause participants to overreact to new market information during the pandemic where the capital market is highly uncertain, and eventually trigger stock market fluctuations. This is supported by Hong *et al.* (2021) that there is an increase in market inefficiency and price volatility during the pandemic period. Without forethought, participants may have overtraded their positions and lead them to higher portfolio risk, which may not be in accordance with their risk tolerance level. Participants are likely to have taken more risk than they can handle. The association between impulsiveness and risk taking is consistent with previous studies of different contexts, crime, sports, and cyber addiction (Armstrong *et al.*, 2020; Maher *et al.*, 2015; Mlouki *et al.*, 2021).

The current study also ascertained that HSS is accompanied by a lower portfolio risk. Specifically, the experiment participants who prefer higher intense sensory experience under uncertainty have a greater tolerance to financial risk, but surprisingly they constructed a portfolio with lower risk as compared to LSS. On the contrary, LSS possesses lower tolerance to risk because of the higher discomfort in the unpredictable financial environment. It is unusual for LSS who are characterised as low acceptance to new experience of taking higher risk in their portfolio despite having a low tolerance to uncertainty. They are believed to have irrationally taken on more risk than they are willing to accept. Herding behaviour provides plausible explanation for this phenomenon as the results reported that participants regretted not putting much effort into their investment analysis. Without further research, these experiment participants may have placed their funds according to the automated analysis (Heat Maps) in the trading platform and had unconsciously consumed more risk than expected which led them to experience intense unwanted emotions (regret & rumination) of those bad decisions under unfavourable market condition. A similar finding was reported by Rabbani *et al.* (2021) on baby boomers on the significant direct relationship between sensation seeking and financial risk tolerance. However, the findings on risk taking of this research are contrary to other study domains (online gambling, monetary reward,

risk sports activity & driving) which suggest that HSS who prefer high intense sensation and excitement are more likely to have higher risk taking and poor cognitive control (Moreau *et al.*, 2020; Xu *et al.*, 2020; Rumbold *et al.*, 2021; Mascret *et al.*, 2021).

Contrary to expectations, this study did not find a significant relationship between financial anxiety and investment risk taking. This indicates that the uneasiness of personal finance does not influence an individual's willingness to accept risk and risk-taking decisions. To the researcher's best knowledge, no literature had investigated financial anxiety in an investment context. This unexpected outcome may have been caused by cultural differences and research design of the study. Previous studies of financial anxiety were conducted in different geographical regions, such as the United Kingdom, the United States, and Nepal (Vosylis & Erentaitė, 2020; Archuleta *et al.*, 2020; Heo *et al.*, 2015). Moreover, the level of financial anxiety may not be as depicted because the experiment does not involve real money.

4.3 Research Question Model 3: the effect of regret, rumination, and emotion regulation on portfolio return in the investment decision-making process

4.3.1 Results

4.3.1.1 Investors' sentiment during investment decision-making process (Do rumination and regrets affect portfolio return?)

Text analyses were conducted to explore the emotional experienced by the students during the investment decision process before proceeding to SEM analysis.

4.3.1.1.1 Regret

81 students took part in the second stage of the data collection. From the open-ended responses, approximately 81% of the participants reported experiencing regret on their investment decision, while 19% of them did not experience regret. Overall, participants' sentiment was negative when they recalled their investment decision. Results in Figure 4.1 reported 112 negative words and 69 positive words were found in the regret text. Although participants felt bad about their investment decision, they remained optimistic. It can be observed that sadness was the highest score, followed by anger, anticipation, and trust (Figure 4.2). Although the participants were sad and angry with the losses, yet they believed in their investment instinct and had trust in their stock selections. Other emotions such as fear, disgust, joy, and surprise were at around 20 to 30 counts.

With reference to Figure 4.3, bold and larger font words in the wordcloud contain higher frequencies. "Stock" was mentioned over 40 times, followed by "invest" and "regret", which at almost 30 times. Besides, "loss", "mistake", "wish", "better", "profit", "little", "sad", "guilty", "disappoint", "hope", "track", "monitor",

"earlier", "frustrate", "sorry", "miss", "anxious", "overthink", "greedy" etc. were keywords mentioned in the regret text. Participants who made losses were regretful for not monitoring and keeping track of their portfolios, which led them to overthink, feel sad, guilty, disappointed, sorry, and frustrated (Figure 4.4). Some of the participants were greedy in their investments. They hoped and wished to make better profits.

Figure 4. 1 Total Sentiment Score

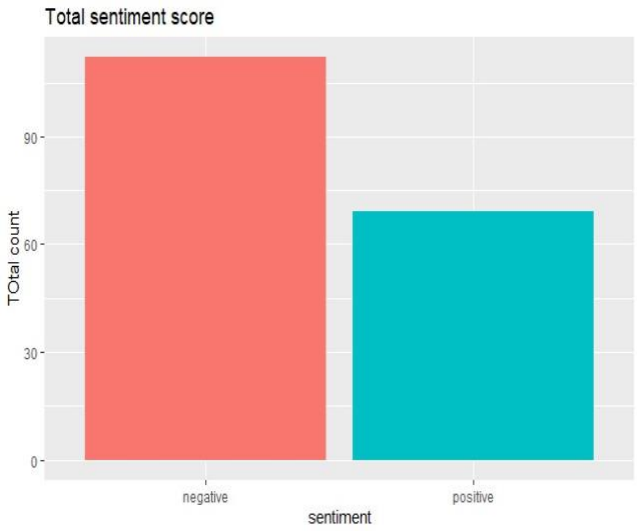


Figure 4. 2 Eight Emotions Sentiment Score

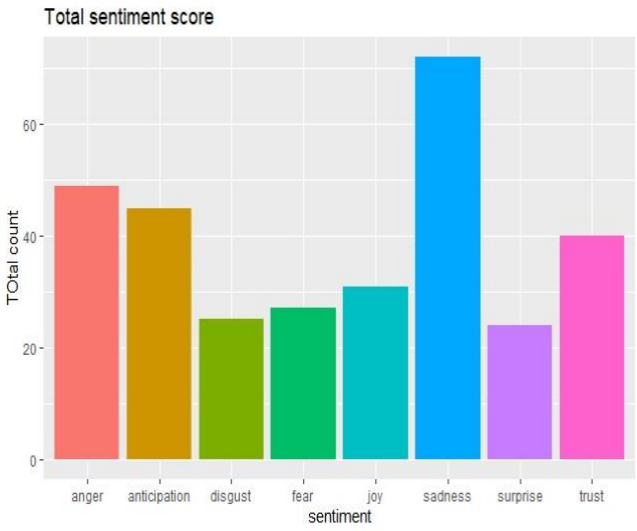
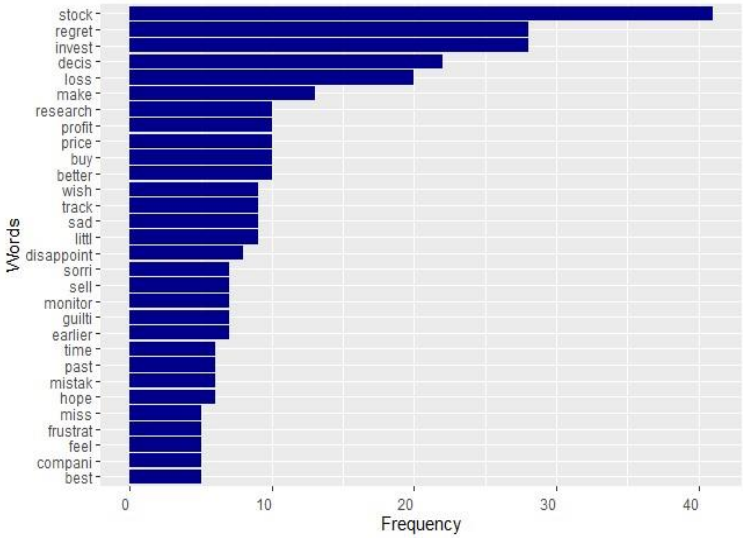


Figure 4. 3 Wordcloud



Figure 4. 4 Words Frequency



4.3.1.1.2 Rumination

80% of the participants reported experiencing rumination upon recalling their past investment decisions and 20% of them didn't. Figure 4.5 illustrates the total sentiment score of open-ended questions on rumination. It is

noticeable that participants had almost equal positive and negative sentiment score, 72 and 68 respectively. Participants experienced intense sadness, anticipation, anger, trust, and fear when they repetitively think of their past investment decisions (Figure 4.6). Such recurring thoughts focused on analysing the causes of the poor investment decisions, hoping to understand and learn from their mistakes to make better future investment decisions. These mistakes include lack of research efforts and portfolio monitoring. Participants were sad, regretful, disappointed, and depressed over the past decisions (Figure 4.7 & Figure 4.8).

Figure 4. 5 Total Sentiment Score

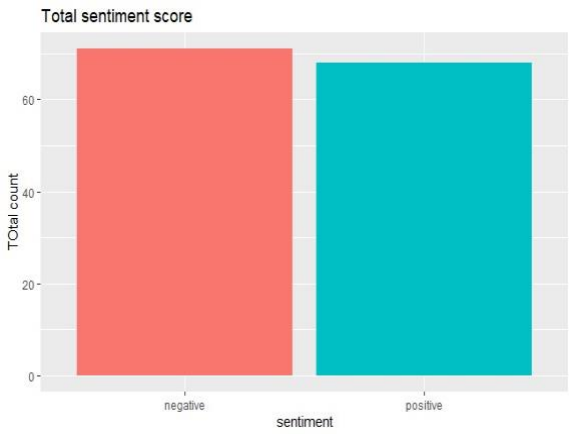


Figure 4. 6 Eight Emotions Sentiment Score

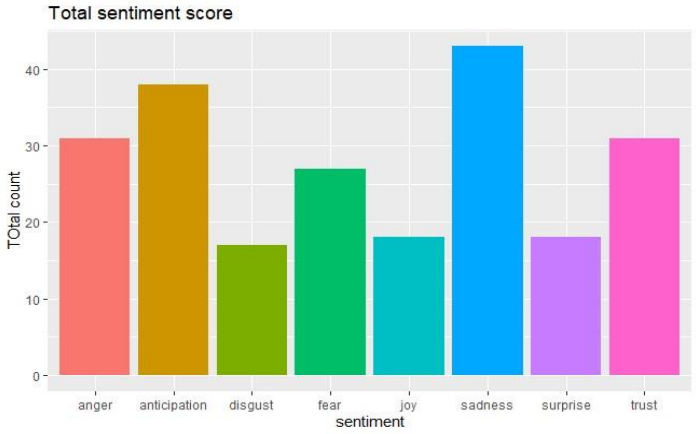
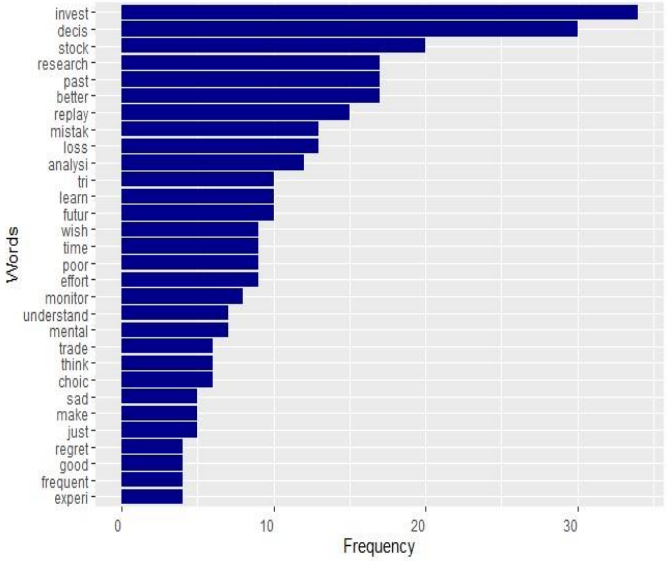


Figure 4. 7 Wordcloud



Figure 4. 8 Words Frequency



4.3.1.2 Do regret, rumination, and emotion regulation affect investors' portfolio return?

Structural model analysis was utilised to estimate the proportion of variance in portfolio risk that can be accounted for by regret, rumination, and emotion regulation. The results, as shown in Table 4.8 revealed that all three variables were statistically significant to portfolio return with t -value ≥ 1.645. Values in Table 4.7 indicated no multicollinearity concern in the model as all inner VIF values for independent variables were less than 5 and 3.3. Table 4.8 further provides summary results of hypothesis testing. Interestingly, the relationship between emotion regulation and portfolio return was found to be negative and contrary to the literature. The result was counterintuitive. Hence, H8 was rejected.

There was a significant positive relationship between rumination and portfolio return which supported the hypothesis, H6 ($t = 1.854$, $p = 0.032$) in this study. Strong evidence revealed that H7, regret ($t = 2.036$, $p = 0.021$) is the most important factor affecting the portfolio return. Higher tendency of regret induced a lower return. Therefore, both H6 and H7 were supported.

Table 4. 7 Latent Collinearity Assessment

Constructs	Return (VIF)	Collinearity problem? (VIF>5)
Emotion Regulation	1.512	No
Rumination	1.506	No
Regret	1.023	No

Table 4. 8 Hypothesis Testing

Hypothesis	Relationship	Std Beta	Std. Error	$t-value$	$p-value$	Decision	$R2$	$f2$
H6	Rumination - > Return	0.218	0.118	1.854*	0.032	Support	0.180	0.038
H7	Regret - > Return	-0.416	0.204	2.036*	0.021	Support		0.139
H8	Emotion Regulation -> Return	-0.286	0.109	2.629*	0.004	Do not Support		0.097

*$p<0.05$. **$p<0.01$

4.3.2 Discussion

The second part of the study aims to address the emotion effects in the context of investment decision-making. The quality of investment decisions is assessed by the portfolio performance using the Treynor ratio. Statistical analysis confirmed the effects of rumination on participants' investment decision. Ruminators reported having a combination of positive and negative sentiment over their poor decision. Specifically, they were sad, angry, and fearful of their mistakes, and simultaneously they expect and trust their ability to make better future decisions. The study also found that higher-order counterfactual analysis leads to better portfolio performance. When participants realised and recognised their failure, it had helped them to improve their portfolio performance. Instead of dwelling on the negative emotions and wishing to alter the past, ruminators mentally tend to replay the scene to seek better alternatives. They are more concerned about the root cause of poor decisions, hoping to learn and avoid the same mistakes again.

Specifically, participants were disappointed with their past investment decisions and were regretful. However, they reflected and realised that they should have spent more time and effort conducting investment research before actually investing, and frequently monitor their portfolio to ensure that they have made better investment decisions. The analysis also confirmed that participants who resolved their rumination were found to have attained self-realisation and strengthen their personal growth. The findings are consistent with the study conducted by Watkins (2008) and Dey *et al*. (2018). Hence, it is concluded that repetitive higher order thinking with higher self-reflection traits is linked to personal growth and improved investment decision.

The analysis results further support the fact that emotions have a significant impact on investment decision-making. Participants with a higher level of regret have poor portfolio performance, indicating their in-touch emotions over a terrible decision ended up with further misjudgement. Looking back at their mistakes, they experienced a high level of unpleasant emotions, such as sadness and anger. "Regret", "sorry", "disappointed", "guilty", "frustrated", "loss", "overthink", "wrong", "sad" are negative words that participants frequently mentioned in their regret text. They hoped and wished they could alter past mistakes for better portfolio performance. The emotions of regret to action and inaction are also frequently recorded. Participants regretted when they realised their portfolio performance could have been better if they had acted differently. For example, the emotion gets intense when there is a foregone investment opportunity or the realised outcome of an unchosen alternative performs better. Regretful participants also blamed themselves over their negligence and the irrational regret aversion behaviours that were overtaken by emotions, such as the disposition and status quo bias. Greedy participants would hold on to a winning position for too long intending to avoid regret over the upside potential, while anxious participants sold a winning position too early to avoid a decline in the asset value which they would later regret when prices soar. The experiment also revealed that participants refused to sell a

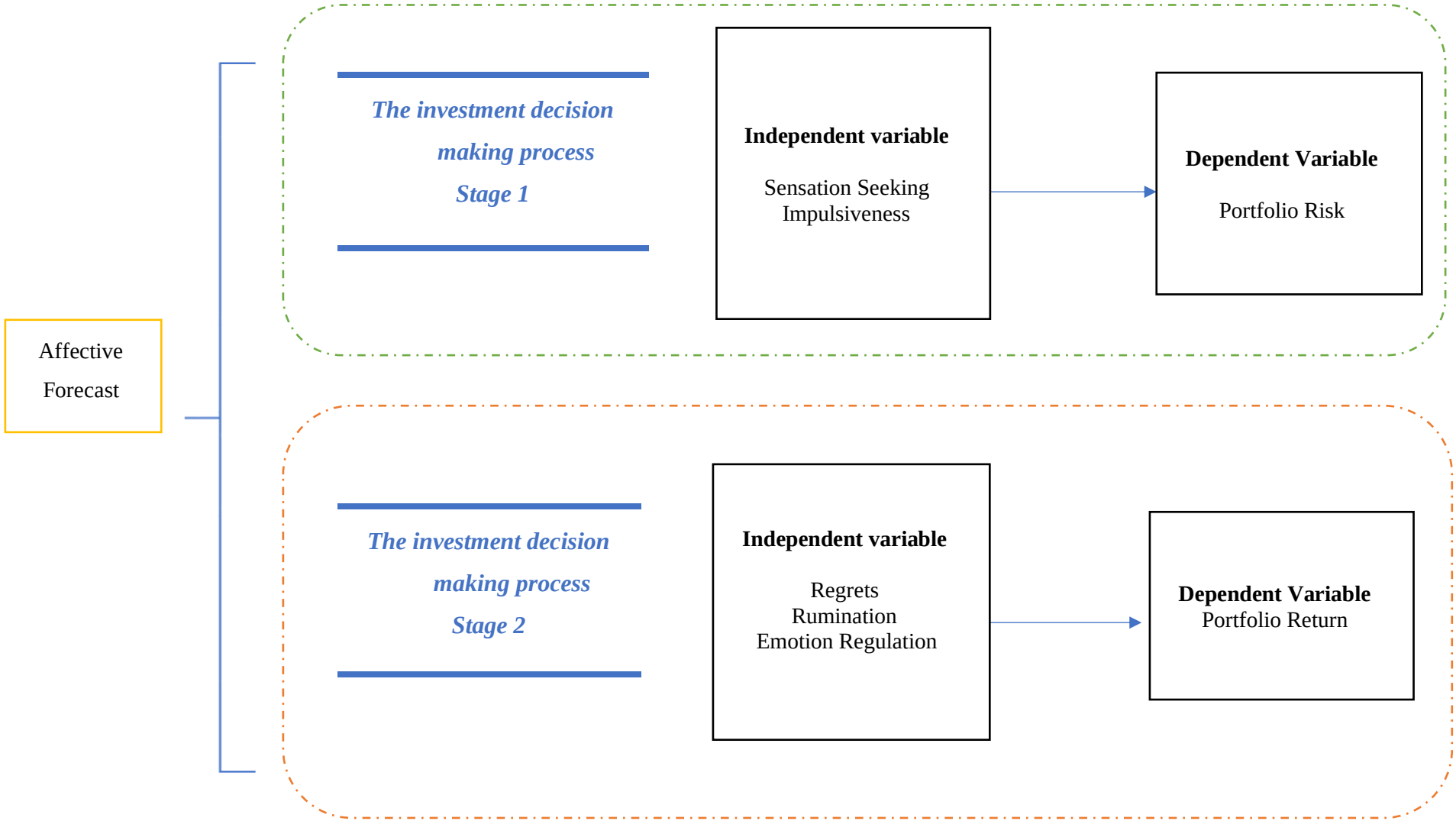
losing position and stayed on to their initial decision, hoping prices would recover to avoid regret. It is important to note that such irrational behaviour arises when there is a change in the investment's goal to regret reduction or regret avoidance. Excessive focus on regret deviates them from rationality, distorts their belief, thinking and judgement, and hence alters their investment strategies which may no longer be beneficial in the subsequent investment decisions. These irrational findings further supported the individual's emotional influence on their market timing. The findings are consistent with Buchanan *et al.* (2016), Michenaud and Solnik (2008), and Sirigu *et al*. (2005).

Contrary to the literature (Jerčić & Sundstedt, 2019; Morawetz *et al*., 2020; Peterson, 2011), the result suggests that emotion regulation is a negative significant predictor to the portfolio performance, indicating a constant level of emotion regulation does not necessarily mean well. Poor emotion regulation may lead to irrational behaviour and poor investment decisions. As the analysis of this experiment reported, participants were guilty, sad, and frustrated over their bad investment decisions and that constant regulation of these unwanted emotions does not necessarily eliminate them or change to the desired state of mind. It depends on the effectiveness of the emotional regulation strategies which is subjected to the individual's regulation ability, regulation effort and duration, gender and cultural differences (Kerr, 2021; Tamir, 2021; Meyer *et al*., 2012; Davis *et al*., 2012; Dunn *et al*., 2009). Specifically, impulsiveness behaviour, disposition effects and status quo bias are evidences of emotional dysregulation in this study. Altering emotions changes one's state of mind and influences their risk-taking decision. Unconsciously, one may possess higher risk-taking behaviour or behave more conservatively than they are in a neutral state, indicating there is a short-term deviation in their risk tolerance level (Morawetz *et al*., 2020; Heilman *et al*., 2010; Szasz *et al*., 2016). An individual's short-run willingness to take risk is not the same as the long run which varies according to how their emotion is affected by the market situation.

Parenting styles and cultural environment are important determinants of one's emotional self-regulation development. An individual's emotional response, emotional expression and emotional control are closely related to their upbringing and are dependent on their parents' acceptance, hence leading individuals to control and express their emotion in a socially accepted way (Frankel *et al*., 2012). Individuals with high self-regulation parents can manage their emotions better through internalising ideas and strategies while highly dysregulated parents are not able to properly guide their children to identify their emotions and affect their regulation ability which leads to emotion dysregulation (Xu *et al*., 2020). Therefore, this study concludes that emotion regulation does not improve one's cognitive reasoning skill of individuals with poor emotion regulation strategies and poor cognitive reasoning abilities lead to poor investment decisions.

Succinctly, emotions do influence individual investment decisions but constant emotion regulation does not enhance rationality or improve investment decisions. Participants who dwell into intense regret would suffer cognitive bias and end up with poor investment decisions. Higher repetitive order thinking helps in improving subsequent investment decisions, especially when they are keen to seek the cause and solutions, which would eventually improve their personal development upon resolve.

Figure 4. 9 Final Model of the Study



CHAPTER FIVE

CONCLUSIONS

5.1 Conclusions

This study emphasises that financial risk tolerance psychometric instruments may not be a reliable measurement as investors are unable to accurately predict their emotions of those hypothetical investment situations in both gain and loss domains. The study concludes that investors are mentality weak at estimating their intensity of emotions. Investors do not feel as happy when they achieved a positive above-average portfolio return, and the discomfort of monetary loss is not as severe when their portfolio return is below the average. Previous studies suggested that the affective forecasting errors can be explained by focalism, memory impairment and mental stimulation errors where investors' memory are error prone, and they do not take into a full consideration of the scenarios given. Similarly, the unexpected emotions support the fact that investors are lacking self-empathy as they do not understand their inner thoughts, emotions and mental state in situations involving monetary loss and gain in investments which can lead to a different risk tolerance conclusion. Thus, measurement of financial risk tolerance might not be accurate if investors could not perceive themselves accurately under the hypothetical situation. It is therefore important to understand investors from the psychological perspective in their investment decision-making process.

The study proceeds to analyse the effects of psychological traits and emotions in investors' investment decision-making process and concludes that inheritable traits such as impulsiveness and sensation seeking are important determinants of investors' risk decision. Impulsive investors who experience declining reasoning ability during emotional acceleration are likely to overreact to market information and thus will take a higher risk in their financial portfolio. This indicates impulsive investors are emotionally driven under the external and internal stimulation of a highly volatile financial market. Therefore, in response to the market condition, investors may not always be in a neutral state of mind and a spur-of-moment decision can cause deviation in their risk tolerance and lead them to higher risk-taking.

The experimental results suggest that sensation seeking is a factor to irrational risk decision-making to achieve a desire investment return. LSS who have a narrower risk acceptance level are found to have a higher risk in their investment, whereas HSS who have greater risk tolerance have lower portfolio risk. LSS may have exhibited familiarity bias in their investment decision by investing only in assets that they are familiar with and are unwilling to expose themselves to unfamiliar assets and other investment areas. Overweighting positions in familiar assets increases the portfolio risk and can cause enormous losses due

to lack of diversification. Hence, the study recommends LSS with low financial risk tolerance to accept more investment choices and actively monitor their portfolio so that their portfolio risk would stay within their risk tolerance range.

Lastly, the findings of this study highlight the importance of self-empathy which indicates how emotions and emotion regulation affect investors' portfolio performance in the investment decision-making process. Investors who experienced regret struggled to alter their past investment decisions and ended up with poorer portfolio performance. Intense emotions of frustration and self-blaming keep them overly focused on their past decisions which distort their judgments and deviate them from their investment goals. Thus, their subsequent decisions are built on the fundamentals of regret avoidance and irrational regret reduction which are not beneficial to them. Rumination, on the other hand, implies the need for self-reflection to gain a better portfolio return. Rumination improves portfolio performance if investors do not dwell on their mistakes, but instead acknowledge them and seek to improve their future investment decision by avoiding the same mistakes. However, emotion regulation surprisingly did not improve investors' investment return. Investors who regulate their emotions frequently may not be using an effective emotion regulation strategy and poorly regulated emotions can lead to unfavourable investment decisions. As suggested by the literature, the effectiveness of emotion regulation depends on an individual's regulation ability, effort, and duration. Therefore, investors who failed to change their state of mind may have behaved irrationally and this results in poor investment return. Hence, it is recommended for investors to seek a suitable emotional regulation strategy and improve on their self-regulation to reduce irrational investment behaviour.

5.2 Recommendations for Future Studies

Firstly, the experimental participants in this study were mainly young adults aged between 18 to 25 with a sample size of 100 in phase 1, 81 in Phase 2, and 70 in Phase 3. It is suggested for future research to expand the study into different age groups such as the Baby Boomers and Generation Y to examine the psychological aspect of investors in their investment decision. Secondly, the variables (affective forecasting, sensation seeking, impulsiveness, regret, rumination and emotion regulation) were measured by psychometric instruments and the accuracy and reliability of the responses were highly depended on the participants' mental condition at the time they did the assessments. There were many other factors influencing the respondents' temperament and hence cognitive functioning could affect their assessment responses. Emotional responses can be intense in either a positive or negative direction. Therefore, mood bias becomes a problem when opinions are exaggerated by the respondent's current emotional state. When a respondent becomes aware of the purpose of the study, they may intentionally provide answers which

they want to be seen in a positive light and not answering the survey items precisely or truthfully. Regardless of these weaknesses, there is a lack of better measurement methods as self-report measure remains a popular, accurate and reliable method in assessing latent constructs. This study combined experimental method with survey questionnaire to reduce these response bias to the possible maximum level. It is hence recommended that future studies employ a mixed method of study. Thirdly, affective forecasting measurement is assessed based on a single scenario involving the investors' future portfolio performance in both gain and loss domains, benchmarking against the overall participants' portfolio return. Future studies to explore more investment scenarios will help regulators and financial advisers in understanding investors' sentiment and their investment behaviour which seems vital in risk profiling matters. Future studies are strongly encouraged to explore more under-covered psychological aspects to provide a complete view of investors' investment decision-making. For instance, how do investors' risk taking, risk tolerance and financial capacity relates to their investment decision.

APPENDIX

Research Ethics Approval

University of Nottingham
UK | CHINA | MALAYSIA

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3 February 2021

Dear Au Kah Mun,

Reference Number: NUBS-REC-2021-1

Project Title: [PhD] Effects of heterogeneities, post-decisional emotions, financial risk tolerance and emotion regulation on investment decision-making

The NUBS Research Ethics Committee approves your application.

Please note that this approval is for the research work you describe in the application. If you change your research design (i.e., the research questions, the methodologies, or the respondents), you would need to apply for an ethical approval again.

We hope you have the best of luck with your research project.

Regards,

Rasyad Parinduri

Rasyad A. Parinduri
Chair
NUBS Research Ethics Committee

The University of Nottingham
in Malaysia Sdn Bhd (473520-K)

Questionnaire

The Psychology of Investment (Part 1)

Information for Research Participants

Thank you for agreeing to participate in the research project. Your participation in this research is voluntary, and you may change your mind about being involved in the research at any time, and without giving a reason.

This information sheet is designed to give you full details of the research project, its goals, the research team, the research funder, and what you will be asked to do as part of the research. If you have any questions that are not answered by this information sheet, please ask.

What is the research project called?
Effects of Heterogeneities, Post-Decisional Emotions, Financial Risk Tolerance and Emotion Regulation on Investment Decision-Making

Who is carrying out the research?
I am a self-funded doctoral student at the University of Nottingham Malaysia under the Nottingham University Business School.

What is the research about?
This research aims to understand human psychological factors in influencing their investment decision-making.

What groups of people have been asked to take part, and why?
This experimental research in investment decision-making requires participants to have some basic knowledge in finance. To be eligible to take part in this study, you should be at least 18 years old. Postgraduates and undergraduates in the University of Nottingham Malaysia Business School are encouraged to take part.

What will research participants be asked to do?
This experimental study consists of two (2) parts. In the first part, you will be asked to fill in questionnaires that contain several questions on your demographic profile, heterogeneous traits, post-decisional emotions, emotion regulation, and financial risk tolerance. The second part requires you to participate in FTS 500 Stocks and Futures Case using the Financial Trading System (FTS), online browser version which subscribed by the University of Nottingham Malaysia to measure your investment decision. It should take around 5 to 6 weeks to complete the entire study. You will not receive any compensation for your participation in this study.

What will happen to the information I provide?
Information will only be accessible by the researcher and two supervisors who are directly involved with this study. Information collected will be stored in an encrypted folder to avoid any potential access from

unauthorized parties. It will remain strictly confidential and solely used for academic purposes. Information about you will be coded using numbers, for instance, Trader 1, Trader 2, etc.

What will be the outputs of the research?
Information collected is used to produce statistical output. The results of this study are analysed and presented in the findings section of a thesis. The results of this research will allow expansion of knowledge regarding psychology of investment. Implications of this study may also be useful to practitioners in the relevant fields.

Contact details

Researcher: Au Kah Mun, +60173879211, saxka1@nottingham.edu.my, No. 47 Jalan A1 Taman Melawati, 53100 Kuala Lumpur.
Supervisor: Dr Tang Kin Boon, +6(03)89248289, KinBoon.Tang@nottingham.edu.my, University of Nottingham Malaysia, Jalan Broga 43500 Semenyih, Selangor Darul Ehsan, Malaysia.

Complaint procedure
If you wish to complain about the way in which the research is being conducted or have any concerns about the research then in the first instance please contact the Dr Tang Kin Boon.

Or contact the NUBS REC:

Research Ethics Committee
Nottingham University Business School
The Campus
Jalan Broga 43500 Semenyih
Selangor Darul Ehsan, Malaysia.
Email: nubs-rec@nottingham.edu.my

Q1 Please state your username on the FTS Real Time Client Trading platform:

_____

Q2 Please indicate your gender

- ○ Male
- ○ Female

Q3 Please indicate your age

- ○ 18 - 20
- ○ 21 - 24
- ○ 25 and above

Q4 Please indicate your degree of happiness on a 7-point scale ranging from 1 (extremely unhappy) to 7 (extremely happy) described by the following scenario.

	Extremely unhappy (1)	Moderately unhappy (2)	Slightly unhappy (3)	Neither happy nor unhappy (4)	Slightly happy (5)	Moderately happy (6)	Extremely happy (7)
Imagine that you successfully earned an above-average positive return among your peers at the end of the trading period.	○	○	○	○	○	○	○

Q5 With reference to the above scenario, please select THREE (3) emotion terms that best describe your emotional experience if you successfully earned an above-average positive return among your peers at the end of the trading period.

- [ ] Pride
- [ ] Elation
- [ ] Happiness
- [ ] Satisfaction
- [ ] Relief
- [ ] Hope
- [ ] Interest
- [ ] Surprise
- [ ] Sadness
- [ ] Hostility
- [ ] Shame/ Guilt
- [ ] Boredom
- [ ] Anxiety
- [ ] Disgust
- [ ] Contempt

☐ Anger

Q6 Please indicate your degree of happiness on a 7-point scale ranging from 1 (extremely unhappy) to 7 (extremely happy) described by the following scenario.

	Extremely unhappy (1)	Moderately unhappy (2)	Slightly unhappy (3)	Neither happy nor unhappy (4)	Slightly happy (5)	Moderately happy (6)	Extremely happy (7)
Imagine that you suffered a loss, and your return is below-average among your peers at the end of the trading period.	○	○	○	○	○	○	○

Q7 With reference to the above scenario, please select THREE (3) emotion terms that best describe your emotional experience if you suffered a loss, and your return is below-average among your peers at the end of the trading period.

- ☐ Pride
- ☐ Elation
- ☐ Happiness
- ☐ Satisfaction
- ☐ Relief
- ☐ Hope
- ☐ Interest
- ☐ Surprise
- ☐ Sadness
- ☐ Hostility
- ☐ Shame/ Guilt
- ☐ Boredom
- ☐ Anxiety
- ☐ Disgust
- ☐ Contempt

☐ Anger

Q8 The following statements are about your impulsivity. Please indicate the frequencies of each statement by selecting the most appropriate option on a 7-point scale ranging from 1 (never true) to 7 (always true).

	Never true (1)	Rarely true (2)	Sometimes but infrequently true (3)	Neutral (4)	Sometimes true (5)	Usually true (6)	Always true (7)
I plan tasks carefully.	○	○	○	○	○	○	○
I do things without thinking.	○	○	○	○	○	○	○
I don't "pay attention."	○	○	○	○	○	○	○
I am self-controlled.	○	○	○	○	○	○	○
I concentrate easily.	○	○	○	○	○	○	○
I am a careful thinker.	○	○	○	○	○	○	○
I say things without thinking.	○	○	○	○	○	○	○
I act on the spur of the moment.	○	○	○	○	○	○	○

Q9 The following statements are regarding your anxiety about money. Please indicate the degree to which you believe each of the statement is true by selecting the most appropriate option on a 7-point scale ranging from 1 (never true) to 7 (always true).

	Never true (1)	Rarely true (2)	Sometimes but infrequently true (3)	Neutral (4)	Sometimes true (5)	Usually true (6)	Always true (7)
I prefer not to think about the stare of my personal finances.	○	○	○	○	○	○	○
Thinking about my personal finances can make me feel guilty.	○	○	○	○	○	○	○
I am worried about the debt I will have when I complete my university education.	○	○	○	○	○	○	○
Thinking about my personal finances can make me feel anxious.	○	○	○	○	○	○	○

I get myself into a situation where I do not know where I'm going to get the money to "bail" myself out.	○	○	○	○	○	○	○
Discussing my finances can make my heart race or make me feel stressed.	○	○	○	○	○	○	○
I do not make a big enough effort to understand my finances.	○	○	○	○	○	○	○
I do not think I am doing as well as I could academically because I worry about money.	○	○	○	○	○	○	○
I find opening my bank statements unpleasant.	○	○	○	○	○	○	○

I would rather someone else who I trusted kept my finances organized.	○	○	○	○	○	○	○

Q10 The following statements are about your characteristics. Please indicate the degree to which you agree and disagree with each of the statement that best describes you in an honest manner by selecting the most appropriate option on a 7-point scale ranging from 1 (strongly disagree) to 7 (strongly agree).

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
I would like to explore strange places.	○	○	○	○	○	○	○
I get restless when I spend too much time at home.	○	○	○	○	○	○	○
I like to do frightening things.	○	○	○	○	○	○	○
I like wild parties.	○	○	○	○	○	○	○
I would like to take off on a trip with no pre-planned routes or timetables.	○	○	○	○	○	○	○

I prefer friends who are excitingly unpredictable.	○	○	○	○	○	○	○
I would like to try bungee jumping.	○	○	○	○	○	○	○
I would love to have new and exciting experiences, even if they are illegal.	○	○	○	○	○	○	○

Q11 The following statements are about your tolerance to risk. Each of the items below contains two to four choices. Please choose one of the options which best describe yourself in an honest manner.

In general, how would your best friend describe you as a risk taker?

- ○ A real gambler
- ○ Willing to take risks after completing adequate research
- ○ Cautious
- ○ A real risk avoider

You are on TV game show and can choose one of the following. Which would you take?

- ○ RM1,000 in cash
- ○ A 50% chances of winning RM5,000
- ○ A 25% chances of winning RM10,000
- ○ A 5% chances of winning RM100,000

You have just finished saving for a "once-in -a-lifetime" vacation. Three weeks before you plan to leave, you lose your job. You would:

- ○ Cancel the vacation
- ○ Take a much more modest vacation
- ○ Go as scheduled, reasoning that you need the time to prepare a job search
- ○ Extend your vacation, because this might be your last chance to go first-class

If you expected received RM20,000 to invest, what would you do?

- ○ Deposit in a bank account, money market account or an insured CD
- ○ Invest it in safe high quality bonds or bond mutual funds
- ○ Invest in stock or stock mutual funds

In terms of experience, how comfortable are you investing in stock or mutual funds?

- ○ Not at all comfortable
- ○ Somewhat comfortable
- ○ Very comfortable

When you think of the word "risk" which of the following words come to mind first?

- ○ Loss
- ○ Uncertainty
- ○ Opportunity
- ○ Thrill

Some experts are predicting prices of assets such as gold, jewels, collectibles, and real estate (hard assets) to increase in value: bond prices may fall, however, experts tend to agree that government bonds are relatively safe. Most of your investment assets are now in high interest government bonds. What would you do?

- ○ Hold the bonds
- ○ Sell the bonds, put half the proceeds into money market accounts and the other half into hard assets
- ○ Sell the bonds and put the total proceeds into hard assets.
- ○ Sell the bonds, put all the money into hard assets, and borrow additional money to buy more.

Given the best and worst case returns of the four investment choices below, which would you prefer?

- ○ RM200 gain best case;RM0 gain/ loss worst case
- ○ RM800 gain best case; RM200 loss worst case
- ○ RM2,600 gain best case; RM800 loss worst case
- ○ RM4,800 gain best case; RM2,400 loss worst case

In addition to whatever you own, you have been given RM1,000. You are now asked to choose between:

- ○ A sure gain of RM500
- ○ A 50% chance of gain RM1,000 and a 50% chance to gain nothing

In addition to whatever you own, you have been given RM2,000. You are now asked to choose between:

- ○ A sure loss of RM500
- ○ A 50% chance to lose RM 1,000 and a 50% chance to lose nothing

Suppose a relative left you an inheritance of RM100,000, stipulating in the will that you invest **ALL** the money in **ONE** of the following choices. Which would you select?

- ○ A savings account or money market mutual funds
- ○ A mutual fund that owns stocks and bonds
- ○ A portfolio of 15 common stocks
- ○ Commodities like gold, silver and oil

If you had to invest RM20,000, which of the following investment choices would you find the most appealing?

- ○ 60% in low-risk investments, 30% in medium-risk investments, and 10% in high-risk investments
- ○ 30% in low-risk investments, 40% in medium-risk investments, and 30% in high-risk investments
- ○ 10% in low-risk investments, 40% in medium-risk investments, and 50% in high-risk investments

Your trusted friend and neighbor, an experienced geologist, is putting together a group of investors to fund an exploratory gold mining venture. The venture could pay back 50 to 100 times the investment if successful. If the mine is burst, the entire investment is worthless. Your friend estimates the chances of success is only 20%. If you had the money, how much would you invest?

- ○ Nothing
- ○ One month's salary
- ○ Three month's salary
- ○ Six month's salary

Q12 The following are about your characteristics. Please indicate the degree to which you agree and disagree with each of the statement that best describes you in an honest manner by selecting the most appropriate option on a 7-point scale ranging from 1 (strongly disagree) to 7 (strongly agree).

I see myself as someone who.....

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
Is talkative.	○	○	○	○	○	○	○
Does a thorough job.	○	○	○	○	○	○	○
Is original, comes up with new ideas.	○	○	○	○	○	○	○
Is reserved.	○	○	○	○	○	○	○
Is relaxed, handles stress well.	○	○	○	○	○	○	○
Has a forgiving nature.	○	○	○	○	○	○	○
Worries a lot.	○	○	○	○	○	○	○
Has an active imagination.	○	○	○	○	○	○	○
Tends to be lazy.	○	○	○	○	○	○	○
Is considerate and kind to almost everyone.	○	○	○	○	○	○	○
Does things efficiently.	○	○	○	○	○	○	○

Is outgoing, sociable.	○	○	○	○	○	○	○
Is sometimes rude to others.	○	○	○	○	○	○	○
Gets nervous easily.	○	○	○	○	○	○	○
Has few artistic interests.	○	○	○	○	○	○	○

The Psychology of Investment (Part 2)

Q1 Please state your username on the FTS Real Time Client trading platform:

_____

Q2 Investors often look back and imagine how they could have done things differently to transform the current situation whether it is a decision they wish they hadn't made or a decision they should have made but didn't.

Have you ever felt sorry and wish you could alter your past investment decision during the investment process? Please describe your emotions in detail. (Min 30 characters)

_____

_____

_____

Q3 Have you been mentally replaying your past investment decision trying to understand the cause to your poor investment choice and wish you could have made a better decision?

Please describe your emotions in detail. (Min 30 characters)

_____

_____

_____

Q4 The following statements are about your emotions. Please indicate the frequencies of each statement by selecting the most appropriate option on a 7-point scale ranging from 1 (never) to 7 (always).

	Never (1)	Rarely (2)	Sometimes but infrequent (3)	Neutral (4)	About half of the time (5)	Most of the time (6)	Always (7)
How intense are your feeling on the past investment decision made in which you might have made a better decision instead?	○	○	○	○	○	○	○
How intense do you repetitively think about your past investment decision mistakes?	○	○	○	○	○	○	○

Q5 The following statements describe your emotion with reference to your trading experience on the FTS Real Time Client trading platform. Please indicate the degree to which you agree and disagree with each of the statement by selecting the most appropriate option on a 7-point scale ranging from 1 (strongly disagree) to 7 (strongly agree).

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
Whenever I make a choice, I'm curious about what would have happened if I had chosen differently.	○	○	○	○	○	○	○
Whenever I make a choice, I try to get information about how the other alternatives turned out.	○	○	○	○	○	○	○
If I make a choice and it turns out well, I still feel like something of a failure if I find out that another choice would have turned out better.	○	○	○	○	○	○	○
When I think about how I'm doing in life, I often assess opportunities I have passed up.	○	○	○	○	○	○	○
Once I make a decision, I don't look back.	○	○	○	○	○	○	○

Q6 The following statements are about your feelings when you are sad and depressed with reference to your trading experience on the FTS Real Time Client trading platform. Please indicate the degree to which you agree and disagree with each of the statement by selecting the most appropriate option on a 7-point scale ranging from 1 (strongly disagree) to 7 (strongly agree).

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
Think about how alone you feel.	○	○	○	○	○	○	○
Think " I won't be able to do my job if I don't snap out of this."	○	○	○	○	○	○	○
Think about your feelings of fatigue and achiness.	○	○	○	○	○	○	○
Think about how hard it is to concentrate.	○	○	○	○	○	○	○
Think “What am I doing to deserve this?”.	○	○	○	○	○	○	○
Think about how passive and unmotivated you feel.	○	○	○	○	○	○	○
Analyse recent events to try to understand why you are depressed.	○	○	○	○	○	○	○
Think about how you don't seem to feel anything anymore.	○	○	○	○	○	○	○

Think "Why can't I get going?"	○	○	○	○	○	○	○
Think “Why do I always react this way?”.	○	○	○	○	○	○	○
Go away by yourself and think about why you feel this way.	○	○	○	○	○	○	○
Write down what you are thinking about and analyse it.	○	○	○	○	○	○	○
Think about a recent situation, wishing it had gone better.	○	○	○	○	○	○	○
Think "I won't be able to concentrate if I keep feeling this way."	○	○	○	○	○	○	○
Think “Why do I have problems other people don’t have?”.	○	○	○	○	○	○	○
Think “Why can’t I handle things better?”.	○	○	○	○	○	○	○
Think about how sad you feel.	○	○	○	○	○	○	○

Think about all your shortcomings, failings, faults, mistakes.	○	○	○	○	○	○	○
Think about how you don't feel up to doing anything.	○	○	○	○	○	○	○
Analyse your personality to try to understand why you are depressed.	○	○	○	○	○	○	○
Go someplace alone to think about your feelings.	○	○	○	○	○	○	○
Think about how angry you are with yourself.	○	○	○	○	○	○	○

Q7 The following statements are about how you manage your emotions. Please indicate the frequencies of each statement by selecting the most appropriate option on a 7-point scale ranging from 1 (never) to 7 (every time).

	Never (1)	Rarely (2)	Occasionally (3)	Sometimes (4)	Frequently (5)	Usually (6)	Every time (7)
When I want to feel more positive emotion (such as joy or amusement), I change what I'm thinking about.	○	○	○	○	○	○	○
I keep my emotions to myself.	○	○	○	○	○	○	○
When I want to feel less negative emotion (such as sadness or anger), I change what I'm thinking about.	○	○	○	○	○	○	○
When I am feeling positive emotions, I am careful not to express them.	○	○	○	○	○	○	○
When I'm faced with a stressful situation, I make myself think about it in a way that helps me stay calm.	○	○	○	○	○	○	○
I control my emotions by not expressing them.	○	○	○	○	○	○	○

When I want to feel more positive emotion, I change the way I'm thinking about the situation.	○	○	○	○	○	○	○
I control my emotions by changing the way I think about the situation I'm in.	○	○	○	○	○	○	○
When I am feeling negative emotions, I make sure not to express them.	○	○	○	○	○	○	○
When I want to feel less negative emotion, I change the way I'm thinking about the situation.	○	○	○	○	○	○	○

The Psychology of Investment (Part 3)

Q1 Please state your username on the FTS Real Time Client trading platform:

_____

Q2 With reference to your performance report, please indicate your degree of happiness by comparing your trading result (My Value) to the overall average performance (Average Value) based on a 7-point scale ranging from 1 (not happy) to 7 (very happy).

	Extremely unhappy (1)	Moderately unhappy (2)	Slightly unhappy (3)	Neither happy nor unhappy (4)	Slightly happy (5)	Moderately happy (6)	Extremely happy (7)
How do you feel?	○	○	○	○	○	○	○

Q3 Please select THREE (3) emotion terms that best describe your current emotional experience on your trading performance.

- [ ] Pride
- [ ] Elation
- [ ] Happiness
- [ ] Satisfaction
- [ ] Relief
- [ ] Hope
- [ ] Interest
- [ ] Surprise
- [ ] Sadness
- [ ] Hostility
- [ ] Shame/ Guilt
- [ ] Boredom
- [ ] Anxiety
- [ ] Disgust
- [ ] Contempt

☐ Anger

Q4 Humans make mistakes, are emotionally influenced and are not always rational, especially when dealing with money matters. Describe **TWO (2)** situations that your investment decision is affected by your emotional experience. (Min 30 characters)

(Note: it is important to understand that these emotions can be both positive and negative)

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REFERENCES

Ahmad, Z., Ibrahim, H., & Tuyon, J. (2017). Behavior of fund managers in malaysian investment management industry. *Qualitative Research in Financial Markets, 9*(3), 205-239. 10.1108/QRFM-082016-0024

Archuleta, K. L., Mielitz, K. S., Jayne, D., & Le, V. (2020). Financial goal setting, financial anxiety, and solution-focused financial therapy (SFFT): A quasi-experimental outcome study. *Contemporary Family Therapy, 42*(1), 68-76. 10.1007/s10591-019-09501-0

Aren, S., & Zengin, A. N. (2016). Influence of financial literacy and risk perception on choice of investment. *Procedia - Social and Behavioral Sciences, 235*, 656-663. https://doi.org/10.1016/j.sbspro.2016.11.047

Armstrong, T. A., Boisvert, D., Wells, J., & Lewis, R. (2020). Extending steinberg's adolescent model of risk taking to the explanation of crime and delinquency: Are impulsivity and sensation seeking enough? *Personality and Individual Differences, 165*, 110133. 10.1016/j.paid.2020.110133

Ayton, P., Pott, A., & Elwakili, N. (2007). Affective forecasting: Why can't people predict their emotions? *Thinking & Reasoning, 13*(1), 62-80. 10.1080/13546780600872726

Baretta, D., Greco, A., & Steca, P. (2017). *Understanding performance in risky sport: The role of selfefficacy beliefs and sensation seeking in competitive freediving* https://doiorg.ezproxy.nottingham.edu.my/10.1016/j.paid.2017.06.006

Basel, J. S., & Brühl, R. (2013). *Rationality and dual process models of reasoning in managerial cognition and decision making* https://doi.org/10.1016/j.emj.2013.07.004

Bateman, H., Stevens, R., & Lai, A. (2015). Risk information and retirement investment choice mistakes under prospect theory. *Journal of Behavioral Finance, 16*(4), 279-296.

10.1080/15427560.2015.1095749

Baule, R., Korn, O., & Kuntz, L. (2019). Markowitz with regret. *Journal of Economic Dynamics and Control, 103*, 1-24. 10.1016/j.jedc.2018.09.012

Baumann, A. A., & Odum, A. L. (2012). *Impulsivity, risk taking, and timing* https://doiorg.ezproxy.nottingham.edu.my/10.1016/j.beproc.2012.04.005

Baumann, F., Benndorf, V., & Friese, M. (2019). *Loss-induced emotions and criminal behavior: An experimental analysis* https://doi.org/10.1016/j.jebo.2019.01.020

Bendor, J. (2015). In Wright J. D. (Ed.), *Bounded rationality*. Elsevier. https://doi.org/10.1016/B978-0-08-

097086-8.93012-5

Bonnaire, C., & Barrault, S. (2018). *Are online poker problem gamblers sensation seekers?* https://doiorg.ezproxy.nottingham.edu.my/10.1016/j.psychres.2018.03.024

Bonus, J. A., Wulf, T., & Matthews, N. L. (2020). The cost of clairvoyance: Enjoyment and appreciation of a popular movie as a function of affective forecasting errors. *Journal of Media Psychology, 32*(4), 216-222. 10.1027/1864-1105/a000268

Bradley, T. K., & Sonya, L. B. (2012). Tactical asset management or financial trauma?: Why the abandonment of buy-and-hold may be a symptom of posttraumatic stress. *Journal of Financial Therapy, 3*(2)10.4148/jft.v3i2.1718

Braga, R., & Fávero, L.,Paulo Lopes. (2017). Disposition effect and tolerance to losses in stock investment decisions: An experimental study. *Journal of Behavioral Finance, 18*(3), 271-280. 10.1080/15427560.2017.1308946

Breivik, G., Sand, T. S., & Sookermany, A. M. (2017). *Sensation seeking and risk-taking in the norwegian population* https://doi-org.ezproxy.nottingham.edu.my/10.1016/j.paid.2017.07.039

Brooks, A. M., Capra, C. M., & Berns, G. S. (2012). *Neural insensitivity to upticks in value is associated with the disposition effect* https://doi.org/10.1016/j.neuroimage.2011.10.081

Buchanan, J., Summerville, A., Lehmann, J., & Reb, J. (2016). The regret elements scale: Distinguishing the affective and cognitive components of regret. *Judgment and Decision Making, 11*(3), 275-286.

Buechel, E. C., Zhang, J., & Morewedge, C. K. (2017). Impact bias or underestimation? outcome specifications predict the direction of affective forecasting errors. *Journal of Experimental Psychology: General, 146*(5), 746-761. 10.1037/xge0000306

Buttonwood. (2015). **What's wrong with finance**. *The Economist Newspaper Limited 2022* https://www.economist.com/buttonwoods-notebook/2015/05/01/whats-wrong-with-finance

Campos-Vazquez, R. M., & Cuilty, E. (2014). *The role of emotions on risk aversion: A prospect theory experiment* https://doi.org/10.1016/j.socec.2014.01.001

Caprara, G., Vecchione, M., Barbaranelli, C., & Alessandri, G. (2013). Emotional stability and affective self-regulatory efficacy beliefs: Proofs of integration between trait theory and social cognitive theory. *European Journal of Personality, 27*(2), 145-154. 10.1002/per.1847

Chatjuthamard, P., Jindahra, P., Sarajoti, P., & Treepongkaruna, S. (2021). The effect of COVID-19 on the global stock market. *Accounting and Finance (Parkville), 61*(3), 4923-4953. 10.1111/acfi.12838

Chin, W. W. (1998). Commentary: Issues and opinion on structural equation modeling. *MIS Quarterly, 22*(1), vii-xvi.

Chitchai, N., Senasu, K., & Sakworawich, A. (2018). *The moderating effect of love of money on relationship between socioeconomic status and happiness* https://doi.org/10.1016/j.kjss.2018.08.002

Choi, S. (2022). Dynamic volatility spillovers between industries in the US stock market: Evidence from the COVID-19 pandemic and black monday. *The North American Journal of Economics and Finance, 59*, 101614. https://doi-org.unm-ezproxy.idm.oclc.org/10.1016/j.najef.2021.101614

Ciccarelli, S. K., & White, J. N. (2009). *Psychology* (2nd ed.). Pearson Prentice Hall.

Ciccarelli, M., Griffiths, M. D., Cosenza, M., Nigro, G., & D'Olimpio, F. (2020). *Disordered gambling and attentional bias: The mediating role of risk-taking* https://doiorg.ezproxy.nottingham.edu.my/10.1016/j.jad.2020.03.144

Connolly, T., & Zeelenberg, M. (2002). Regret in decision making. *Curr Dir Psychol Sci, 11*(6), 212-216. 10.1111/1467-8721.00203

Copping, L. T., Campbell, A., & Muncer, S. (2014). Conceptualizing time preference: A life-history analysis. *Evolutionary Psychology, 12*(4)10.1177/147470491401200411

Costa, P., & McCrae, R. R. (1999). A five-factor theory of personality. [The Five-factor of Personality: Theoretical Perspectives] *2*, 51-87.

Das, U., & Mohapatra, S. R. (2017). Investment decision making: Behavioural biases. *SCMS Journal of Indian Management, 14*(1), 60-74. http://search.ebscohost.com/login.aspx?direct=true&AuthType=cookie,ip,shib,uid&db=bth&AN=122258874&site=ehost-live&scope=site&authtype=shib&custid=s8000044

Dash, S. R., & Maitra, D. (2022). The COVID-19 pandemic uncertainty, investor sentiment, and global equity markets: Evidence from the time-frequency co-movements. *The North American Journal of Economics and Finance, 62*, 101712. https://doi-org.unmezproxy.idm.oclc.org/10.1016/j.najef.2022.101712

Davies, G. B., & Brooks, P. (2014). **Risk tolerance : Essential, behavioural and misunderstood**.*7.2014*

Davies, G. B. (2018). New vistas in risk profiling. *Risk profiling and tolerance: Insights for the private wealth manager* (pp. 71). CFA Institute Research Foundation.

Davis, E., Greenberger, E., Charles, S., Chen, C., Zhao, L., & Dong, Q. (2012). Emotion experience and regulation in china and the united states: How do culture and gender shape emotion responding? *International Journal of Psychology, 47*(3), 230-239. 10.1080/00207594.2011.626043

de Bruijn, E., & Antonides, G. (2020). *Determinants of financial worry and rumination* https://doiorg.ezproxy.nottingham.edu.my/10.1016/j.joep.2019.102233

de Castro, P. A. L., Barreto Teodoro, A. R., de Castro, L. I., & Parsons, S. (2016). *Expected utility or prospect theory: Which better fits agent-based modeling of markets?* https://doi.org/10.1016/j.jocs.2016.10.002

De Grauwe, P. (2011). Animal spirits and monetary policy. *Economic Theory, 47*(2), 423-457. 10.1007/s00199-010-0543-0

Dey, S., Joormann, J., Moulds, M. L., & Newell, B. R. (2018). The relative effects of abstract versus concrete rumination on the experience of post-decisional regret. *Behaviour Research and Therapy, 108*, 18-28. 10.1016/j.brat.2018.06.007

Dhami, M. K., & Harries, C. (2010). Information search in heuristic decision making. *Applied Cognitive Psychology, 24*(4), 571-586. 10.1002/acp.1575

Dhandra, T. K. (2020). *Does self-esteem matter? A framework depicting role of self-esteem between dispositional mindfulness and impulsive buying* https://doiorg.ezproxy.nottingham.edu.my/10.1016/j.jretconser.2020.102135

Dierick, N., Heyman, D., Inghelbrecht, K., & Stieperaere, H. (2019). *Financial attention and the disposition effect* https://doi-org.ezproxy.nottingham.edu.my/10.1016/j.jebo.2019.04.019

Dorn, L. M. -., Rief, W., & Mehl, S. (2020). *Can theory of mind be improved? positive expectations cause better theory of mind performance in a community sample* https://doi.org/10.1016/j.jbtep.2020.101577

Dunn, B. D., Billotti, D., Murphy, V., & Dalgleish, T. (2009). The consequences of effortful emotion regulation when processing distressing material: A comparison of suppression and acceptance. *Behaviour Research and Therapy, 47*(9), 761-773. 10.1016/j.brat.2009.05.007

Ebstein, R. P., Israel, S., Chew, S. H., Zhong, S., & Knafo, A. (2010). *Genetics of human social behavior* https://doi.org/10.1016/j.neuron.2010.02.020

Federal reserve missed financial crisis warning signs in 2007, documents show. (2013). *The Telegraph* https://www.telegraph.co.uk/finance/financialcrisis/9812304/Federal-Reserve-missed-financialcrisis-warning-signs-in-2007-documents-show.html

Fessler, D. M. T., Pillsworth, E. G., & Flamson, T. J. (2004). *Angry men and disgusted women: An evolutionary approach to the influence of emotions on risk taking* https://doiorg.ezproxy.nottingham.edu.my/10.1016/j.obhdp.2004.06.006

Finkenauer, C., Gallucci, M., van Dijk, W. W., & Pollmann, M. (2007). Investigating the role of time in affective forecasting: Temporal influences on forecasting accuracy. *Pers Soc Psychol Bull, 33*(8), 1152-1166. 10.1177/0146167207303021

Frankel, L. A., Hughes, S. O., O'Connor, T.,M., Power, T. G., Fisher, J. O., & Hazen, N. L. (2012). Parental influences on children's self-regulation of energy intake: Insights from developmental literature on emotion regulation. *Journal of Obesity, 2012*, 327259-12. 10.1155/2012/327259

Gagnon, G. (2004). *Exchange rate fluctuations in an economy with noise traders* https://doi.org/10.1016/j.jmacro.2002.01.001

Gambetti, E., & Giusberti, F. (2012). *The effect of anger and anxiety traits on investment decisions* https://doi-org.ezproxy.nottingham.edu.my/10.1016/j.joep.2012.07.001

Gambetti, E., & Giusberti, F. (2019). *Personality, decision-making styles and investments* https://doiorg.ezproxy.nottingham.edu.my/10.1016/j.socec.2019.03.002

Gambetti, E., Zucchelli, M. M., Nori, R., & Giusberti, F. (2022). Default rules in investment decisionmaking: Trait anxiety and decision-making styles. *Financial Innovation (Heidelberg), 8*(1), 1-26.10.1186/s40854-021-00329-y

Ganegoda, D. B., & Folger, R. (2015). *Framing effects in justice perceptions: Prospect theory and counterfactuals* https://doi-org.ezproxy.nottingham.edu.my/10.1016/j.obhdp.2014.10.002

Garg, N., & Lerner, J. S. (2013). *Sadness and consumption* https://doi.org/10.1016/j.jcps.2012.05.009

Gasiorowska, A. (2014). The relationship between objective and subjective wealth is moderated by financial control and mediated by money anxiety. *Journal of Economic Psychology, 43*, 64-74. 10.1016/j.joep.2014.04.007

Gemayel, R., & Preda, A. (2018). *Does a scopic regime erode the disposition effect? evidence from a social trading platform* https://doi-org.ezproxy.nottingham.edu.my/10.1016/j.jebo.2018.08.014

Gigerenzer, G., & Gaissmaier, W. (2015). In Wright J. D. (Ed.), *Decision making: Nonrational theories*. Elsevier. https://doi.org/10.1016/B978-0-08-097086-8.26017-0

Gilbert, D. T., & Wilson, T. D. (2009). Why the brain talks to itself: Sources of error in emotional prediction. *Philosophical Transactions.Biological Sciences, 364*(1521), 1335-1341. 10.1098/rstb.2008.0305

Grable, J. E. (2000). Financial risk tolerance and additional factors that affect risk taking in everyday money matters. *Journal of Business & Psychology, 14*(4), 625. http://search.ebscohost.com/login.aspx?direct=true&AuthType=cookie,ip,shib,uid&db=bth&AN=3067500&site=ehost-live&scope=site&authtype=shib&custid=s8000044

Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology, 85*(2), 348362. 10.1037/0022-3514.85.2.348

Guo, L., Li, F. W., & John Wei, K. C. (2020). Security analysts and capital market anomalies. *Journal of Financial Economics, 137*(1), 204-230. 10.1016/j.jfineco.2020.01.002

Habib, M., Cassotti, M., Borst, G., Simon, G., Pineau, A., Houdé, O., & Moutier, S. (2012). *Counterfactually mediated emotions: A developmental study of regret and relief in a probabilistic gambling task* https://doi.org/10.1016/j.jecp.2012.01.007

Hair, J. F., Babin, B. J., & Krey, N. (2017). Covariance-based structural equation modeling in the journal of advertising: Review and recommendations. *Journal of Advertising: Themed Issue - Methodology in Advertising Research, 46*(1), 163-177. 10.1080/00913367.2017.1281777

Harding, N., & He, W. (2016). Investor mood and the determinants of stock prices: An experimental analysis. *Accounting and Finance (Parkville), 56*(2), 445-478. 10.1111/acfi.12098

Heilman, R. M., Crişan, L.,G., Houser, D., Miclea, M., & Miu, A. C. (2010). Emotion regulation and decision making under risk and uncertainty. *Emotion (Washington, D.C.), 10*(2), 257. 10.1037/a0018489

Henseler, J. ö., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science, 43*(1), 115-135. 10.1007/s11747-014-0403-8

Heo, W., Rabbani, A., & Grable, J. (2015). Financial anxiety, physiological arousal, and planning intention. *Journal of Financial Therapy, 5*(2)10.4148/1944-9771.1083

Hermann, D., Mußhoff, O., & Rau, H. A. (2019). *The disposition effect when deciding on behalf of others* https://doi-org.ezproxy.nottingham.edu.my/10.1016/j.joep.2019.102192

Hibbert, A. M., Lawrence, E. R., & Prakash, A. J. (2018). The effect of prior investment outcomes on future investment decisions: Is there a gender difference? *Review of Finance, 22*(3), 1195-1212. 10.1093/rof/rfw060

Hinvest, N. S., Alsharman, M., Roell, M., & Fairchild, R. (2021). Do emotions benefit investment decisions? anticipatory emotion and investment decisions in non-professional investors. *Frontiers in Psychology*, *12*, 705476-705476. 10.3389/fpsyg.2021.705476

Hoang, L. T., Phan, T. T., & Ta, L. N. (2020). Nominal price anomaly in emerging markets: Risk or mispricing? *The Journal of Asian Finance, Economics, and Business, 7*(9), 125-134. 10.13106/JAFEB.2020.VOL7.NO9.125

Hogg, M. A. (2022). In Vaughan G. M. (Ed.), *Social psychology / michael A. hogg, graham M. vaughan* (Ninth Edition. ed.). Harlow, United Kingdom; New York: Pearson Education Ltd.

Hong, H., Bian, Z., & Lee, C. (2021). COVID-19 and instability of stock market performance: Evidence from the U.S. *Financial Innovation (Heidelberg), 7*(1), 1-18. 10.1186/s40854-021-00229-1

Horvath, P., & Zuckerman, M. (1993). *Sensation seeking, risk appraisal, and risky behavior* https://doiorg.ezproxy.nottingham.edu.my/10.1016/0191-8869(93)90173-Z

Hoyle, R. H., Stephenson, M. T., Palmgreen, P., Lorch, E. P., & Donohew, R. L. (2002). Reliability and validity of a brief measure of sensation seeking. *Personality and Individual Differences, 32*(3), 401414. 10.1016/S0191-8869(01)00032-0

Hsee, C. K., & Hastie, R. (2006). *Decision and experience: Why don't we choose what makes us happy?* https://doi-org.ezproxy.nottingham.edu.my/10.1016/j.tics.2005.11.007

Hsee, C. K., & Rottenstreich, Y. (2004). Music, pandas, and muggers: On the affective psychology of value. *Journal of Experimental Psychology.General, 133*(1), 23. 10.1037/0096-3445.133.1.23

Hsu, Y., & Tang, L. (2022). Effects of investor sentiment and country governance on unexpected conditional volatility during the COVID-19 pandemic: Evidence from global stock markets. *International Review of Financial Analysis, 82*, 102186. https://doi-org.unmezproxy.idm.oclc.org/10.1016/j.irfa.2022.102186

Huang, Y., Chiu, J., Lin, C., & Robin, . (2022). The effect of chinese lunar calendar on individual investors' trading. *Pacific-Basin Finance Journal, 71*, 101694. https://doi-org.unmezproxy.idm.oclc.org/10.1016/j.pacfin.2021.101694

Humphreys, K. L., Lee, S. S., & Tottenham, N. (2013). *Not all risk taking behavior is bad: Associative sensitivity predicts learning during risk taking among high sensation seekers* https://doi.org/10.1016/j.paid.2012.11.031

Jack, K., Les, D., Robert J., H., & Melissa, H. (2023). ***Personal finance*** (14th ed.). McGraw Hill.

Jerčić, P., & Sundstedt, V. (2019). *Practicing emotion-regulation through biofeedback on the decision-making performance in the context of serious games: A systematic review* https://doi.org/10.1016/j.entcom.2019.01.001

Johnston, D. W., Kassenboehmer, S. C., & Shields, M. A. (2016). *Financial decision-making in the household: Exploring the importance of survey respondent, health, cognitive ability and personality* https://doi.org/10.1016/j.jebo.2016.09.014

Kahneman, D. (2003). A psychological perspective on economics. *The American Economic Review*, *93*(2), 162-168. 10.1257/000282803321946985

Kahneman, D., & Tversky, A. (1983). Can irrationality be intelligently discussed? *Behavioral and Brain Sciences*, *6*(3), 509-510. 10.1017/S0140525X00017246

Kaluszka, M., & Krzeszowiec, M. (2012). *Pricing insurance contracts under cumulative prospect theory* https://doi.org/10.1016/j.insmatheco.2011.11.001

Kapoor, J., Les, D., Robert J., H., & Melissa, H. (2022). *Personal finance* (14th ed.). McGraw Hill.

Kennedy, S. (2018). What are economists getting wrong today?. *Bloomberg* https://www.bloomberg.com/markets/fixed-income

Kermer, D. A., Driver-Linn, E., Wilson, T. D., & Gilbert, D. T. (2006). Loss aversion is an affective forecasting error. *Psychol Sci*, *17*(8), 649-653. 10.1111/j.1467-9280.2006.01760.x

Kerr, A. D. (2021). On the rationality of emotion regulation.*34*(4), 453-473. 10.1080/09515089.2021.1915969

Kim, J., Ok, Y., & Park, Y. J. (2020). Institutional investors' trading response to stock market anomalies: Evidence from korea. *Sustainability (Basel, Switzerland)*, *12*(4), 1420. 10.3390/su12041420

Klement, J. (2018). *Risk profiling and tolerance: Insights for the private wealth manager*. CFA Institution Research Foundation.

Klos, A., Weber, E. U., & Weber, M. (2005). Investment decisions and time horizon: Risk perception and risk behavior in repeated gambles. *Management Science*, *51*(12), 1777-1790. http://www.jstor.org/stable/20110467

Koestner, M., Loos, B., Meyer, S., & Hackethal, A. (2017). Do individual investors learn from their mistakes? *Journal of Business Economics*, *87*(5), 669-703. 10.1007/s11573-017-0855-7

Kruglanski, A. W., & Gigerenzer, G. (2011). Intuitive and deliberate judgments are based on common principles. *Psychological Review, 118*(1), 97-109. 10.1037/a0020762

Krugman, P. (2009). How did economists get it so wrong?. *The New York Times Magazine* https://www.nytimes.com/2009/09/06/magazine/06Economic-t.html

Kruschwitz, J. D., Simmons, A. N., Flagan, T., & Paulus, M. P. (2012). *Nothing to lose: Processing blindness to potential losses drives thrill and adventure seekers* https://doiorg.ezproxy.nottingham.edu.my/10.1016/j.neuroimage.2011.09.048

Kwartler, T. (2017). *Text mining in practice with R / ted kwartler*. Chichester, England : Wiley.

Lachenbruch, P. A., & Cohen, J. (1989). *Statistical power analysis for the behavioral sciences (2nd ed.)*. American Statistical Association. 10.2307/2290095

Lai, K., Xiong, X., Jiang, X., Sun, M., & He, L. (2020). *Who falls for rumor? influence of personality traits on false rumor belief* https://doi-org.ezproxy.nottingham.edu.my/10.1016/j.paid.2019.109520

Larsen, R. J. (2018). In Buss D. M. (Ed.), *Personality psychology: Domains of knowledge about human nature / randy J. larsen, david M. buss* (Sixth edition, International student edition ed.). New York : McGraw-Hill Education.

Lau, T., Morewedge, C. K., & Cikara, M. (2016). Overcorrection for social-categorization information moderates impact bias in affective forecasting. *Psychological Science, 27*(10), 1340-1351. 10.1177/0956797616660292

Lee, H., & Sturm, R. E. (2017). *A sequential choice perspective of post decision regret and counterfactual thinking in voluntary turnover decisions* https://doi.org/10.1016/j.jvb.2016.12.003

Lemarié, L., Bellavance, F., & Chebat, J. (2019). Regulatory focus, time perspective, locus of control and sensation seeking as predictors of risky driving behaviors. *Accident Analysis and Prevention, 127*, 19-27. 10.1016/j.aap.2019.02.025

Lench, H. C., Levine, L. J., Perez, K., Carpenter, Z. K., Carlson, S. J., Bench, S. W., & Wan, Y. (2019). When and why people misestimate future feelings: Identifying strengths and weaknesses in affective forecasting. *Journal of Personality and Social Psychology*, *116*(5), 724-742. 10.1037/pspa0000143

Levene, T. (2015). *Investing for dummies / tony levene* (Fourth edition. ed.). West Sussex, England : John Wiley & Sons, Ltd.

Levine, L. J., Lench, H. C., Kaplan, R. L., & Safer, M. A. (2012). Accuracy and artifact: Reexamining the intensity bias in affective forecasting. *Journal of Personality and Social Psychology*, *103*(4), 584. 10.1037/a0029544

Li, F., Yin, S., Feng, P., Hu, N., Ding, C., & Chen, A. (2018). *The cognitive up- and down-regulation of positive emotion: Evidence from behavior, electrophysiology, and neuroimaging* https://doiorg.ezproxy.nottingham.edu.my/10.1016/j.biopsycho.2018.05.013

Liêu, M., & Pelster, M. (2020). *The disposition effect in a scopic regime: Data from a laboratory experiment* https://doi-org.ezproxy.nottingham.edu.my/10.1016/j.dib.2020.105680

Lippi, A., Barbieri, L., Piva, M., & De Bondt, W. (2018). Time-varying risk behavior and prior investment outcomes: Evidence from italy. *Judgment and Decision Making*, *13*(5), 471-483.

Lu, S., Zhao, J., Wang, H., & Ren, R. (2018). *Herding boosts too-connected-to-fail risk in stock market of china* https://doi-org.ezproxy.nottingham.edu.my/10.1016/j.physa.2018.04.020

Maher, A. M., Thomson, C. J., & Carlson, S. R. (2015). Risk-taking and impulsive personality traits in proficient downhill sports enthusiasts. *Personality and Individual Differences*, *79*, 20-24. 10.1016/j.paid.2015.01.041

Mani, A., Mullainathan, S., Shafir, E., & Zhao, J. (2013). Poverty impedes cognitive function. *Science (New York, N.Y.)*, *341*(6149), 976. 10.1126/science.1238041

Mascret, N., Nicolleau, M., Martha, C., Naude, C., Serre, T., & Ragot-Court, I. (2021). The predictive role of achievement goals adoption on sensation-seeking and risk taking in driving. *Transportation Research.Part F, Traffic Psychology and Behaviour*, *79*, 1-10. 10.1016/j.trf.2021.03.006

Matz, S. C., Gladstone, J. J., & Stillwell, D. (2016). Money buys happiness when spending fits our personality. *Psychol Sci*, *27*(5), 715-725. 10.1177/0956797616635200

Meissner, P., & Wulf, T. (2017). The effect of cognitive diversity on the illusion of control bias in strategic decisions: An experimental investigation. *European Management Journal*, *35*(4), 430-439. 10.1016/j.emj.2016.12.004

Mette, F. M. B., de Matos, C. A., Rohden, S. F., & Ponchio, M. C. (2019). *Explanatory mechanisms of the decision to buy on credit: The role of materialism, impulsivity and financial knowledge* https://doiorg.ezproxy.nottingham.edu.my/10.1016/j.jbef.2018.10.002

Meyvis, T., Ratner, R., & Levav, J. (2010). Why don't we learn to accurately forecast feelings? how misremembering our predictions blinds us to past forecasting errors. *Journal of Experimental Psychology-General, 139*(4), 579-589. 10.1037/a0020285

Michenaud, S., & Solnik, B. (2008). Applying regret theory to investment choices: Currency hedging decisions. *Journal of International Money and Finance, 27*(5), 677-694. 10.1016/j.jimonfin.2008.03.001

Middleton, E. (1996). *Adaptation level and 'animal spirits'* https://doi.org/10.1016/0167-4870(96)00020-7

Mlouki, I., Bouanene, I., Sioud, I., Bchir, A., al'Absi, M., & El Mhamdi, S. (2021). Impulsivity mediates the impact of early life adversity on high risk behaviors among tunisian adolescents. *Preventive Medicine Reports, 23*, 101424-101424. 10.1016/j.pmedr.2021.101424

Mobini, S., Pearce, M., Grant, A., Mills, J., & Yeomans, M. R. (2006). The relationship between cognitive distortions, impulsivity, and sensation seeking in a non-clinical population sample. *Personality and Individual Differences, 40*(6), 1153-1163. 10.1016/j.paid.2005.11.006

Morawetz, C., Mohr, P. N. C., Heekeren, H. R., & Bode, S. (2020). The effect of emotion regulation on risk-taking and decision-related activity in prefrontal cortex. *Social Cognitive and Affective Neuroscience, 14*(10), 1109-1118. 10.1093/scan/nsz078

Moreau, A., Chauchard, É., Sévigny, S., & Giroux, I. (2020). Tilt in online poker: Loss of control and gambling disorder. *International Journal of Environmental Research and Public Health, 17*(14), 1-14. 10.3390/ijerph17145013

Mousavi, S., & Gigerenzer, G. (2014). *Risk, uncertainty, and Heuristics* https://doi.org/10.1016/j.jbusres.2014.02.013

Moxley, J. H., Anders Ericsson, K., Charness, N., & Krampe, R. T. (2012). *The role of intuition and deliberative thinking in experts' superior tactical decision making* https://doi.org/10.1016/j.cognition.2012.03.005

Murphy, R. O., Andraszewicz, S., & Knaus, S. D. (2016). Real options in the laboratory: An experimental study of sequential investment decisions. *Journal of Behavioral and Experimental Finance, 12*, 23-39. 10.1016/j.jbef.2016.08.002

Nguyen, L. T. M., Gallery, G., & Newton, C. (2016). The influence of financial risk tolerance on investment decision-making in a financial advice context. *Australasian Accounting Business & Finance Journal, 10*(3), 3-22. http://search.ebscohost.com/login.aspx?direct=true&AuthType=cookie,ip,shib,uid&db=bth&AN=118528308&site=ehost-live&scope=site&authtype=shib&custid=s8000044

Nguyen, L., Gallery, G., & Newton, C. (2019). The joint influence of financial risk perception and risk tolerance on individual investment decision-making. *Accounting & Finance, 59*, 747-771. 10.1111/acfi.12295

Nolen-Hoeksema, S., & Morrow, J. (1991). A prospective study of depression and posttraumatic stress symptoms after a natural disaster: The 1989 loma prieta earthquake. *Journal of Personality and Social Psychology*, *61*(1), 115-121. 10.1037/0022-3514.61.1.115

Nuzula, N. F., Sisbintari, I., Suhadak, & Handayani, S. R. (2019). The use of technical analysis, source of information and emotion and its influence on investment decisions. *Journal of Behavioral and Experimental Finance, 22*, 51-56. 10.1016/j.jbef.2019.02.004

Ochsner, K. N., & Phelps, E. (2007). Emerging perspectives on emotion–cognition interactions. *Trends in Cognitive Sciences, 11*(8), 317-318. https://doiorg.ezproxy.nottingham.edu.my/10.1016/j.tics.2007.06.008

Ozkan, O. (2021). Impact of COVID-19 on stock market efficiency: Evidence from developed countries. *Research in International Business and Finance, 58*, 101445. https://doi-org.unmezproxy.idm.oclc.org/10.1016/j.ribaf.2021.101445

Pak, O., & Mahmood, M. (2015). Impact of personality on risk tolerance and investment decisions. *International Journal of Commerce and Management, 25*(4), 370-384. 10.1108/IJCoMA-01-2013-0002

Palomäki, J., Laakasuo, M., & Salmela, M. (2012). "Don't worry, it's just poker!"-experience, selfrumination and self-reflection as determinants of decision-making in on-line poker. *Journal of Gambling Studies, 29*(3), 1-15. 10.1007/s10899-012-9311-3

Parveen, S., Satti, Z. W., Subhan, Q. A., & Jamil, S. (2020). Exploring market overreaction, investors' sentiments and investment decisions in an emerging stock market. *Borsa Istanbul Review, 20*(3), 224235. 10.1016/j.bir.2020.02.002

Patrick, V. M., Macinnis, D. J., & Park, C. W. (2006). Not as happy as I thought I'd be? affective misforecasting and product evaluations. *The Journal of Consumer Research, 33*(4), 479-489. 10.1086/510221

Patton, J., Stanford, M., & PhD, E. (1995). Factor structure of the barratt impulsiveness scale.*51*, 768-774. 10.1002/1097-4679(199511)51:6%3C768::AID-JCLP2270510607%3E3.0.CO;2-1

Pelster, M., & Hofmann, A. (2018). *About the fear of reputational loss: Social trading and the disposition effect* https://doi-org.ezproxy.nottingham.edu.my/10.1016/j.jbankfin.2018.07.003

Peterson, R. L. (2011). *Inside the investor's brain: The power of mind over money* (illustrated ed.). John Wiley & Sons.

Pletzer, B., & M. Ortner, T. (2016). *Neuroimaging supports behavioral personality assessment: Overlapping activations during reflective and impulsive risk taking* https://doiorg.ezproxy.nottingham.edu.my/10.1016/j.biopsycho.2016.06.012

Plutchik, R. (1994). *The psychology and biology of emotion*. HarperCollins College Publishers.

Pyles, M. K., Li, Y., Wu, S., & Dolvin, S. D. (2016). *Cultural influences on risk tolerance and portfolio creation* https://doi.org/10.1016/j.jbef.2016.01.001

Qu, W., Zhang, W., & Ge, Y. (2020). The moderating effect of delay discounting between sensation seeking and risky driving behavior. *Safety Science, 123*, 104558. 10.1016/j.ssci.2019.104558

Rabbani, A. G., Yao, Z., Wang, C., & Grable, J. E. (2021). Financial risk tolerance, sensation seeking, and locus of control among pre-retiree baby boomers. *Financial Counseling and Planning, 32*(1), 146157. 10.1891/JFCP-18-00072

Radner, R. (2015). In Wright J. D. (Ed.), *Decision and choice: Bounded rationality*. Elsevier. https://doi.org/10.1016/B978-0-08-097086-8.43028-X

Ramayah, T., Chuah, F., Ting, H., & Memon, M. A. (2018). *Partial least square structural equation modeling (PLS-SEM) using smart-PLS 3.0* (2nd ed.). Pearson.

Ramiah, V., Xu, X., & Moosa, I. A. (2015). *Neoclassical finance, behavioral finance and noise traders: A review and assessment of the literature* https://doi.org/10.1016/j.irfa.2015.05.021

Ramkumar, G., & Chitra, S. (2021). A study on factors influencing investment decisions of retail investors in VUCA world. *Ushus Journal of Business Management, 20*(1), 69. 10.12725/ujbm.54.4

Rapetti, M. (2012). Animal spirits: How human psychology drives the economy, and why it matters for global capitalism, by george A. akerlof and robert J. shiller. *Eastern Economic Journal, 38*(2), 276278. 10.1057/eej.2010.16

Raut, R. K., & Kumar, R. (2018). Investment decision-making process between different groups of investors: A study of indian stock market. *Asia-Pacific Journal of Management Research and Innovation, 14*(1-2), 39-49. 10.1177/2319510X18813770

Razen, M., Kirchler, M., & Weitzel, U. (2020). *Domain-specific risk-taking among finance professionals* https://doi-org.ezproxy.nottingham.edu.my/10.1016/j.jbef.2020.100331

Rice, D. (2005). *Variance in risk tolerance measurement: Toward a uniform solution*

Roberts, B. W., Walton, K. E., & Viechtbauer, W. (2006). Patterns of mean-level change in personality traits across the life course: A meta-analysis of longitudinal studies. *Psychological Bulletin, 132*(1), 1-25. 10.1037/0033-2909.132.1.1

Roszkowski, M. J., & Grable, J. E. (2010). Gender differences in personal income and financial risk tolerance: How much of a connection? *The Career Development Quarterly, 58*(3), 270-275. 10.1002/j.2161-0045.2010.tb00192.x

Rumbold, J. L., Madigan, D. J., Murtagh-Cox, A., & Jones, L. (2021). Examining profiles of the big five and sensation seeking among competitive climbers. *Psychology of Sport and Exercise, 55*, 101951. 10.1016/j.psychsport.2021.101951

Ryder, B. (2022). The slumps that shaped modern finance. *The Economist Newspaper Limited 2022* https://www.economist.com/news/essays/21600451-finance-not-merely-prone-crises-it-shaped-them-five-historical-crises-show-how-aspects-today-s-fina

Sadi, R., Asl, H., & Rostami, M. (2011). Behavioral finance: The explanation of investors' personality and perceptual biases effects on financial decisions. *International Journal of Economics and Finance, 3*10.5539/ijef.v3n5p234

Sarstedt, M., Hair, J. F., Cheah, J., Becker, J., & Ringle, C. M. (2019). How to specify, estimate, and validate higher-order constructs in PLS-SEM. *Australasian Marketing Journal, 27*(3), 197-211. 10.1016/j.ausmj.2019.05.003

Scherer, K. R. (2005). What are emotions? and how can they be measured? *Social Science Information, 44*(4), 695-729. 10.1177/0539018405058216

Schermerhorn, J. R. (2009). *Exploring management*. John Wiley & Sons.

Schmidt, B., Holroyd, C. B., Debener, S., & Hewig, J. (2017). I can't wait! neural reward signals in impulsive individuals exaggerate the difference between immediate and future rewards. *Psychophysiology, 54*(3), 409-415. 10.1111/psyp.12796

Schwartz, B., Ward, A., Monterosso, J., Lyubomirsky, S., White, K., & Lehman, D. R. (2002). Maximizing versus satisficing: Happiness is a matter of choice. *Journal of Personality and Social Psychology, 83*(5), 1178-1197. 10.1037/0022-3514.83.5.1178

Sekaran, U., & Bougie, R. (2016). *Research methods for business: A skill-building approach*. Wiley.

Shanaev, S., Shuraeva, A., & Fedorova, S. (2021). The groundhog day stock market anomaly. *Finance Research Letters, 47,* 102641. 10.1016/j.frl.2021.102641

Shani, Y., & Zeelenberg, M. (2012). Post-decisional information search: Balancing the pains of suspecting the worst with the comforts of knowing the worst. *Social Influence: Social Influence and Consumer Behavior, 7*(3), 193-210. 10.1080/15534510.2012.679219

Shapiro, G. K., & Burchell, B. J. (2012). Measuring financial anxiety. *Journal of Neuroscience, Psychology, and Economics, 5*(2), 92-103. 10.1037/a0027647

Sheng, J., Xu, S., An, Y., & Yang, J. (2021). Dynamic portfolio strategy by loss-averse fund managers facing performance-induced fund flows. *International Review of Financial Analysis, 73*10.1016/j.irfa.2020.101609

Shiv, B., Loewenstein, G., Bechara, A., Damasio, H., & Damasio, A. R. (2005). Investment behavior and the negative side of emotion. *Psychol Sci, 16*(6), 435-439. 10.1111/j.0956-7976.2005.01553.x

Shrira, I., Wisman, A., & Noguchi, K. (2018). Diversity of historical ancestry and personality traits across 56 cultures. *Personality and Individual Differences, 128,* 44-48. https://doi-org.unmezproxy.idm.oclc.org/10.1016/j.paid.2018.02.013

Shu, M., Song, R., & Zhu, W. (2021). The 'COVID' crash of the 2020 U.S. stock market. *The North American Journal of Economics and Finance, 58,* 101497. https://doi-org.unmezproxy.idm.oclc.org/10.1016/j.najef.2021.101497

Simon, H. A. (1956). Rational choice and the structure of the environment. *Psychological Review, 63*(2), 129-138. 10.1037/h0042769

Sirigu, A., Dolan, R. J., Coricelli, G., O'Doherty, J.,P., Critchley, H. D., & Joffily, M. (2005). Regret and its avoidance: A neuroimaging study of choice behavior. *Nature Neuroscience, 8*(9), 1255-1262. 10.1038/nn1514

Son, N. T., & Nguyen, N. M. (2019). *Prospect theory value and idiosyncratic volatility: Evidence from the korean stock market* https://doi.org/10.1016/j.jbef.2018.11.006

Stange, J. P., Bessette, K. L., Jenkins, L. M., Peters, A. T., Feldhaus, C., Crane, N. A., Ajilore, O., Jacobs, R. H., Watkins, E. R., & Langenecker, S. A. (2017). Attenuated intrinsic connectivity within cognitive control network among individuals with remitted depression: Temporal stability and association with negative cognitive styles. *Human Brain Mapping, 38*(6), 2939-2954. 10.1002/hbm.23564

Steinberg, L. (2008). A social neuroscience perspective on adolescent risk-taking. *Developmental Review, 28*(1), 78-106. 10.1016/j.dr.2007.08.002

Strömbäck, C., Lind, T., Skagerlund, K., Västfjäll, D., & Tinghög, G. (2017). *Does self-control predict financial behavior and financial well-being?* https://doi.org/10.1016/j.jbef.2017.04.002

Szasz, P. L., Hofmann, S. G., Heilman, R. M., & Curtiss, J. (2016). Effect of regulating anger and sadness on decision-making.*45*(6), 479-495. 10.1080/16506073.2016.1203354

Tamir, M. (2021). Effortful emotion regulation as a unique form of cybernetic control. *Perspectives on Psychological Science, 16*(1), 94-117. 10.1177/1745691620922199

Tauni, M. Z., Fang, H. X., & Iqbal, A. (2017). *The role of financial advice and word-of-mouth communication on the association between investor personality and stock trading behavior: Evidence from chinese stock market* https://doi.org/10.1016/j.paid.2016.11.048

Toffalini, E., Bellavitis, B., & Cornoldi, C. (2015). Enhanced memory for negative scripted material in low compared to high sensation seekers. *Journal of Research in Personality, 57*, 48-52. 10.1016/j.jrp.2015.03.004

Trepel, C., Fox, C. R., & Poldrack, R. A. (2005). *Prospect theory on the brain? toward a cognitive neuroscience of decision under risk* https://doi-org.ezproxy.nottingham.edu.my/10.1016/j.cogbrainres.2005.01.016

Uddin, M., Chowdhury, A., Anderson, K., & Chaudhuri, K. (2021). The effect of COVID – 19 pandemic on global stock market volatility: Can economic strength help to manage the uncertainty? *Journal of Business Research, 128*, 31-44. 10.1016/j.jbusres.2021.01.061

Van den Berg, M., van Nes, R., & Hoogendoorn, S. (2018). Estimating choice models to quantify the effect of herding on the decision to evacuate: Application of a serious gaming experimental setup. *Transportation Research Record, 2672*(1), 161-170. 10.1177/0361198118784404

Vasileiou, E. (2021). Explaining stock markets' performance during the COVID-19 crisis: Could google searches be a significant behavioral indicator? *Intelligent Systems in Accounting, Finance & Management, 28*(3), 173-181. 10.1002/isaf.1499

Velupillai, K. V., & Kao, Y. (2014). *Computable and computational complexity theoretic bases for herbert Simon's cognitive behavioral economics* https://doi.org/10.1016/j.cogsys.2013.07.005

Verduyn, P., Delvaux, E., Van Coillie, H., Tuerlinckx, F., & Van Mechelen, I. (2009). Predicting the duration of emotional experience: Two experience sampling studies. *Emotion (Washington, D.C.), 9*(1), 83. 10.1037/a0014610

Vosylis, R., & Erentaitė, R. (2020). Linking family financial socialization with its proximal and distal outcomes: Which socialization dimensions matter most for emerging adults' financial identity, financial behaviors, and financial anxiety? *Emerging Adulthood (Thousand Oaks, CA), 8*(6), 464-475. 10.1177/2167696819856763

Walsh, E., & Ayton, P. (2009). My imagination versus your feelings: Can personal affective forecasts be improved by knowing other peoples' emotions? *Journal of Experimental Psychology: Applied, 15*(4), 351-360. 10.1037/a0017984

Wang, C., Zhao, H., & Zhang, H. (2020). Chinese college students have higher anxiety in new semester of online learning during COVID-19: A machine learning approach. *Frontiers in Psychology, 11*, 587413-587413. 10.3389/fpsyg.2020.587413

Watkins, E. R. (2008). Constructive and unconstructive repetitive thought. *Psychological Bulletin, 134*(2), 163-206. 10.1037/0033-2909.134.2.163

Watkins, E. R., & Roberts, H. (2020). Reflecting on rumination: Consequences, causes, mechanisms and treatment of rumination. *Behaviour Research and Therapy, 127*10.1016/j.brat.2020.103573

Wen-Hsien Huang, & Zeelenberg, M. (2012). Investor regret: The role of expectation in comparing what is to what might have been. *Judgment and Decision Making, 7*(4), 441-451.

Wilson, T. D., & Gilbert, D. T. (2005). Affective forecasting: Knowing what to want. *Curr Dir Psychol Sci, 14*(3), 131-134. 10.1111/j.0963-7214.2005.00355.x

Wilson, T. D., & Gilbert, D. T. (2008). Explaining away: A model of affective adaptation. *Perspect Psychol Sci, 3*(5), 370-386. 10.1111/j.1745-6924.2008.00085.x

Wilson, T. D., Wheatley, T., Meyers, J. M., Gilbert, D. T., & Axsom, D. (2000). Focalism: A source of durability bias in affective forecasting. *Journal of Personality and Social Psychology, 78*(5), 821-836.

10.1037/0022-3514.78.5.821

Wu, B., Cai, Y., & Zhang, M. (2021). Investor sentiment and stock price crash risk in the chinese stock market. *Journal of Mathematics (Hidawi), 2021*, 1-10. 10.1155/2021/6806304

Xu, L., Chen, J., Zhang, X., & Zhao, J. (2021). COVID-19, public attention and the stock market. *Accounting and Finance (Parkville), 61*(3), 4741-4756. 10.1111/acfi.12734

Xu, X., Spinrad, T. L., Cookston, J. T., & Matsumoto, D. (2020). The relations of parental emotion dysregulation and emotion socialization to young adults' emotion dysregulation. *Journal of Child and Family Studies, 29*(3), 725-737. 10.1007/s10826-019-01619-x

Yusof, S. A. (2015). Household bargaining, financial decision-making and risk tolerance. *International Journal of Business & Society*, *16*(2), 221-236. http://search.ebscohost.com/login.aspx?direct=true&AuthType=cookie,ip,shib,uid&db=bth&AN=109577846&site=ehost-live&scope=site&authtype=shib&custid=s8000044

Zeelenberg, M., & Beattie, J. (1997). *Consequences of regret aversion 2: Additional evidence for effects of feedback on decision making* https://doi-org.ezproxy.nottingham.edu.my/10.1006/obhd.1997.2730

Zheng, Y., Tian, M., Li, Q., & Liu, X. (2019). *Greater tolerance to losses in sensation seeking: Evidence from probability and delay discounting* https://doi-org.ezproxy.nottingham.edu.my/10.1016/j.drugalcdep.2018.09.027

Zhong, X., & Wang, J. (2018). *Prospect theory and corporate bond returns: An empirical study* https://doi.org/10.1016/j.jempfin.2018.02.005

Zhong, X., & Wang, J. (2018). Prospect theory and corporate bond returns: An empirical study. *Journal of Empirical Finance*, *47*, 25-48. 10.1016/j.jempfin.2018.02.005

Zhou, P., Critchley, H., Garfinkel, S., & Gao, Y. (2021). The conceptualization of emotions across cultures: A model based on interoceptive neuroscience. *Neuroscience & Biobehavioral Reviews, 125*, 314-327. https://doi-org.unm-ezproxy.idm.oclc.org/10.1016/j.neubiorev.2021.02.023

Zuckerman, M. (1994). *Behavioral expressions and biosocial bases of sensation seeking*. Cambridge University Press.