BEHAVIOURAL FINANCE AND ITS IMPACTS ON PORTFOLIO MANAGEMENT DECISION: EVIDENCE IN MALAYSIA

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DECLARATION

We hereby declare that:

(1) This undergraduate FYP is the end result of our own work and that due acknowledgement has been given in the references to ALL sources of information be they printed, electronic, or personal.

(2) No portion of this FYP has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.

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DEDICATION

First, we would like to dedicate this research project to our beloved supervisor, Dr Kuah Yoke Chin who is guidable and supportive, and always gave valuable feedback to us throughout the completion for this research.

Second, we intend to dedicate our research to our respective family members and friends to thank for their endless supports in completing this research project and share our achievements with them.

Lastly, this research project is also dedicated to the potential researchers in assisting them in their future studies.

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LIST OF ABBREVIATIONS

ADTV   Average daily trading volume

APT   Arbitrage pricing theory

AVE   Average Variance Extracted

CA   Conbrach's Alpha

CAPM   Capital Asset Pricing Model

CDS   Central Depository System

CME   Chicago Mercantile Exchange

CR   Composite Reliability

DV   Dependent Variable

EMH   Efficient market hypothesis

FTSE   Financial Times Stock Exchange

HTMT   Heterotrait-monotrait

ISE   Islamabad Stock Exchange

IV   Independent Variable

KLCI   Kuala Lumpur Composite Index

KLSEB   Kuala Lumpur Stock Exchange Berhad

MPT   Modern Portfolio Theory

MSE   Malayan Stock Exchange

MYR   Malaysia Ringgit

PLS-SEM   Partial Least Squares Structural Equation Modelling

RSS   Regulated short selling

SEMS   Stock Exchange of Malaysia and Singapore

UTAR   Universiti Tunku Abdul Rahman

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PREFACE

Behavioural finance is an area of finance which emphasizes on the effect of psychological factors towards the investors' behaviours. As it works in a different manner from what the traditional financial theories perceive, hence there remains a lack of studies conducted on the behavioural finance in Malaysia. The situation concerning the importance of understanding behavioural finance can be clearly observed when irrational actions were taken by the Malaysian investors in the stock market during the Covid-19 pandemic. Therefore, this study was conducted to investigate whether several behavioural biases namely overconfidence bias, regret aversion bias, loss aversion bias, representativeness bias, and herding bias play a role in affecting the investment decision made by Malaysian investors. In order to collect the response of Malaysian investors, the method of survey was applied through the distribution of questionnaires on online platform. The data analysis was performed with the execution of several statistical tests. Eventually, this study provides useful information in raising the awareness of behavioural finance in Malaysia towards the related parties.

ABSTRACT

In order to examine whether the behavioural biases play a role in affecting the Malaysian's investment decision making, this study which concerns the relationship between the investment decision made by Malaysian investors and several behavioural biases was conducted. There was a total of 163 respondents who took part in this study through online platform. In this study, the statistical results of Cronbach's alpha, composite reliability, average variance extracted (AVE), discriminant validity, and hypotheses testing were obtained through the execution of Partial Least Squares Structural Equation Modeling (PLS-SEM). Besides, this study discovered some of the studied biases which are overconfidence bias, representativeness bias, and herding bias possessed significant relationship with the investment decision made by Malaysian investors while the others which includes regret aversion bias and loss aversion bias did not. It is observed that the Malaysian investors tend to be overconfident, stereotyped, and relied on others' information while making their investment decisions. On the other hand, they are not afraid of making investment decision even though it could possibly cause them to be regretful or suffer loss. At last, this study serves to provide insights and recommendations for multiple parties such as the society, investors, investment advisors, and corporations.

CHAPTER 1:   RESEARCH OVERVIEW

1.0   Introduction

Unlike traditional financial theories which expect investors to be consistently rational in making financial decisions, behavioural finance is a finance area of study which puts emphasis on the psychological factors towards the investors' behaviours. It makes the assumption that the investors are not always rational and the investment decisions can be partially affected by the psychological factors. Regarding this, this study serves a purpose in investigating the effect of several behavioural biases namely overconfidence bias, regret aversion bias, loss aversion bias, representativeness bias, and herding bias towards the investment decision of Malaysian investors.

In this chapter, five subtopics related to research overview are being discussed. Finally, the conclusion summarizes the chapter.

1.1   Research Background

1.1.1   Malaysian Stock Market

Stock market is a significant indicator or key driving force of economic performance (Janor, Halid & Rahman, 2005). Stock market is a place where the issued stocks are transferred, traded, and circulated. The stock market

includes the exchange market and the over-the-counter market. According to Omar and Halim (2015), the stock market has become an entity which allows investors or individuals to trade company shares.

In 1930, Malaysia's first formal securities organization, Singapore Stockbrokers' Association was set up, but there was no public exchange until the Malayan Stock Exchange (MSE) was established in 1960. After Singapore seceded from Malaysia in 1965, the exchange continues to operate as usual in both countries but was renamed as Stock Exchange of Malaysia and Singapore (SEMS). In 1973, after the currency interchangeability agreement among Malaysia and Singapore was terminated, the SEMS was split into the Kuala Lumpur Stock Exchange Berhad (KLSEB) and the Stock Exchange of Singapore (SES). In the same year, the KLSEB was taken over by Kuala Lumpur Stock Exchange (KLSE) and renamed as KLSE. In 2004, the KLSE was renamed as Bursa Malaysia, making it to be a diversified international exchange. Besides, Bursa Malaysia provided a comprehensive market capitalization analysis of the performance of Malaysia's 30 largest companies by using the Kuala Lumpur Composite Index (KLCI), the main index for Malaysian stock market (Kwong et al., 2017). According to Bursa Malaysia (n.d.), there are 936 companies listed in Bursa Malaysia as of 2020. The total market capitalization of listed companies in Malaysia reached 403.96 billion US dollar (USD) as of December 2019 ("Malaysia Market Capitalization of Listed Companies", 2020). This shows the significance of stock exchange in market that can influence the Malaysia's economic movement and investors' wealth.

Figure 1.1: FTSE Bursa Malaysia KLCI from 2016 to 2020
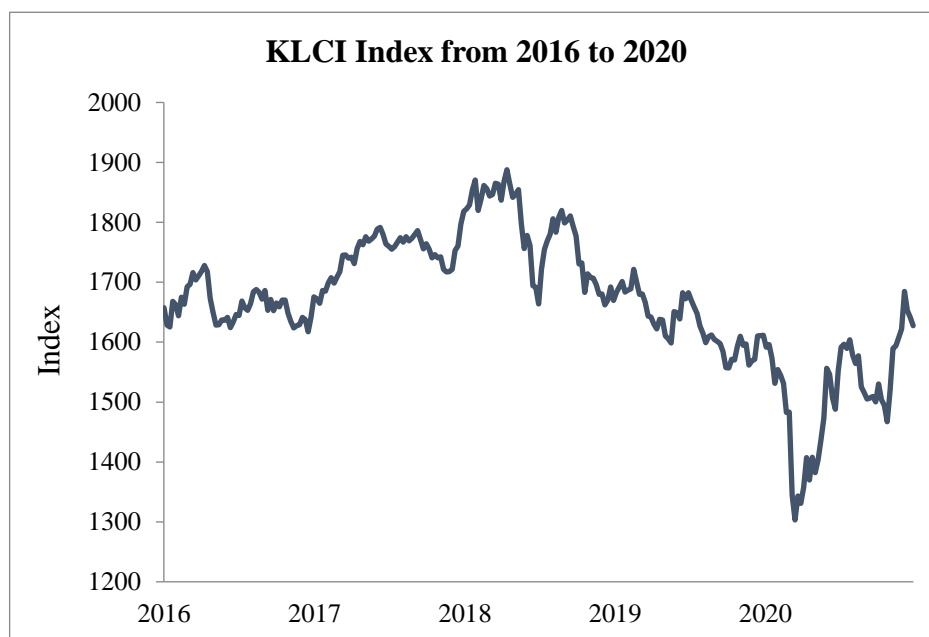
Source: Yahoo Finance (2016 – 2020)

Figure 1.1 shows the weekly data of FTSE Bursa Malaysia KLCI (FBM KLCI) from 2016 to 2020. It illustrates the fluctuation of Malaysia stock index within the five years. The index reached the highest point in 2018, which nearly attained 1,900 and had the lowest point at 1,303 in 2020.

1.1.2 Malaysian Investors

Investor refers to any person or institution that invests in securities and hopes to earn a return including capital appreciation, interest, and dividend. The majority of individual investors in capital market are comprised of household investors which are known as retail investors. Retail investors usually buy few numbers of shares for their portfolios, in contrast with the institutional investors who make wholesale investments (Mishra, 2014). Through investing in capital market, the financial assets can be owned

directly or indirectly by individual investors in the name of trusts, funds, or companies. Investors have many investment choices that can help them in achieving their goals. However, the choices vary from one person to another. The investment choices made by the investors do not only depend on the investment goals, but they also rely on the investors' financial literacies. Hence, different investors have their own investment strategies to achieve their investment objectives.

Apart from that, an investment strategy can be referred to the way of how the investors allocate capitals in their portfolios. The strategy should take the investors' risk tolerance into account as well as their future needs for capital (Rosemary, Kaku & Hashimu, 2017). As different investors have different levels of risk tolerance, some investors will prefer to invest in the low-risk investment such as certificates of deposit, high-yield savings account, and corporate or government bonds (Lim, 2020). On the other hand, some investors will prefer to invest in high-risk investment including real estate, derivatives market, and mutual fund to gain a higher return (Karim, Wenceslas & Shukri, 2016). Additionally, the investment strategy also depends on the personal belief which guides an investor's investment behaviour (Rosemary et al. 2017).

Furthermore, the average daily trading volume (ADTV) can be defined as the average number of stocks that is traded in a given stock in a given day. In 2020, the retail ADTV in Malaysia surged by 236% year on year to an all-time high of RM1.6 billion. In reference to Msmeadmin (2021), the ADTV retail investors who aged between 35 and 54 are accounted for 50% of the total volume. As specified by Tan Sri Abdul Wahid Omar, the chairman of Bursa Malaysia, the retail investors aggressively entered the

market, causing the Bursa's securities and derivatives trading to surge. This leads to the bourse's record performance for the fiscal year 2020 since its listing in 2005 (Kana, 2020). He also stated that about 65% of the new Central Depository System (CDS) accounts registered in 2020 are investment recruits aged between 25 and 40. In the long run, this is beneficial for the long-term sustainable development of the market (Msmeadmin, 2021). In conclusion, Malaysian retail investors are being more participative in the stock market.

Figure 1.2: FTSE Bursa Malaysia KLCI Trading Volume from 2016 to 2020
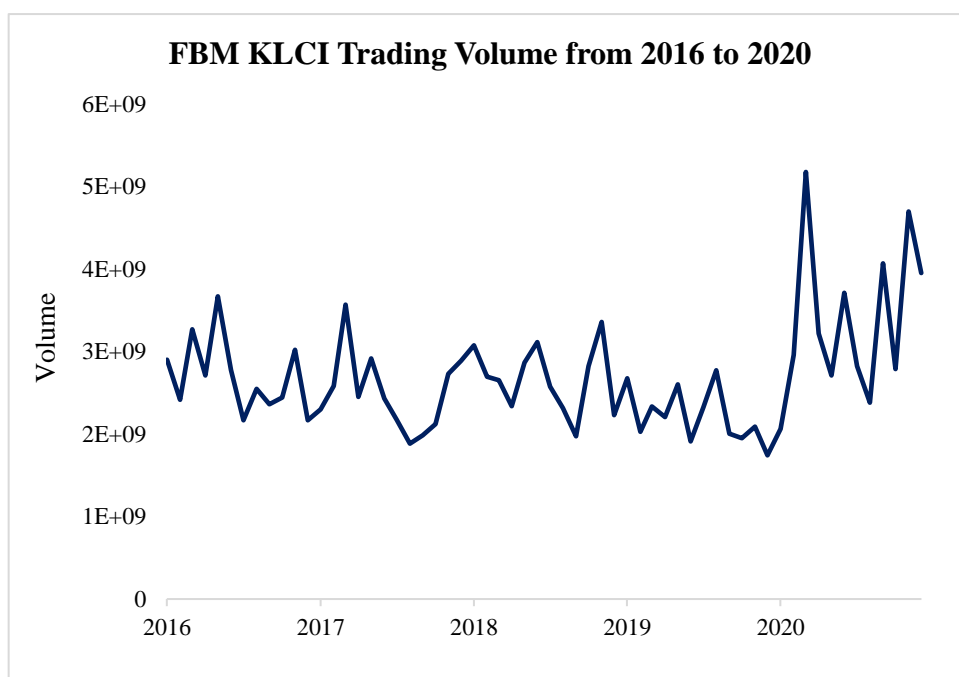
Source: Yahoo Finance (2016 – 2020)

Figure 1.2 shows the trading volume of FBM KLCI from 2016 to 2020. The highest trading volume is in March 2020 which achieved 5.18 billion and the lowest trading volume is in December 2019 at 1.74 billion.

1.2   Problem Statement

According to Cheong (2021), the participation of retail investor had significantly increased in 2020. As a matter of fact, the retail average daily trading volume (ADTV) increased by 236% to RM1.6 billion (Cheong, 2021). Besides, the registration of Central Depository System (CDS) accounts increased by 125% in the first half of the year 2020 as compared to a year earlier (The Edge Markets, 2020). These have shown that more citizens are aware of the importance of investing and started to make investment. This is not an issue if the investors are rational in making investment decisions. Regarding this, the phenomenon of irrational investment behaviour is observed from the retail investors in Malaysia.

As an illustration, the regulated short selling (RSS) has been banned in Malaysia from 24th March 2020 to 31st December 2020 when the global market was hammered by the Covid-19 pandemic (Lim, 2020). When the ban on regulated short selling (RSS) lifted, Top Glove which share price rose a lot in 2020 had been shorted 106.11 million shares with RM573.22 million total worth (Shankar, 2021). On 29th January 2021, Malaysian retail investors gathered and pushed "Top Glove" share price from RM6.21 to RM6.74 (Zainul, 2021) just to fight the financial institution who shorted the medical glove counter after being inspired by the "Game Stop Corporation" incident in the United States (Ananthalakshmi, 2021). As a reference, Game Stop Corporation has been shorted by the financial institutions in the U.S., where the retail investors in the U.S. fought the financial institutions by pushing up the share price from around $4 to $346 (Kolhatkar, 2021), and finally the financial institutions had suffered a huge loss from this incident (Akhtar, 2021). However, the retail investors in Malaysia failed to do so. According to KLSE screener, as of 22nd February 2021, the Top Glove price dropped by 14.24% to

RM5.78 from RM6.74 on 29th January 2021. As a result, the retail investors faced loss and trapped in the counter.

Regarding the discussed phenomenon, it is worrisome that the retail investors will suffer a failed investment if they continue the irrational investment behaviours. Therefore, this raises the motivation to conduct a relevant study as the investors might be alerted about the behavioural biases which affect their investment decisions, hence being more cautious in making investment decisions. Besides, as more investors have participated in the equity market, it is helpful for the investors to have a clear understanding on the behaviour biases before making investment decisions.

In connection with the stated study, the behavioural financial theory is brought in to find out the impact of behavioural biases (overconfidence bias, regret aversion bias, loss aversion bias, representativeness bias, and herding bias) on the investment decision. The study mainly focuses on Malaysian investors from different ages and targets the respondents with investment experience as this can provide a more specific result of the investors' behavioural biases towards their investment decisions.

1.3   Research Questions

1.3.1   General Research Question

What are the behavioural biases that affects an investor's investment decision?

1.3.2   Specific Research Questions

a.   Does overconfidence bias significantly affect an investor's investment decision?

b.   Does regret aversion bias significantly affect an investor's investment decision?

c.   Does loss aversion bias significantly affect an investor's investment decision?

d.   Does representativeness bias significantly affect an investor's investment decision?

e.   Does herding bias significantly affect an investor's investment decision?

1.4   Research Objectives

1.4.1   General Research Objective

The objective of this study is to investigate whether the behavioural biases including overconfidence bias, regret aversion bias, loss aversion bias, representativeness bias, and herding bias will affect an investor's investment decision.

1.4.2   Specific Research Objectives

a.   To study the relationship between overconfidence bias and an investor's investment decision.

b.   To study the relationship between regret aversion bias and an investor's investment decision.

c.   To study the relationship between loss aversion bias and an investor's investment decision.

d.   To study the relationship between representativeness bias and an investor's investment decision.

e.   To study the relationship between herding bias and an investor's investment decision.

1.5   Research Significance

According to Yildirim (2017), efficient market hypothesis (EMH) states that the stock prices reflect all the information in an efficient market and assumes that the investors are rational in all conditions. However, in reality, the investors might not always act in a rational way and their investment decision-making might be influenced by the psychological or emotional elements. Thus, the study of behavioural finance is important to explain the investors' actual behaviours in the investment decision-making process.

Regarding this study, it is proposed to study whether the selected behavioural biases namely overconfidence bias, regret aversion bias, loss aversion bias, representativeness bias, and herding bias have influence over the investment decision of individual investor. In fact, these biases are chosen as they can affect an investor's level of risk acceptance in investment decision-making process (Boda, Guniganti, & Ray, 2016). Therefore, this study provides essential information to society as it shows that the investment decision of an investor will not be purely influenced by the current market information and condition, however, it will also be affected by the stated behavioural biases.

Besides, this study provides insights to the investors. It is useful for the investors to understand that their investment decisions can also be affected by behavioural biases and their decisions might not always as rational as they think they are. Hence, they will take the factors of behavioural biases into consideration while making decisions. Consequently, the investors might avoid unnecessary losses in their investment which can be caused by irrational and impulsive decisions since they become more alert while making investment decision. Thus, this study is beneficial

for investors as they can be conscious of these biases and work to avoid them while developing an investment management strategy.

In addition, this study can also work as a reference for the investment advisors to study the effect of behavioural factors towards the investment decision-making. Investment advisors can make use of the information of this study in guiding the individual investors to make a more profitable investment decision in accordance with their investment goals. This study might also help the investment advisors to evaluate the investment decision of their clients based on the behavioural factors. Not only that, as the investment advisors work as the consultants of individual investors for investment guidance, it is recommendable for the advisors to provide behavioural finance related knowledge to the investors and guide them in making rational investment decisions to ensure profit maximization.

Apart from that, this study also serves to provide extra information for the corporations as the corporations are one of the main market players which often involved in the financial market directly. When a corporation has an intention for growth and expansion, it will raise fund or capital in the financial market by either issuing the corporate stocks or bonds. Therefore, it is important for corporation to understand the investing patterns of their potential investors in order to ensure the stock or bond performance. Regarding this, this study aids the corporation in recognizing the irrational investment behaviours of their investors where the psychological and emotional factors can play a part in influencing their decision-makings. Hence, it can be fruitful if the behavioural biases of investors are taken into account, and it might increase the accuracy of the prediction made upon the investors' investment decisions.

In conclusion, this study serves multiple essential purposes for different parties including the society, investors, investment advisors, and corporations. Through this study, it signifies the importance of understanding the effects of the behavioural biases towards the investment decision-making.

1.6   Conclusion

To sum up, the abstracts of Malaysian stock market and investors are presented in the research background. Next, the problem statement details the issue which initiates the interest in conducting this study. Furthermore, the research questions and objectives list out the study aims. Lastly, the significance of research explains potential benefits and insights which can be brought by this study towards the related parties. The literature review will be continued in the following chapter.

CHAPTER 2:   LITERATURE REVIEW

2.0   Introduction

The financial markets performance highly depends on the investors' investment decision. This purpose of this study is to investigate the relationship between the dependent variable and independent variables. The investment decision made by individual investor serves as the dependent variable of this study, whereas the independent variables are overconfidence bias, regret aversion bias, loss aversion bias, representativeness bias, and herding bias. This chapter does not only explain the dependent variable and independent variables used in the study, but also the underlying theories related to the study. Besides, the study framework is also presented in this chapter.

2.1   Underlying Theories

2.1.1   Behavioural Finance Theory

The idea of behavioural finance theory was inspired by Amos Tversky and Nobel Laureate Daniel Kahneman, the psychologists who studied on the human biases and cognitive error (Wamae, 2013). In the early of 1990s, behavioural finance theory was proposed to challenge the modern portfolio theory which assumed the market is efficient and investors are rational by combining the psychological factors and finance theories (Masini & Menichetti, 2012). The behavioural finance theory emerged as it can explain

the financial market anomalies which cannot be explained by the modern financial theories.

As mentioned by Velnampy (2017), behaviour finance tried to explain the phenomena of irrational investment decisions from the view of psychology and biases. Khoshnood and Khoshnood (2011) explained that the behavioural biases which affect the investment decisions are caused by the influence from different perspectives such as personality, experiences, judgement, and other social issue. Thus, under behavioural finance theory, the financial decisions made will be less rational since it was subjected to the behavioural biases (Xu, 2014). Overall, behavioural finance is the study on the human emotional factors and psychological activities in the investment decision-making process and analysis, thinking that all these factors play a decisive role in the human decision-making process.

The studies from Rehan and Umer (2017), Ebenezer and Bankole (2020), Dominic (2020), Banerji, Kundu, and Ahmed (2020), Sharma (2019), and Antony (2017) have concluded that the biases such as overconfidence bias, representative bias, regret aversion bias, mental accounting, herding bias, anchoring bias, and availability bias are the factors affecting the investment decisions. Barberis and Thaler (2003) have also concluded that there are evidence from cognitive psychology experiment which reveals that the biases and irrationalities take place when the investors' preferences and beliefs are formed. Hence, the investors are found out to be making their decisions in great reliance to their preferences and beliefs.

2.1.2　Efficient Market Hypothesis

Efficient market hypothesis (EMH) or efficient market theory expresses that the share prices of stock reflect all information. This theory is developed by Eugene Fama in his 1979 book titled "Efficient Capital Markets: A Review of Theory and Empirical Work". Fama believes that all information that is related to the share price is freely available or "universally shared" among investors. According to Downey (2021), EMH hypothesizes that the stocks are traded at their fair values. It assumes that there are always many buyers and sellers in the market, causing the share price to fluctuate. Thus, the stock prices are always unpredictable. Regarding EMH, no one in the market can make a precise guess on the stock price movement nor hide any information from the financial market. For instance, if a company generates a great loss in its business, it can reduce the investors' confidence towards the company. As a result, the investors might withdraw their investments from the stated company and this can influence the company share price.

Aside from that, Subash (2012) mentioned that there are a few assumptions which are made in EMH: (1) all investors have equal access to the historical stock prices and information available; (2) no investor has any advantage over the other investors in making investment decision; (3) all of the investors are rational; (4) no investor can beat the market in a long run; (5) stock prices will change erratically. Therefore, EMH always assumes the investors are rational in making their investment decisions.

Apart from that, random walk theory, which is the main idea of EMH, pointed out that it is impossible for any investor to outperform the market. In addition, random walk theory also suggests that the future price of a stock

is independent of its own historical price movement as well as the prices of other stocks (Kisaka, 2015). For this reason, it is impossible for the investors to outperform the market since the stock price is uncontrollable (Smith, 2020). With that being the case, this theory assumes both stock analysis which comprises of technical and fundamental analysis are not reliable (Smith, 2020).

Furthermore, EMH consists of three variations which are weak, semi-strong, and strong forms. Each form represents a different level of the market efficiency. Firstly, the weak form assumes that the stock price today only reflects the data of past prices. The price may not reflect the new information that is not publicly available. On top of that, the past information of a particular stock such as its volume and chart pattern are independent of its future price. Therefore, investors are impossible to earn high gains by simply analysing historical data because the historical data is independent of the future price. As an example, if a company generates high earnings in the previous year, its outstanding performance will have no impact towards its current share price. This is because although the company was capable in making great profits in the previous year, the high earnings cannot be guaranteed for the subsequent years. Secondly, the semi-strong form of EMH believes that all information is publicly used in calculating the share's current price (Maverick, 2020). According to Subash (2012), the semi-strong form stated that the investors are impossible to earn superior return by only using publicly available information because all these information are already incorporated into the share prices. Thirdly, the strong form of EMH stated that the share price will always react to all details including historical, current, and insider information. However, Nada (2013) asserted that investors can make greater gains with the earlier access to the insider

information. In addition, Nada (2013) also stated that the actual financial markets are supported by all three forms of EMH. The financial markets cannot work efficiently with only the strong form of EMH.

2.1.3   Modern Portfolio Theory

Modern portfolio theory (MPT) was introduced by Harry Markowitz in 1952 with an article named "Portfolio Selection". As specified by Chen (2020), MPT can be applied by the risk-averse investors in constructing their portfolios where their portfolio returns will be maximized based on the level of market risk. Not only that, MPT can also be applied by the investors to minimize their investment risk for a given expected return. However, as it requires ones to hold many different types of financial assets in order to practice MPT, MPT is more advisable for the fund managers instead of individual investors. In addition, Shikuku (2012) explained that the MPT suggested the investors to diversify their investment portfolios as it can reduce the total investment risk. On top of that, non-systematic risk can also be reduced through portfolio diversification. Therefore, the investors should learn to diversify their portfolio effectively.

According to Omisore, Yusuf, and Christopher (2012), MPT assumes that the investors are always rational while making investment decision. This assumption is also applied in the efficient market hypothesis (EMH). Hence, both theories assume the market is efficient due to the rationality of the investors. Based on these two theories, when many investors make irrational investment decisions, it can adversely affect the efficiency of financial market as the security price will be influenced.

Besides, Kan and Zhou (2007) shared that an optimal portfolio of mean-variance for an investor is a combination of tangency portfolio and riskless asset. This will allow the separation of two funds. In fact, different combinations of assets in a portfolio are associated with different levels of return. Therefore, the optimal portfolio concept can be applied to find out the best combination which provides the maximum expected return. Through portfolio diversification, some stocks will move in the same direction under certain circumstance whereas the others will move in the opposite way. As the more the price trends are out of sync, the lower the covariance between these assets will be, hence reducing the overall risk (Dikov, 2020). In short, optimal portfolio does not aim for high return or low-risk investment, it aims for assets that will carry the best potential returns.

Other than that, Elton and Gruber (1997) stated that the MPT is normally implemented in forecasting model. By practicing MPT, ones need to carry out predictions and estimations on the stocks which they wish to invest in. This is because MPT requires forecasted values for the calculation of risk and return on the investment. In order to obtain the forecasted values, the investors will have to use the historical values of the assets. However, it is very difficult for the investors to predict the future values of assets as it considers many changing variables, thus the forecasted values may not be accurate (Ang, Kong, Ong, Poo, & Tan, 2019).

2.1.4 Linkage between the underlying theories and this study

The theories which links to this study such as behavioural finance theory, efficient market hypothesis, and modern portfolio theory are presented. The efficient market theory and modern portfolio theory have the similarity in assuming the investors are rational in making investment decisions. However, these theories cannot explain the market anomalies and the irrational behaviours in the practical world. Therefore, the behavioural finance theory which can explain the market anomalies and irrational behaviours emerged and this study aims to discover the biases which affects investment decisions according to behavioural finance theory.

2.2 Review of Variables

2.2.1 Investment Decision

Investment decision is the dependent variable that is being tested in this study. As stated by Simon (1955), it is believed that the investment decision is often made by a rational investor. A rational investor is assumed that he or she is knowledgeable, logical, reasonable, and skilful in maximizing his or her preferences with minimal cost. It means that the investors are well-informed, not influenced by their emotions, and careful in making the investment decision in order to achieve their investment goals. However, Byrne and Utkus (2013) argued that the actual situation happened in the market does not match with the assumptions above.

According to Byrne and Utkus (2013), human decision-making, including investment decision will be affected by the behavioural biases. Behavioural biases assume that there is an overlap between the cognitive and emotional biases (Baker & Ricciardi, 2014). Thus, the behavioural finance is a study in explaining the investors' behaviour through psychology (Aigbov & Ilaboya, 2019). The study of behavioural finance has been growing over the last twenty years and it believes the investors are rarely behaved rationally (Byrne & Utkus, 2013). In reference to the finding of Wamae (2013), the investors' decisions are not always rational as what stated by Simon (1955). It is found out that there is a significant relationship between the investment decision and behavioural biases.

2.2.2   Overconfidence Bias

Overconfidence bias is defined as the investor's tendency to overestimate the information that they have and underestimate the risk of their investment (Odean, 1998). The investors with overconfidence bias tend to believe that they have better information and abilities in investing which is often not true. In this way, they overestimate their capabilities and may suffer losses due to the irrational decisions which they made as a result of overconfidence bias (Qadri & Shabbir, 2014).

Besides, Sindhu and Waris (2014) indicated that the past investment returns can lead the investors to be overconfident as a positive relationship between the turnover and past returns is found. Moreover, it is also analysed that the overconfidence bias is positively related to the return risk (Sindhu & Waris,

2014). Thus, the investors can become overconfident due to the past information. As a consequence, it will affect their investment decisions (Qadri & Shabbir, 2014).

Apart from that, Qadri and Shabbir (2014) concluded that the overconfidence bias gives a significant impact towards the investor's decision in Islamabad Stock Exchange (ISE). It also showed that the investors with overconfidence bias will trade frequently based on their skills, knowledge and experience, thus this can affect their investment decision. As a result, the investors with overconfidence bias will overtrade in market. Consequently, it leads to the negative impact on their investment returns as they overestimate the investment value (Byrne & Utkus, 2013).

Furthermore, Hunjra, Rehman, and Qureshi (2012) found out that the overconfidence bias plays a significant role in affecting the investment decision positively and this finding corresponds to the research of Lim (2012) and Subramaniam and Velnampy (2017). However, Onsomu (2014) argued that overconfidence bias is insignificant in influencing the investors' decision since there are less than 50% of the investors in Kenya are being affected by it. Not only that, Rekik and Boujelbene (2013) also concluded that the overconfidence bias has no influence towards the investment decision as the Tunisian investors seem to be under-confident in investing. Likewise, the investment decision of the individual investors in Nigeria is also not significantly related to the overconfidence bias (Aigbov & Ilaboya, 2019).

2.2.3 Regret Aversion Bias

Regret aversion bias is a psychological error that happened due to the feelings of fear of regret. These individuals are unwilling to admit the mistake they made if it is due to their poor investment decision (Subash, 2012). People who are regret-averse are afraid of two types of errors. Firstly, they are fear of the error of omission, which is the error that the investors have forgone the opportunity to buy the right and gained investment. Secondly, they are also fear of the error of commission, which is the error that the investors have made a poor investment decision (Sharma, 2019).

As mentioned by Forgel and Berry (2006), investors who are regret-averse are unable to make an investment decision quickly and effectively since they refuse to admit the poor investment decisions that are made by themselves. Thus, it may lead to losses as the regret-averse investors tend to keep the investment with poor performance for an extended period because they think of the possibilities to be regretful in forgoing the gain opportunity too soon. Additionally, as stated by Fogel and Berry (2006), these investors do not show any regret if the losses of their investments are due to the advice from other people such as the brokers.

Aside from that, Sharma (2019) shared that there is a significant relationship between the regret aversion bias and investment decisions. This statement is also supported by Kisaka (2015) since the finding found out that the regret aversion bias can significantly affect the investment decision. However, Kengatharan and Kengatharan (2014) pointed out that regret aversion bias does not play a significant role towards the investor's investment decision.

Likewise, Aigbov and Ilaboya (2019) also found out the similar result where the regret aversion bias does not significantly affect investment decision.

Moreover, Subash (2012) and Pashtoon (2016)'s findings concluded that investors are equal likely to exhibit regret aversion bias on their investment decisions regardless of their ages and investing experience. In contrast, Gupta and Ahmed (2016) argued that the experienced investors are more likely to suffer from regret aversion bias than the younger investors in making investment decisions.

2.2.4   Loss Aversion Bias

Loss aversion bias is an important component in the prospect theory which was proposed by Kahneman and Tversky (1979). Loss aversion bias makes people to think that they have suffered greater loss although they face the same amount of gains and losses simultaneously. The disutility of losses is two times of the positive utility of gains (Montier & Strategy, 2002). Loss aversion bias reflects that people have inconsistent risk preferences. When people make a gain in their investment, they tend to be risk averse. On the other hand, people tend to behave in a risk-seeking way when they make loss in their investment (Kahneman & Tversky, 1979). This statement is supported by Chandra and Kumar (2012) where they proved that the investors with loss aversion bias inclined to resort to safer alternatives such as stocks which they knew well. Apart from that, Jayaraj (2013) stated that the investors perceive profit and loss in a different way. The investors prefer to make investment decisions based on their perceived benefits but not perceived losses (Jayaraj, 2013). Additionally, Jayaraj (2013) also stated

that the losses in investment can bring greater impact towards the investors' emotions rather than gains.

Furthermore, investors are more inclined to invest in riskier investment when there is higher possibility in suffering losses. For instance, it is common to observe that the bidder ends up paying more than the actual item price as well as the original price set by the bidder in an auction. According to Thaler (1988), it is called the winner's curse phenomenon. Besides, Ariely and Simonson (2003) observed that some bidders will act irrationally during the auction process. Some bidders will treat the items as their "own" and once the others are bidding up the prices, these bidders will tend to push the prices higher irrationally in order to not lose the items. Eventually, they will obtain the ownership of these items at a price which is much higher than the actual price. This clearly shows the phenomenon of loss aversion bias. Moreover, some researcher called this occurrence as the pseudo-endowment effect and this occurrence indicates that the bidders who do not actually own the items are also susceptible to loss aversion bias (Ariely & Simonson, 2003).

Apart from that, Samal and Mohapatra (2020) and Khilar and Singh (2020) found out that there is a significant and positive relationship between loss aversion bias and investment decision. They pointed out that the investors with loss aversion bias will seek for low-risk investment instead of high-risk investment. Not only that, the researchers also stated that the investors with more experience and higher level of education tend to be more risk and loss averse while making investment decisions. This idea was supported by Narayan (2015) and Pashtoon (2016) who found out that the loss aversion bias is influenced by age and experience when making investment decisions.

In addition, researchers such as Coval and Shumway (2005), and Lehenkari and Perttunen (2004) observed that there is a negative correlation between loss aversion bias and investment decision. The researchers discovered that the investors tend to be risk seeking rather than risk averse after they gain benefits from investment. This finding is supported by Odean (1999) who stated that the investors will be more confident after they gain profit and they will invest in high-risk investment to gain higher return.

2.2.5 Representativeness Bias

Representativeness bias can be defined as the similarity of the events which confuses the individuals' thinking in determining the probability of an outcome of their actions (Tversky & Kahneman, 1983). The investors who have representativeness bias will make investment decision by recollecting the past event or performance rather than the immediate analysis on the stock performance. Representativeness bias will also make the investors to overweigh recent good or bad news while judging the stock performance. Consequently, this can affect the probability of making a good investment decision (Subash, 2012).

While making investment decision, the investors with representativeness bias will associate the good characteristics of a company directly to its stock. However, these stocks will generally be a poor investment for them (Lakonishok, Shleifer, & Vishny, 1994).

Apart from that, DeBondt and Thaler (1995) noted that the investors who have representativeness bias can be observed through the stocks they purchased in stock market. For example, the investors with representativeness bias are inclined to overreact on the stock performance since they tend to buy 'hot' stocks rather than poorly performed stocks (Debondt & Thaler, 1995). This can cause the investors to buy the overpriced stock as they might purchase the stock after its price rises and expect the growth to continue. However, they ignore the stock while its price is lower than the intrinsic value (Alrabadi, Al-Abdallah, & Aljarayesh, 2018).

In addition, as stated by Torngren and Montgomery (2004), there is a positively significant relationship between the representativeness bias and investment decision as the investors merely use the past performance or analysis in building their expectation. This statement is also supported by Patil and Chavan (2020), and Raut, Das and, Mishra (2020). Besides, the research of Alrabadi et al. (2018) pointed out that there is a significant effect of representativeness bias towards the investment performance in Amman Stock Exchange. However, Aigbovo and Ilaboya (2019) argued that representativeness bias has no influence on the investment decision.

As mentioned by Subash (2012), the experienced and younger investors have a higher possibility to suffer from representativeness bias and it causes them to make wrong decisions while investing. On the other hand, Pashtoon (2016) argued that the young investors are less susceptible to the representativeness bias as compared to the experienced investors.

2.2.6 Herding Bias

Herding bias is a conduct that can be commonly observed in the financial markets. It is a kind of blind herding behaviour which can also be known as the "bandwagon effect". In the process of selection and investment, some investors who are incapable in making accurate judgements will tend to follow the ideas of others while making investment decision (Scharfstein & Stein, 1990). This effect can cause a serious cycle. As more investors make the repeated process of a choice, it can increase the investment risk (Tan et al., 2008).

Regarding this, the American scholars, Lakonishok, Shleifer, and Vishny (1992) are the first researchers to systematically study the herding bias in the stock market. Their study of the United States (U.S.) pension funds and small company stocks revealed that there was obvious herding bias in the trading of small company stocks. On the other hand, the pension funds did not show this phenomenon. Besides, the subsequent studies further showed that American mutual funds have a certain degree of herding behaviour. However, different types of funds have a significant difference in the degree of herding bias. In addition, as the number of funds holding stocks increases, the phenomenon of herding bias increases significantly (Lakonishok et al., 1992).

Furthermore, Mobarek, Mollah, and Keasey (2014) found out that there is a positive relationship between herding bias and investment decision making. This statement is proven with the study in European market. When the stock price shows some evident rise or fall trend, the investors will be suspicious of their original investment plan and prone to believe that there is some

information in the market that they have not mastered (Thaler & Johnson, 1990). In this case, the investors will prefer to follow the direction of other investors to avoid losses. This situation is also observed in the Amman Stock Exchange (Alrabadi et al., 2018).

Moreover, Rekik and Boujelbene (2013) investigated the relationship between herding bias and investment decision making among Tunisian investors. A significant relationship was pointed out in their study and they suggested that the changes of demographic characteristics such as experience, gender, and age will affect the herding bias in an investment decision making process. This is because the elder investors are less exposed to the current market situation, causing them to be less sensitive towards the stock market. They also claimed that the female investors show more herding bias as compared to male investors because the female investors are more risk averse (Rekik & Boujelbene, 2013). In contrast, Alrabadi et al. argued that demographics characteristic including gender is insignificant towards the herding bias while making investment decision. Chen et al. (2007) and Onsumu (2014) had also made the same conclusion.

2.3   Proposed Theoretical Framework

Figure 2.1: Proposed Theoretical Framework

Independent Variables
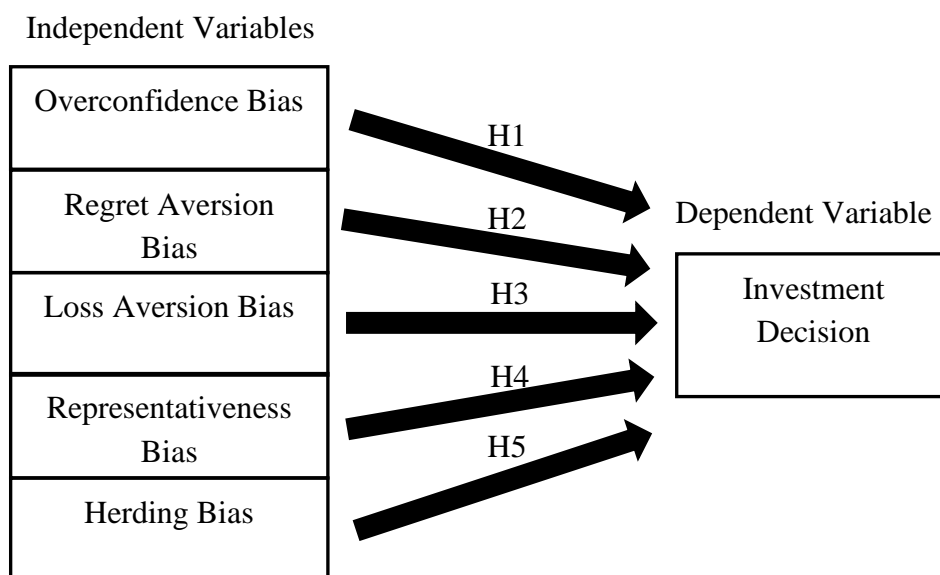
Source: Developed for the Research

Overconfidence bias is expected to have a significant relationship with investment decision in reference to the findings of Chhapra, Kashif, Rehan, and Bai (2018), Bakar and Ng (2016), and Sharma (2019). Next, this study anticipates a significant relationship between regret aversion bias and investment decision due to the equivalent discovery of Samal and Mohapatra (2020), Kisaka (2015), and Rehan and Umer (2017). Apart from that, there is an expectation in observing a significant relationship between loss aversion bias and investment decision through this study as the similar result was given by Akinkoye and Bankole (2020), Samal and Mohapatra (2020), and Kisaka (2015). Besides, representativeness bias is also expected to have a significant relationship with investment decision which is supported by the findings of Rasheed, Rafique, Zahid, and Akhtar (2018), Alrabadi, Al-Abdallah and Aljarayesh (2018), and Raut, Das, and Mishra (2020). Lastly, in line with the findings of Raut et al. (2020), Almansour and Abrabyat (2017), and

Hayat and Anwar (2016), this study is expected to discover a significant relationship between herding bias and investment decision.

2.4　Hypotheses Development

2.4.1　Overconfidence Bias

$H1_0$: There is no significant relationship between overconfidence bias and investor's investment decision.

$H1_1$: There is a significant relationship between overconfidence bias and investor's investment decision.

Based on the research of Pak and Chatterjee (2016), it is discovered that the overconfident investors are more likely to invest in risky asset. In addition, Phan, Rieger, and Wang (2018) pointed out that overconfident investors are associated with the high asset allocation in equity holdings where equities are considered as high-risk investment. Furthermore, Chhapra et al. (2018), and Bakar and Ng (2016)'s findings showed that the overconfidence bias can significantly affect the investment decision. However, Abul (2019), Sashikala and Chitramani (2018), and Aigbovo and Ilaboya (2019)'s findings showed a contrasting result where the overconfidence bias is found out to have no significant impact towards investment decision.

2.4.2   Regret Aversion Bias

$H2_0$: There is no significant relationship between regret aversion bias and investor's investment decision.

$H2_1$: There is a significant relationship between regret aversion bias and investor's investment decision.

According to the research of Kisaka (2015), Samal and Mohapatra (2020), and Rehan and Umer (2017), it is discovered that the regret aversion bias can significantly influence the investment decision. Kisaka (2015) found out that risk aversion bias is commonly discovered among investors and most investors had regretted at least once in their investment lifetime. As most investors make investment with the aim of fulfilling certain long-term goals, the investors will be highly sensitive in making investment decisions as a wrong decision can cost their hard-earned money (Subramaniam & Velnampy, 2017). Therefore, when the investors made mistakes in their past investments, they will regret and avoid to repeat the same mistake (Wamae, 2013). On the other hand, the research of Aigbovo and Ilaboya (2019), and Kengatharan and Kengatharan (2014) stated the opposite result where the regret aversion bias is discovered to have no significant impact towards investment decision.

2.4.3　　　　Loss Aversion Bias

$H3_0$: There is no significant relationship between loss aversion bias and investor's investment decision.

$H3_1$: There is a significant relationship between loss aversion bias and investor's investment decision.

Based on the research of Hallale and Gadekar (2019), the loss aversion bias can influence the investment decision. The investors who make gain in investment will become more risk-seeking as they are discovered to invest more in high-risk assets (Hallale & Gadekar, 2019). In contrast, the investors who suffer losses in investment will behave in a risk-averse manner as they are discovered to have higher asset allocation in low-risk investment (Hallale & Gadekar, 2019). In addition, Kisaka (2015) and Samal and Mohapatra (2020) discovered a significant relationship between loss aversion bias and investment decision. If an investment is not profitable in the initial stage, the investors with loss aversion bias will tend to sell it off immediately (Wamae, 2013). Not only that, the loss aversion biased investors will focus on avoiding losses rather than earning gains (Subramaniam & Velnampy, 2017). However, Kengatharan and Kengatharan (2014), and Aigbovo and Ilaboya (2019) found out there is no significant relationship between loss aversion bias and investment decision.

2.4.4   Representativeness Bias

$H4_0$: There is no significant relationship between representativeness bias and investor's investment decision.

$H4_1$: There is a significant relationship between representativeness bias and investor's investment decision.

As mentioned by Rasheed et al. (2018), the representativeness bias can significantly influence the investment decision as the investors with the stated bias will tend to apply stereotyped information while making investment decisions. In addition, Raut et al. (2020) pointed out that the investors with representativeness bias often make investment decision without conducting any proper analysis. They make investment decision merely based on the historical performance or a few characteristics of the company which they wish to invest in (Raut et al., 2020). Apart from that, Dickason, Nel, and Ferreira (2017) found out both male and female investors are susceptible to representativeness bias where male investors tend to make decision based on stereotypes and female investors rely heavily on the historical performance as they believe the return patterns will be repeated. On the other hand, the findings of Sashikala and Chitramani (2018), and Aigbovo and Ilaboya (2019) observed that the representativeness bias has no significant impact towards investment decisions.

2.4.5   Herding Bias

H5$_0$: There is no significant relationship between herding bias and investor's investment decision.

H5$_1$: There is a significant relationship between herding bias and investor's investment decision.

Based on Raut et al. (2020), and Samal and Mohapatra (2020)'s findings, the herding bias can significantly impact the investment decision. The investors with herding bias are usually the individual investors who have inadequate knowledge in investment, hence they tend to incorporate the recommendations of their friends, colleagues or popular analysts into their portfolios (Subramaniam & Velnampy, 2017). Apart from that, Almansour and Arabyat (2017) also found out the similar result where the investment decision can be significantly influenced by herding bias as investors are very likely to consider other investors' decision before making their own investment decisions. In contrast, Bakar and Ng (2016), Rahman and Soon (2020), and Chhapra et al. (2018) observed the otherwise where the herding bias possesses an insignificant relationship with investment decision.

2.5   Conclusion

This chapter has explained the definition of the related theories such as behavioural finance theory, efficient market hypothesis, and modern portfolio theory. Besides, the definitions of the investment decision, overconfidence bias, regret aversion bias, loss aversion bias, representativeness bias, and herding bias are presented in this chapter. Not only that, the result of related studies is also presented in this chapter. Lastly, this chapter presents the proposed framework as well. The research methodology will be conducted in the following chapter.

CHAPTER 3: METHODOLOGY

3.0   Introduction

This chapter gives explanation of methodology in detail. Firstly, the method used in this study is discussed in the research design. Secondly, this chapter discusses the techniques applied in collecting data. Thirdly, the design of sample, instruments of research, management of constructs, and processing of data which took part in this study are also detailed in this chapter. Ultimately, the data analysis is clearly defined.

3.1   Research Design

Research design is carried out to determine an appropriate structure which the researchers can apply to complete their study (Sileyew, 2019). The research methods used play a significant role in research design as a good research method ensures the study obtains relevant and applicable data. Hence, this contributes to an effective research. For the purpose of further investigation, the Partial Least Squares Structural Equation Modeling (PLS-SEM) will be applied in this study to transform the variables data into empirical results. The PLS-SEM is widely used by the researchers because it can easily estimate complex models with many constructs, indicator variables, and structural paths without imposing distributional assumptions on the data (Hair, Risher, Sarstedt & Ringle, 2019). A survey research has been carried out in this study. Questionnaire set of dependent and independent variables is being distributed to the respondents to obtain the right information about this study to meet the research objective.

3.1.1 Exploratory Research

In this study, the exploratory research is selected because the conduct of this study can help in studying the problem that has not been clearly defined. Besides, the insufficiency of related information about this study is also another reason for implementing exploratory research.

There are a few advantages with applying the exploratory research. Firstly, it is flexible and adaptable to changes (Swedberg, 2018). Secondly, it saves time in the study and provides the initial groundwork for the further use. In a nutshell, by using this technique, the researchers are prepared change their opinion to the study of new data.

3.2 Data Collection Methods

Data collection is a significant step as the researchers need to gather information from relevant sources which helps in answering the research questions and the hypothesis testing. Besides, data collection is an approach to measure the information collected to test the hypothesis and obtain the result (Parveen & Showkat, 2017). The data that are collected should not be complicated, instead it should be easy to understand. This is to ensure that the data are accurate and valid.

3.2.1 Primary Data

Primary data is the main type of data collected in this study. As stated by Ajayi (2017), primary data is the data that is new and fresh which are collected for research purpose. It can also be called as real time data. Besides, the data should also pair with the hypothesis (Hox & Bowije, 2005). To obtain primary data, there are a few types of ways such as measurements, interviews, surveys, and others. In this study, survey is chosen to collect the primary data by distributing the questionnaire to the target population. The questionnaire sets are designed purposely based on the objectives of this study. Thus, it can increase the data quality and accuracy.

After gathering all the data, the data will be analysed by using PLS-SEM. This software is suitable for this study as it can easily test theoretically supported linear and causal models (Wong, 2013). Besides, this software is widely used by business-related research, information systems research, strategic management, and others (Henseler, Hubona & Ray, 2016). The result of factors which are the P-value, compatibility, and discrimination will be the concerned items in this study.

3.3 Sampling Design

Achaya, Prakash, Saxena, and Nigam (2013) indicated that studying the whole population is the best strategy in the research, but studying the sample is more practical instead of the population as it is difficult to collect data if the population is large in size (Bhandari, 2020). A sample refers to the subset of the population and it can be said as the representative of the population (Achaya, et al., 2013). In

reference to Jawale (2020), sampling design is a plan or method to obtain the sample from the population whereas sampling is the process of selecting the suitable sample from the population to determine the characteristics of the population (Majid, 2018). This process is significant in the sense that good sample statistically represents the population of interest in this study. Figure 3.1 shows the steps of sampling process.

Figure 3.1: Steps of Sampling Process
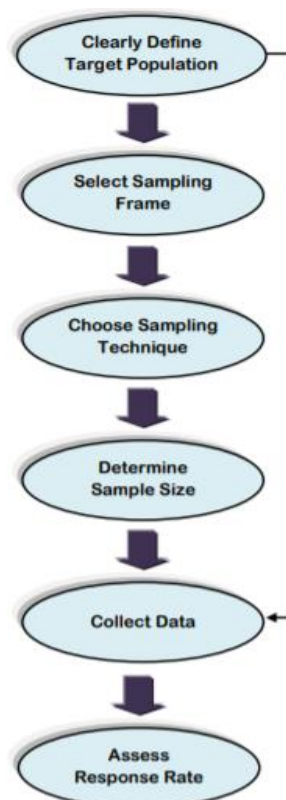
Source: Taherdoost, H. (2016)

3.3.1   Target Population

The target population is the group of people who the research intends to study (Majid, 2018). Since this study aims to find out the behavioural biases that affects the individual investment decision in Malaysia, the target population focuses on the Malaysian who have investment experience in any financial markets. To ensure the result is unbiased, the individual who does not have any investment experience is not the target population. As this study is studying individual investment decision, thus it is truly believed that the respondents who do not make any investment decision before must not be clear on their investing behaviour and hence contributing to a biased result. Besides, this study mainly focuses on Malaysian as the targeted population only. This is because this study aims to show a specific result towards the behaviour of solely Malaysian investors.

3.3.2   Sampling Frame and Sample Location

Sampling frame proposes a list which comprises of samples to be studied (Taherdoost, 2016). In this study, the Malaysian investors are the targeted population, hence, the investor groups on the Facebook such as "investalks", "Learning Investment with Value Envision" and "BursaKakis Investment Club" which gathered the investors are set as the sampling frame. The social media will be the sample location. Hence, the data will be collected from the investor groups on social media through online platform.

3.3.3   Sampling Method

The sampling method of convenience is selected for data collection. The stated method is an approach that selects the respondents who are ready and convenient to fit the research purpose (Etikan, Musa & Alkassim, 2016). This method is chosen as it is affordable and easy for the researchers as compared to other sampling method (Taherdoost, 2016).

3.3.4   Sample Size

Sample size refers to the number of completed responses to be gathered in the survey. Sample size determination is important in research to ensure the research resources have been efficiently used and shown the statistically significant result (Burmeister & Aitken, 2012). According to Kock and Hadaya (2016), one of the methods in determining the minimum sample size is the minimum R-squared method. In reference to this method, the minimum sample size is reckoned by observing the numbers of arrows pointing at the constraint, estimating the R-squared, and determining the significance level. In this study, there are five variables pointing at the latent variable, the R-squared is estimated at 0.1 and the significance level is 5%. Table 3.1 shows a summary of minimum sample size required based on 5% significance level. Hence, through this method, the minimum sample size of this study is 147 samples. Therefore, this study aims to have a minimum sample size of 147 sample size.

Table 3.1: Table for the Minimum R-Squared Method

Maximum number of arrows pointing at a construct	Minimum R^2 in the model			
	.10	.25	.50	.75
2	110	52	33	26
3	124	59	38	30
4	137	65	42	33
5	147	70	45	36
6	157	75	48	39
7	166	80	51	41
8	174	84	54	44
9	181	88	57	46
10	189	91	59	48

Source: Kock, N., & Hadaya, P. (2018).

3.4   Research Instrument

There is solely one instrument being applied in this study, which is the questionnaire survey. It is a widely applied method for data collection since there is no face-to-face contact required (Acharya, 2010). This questionnaire survey will be created in Google form and distributed to respondents through an online platform.

3.4.1   Questionnaire Design

Questionnaire refers to the question set devised with an intention to be asked to the interviewees or respondents to collect the information suitable for analysis (Acharya, 2010). Questionnaire is important to be standardized to ensure that the response of the questions can be interpreted as a reflection of the differences among the respondents' behaviour. A standardized questionnaire means that all the respondents face the same questions and same system of coding responses (Siniscalco, 2005). In this study, a set of questionnaires consisting of two sections with 26 questions in total will be distributed.

Section A contains eight questions which are related to demographic factors. Next, Section B comprises the questions related to the dependent variable and independent variables. This section applies the 5-points Likert scale for respondents to answer the questions, where Scale 1 refers to strongly disagree, Scale 2 refers to disagree, Scale 3 refers to neutral, Scale 4 refers to agree and Scale 5 refers to strongly agree.

3.4.2 Pilot Test

Pilot test can be defined as a miniature study which works as a trial to prepare the research protocols and research technique for actual data collection (Hassan, Schattner, & Mazza, 2006). Pilot test can be used to evaluate the suitableness of the research proposed method, appropriateness, and quality of data collection. By conducting the pilot test, it can increase the likelihood of success of the research (van Teijlingen & Hundley, 2001). Regarding this, Lancaster, Dodd and Williamson (2002) share their advice where a pilot test can be easily proceeded if the sample size used is 30 respondents and above. Thus, in order to conduct the pilot test, 30 responses will be collected through the questionnaire. The collected responses will then be analysed through PLS-SEM to determine its reliability and validity. Depending on the feedback received from the respondents, necessary revision will be made to improve the questionnaire's quality.

3.4.3   Process of Questionnaire Set Up

In the section B of the questionnaire, five questions are prepared for each variable. After that, a collection of 30 responses are collected for the execution of pilot test. However, it is discovered that the outer loading of a few questions does not fulfil the minimum value of 0.70. The outer loadings value of 0.60 and above are still acceptable although it does not meet the minimum value. Therefore, the questions which have an outer loadings value of less than 0.60 are removed from questionnaire. After filtering the unqualified questions, a total of 18 questions are remained in the questionnaire section B.

3.4.4   Source of Questionnaire

Two sources are mainly used to set up the questionnaire. Firstly, part of the questionnaire is developed by referring the questionnaires used in past studies. Secondly, another part of the questionnaire is designed for this study by referring to the information obtained from online resources.

3.4.4.1 Investment Decision

Table 3.2: Questionnaire Source for Investment Decision

No.	Source
ID1	Developed for the Research
ID2	Aspara & Tikkanen (2009)
ID3	Aspara & Tikkanen (2009)

Source: Developed for the Research

3.4.4.2 Overconfidence Bias

Table 3.3: Questionnaire Source for Overconfidence Bias

No.	Source
OB1	Scott, Stumpp, & Xu (2003)
OB2	Developed for the Research

Source: Developed for the Research

3.4.4.3   Regret Aversion Bias

Table 3.4: Questionnaire Source for Regret Aversion Bias

No.	*Source*
RA1	Developed for the Research
RA2	Developed for the Research

Source: Developed for the Research

3.4.4.4   Loss Aversion Bias

Table 3.5: Questionnaire Source for Loss Aversion Bias

No.	*Source*
LA1	Ang, Kong, Ong, Poo, & Tan (2019)
LA2	Developed for the Research
LA3	Ang et al. (2019)

Source: Developed for the Research

3.4.4.5 Representativeness Bias

Table 3.6: Questionnaire Source for Representativeness Bias

No.	Source
RB1	Developed for the Research
RB2	Developed for the Research
RB3	Developed for the Research
RB4	Developed for the Research

Source: Developed for the Research

3.4.4.6 Herding Bias

Table 3.7: Questionnaire Source for Herding Bias

No.	Source
HB1	Developed for the Research
HB2	Ang et al. (2019)
HB3	Developed for the Research
HB4	Ang et al. (2019)

Source: Developed for the Research

3.5   Construct Measurement

A questionnaire is utilized to investigate all variables involved in this study. The respondents will answer the questionnaire by rating the statements with a 5-points Likert scale.

3.5.1   Scale of Measurement

Measurement scale provides information by numbers in statistical analysis. There are four types of measurement scale which are nominal, ordinal, interval, and ratio scales (Stevens, 1946). All the measurement scales are suitable to be applied in different scenarios as they capture different level of information. Nominal, ordinal, and interval scale of measurement are involved in this study.

3.5.1.1   Nominal Scale

Nominal scale labels different kinds of information (Stevens, 1946). It does not compare different information. Instead, it identifies different information by giving labels. For instance, the last digit on the Malaysian identity card where an odd number indicates a male and an even number indicates a female. The label simply shows the gender, and it does not mean one gender is better than the other. Hence, it only deals with qualitative variables. In the questionnaire, the nominal scale of measurement is applied as below.

Figure 3.2: Nominal Scale

Please indicate your gender:	
☐ Male	☐ Female

Source: Developed for the Research

3.5.1.2 Ordinal Scale

Ordinal scale ranks information in order (Stevens, 1946). It can be used to indicate the order of both quantitative and qualitative variables. However, it does not establish the degree of variation between them. For instance, rank 1 is better than rank 2 and rank 2 is better than rank 3. However, the ordinal scale does not show how much rank 1 is better than rank 2. The application of ordinal scale measurement in the questionnaire is as shown below.

Figure 3.3: Ordinal Scale

Please state your monthly personal income:	
☐ Below RM2000	☐ RM4001 - RM6000
☐ RM2001 - RM4000	☐ RM6000 and above

Source: Developed for the Research

3.5.1.3 Interval Scale

Interval scale provides information of deviance between two choice (Stevens, 1946). However, when a zero is involved in the interval scale, it only serves as a reference point with no true zero value. For instance, the temperature of zero degree Celsius does not mean the absence of temperature. Instead, it simply indicates the temperature. In this study, the application of Likert scale exhibits the inclusion of interval scale. Its implementation in the questionnaire is shown as below.

Figure 3.4: Interval Scale

No.	Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
ID1	I will consider the cost or transaction fee when making an investment decision.	1	2	3	4	5

Source: Developed for the Research

3.5.2 Scaling Technique

The 5-point Likert scale is implemented where the respondents will rate the provided statements with their level of agreement from 1 which is strongly disagree to 5 which is strongly agree (Boone & Boone, 2012). In addition, the application of a 5-point Likert scale enables the respondents to stay neutral with a middle point. Likert scale is useful for collecting primary data as it allows the data to be easily quantifiable (Rinker, 2014).

3.6 Data Processing

The extraction and deduction of data from a large amount of data are made during data processing. These data will then be converted and gathered into valuable and meaningful information. Most of the time, the survey questionnaire will be used to collect opinions and data related to the research study. The stages involved in data processing are questionnaire checking, data checking, data editing, data coding, and data transcribing.

3.6.1 Questionnaire Checking

Questionnaire questions should be carefully checked for grammatical errors or typos before they are distributed to avoid presenting wrong information and causing misunderstanding about the questions. Besides, questionnaire design should closely revolve around the studied topic to achieve the accurate data collection with timeliness. The designed questions should neither leave out the required information nor include any irrelevant information.

3.6.1.1 Data Checking

Data checking is the process to ensure that the respondents have completed all the questions in the questionnaire. If the respondent does not complete all the questions, the data collected may be invalid. Data checking can

ensure the data collected are valid and it strengthens the quality and accuracy of collected data.

3.6.2 Data Editing

Data editing is a process to be conducted after the questionnaires are received back from the respondents. Data editing involves verifying, examining, and adjusting the data to minimize potential bias. Data editing should be conducted to avoid information inconsistency which can be caused by the incomplete information given by the respondents.

3.6.3 Data Coding

After collecting the questionnaires, the answers of each question need to be sorted out and summarized. In order to make full use of the survey data in the questionnaire and to improve the analysis results of the questionnaire, it is necessary to code the data in the questionnaire. Data coding is the process of giving a numerical code that a computer can recognize for different answers to a question. In the same question, each code represents only a viewpoint, which would then be entered in numerical form into a computer to convert words that cannot be directly statistically calculated into numbers. Data coding can compress a large amount of written information into data report, making the information to be clearer for grouping and analysis.

3.6.4   Data Transcribing

Data transcribing is a process which transcribes all the collected data and uses the PLS-SEM software to run for the data analyzing purpose.

3.7   Data Analysis

3.7.1   Descriptive Analysis

Descriptive analysis can be defined as a simple and clear summary that represents the largest sample of data from the responses that are collected from the respondents (Sharma, 2019). Descriptive analysis is used to transform the data set into quantitative descriptions through tables, graphs, and general discussion to help people in understanding the meaning of analysed data. The purpose for descriptive analysis to be implemented in this study is to emphasize the underlying connection among variables as well as the basic information about the variables in the sample of data (Sharma, 2019). Based on the questionnaire design, the Section A focuses on the demographic data, which explains the characteristics of the population. Demographic data is considered as quantitative data, thus descriptive analysis will be used to analyse the characteristics of the respondents in this study.

3.7.2 Review of Data Analysis

Validity and reliability are the concepts used to measure the quality of the quantitative research result. Validity focuses on the accuracy of the measures and how well the results performed in the study. Next, the reliability focuses on the consistency or stability of the measure results performed in repeated measurements under the same condition with same instruments used (Heale & Twycross, 2015). Thus, the awareness of validity and reliability need to be considered in the measurement before testing on the relationship between investment decisions and the behavioural biases. In this study, the computer software, PLS-SEM is applied to study and estimate the complex cause-effect relationship model.

3.7.3 Evaluation of Outer Model

The outer model is set up to run the validity and reliability tests. As specified by Hussain, Zhu, Siddiqi, Ali, and Shabbir (2018), the outer model, which is also known as measurement model, is set up to assess the connection among constructs and their indicator variables. On the other hand, the inner model, which is also known as structural model, is set up to show the relationship between the constructs. The inner model manifests how the dependent latent variable is affected by the independent latent variables. (Hussain et al., 2018).

Furthermore, it is essential to determine the nature of the measured construct while setting up the outer model. Coltman, Devinney, Midgley, and Venaik (2008) stated that there are two types of constructs which are reflective and

formative constructs. The reflective constructs involve causality from the constructs to the indicators. As all indicators are caused by the same constructs, they are highly correlated and interchangeable. Contrarily, for the formative constructs, the causality is studied from the indicators to constructs. Therefore, the indicators are not interchangeable (Coltman et al, 2008).

As mentioned by Wong (2013), when the formative constructs are involved in the model, it is unnecessary to carry out the reliability and validity test because the indicators can have zero, positive, or negative correlation with each other. However, when the reflective constructs are involved in the model, the reliability and validity tests become important as the reflective indicators are highly correlated (Wong, 2013). In this study, the internal consistency reliability, convergent validity, and discriminant validity are implemented to measure the reflective outer model.

3.7.4   Internal Consistency Reliability

Before analysing the scale data, it is necessary to consider whether the measured values are reliable. Only when the reliability is accepted, the data analysis of the scale can be reliable. Cronbach's alpha and composite reliability will normally be used to conduct reliability tests. Hair et al. (1998) suggested that the minimum value of composite reliability should more than or equal to 0.5. However, some researchers suggested that the value at least more than or equal to 0.6 (Bagozzi & Yi, 1998).

Table 3.8: Cronbach's Alpha Coefficient Values

Authors	Cronbach's Alpha Cut-off	Comment
Griethuijsen et al. (2015) Hair et al. (2010)	0.7 or 0.6	Acceptable
Abraham & Barker (2014) Nunnally & Bernstein (1978)	≥ 0.7	Acceptable
Tuan, Chin & Shieh (2005)	0.7 < Cronbach α < 0.87	Generally satisfactory
Heddy & Sinatra (2013)	0.97	Excellent

Source: Developed for the Research

The reliable cut-off value of Cronbach's alpha and the interpretation by past researchers are exhibited in Table 3.8.

3.7.5   Convergent Validity

Convergent validity utilizes the outer loading values of indicators as well as the average variance extracted (AVE) in determining the convergence degree between the indicators of same constructs. AVE is the summary value of convergence which is computed based on the variance of all items loading on a single construct (Hair, Matthews, Matthews & Sarstedt, 2017). In order to ensure a sufficient degree of convergence validity, the values of outer loadings and AVE needs to be at a minimum of 0.70 and 0.50 respectively. This can ensure at least 50% of the indicator variance is included in the construct score (Hair, Ringle & Sarstedt, 2011).

3.7.6　Discriminant Validity

Discriminant validity refers to the degree to which constructs are truly different from other constructs according to empirical criteria. There are three ways to evaluate discriminant validity which includes cross loading, Fornell-Larcker criterion, and Heterotrait-monotrait (HTMT) ratio of correlation.

The first way to assess discriminant validity is through the cross-loading. The establishment condition is the loading of the indicator on the related constructs should be greater than all its loading on the other constructs. If the loading of the indicator on related constructs is less than other constructs, the problem of discriminant validity may occur (Hair et al., 2016).

The second way to measure discriminant validity is through the Fornell-Larcker criterion (Fornell & Larcker, 1981). The establishment condition depends on whether the average variance extracted (AVE) of the construct is greater than the square root of the correlation coefficient between the construct and other latent construct (Hair et al., 2016).

The third way to measure discriminant validity is through the HTMT ratio of correlation. It is an alternative option for appraising discriminant validity in the PLS-SEM model. The value of HTMT ratio should not more than one. If the HTMT ratio reaches one, it will be indicated as lack of discriminant validity (Hamid, Sami & Sidek, 2017). Although the cross loading and Fornell-Larcker criterion have been widely used to evaluate the discriminant validity between SEM and PLS, Henseler et al. (2015) believed that the sensitivity of the mentioned indicators remains insufficient. Therefore, the

researchers proposed the application of HTMT ratio of correlation to evaluate discriminant validity (Henseler et al., 2015).

3.8 Conclusion

To sum up, the detail of methodology used is specified in this chapter and the outcome of obtained data will be analysed in the next chapter.

CHAPTER 4: DATA ANALYSIS

4.0   Introduction

This chapter explains and analyses the result obtained from the questionnaire. The response rate of data collection is firstly discussed in this chapter. Besides, this chapter also describes the respondents' demographic profile through descriptive analysis. By applying PLS-SEM, the result of descriptive analysis, construct validity, discriminant validity, and path coefficient are obtained.

4.1   Response Rate

The questionnaire is distributed online as Google form in three Facebook investment groups which are "investalks", "Learning Investment with Value Envision", and "BursaKakis Investment Club". As the target respondent of this study is Malaysian investors, hence these Facebook groups are chosen as most of its members fulfil the requirement.

During the data collection process, a total 192 questionnaires are filled up. However, only 163 of them are qualified to be the target respondents of this study. 28 of the data collected are eliminated as the respondents are not investors and one of the responses is weed out as it is filled up by a non-Malaysian.

As the questionnaire shared in the Facebook investment groups can be filled up by all members, therefore, the response rate of questionnaire is only 0.4238% as there

are a total of 45,300 members in these three groups and only 192 of them responded to the questionnaire.

4.2   Descriptive Analysis

Descriptive analysis is a technique performed through data rearrangement, reorder, and manipulation for the purpose of conducting analysis. It helps in summarizing and describing data points in a constructive way. During the process of data collection, the demographic data is collected in questionnaire Section A and presented using pie charts. There is a total response of 163 obtained through survey. Besides, the responses towards the statements concerning the DV and IVs are collected in the questionnaire Section B. The PLS-SEM is applied to calculate the mean, standard deviation, T-statistic, and P-value of each statement.

4.2.1 Demographic Profile of Respondents

Figure 4.1: Gender
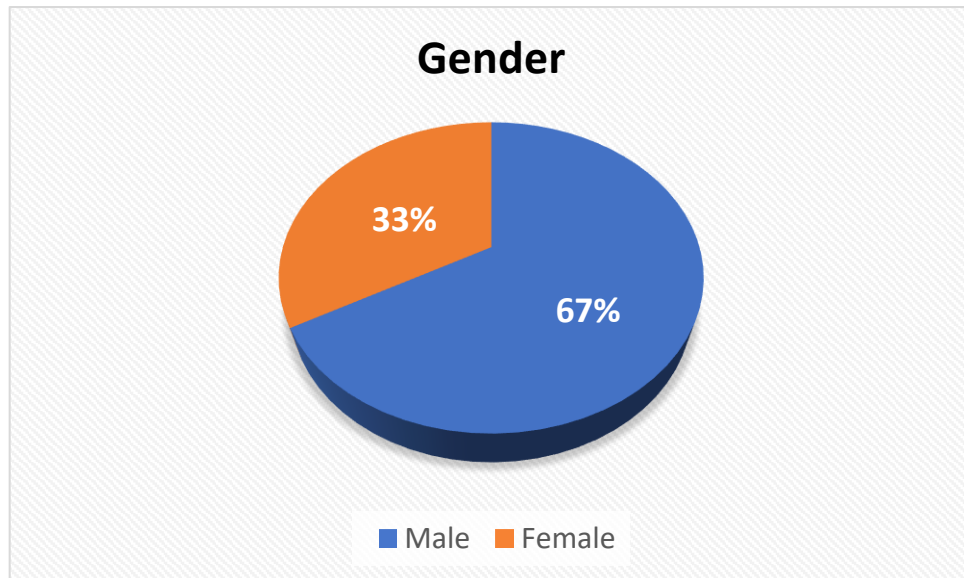
Source: Developed for the Research

Based on the pie chart above, out of 163 respondents, there are 67% or 109 respondents are male whereas the rest 33% or 54 respondents are female.

Figure 4.2: Age Group
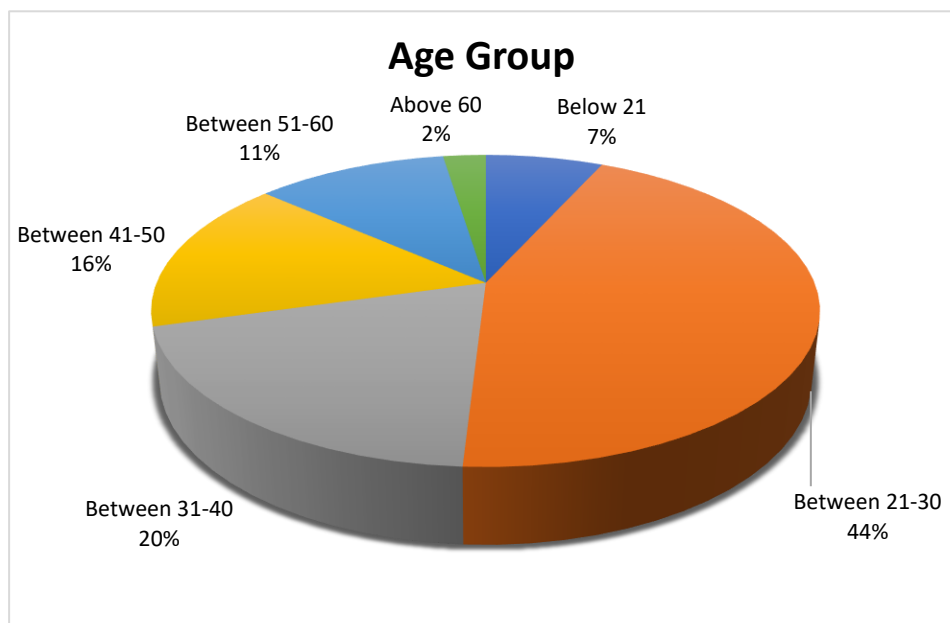
Source: Developed for the Research

Firstly, according to the given chart, 11 respondents are aged below 21 and this comprises 7% of the total respondents. Secondly, most of the respondents are in the age group between 21 to 30 which amounts to 72 respondents or in other terms, 44% of total respondents. Thirdly, the second largest number of respondents are aged between 31 to 40 and it comprises of 20% of the total respondents. Apart from that, there are 26 respondents aged between 41 to 50 which made up 16% of the total respondents. In addition, 11% or 18 respondents involved in the survey are from the age group between 51 to 60. Lastly, only 2% of the total respondents are aged above 60.

Figure 4.3: Marital Status
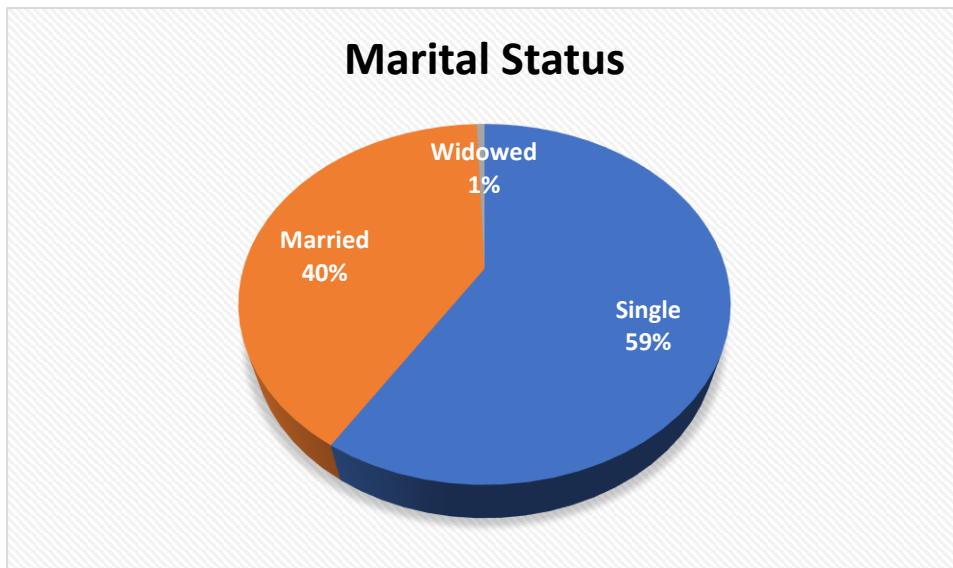
Source: Developed for the Research

As shown in the given chart, 96 of the responses are collected from single respondents which covers a total of 59%. The rest 40% of respondents are married which consists of 66 respondents. However, there is 1% or 1 respondent who is widowed. In this survey, none of the respondents is divorced or separated.

Figure 4.4: Monthly Personal Income
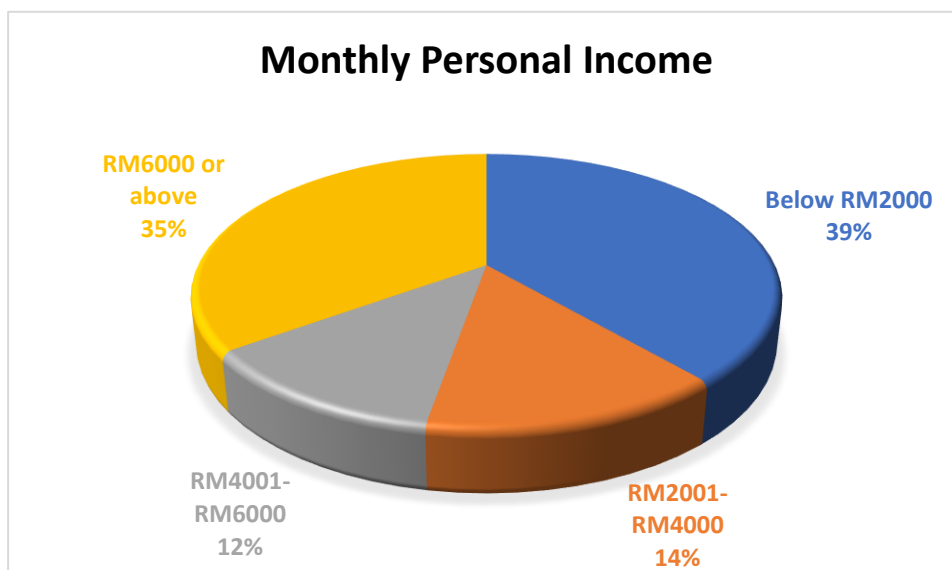
Source: Developed for the Research

The monthly personal income of all collected responses is presented in the above chart. There are 39% or 63 respondents whose monthly income are below RM2000. Besides, the level of monthly personal income from RM2001 to RM4000 consists of only 14% which is 23 respondents while the monthly income level between RM4001 to RM6000 is 12% or 20 respondents. Lastly, there are 57 respondents who made up 35% of the total respondents have monthly personal income equals or more than RM6000.

Figure 4.5: Experience in Investing
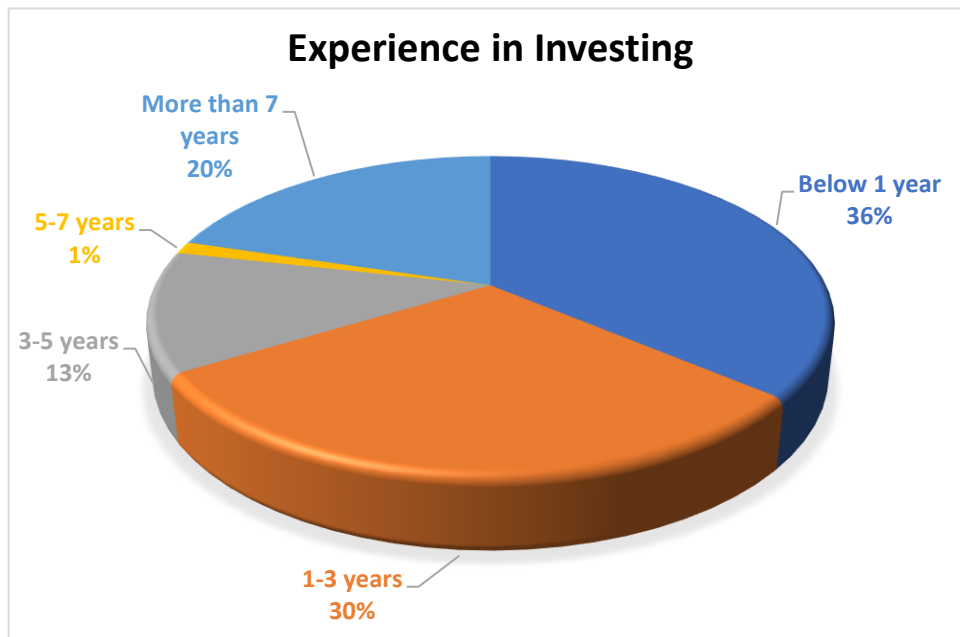
Source: Developed for the Research

As presented in the given chart, a portion of 36% or 59 responses are filled by respondents with an experience of investing of less than one year. Besides, 30% or 49 respondents have one to three years of experience in investing. Aside from that, for the experience of investing from three to five years, it makes up a total of 13% which in other terms, 20 respondents. The least number of respondents have an experience of investing from five to seven years as only 1% of the total respondents are enrolled in this category. Lastly, 20% of the total respondents which consists of 33 respondents have an experience of investing of more than seven years.

4.3 Measurement and Structural Model

The relationships among variables in this study is testified with the implementation of PLS-SEM in this study. In this part, the findings from PLS-SEM are presented and analysed.

4.3.1 Cronbach's Alpha (CA)

Cronbach's alpha is the measurement used to examine the internal consistency of the data. The data reliability is significant as it ensures the data collected are accurate and can meet the research objectives (Quansah, 2017). In general, the accepted reliability alpha should be larger than 0.70 (Taber, 2018). However, Ursachi, Horodnic, and Zait (2015) suggests that the value of 0.60 to 0.70 is an accepted level of reliability, where above 0.8 indicates a good level.

Table 4.1: Cronbach's Alpha

Variables	Cronbach's Alpha
Investment Decision	0.757
Overconfidence Bias	0.798
Herding Bias	0.791
Representativeness Bias	0.707
Loss Aversion Bias	0.678
Regret Aversion Bias	0.605

Source: Developed for the Research

From the table above, all the Cronbach's alpha values are ranged from 0.605 to 0.798, and hence the internal consistency of these variables are accepted. The overconfidence bias has the highest value of 0.798, followed by herding bias (0.791), investment decision (0.757), and representativeness bias (0.707). The Cronbach's alpha values of loss aversion bias and regret aversion bias are 0.678 and 0.605 respectively.

4.3.2   Composite Reliability

Other than Cronbach's alpha, composite reliability is also a method used to test variables' internal consistency. It is an alternative assessment because Cronbach's alpha provides a more conservative measurement (Wong, 2013). According to Wong (2013), the composite reliability value should be 0.70 or higher.

Table 4.2: Composite Reliability

Variables	Composite Reliability
Investment Decision	0.861
Overconfidence Bias	0.904
Herding Bias	0.858
Representativeness Bias	0.820
Loss Aversion Bias	0.818
Regret Aversion Bias	0.825

Source: Developed for the Research

The outcome elucidates that the composite reliability values of all variables are greater than 0.7, ranged from 0.818 to 0.904. This indicates the internal consistency of the variables are accepted, and hence the data is reliable.

4.3.3   Average Variance Extracted (AVE)

As mentioned in Chapter 3, average variance extracted (AVE) can be used as an indicator to measure the convergent validity. The higher the AVE, the higher the degree of latent variables are explained by the variation of measured variables. Hair, Ringle, and Sarstedt (2011) suggested that the minimum value of AVE should be 0.5 to avoid error occurred in the measurement.

Table 4.3: Average Variance Extracted (AVE)

Variables	Average Variance Extracte
Investment Decision	0.675
Overconfidence Bias	0.825
Regret Aversion Bias	0.705
Loss Aversion Bias	0.604
Representativeness Bias	0.535
Herding Bias	0.604

Source: Developed for the Research

Table 4.3 shows all the AVE values are higher than 0.5, which represents that all the measured variables achieve the criterion of AVE and have a good convergent validity.

4.3.4   Discriminant Validity

Discriminant validity is a measurement to verify whether there is statistical difference in the correlation between two different constructs. One of the ways to measure discriminant validity is Fornell-Larcker criterion proposed by Fornell and Larcker (1981). The values of discriminant validity can be obtained through the square root of average variance extracted (AVE) when measuring the construct validity. The criterion to verify discriminant validity is that the value of AVE square root should be higher than the correlation between the construct and other latent construct.

Table 4.4: Fornell-Larcker Criterion

	Herding Bias	Investment Decision	Loss Aversion Bias	Overconfidence Bias	Regret Aversion Bias	Representativeness Bias
Herding Bias	**0.777**					
Investment Decision	0.225	**0.821**				
Loss Aversion Bias	0.430	0.308	**0.777**			
Overconfidence Bias	-0.201	0.338	0.134	**0.908**		
Regret Aversion Bias	0.489	0.186	0.536	-0.077	**0.840**	
Representativeness Bias	0.152	0.440	0.320	0.376	0.255	**0.732**

Source: Developed for the Research

Table 4.4 elucidates that the values of all variables in Fornell-Larcker criterion are higher than the value of AVE shown in Table 4.3. In Table 4.3, the AVE value of herding bias is 0.604, and its value in Fornell-Larcker criterion is 0.777. The value of 0.777 is the greatest as compared to the values of another latent variables under the same column of herding bias. From the result above, it shows that the discriminant validity is established.

4.3.5 Path Coefficient

Path coefficient can be used to propose the structural model of causal relationship between the variables and to verify the degree of fitting of the model with prior information to the sample data. It can analyse the causal effect between the variables. The result of statistical significance of the model will be shown after proceeding to the "bootstrapping" step, a resampling technique in PLS-SEM. In PLS-SEM, bootstrapping is extensively used in estimating the standard error.

The structural model in Figure 4.6 expresses the relationship between the variables, and the figures represent the relative importance of the influence of IVs on the DV.

Figure 4.6: Structural Model
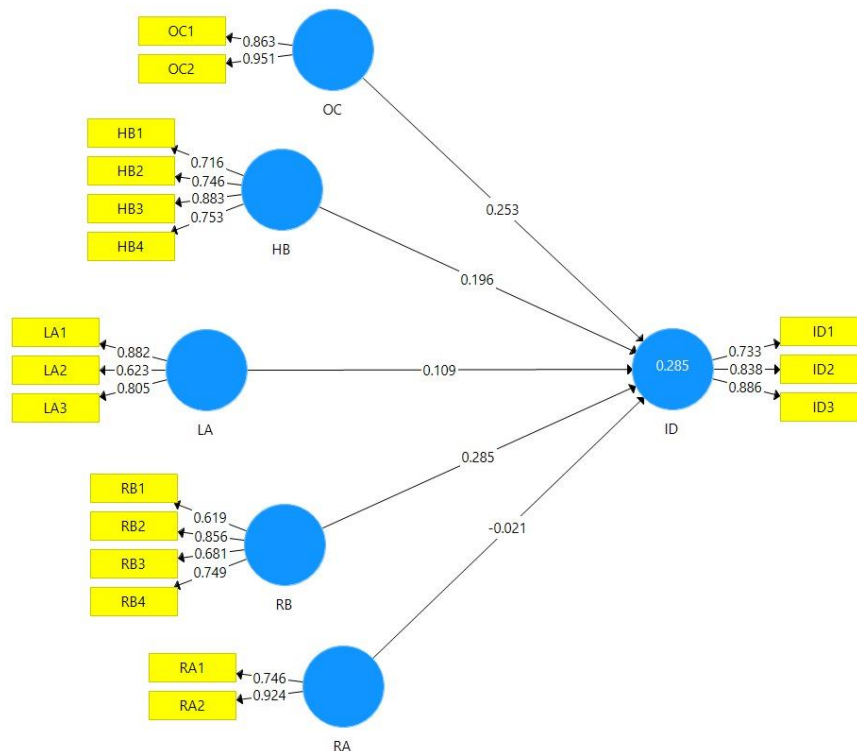
Source: Developed for the Research

Table 4.5: Summary of Structural Model

	Hypothesis	STDEV	T-Statistic	P-Value	Result
Herding Bias ->DV	H1	)2	2.12	0.034*	Supported
Loss Aversion Bias ->DV	H2	0.085	1.288	0.198	Not Supported
Overconfidence Bias ->DV	H3	0.085	2.974	0.003**	Supported
Regret Aversion Bias ->DV	H4	0.099	0.216	0.829	Not Supported
Representativeness Bias ->DV	H5	0.087	3.296	0.001**	Supported

*significant at 0.05 **significant at 0.01 ***significant at 0.001

Source: Developed for the Research

Table 4.5 shows the summary of structural model. In the hypothesis testing, the significance level is set at 0.05 or 5%. If the P-value is smaller than the level of significance, the null hypothesis is rejected, the result is supported, vice versa.

Referring to Table 4.5, herding bias, overconfidence bias, and representativeness bias have P-values of lower than the significance level, hence the results are supported. On the other hand, the results of loss aversion bias and regret aversion bias are not supported due to the P-values of both biases are higher than the significance level. Therefore, it can be concluded that the herding bias, overconfidence bias, and representativeness bias are significantly related to the investor's investment decision. In contrast, the loss aversion bias and regret aversion bias have insignificant relationship with the DV.

For herding bias, the result can be supported by Rekik and Boujelbene (2013), and Alrabadi et al. (2018). Based on their research, the investors are likely to follow the decision made by other investors to prevent losses. Besides, the research of Qadri and Shabbir (2014), and Sindhu and Waris (2014) support the result of overconfidence bias. They found out that the investors will become overconfident due to their own knowledge, skills, and experiences or the past information. Hence, these affect their investment decisions. In addition, the findings of Pashtoon (2016) and Subash (2012), which is regarding the representativeness bias suffered by the investors while making investment decision, support the result above. Due to representativeness bias, the investors' investment decisions will be affected by the past performance or recent news.

Apart from that, loss aversion bias does not significantly affect investment decision based on Table 4.5. This result is supported by Coval and Shumway (2005), and Lehenkari and Perttunen (2004) who stated that the investors tend to be risk seeking after they earn profit from their investment. For regret aversion bias, the result is supported by Kengatharan and Kengatharan (2014), and Aigbov and Ilaboya (2019) who conclude that the investors do not suffer from regret aversion bias in their investment decision-making processes.

4.4   Analysis of Outer Loading

4.4.1   Overconfidence Bias

Table 4.6: Descriptive Statistics of Overconfidence Bias

No	Original Sample	Sample Mean	Standard Deviation	T-Statistic	P-Value
OB1	0.863	0.853	0.056	15.313	0.000***
OB2	0.951	0.950	0.026	37.169	0.000***

*significant at 0.05 **significant at 0.01 ***significant at 0.001

Source: Developed for the Research

The given table shows that OB2 recorded higher original sample (0.951), sample mean (0.950), and T-statistic (37.169). While OB1 obtained higher record of standard deviation with the value of 0.056.

4.4.2   Regret Aversion Bias

Table 4.7: Descriptive Statistics of Regret Aversion Bias

No	Original Sample	Sample Mean	Standard Deviation	T-Statistic	P-Value
RA1	0.746	0.701	0.222	3.357	0.001**
RA2	0.924	0.897	0.132	6.977	0.000***

*significant at 0.05 **significant at 0.01 ***significant at 0.001

Source: Developed for the Research

The presented table elucidates that RA2 recorded higher original sample (0.924), sample mean (0.897), and T-statistic (6.977). While RA1 obtained higher record of standard deviation with the value of 0.222.

4.4.3 Loss Aversion Bias

Table 4.8: Descriptive Statistics of Loss Aversion Bias

No	Original Sample	Sample Mean	Standard Deviation	T-Statistic	P-Value
LA1	0.882	0.884	0.046	19.074	0.000***
LA2	0.623	0.600	0.116	5.370	0.000***
LA3	0.805	0.783	0.085	9.414	0.000***

*significant at 0.05 **significant at 0.01 ***significant at 0.001

Source: Developed for the Research

As stated by the portrayed table, LA1 marked the highest original sample (0.882), sample mean (0.884) and T-statistic (19.074). While LA2 achieved the lowest original sample (0.623), sample mean (0.600), and T-statistic (5.370). To add on, it achieved the greatest value of standard deviation at 0.116.

4.4.4 Representativeness Bias

Table 4.9: Descriptive Statistics of Representativeness Bias

No	Original Sample	Sample Mean	Standard Deviation	T Statistic	P-Value
RB1	0.619	0.604	0.112	5.548	0.000***
RB2	0.856	0.845	0.056	15.175	0.000***
RB3	0.681	0.676	0.077	8.813	0.000***
RB4	0.749	0.747	0.049	15.192	0.000***

*significant at 0.05 **significant at 0.01 ***significant at 0.001

Source: Developed for the Research

In reference to the illustrated table, RB2 had the greatest original sample (0.856) and sample mean (0.845). On the other hand, RB1 had the lowest original sample (0.619), sample mean (0.604), and T-statistic (5.548). At the same time, RB1 also carried the highest standard deviation (0.112). Apart from that, RB4 had the lowest standard deviation (0.049) and the greatest T-statistic (15.192).

4.4.5   Herding Bias

Table 4.10: Descriptive Statistics of Herding Bias

No	Original Sample	Sample Mean	Standard Deviation	T Statistic	P-Value
HB1	0.716	0.688	0.128	5.581	0.000***
HB2	0.746	0.704	0.144	5.163	0.000***
HB3	0.883	0.865	0.123	7.155	0.000***
HB4	0.753	0.719	0.133	5.673	0.000***

*significant at 0.05 **significant at 0.01 ***significant at 0.001

Source: Developed for the Research

In accordance to the presented table, HB3 has the highest values of original sample (0.883), sample mean (0.865), T-statistic (7.155) and the lowest standard deviation (0.123). Other than that, HB1 had the lowest original sample (0.716) and sample mean (0.688). Moreover, HB2 carried the highest standard deviation (0.144) and the lowest T-statistic (5.163).

4.5   Conclusion

In a wrap, chapter 4 mainly discusses on the descriptive analysis which summarizes respondents' demographic data. Besides, by applying PLS-SEM, the analysis of outer loadings is done by analysing and interpreting all independent variables. Apart from that, the validity and reliability tests are also executed. Aside from that, in order to identify whether the result of each variable is supported, the path coefficient is conducted. Lastly, the descriptive analysis is again performed to study the descriptive statistics of the questionnaire statements in accordance with each independent variable.

CHAPTER 5: DISCUSSION, CONCLUSION, AND IMPLICATIONS

5.0   Introduction

This chapter presents the summary of bootstrapping result and the discussion of major finding in this study. The major finding discusses about the relationship between independent and dependent variables based on the result of bootstrapping. The implications of the study are discussed from both policy makers and academic perspective. Then, the study's limitations and some suggestions provided for coming researchers are discussed. Ultimately, the conclusion gives an overview of the whole chapter.

5.1 Summary of Statistical Analysis

Table 5.1: Summary of Bootstrapping Result

Test	Hypothesis	Hypothesis Decision	Result
Overconfidence Bias and Investor's Investment Decision	H_1: There is a significant relationship between overconfidence bias and investor's investment decision.	H_0 is not supported. H_1 is supported.	Significant **P-value = 0.003****
Regret Aversion Bias and Investor's Investment Decision	H_1: There is a significant relationship between regret aversion bias and investor's investment decision.	H_0 is supported. H_1 is not supported.	Insignificant **P-value = 0.829**
Loss Aversion Bias and Investor's Investment Decision	H_1: There is a significant relationship between loss aversion bias and investor's investment decision.	H_0 is supported. H_1 is not supported.	Insignificant **P-value = 0.198**
Representativeness Bias and Investor's Investment Decision	H_1: There is a significant relationship between representativeness bias and investor's investment decision.	H_0 is not supported. H_1 is supported.	Significant **P-value = 0.001****

Herding Bias and Investor's Investment Decision	H_1: There is a significant relationship between herding bias and investor's investment decision.	H_0 is not supported. H_1 is supported.	Significant **P-value = 0.034***

*significant at 0.05 **significant at 0.01 ***significant at 0.001

<u>Source</u>: Developed from the Research

5.2   Discussion of Major Finding

5.2.1   Overconfidence Bias

Respondents in this study are confident with their investment strategy and they think their previous successful experience can help them to generate positive return. The outcome elucidates that overconfidence bias plays a significant role towards investment decision. This indicates that investors strongly believe that their personal skills help them to make a better investment decision. They also think the previous investment decisions and their investment strategy are useful in aiding them to make better decisions. This result corresponds to the research studied by Sindhu and Waris (2014), which concludes that the past investment return and past information lead the investors to be overconfident in their following investment decisions. The result is also tallied with the research done by Hunjra, Rehman, and Qureshi (2012) and Lim (2012). The overconfidence bias makes the investors to always trust their investment decision and to feel that they will not make wrong decisions.

5.2.2 Regret Aversion Bias

Regret aversion bias means the avoidance of investors in making investment decisions as they are afraid of making decisions that can cause them to be regretful. The result shows that there is no relationship between the regret aversion bias and investment decision. This result is tallied with the studies done by Kengatharan and Kengatharan (2014) and Aigbov and Ilaboya (2019). From this study, the investors who suffered from regret aversion bias can make investment decisions, and the decisions will not be affected by their previous mistakes or failures.

5.2.3 Loss Aversion Bias

Loss aversion bias refers to how the investors are afraid of losses and the way they feel that the pain of losing is more severe than the equivalent gain. The study concludes that there is no significant relationship between the loss aversion bias and investment decision. The result is in line with the research done by Ainia and Lutfi (2019). It means that the loss aversion bias will not affect the individual investment decision. Normally, investors who are loss averse will not sell their investments when the price decreases as they are afraid to face the losses. However, most respondents in this study sells their investments when the price drops.

5.2.4 Representativeness Bias

The investors' actions can be confused by representativeness bias as they will tend to think of a probable outcome due to the occurrence of similar past events. This study finds out that there is a significant relationship between the representativeness bias and investment decision. The finding is

in compliance with the conclusion made by Torngren and Montgomery (2004), Patil and Chavan (2020), and Raut, Das and, Mishra (2020). Most of the respondents stated that they will take the past performance of the investments into consideration while making their decisions. They also agreed that they are more likely to invest in the investments which have good historical performance.

5.2.5   Herding Bias

Herding bias causes the investors to rely on others' information while making decisions. In this study, it discovers a significant relationship between the herding bias and investment decision. The outcome is consistent with the findings of Patil and Chavan (2020), Raut, Das and, Mishra (2020), and Rekik and Boujelbene (2013). The investors are very likely to follow the opinions and decisions made by the others as this condition is observable in most respondents' cases. They agreed that their investment decisions can be affected by the surrounding people up to a certain extent.

5.2.6 Summary of Relationships

Table 5.2 Summary of Relationships

Test	Coefficient	Past Studies
Overconfidence Bias and Investor's Investment Decision	0.253 Positive significant	Positive significant: ➢ Hunjra, Rehman, & Qureshi (2012) ➢ Qadri & Shabbir (2014)
Regret Aversion Bias and Investor's Investment Decision	-0.021 Insignificant (P-value = 0.829)	Insignificant: ➢ Kengatharan & Kengatharan (2014) ➢ Aigbovo & Ilaboya (2019)
Loss Aversion Bias and Investor's Investment Decision	0.109 Insignificant (P-value = 0.198)	Insignificant: ➢ Kengatharan & Kengatharan (2014) ➢ Aigbovo & Ilaboya (2019)
Representativeness Bias and Investor's Investment Decision	0.285 Positive significant	Positive significant: ➢ Loris & Jayanto (2021) ➢ Hunjra, Rehman & Qureshi (2012)
Herding Bias and Investor's Investment Decision	0.196 Positive significant	Positive significant: ➢ Samal & Mohapatra (2020) ➢ Loris & Jayanto (2021)

Source: Developed for the Research

As specified in the presented table, the overconfidence bias plays a positive and significant role towards investment decision since the coefficient is 0.253. This result corresponds to the research studied by Hunjra, Rehman, and Qureshi (2012) and Qadri and Shabbir (2014). Besides, there is an insignificant relationship between the regret aversion bias and investor's investment decision as the P-value (0.829) exceeds the level of significance (0.05). The result tallies with the studies done by Kengatharan and Kengatharan (2014) and Aigbov and Ilaboya (2019).

Moreover, the loss aversion bias is insignificant in affecting the investor investment decision since the P-value (0.198) exceeds the level of significance (0.05). The result is in line with the result by Kengatharan and Kengatharan (2014) and Aigbov and Ilaboya (2019). Furthermore, the representativeness bias imposes a positive and significant influence towards investment decision since the coefficient is 0.285. The result is supported by Loris and Jayanto (2021) and Hunira, Reman and Qureshi (2012).

Lastly, the value of coefficient of herding bias (0.196) shows there is a positive and significant relationship between herding bias and investment decision in this study. This result is in line with the research done by Samal and Mohapatra (2020) and Loris and Jayanto (2021).

5.3 Implications of Study

It is understood that behavioural biases will bring effects on the investment decision making processes of Malaysian investors through the discovery of this study. The Malaysian investors will be affected by their behaviours while they are allocating their investment portfolios or making choices in the stock market.

5.3.1 Implications for Policy Makers and Practitioners

This study has proven the existence of behavioural biases in Malaysian stock market. Policy makers and practitioners should take practical steps to keep an eye in avoiding the occurrence of anomalies in stock exchange market. Policy makers need to take this seriously to avoid undue panic among investors which could lead to a stock market crash. In addition, policy makers should also be aware of the impact of behavioural biases on investors and find way to make investors to understand and reduce the impact of behavioural biases on them. The parties related to the Malaysian stock exchange such as Bursa Malaysia and Securities Commission Malaysia should strictly regulate and develop feasible policies to prevent behavioural biases from having undue adverse effects on investors.

5.3.2 Implications from Academic Perspective

This study confirms the existence of behavioural finance in Malaysian stock market and it provides a further insight into the impact of behavioural biases on the Malaysian stock market. Since there are still some gaps in this study, the future researchers can utilize this study as their reference in conducting the future research to further understand the impacts of behavioural biases in Malaysian exchange market.

5.4   Limitations of Study

Throughout the study, there are a few limitations which causes the result of this study to be imperfect. Firstly, the application of PLS-SEM can be considered as an unfamiliar operation for most finance students. Due to the lack of understanding towards the software, the students could face difficulty in applying the software for research purpose. In addition, the software also comprises of data analysis tools including convergent validity, discriminant validity, and others which are something new to the students. Hence, additional time is needed to explore the ways of using PLS-SEM. Besides, another problem arises when two out of five members are unable to install the software. As the professional version of the software is needed in performing data analysis, which only allows a free trial of one month, hence the failure in software installation causes extra difficulties in the data analysis process.

Secondly, the response rate of the study is very low. The expected response rate for this study is 5%, which is 2,265 responses out from 45,300 members. However, in fact, there is only 192 responses collected which made up of 0.4238%. This indicates that the actual response rate is extreme low. Apart from that, the data collected through the questionnaire may not be completely accurate. It is because there is a probability where the respondents will answer the questionnaire randomly because of time-constraint. Therefore, there might be some discrepancies in the data collected in this study.

Lastly, the target respondent of this study is not specific. The unspecific target respondent leads the study to be too general. This is because the respondents with different demographic backgrounds can exhibit different investment behaviours. As an example, the respondent who aged between 21 to 31 may be willing to take higher risk in investing whereas the respondent aged above 51 may be more conservative in making his or her investments.

5.5   Recommendation for Future Researchers

Depending on the conduct of this study, a few suggestions are given for the future researchers. First and foremost, since the study is using investment decision of investors as dependent variable to determine the effect of behavioural finance, hence the future researchers are recommended to use other factors such as investors' return on their portfolio as their dependent variable. This is because the investors' return earned also reflects the investors' behaviours in investing as well as their performance in the financial market in the case of whether they outperform or underperform in market.

Besides, since the current study only includes five behavioural biases, therefore, the future researchers are recommended to include more behavioural biases such as availability bias in their research to further explore the effects of other behavioural biases towards the investor's investment decision.

Furthermore, future researchers are also recommended to specify the respondents' demographic group and integrate them into the analysis to investigate whether the demographic factors can give any impact towards the result of study. Thus, it can make the research result to be more specific and attractive. Throughout the study, the researchers can have better reference and notification on the demographic effects towards the investors' behaviours.

Last but not least, since the study applied PLS-SEM, hence the future investigators are suggested to learn and practice more with the statistical software before beginning their research. It helps in saving time during the data processing, hence enhancing the efficiency.

5.6   Conclusion

In a nutshell, the relationships between several behavioural biases and investment decision made by Malaysian investors are investigated in this study.

Through this study, it is discovered that the behavioural biases including overconfidence bias, representativeness bias, and herding bias can positively and significantly influence the investment decisions of Malaysian investors. On the other hand, the other biases such as regret aversion bias and loss aversion bias are found out to be insignificant towards the Malaysian investors' investment decisions.

Since the behavioural biases are observed to play a role in affecting the investment decisions made by Malaysian investors, hence there are practical implications towards the policy makers and practitioners where the awareness towards behavioural biases should be raised. In addition, it could also bring certain theoretical implications from the academic perspective where the behavioural biases should be incorporated in the future research for a better understanding.

Besides, through this study, there are some limitations discovered such as the application of PLS-SEM which is considered as an unfamiliar software for most students, the low response rate of data collection, and the overgeneralization of target respondents which contributes to the difficulty in data collection process.

Furthermore, a few recommendations are made for the future researchers including the application of portfolio return as the dependent variable, the inclusion of other behavioural biases in the study for a better discovery of the impacts of behavioural biases towards investment decision, and the specialization and integration of respondents' demographic groups to improve the study results. It is also recommended for the researchers to practice with PLS-SEM before handed for a higher efficiency in data processing.

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APPENDIX A: Permission letter for Questionnaire Survey

UNIVERSITI TUNKU ABDUL RAHMAN

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UTAR
UNIVERSITI TUNKU ABDUL RAHMAN

16th March 2021

To Whom It May Concern

Dear Sir/Madam,

Permission to Conduct Survey

This is to confirm that the following students are currently pursuing their *Bachelor of Finance (Honours)* program at the Faculty of Business and Finance, Universiti Tunku Abdul Rahman (UTAR) Perak Campus.

I would be most grateful if you could assist them by allowing them to conduct their research at your institution. All information collected will be kept confidential and used only for academic purposes.

The students are as follows:

Name of Student	Student ID
Chai Hui Xin	18ABB00232
Chew Jing Han	18ABB00507
See Yi Zhen	18ABB00428
Soh Ai Waye	19ABB00474
Song Kar Jing	19ABB00597

If you need further verification, please do not hesitate to contact me.

Thank you.

Yours sincerely,

Suki

....
Dr Kuah Yoke Chin
Supervisor and Head of Department,
Faculty of Business and Finance
Email: kuahyc@utar.edu.my

APPENDIX B: Questionnaire

UNIVERSITY TUNKY ABDUL RAHMAN
FACULTY OF BUSINESS AND FINANCE
ACEDEMIC YEAR 2021/2022

Title: <u>BEHAVIOURAL FINANCE AND ITS IMPACTS ON PORTFOLIO MANAGEMENT DECISION: EVIDENCE IN MALAYSIA</u>

Dear respondents,

We are final year undergraduate students of Bachelor of Finance (Hons) from University Tunku Abdul Rahman (UTAR). The research objective of this research is to investigate whether the behavioural biases (overconfidence bias, regret aversion bias, loss aversion bias, representativeness bias and herding bias) will affect an investor's investment decision.

This questionnaire consists of two parts which are Section A and B. Section A is the demographic information of the respondent and Section B is the behavioural biases of the respondents. This questionnaire may take about 10 minutes to complete. Your feedback is the highest importance for our academic research. All information collected from this survey will be kept **strictly confidential**. Your participation in this survey will be appreciated.

If you have any problems, comments, and suggestions in this study, please do not hesitate to contact us by email or call.

Your sincerely,

	Student ID	Name	Contact No.	Email
1	18ABB00232	Chai Hui Xin	01110703398	huixin001227@1utar.my
2	18ABB00507	Chew Jing Han	0102002820	jinghanxc@1utar.my
3	18ABB00428	See Yi Zhen	0122025535	s.yizhen73@1utar.my
4	19ABB00474	Soh Ai Waye	0149133775	aiwaye@1utar.my
5	19ABB00597	Song Kar Jing	0183831088	jingsong0014@1utar.my

PERSONAL DATA PROTECTION STATEMENT

Please be informed that in accordance with Personal Data Protection Act 2010 ("PDPA") which came into force on 15 November 2013, Universiti Tunku Abdul Rahman ("UTAR") is hereby bound to make notice and require consent in relation to collection, recording, storage, usage and retention of personal information.

Notice:
1. The purposes for which your personal data may be used are inclusive but not limited to:-
   - For assessment of any application to UTAR
   - For processing any benefits and services
   - For communication purposes
   - For advertorial and news
   - For general administration and record purposes
   - For enhancing the value of education
   - For educational and related purposes consequential to UTAR
   - For the purpose of our corporate governance
   - For consideration as a guarantor for UTAR staff/ student applying for his/her scholarship/ study loan

2. Your personal data may be transferred and/or disclosed to third party and/or UTAR collaborative partners including but not limited to the respective and appointed outsourcing agents for purpose of fulfilling our obligations to you in respect of the purposes and all such other purposes that are related to the purposes and also in providing integrated services, maintaining and storing records. Your data may be shared when required by laws and when disclosure is necessary to comply with applicable laws.

3. Any personal information retained by UTAR shall be destroyed and/or deleted in accordance with our retention policy applicable for us in the event such information is no longer required.

4. UTAR is committed in ensuring the confidentiality, protection, security and accuracy of your personal information made available to us and it has been our ongoing strict policy to ensure that your personal information is accurate, complete, not misleading and updated. UTAR would also ensure that your personal data shall not be used for political and commercial purposes.

Consent:
1. By submitting this form you hereby authorise and consent to us processing (including disclosing) your personal data and any updates of your information, for the purposes and/or for any other purposes related to the purpose.

2. If you do not consent or subsequently withdraw your consent to the processing and disclosure of your personal data, UTAR will not be able to fulfill our obligations or to contact you or to assist you in respect of the purposes and/or for any other purposes related to the purpose.

3. You may access and update your personal data by writing to us at s.yizhen73@1utar.my.

Acknowledgment of Notice

[   ] I have been notified by you and that I hereby understood, consented and agreed per UTAR above notice.

[   ] I disagree, my personal data will not be processed.

…………………………
Name:
Date:

Section A: Respondent's Demographical Profile

1   Please indicate your gender:

☐ Male   ☐ Female

2   Age group:

☐ Below 21   ☐ Between 41 - 50
☐ Between 21 - 30   ☐ Between 51 -60
☐ Between 31 - 40   ☐ Above 60

3   Nationality:

☐ Malaysian
☐ Other: _____

4   Marital status:

☐ Single   ☐ Widowed
☐ Married   ☐ Separated
☐ Divorced

6   Please state your monthly personal income:

☐ Below RM2000   ☐ RM4001 - RM6000
☐ RM2001 - RM4000   ☐ RM6000 and above

7   Experience in investing:

☐ No experience   ☐ 3 - 5 years
☐ Below 1 year   ☐ 5 - 7 years
☐ 1 – 3 years   ☐ More than 7 years

8   Which platform do you use for investing: (May select more than one)

☐ AFFIN HWANG Investment Bank Berhad   ☐ KENANGA Investment Bank Berhad
☐ CIMB Investment Bank Berhad   ☐ Rakuten Trade
☐ Malacca Securites Sdn Bhd   ☐ Others: (Please specify) _____

Questionnaire

Please indicate your agreement for the following items based on the Scale of 1 to 5 (1: Strongly Disagree; 5: Strongly Agree). Each item represents a commonly held opinion. Indicate your agreement to each statement by **selecting the most appropriate answer**.

1	2	3	4	5
Strongly Disagree (SD)	Disagree (D)	Neutral (N)	Agree (A)	Strongly Agree (SA)

Section B: Information
Investment Decision

No.	Item	SD	D	N	A	SA
ID1	I will consider the cost or transaction fee when making an investment decision.	1	2	3	4	5
ID2	I will invest in multiple companies rather than one.	1	2	3	4	5
ID3	The best way to make money is by diversifying my investment.	1	2	3	4	5

Overconfidence Bias

No.	Item	SD	D	N	A	SA
OB1	With my past investment successes, I am more confident with my investment now.	1	2	3	4	5
OB2	My successful investment strategies play an important role in generating my investment return.	1	2	3	4	5

Regret Aversion Bias

No.	Item	SD	D	N	A	SA
RA1	I refuse to make investment decision because I am afraid of feeling regret if I make a wrong decision.	1	2	3	4	5
RA2	When I have made a wrong decision in my investment that causes me to suffer loss, I will not close my position but hold my investment until it is profitable or break-even.	1	2	3	4	5

Loss Aversion Bias

No.	Item	SD	D	N	A	SA
LA1	I will not sell a stock even if the price is decreasing because I do not want to suffer loss.	1	2	3	4	5
LA2	I will give extra attention to the investment that has made losses.	1	2	3	4	5
LA3	I believe that I have not lose any money until I sell the investment.	1	2	3	4	5

Representativeness Bias

No.	Item	SD	D	N	A	SA
RB1	I think the company that has good performance for the past few years will maintain their performance for the future years.	1	2	3	4	5
RB2	I think the company that is having good cash flow is a good company.	1	2	3	4	5
RB3	I think that bad news will negatively affect the share price.	1	2	3	4	5
RB4	Once I see a company that is profitable, I will invest in it.	1	2	3	4	5

Herding Bias

No.	Item	SD	D	N	A	SA
HB1	I do not have enough knowledge about stock market.	1	2	3	4	5
HB2	I prefer to follow the decisions made by other investors.	1	2	3	4	5
HB3	I would like to invest in the stocks which my friends or family are having.	1	2	3	4	5
HB4	I do not have enough information to make investment decision.	1	2	3	4	5

Thank you very much for your kind participation.

APPENDIX C: KLCI performance 2016 to 2020 data

Date	Open	High	Low	Close	Adj Close	Volume
4/1/2016	1686.82	1687.89	1648.66	1657.61	1657.61	6.08E+08
11/1/2016	1657.89	1657.89	1628.55	1628.55	1628.55	6.14E+08
18/1/2016	1624.48	1632.6	1600.92	1625.21	1625.21	6.64E+08
25/1/2016	1609.4	1667.8	1609.4	1667.8	1667.8	1.01E+09
1/2/2016	1663.99	1666.51	1631.11	1662.46	1662.46	6.56E+08
8/2/2016	1670.93	1670.93	1638.5	1643.74	1643.74	3.14E+08
15/2/2016	1652.65	1685.65	1648.46	1674.88	1674.88	6.32E+08
22/2/2016	1671.41	1685.88	1658.16	1663.44	1663.44	6.26E+08
29/2/2016	1661.98	1700.49	1651.55	1692.49	1692.49	8.25E+08
7/3/2016	1696.11	1710.2	1676.93	1696.54	1696.54	6.23E+08
14/3/2016	1696.2	1716.34	1689.33	1716.34	1716.34	7E+08
21/3/2016	1714.36	1726.55	1699.76	1703.79	1703.79	7.32E+08
28/3/2016	1701.72	1724.13	1698.26	1710.55	1710.55	7.15E+08
4/4/2016	1709	1725.24	1709	1718.4	1718.4	6.72E+08
11/4/2016	1716.19	1729.13	1709.42	1727.99	1727.99	5.57E+08
18/4/2016	1719.79	1721.47	1704.7	1717.96	1717.96	5.79E+08
25/4/2016	1714.38	1717	1660.92	1672.72	1672.72	7.69E+08
2/5/2016	1674.51	1676.03	1633.18	1649.36	1649.36	6.02E+08
9/5/2016	1647.37	1652.1	1614.4	1628.26	1628.26	8.26E+08
16/5/2016	1628.52	1637.67	1611.91	1628.79	1628.79	7E+08
23/5/2016	1628.83	1638.17	1621.43	1637.19	1637.19	5.99E+08
30/5/2016	1632.68	1638.57	1622.25	1636.46	1636.46	1.38E+09
6/6/2016	1633.38	1664.04	1633.38	1641.22	1641.22	6.63E+08
13/6/2016	1634.59	1634.59	1613.79	1624.18	1624.18	6.29E+08
20/6/2016	1624.93	1642.15	1611.88	1634.05	1634.05	5.16E+08
27/6/2016	1627.69	1654.28	1618.25	1646.22	1646.22	6.13E+08
4/7/2016	1649.34	1657.77	1640.68	1644.54	1644.54	2.7E+08
11/7/2016	1645.84	1668.4	1645.49	1668.4	1668.4	6.93E+08
18/7/2016	1664.92	1674.58	1651.9	1657.42	1657.42	5.35E+08
25/7/2016	1657.64	1668.26	1652.84	1653.26	1653.26	5.93E+08
1/8/2016	1657.18	1666.5	1648.45	1664.04	1664.04	5.73E+08
8/8/2016	1666.34	1685.56	1664.59	1684.15	1684.15	5.86E+08
15/8/2016	1681.05	1700.71	1680.92	1687.68	1687.68	5.84E+08
22/8/2016	1682.94	1691.07	1673.87	1683.09	1683.09	5.09E+08
29/8/2016	1679.24	1688	1668.7	1671.79	1671.79	5.59E+08
5/9/2016	1667.31	1692.12	1667.31	1686.44	1686.44	4.76E+08
12/9/2016	1680.27	1682.41	1650.9	1652.99	1652.99	4.32E+08
19/9/2016	1661.87	1672.28	1645.18	1670.99	1670.99	5.69E+08
26/9/2016	1669.52	1671.46	1652.55	1652.55	1652.55	6.24E+08
3/10/2016	1658.36	1670.3	1656.28	1665.38	1665.38	5.96E+08
10/10/2016	1665.28	1672.34	1658.97	1658.97	1658.97	5.88E+08
17/10/2016	1661.13	1671.57	1652.63	1669.98	1669.98	5.81E+08
24/10/2016	1668.77	1679.11	1666.25	1670.27	1670.27	5.5E+08
31/10/2016	1676.83	1676.83	1643.95	1648.24	1648.24	6.22E+08
7/11/2016	1643.45	1665.36	1625.1	1634.19	1634.19	7.98E+08

14/11/2016	1628.43	1637.4	1614.11	1623.8	1623.8	6.79E+08
21/11/2016	1621.42	1632.71	1621.42	1627.26	1627.26	4.99E+08
28/11/2016	1625.37	1632.23	1616.08	1628.96	1628.96	8.09E+08
5/12/2016	1630.56	1643.75	1624.02	1641.42	1641.42	5.52E+08
12/12/2016	1651.45	1651.45	1629.86	1637.79	1637.79	5.48E+08
19/12/2016	1631.73	1639.49	1616.54	1617.15	1617.15	4.26E+08
26/12/2016	1618.48	1641.73	1616.69	1641.73	1641.73	3.84E+08
2/1/2017	1636.94	1675.49	1630.67	1675.49	1675.49	4.11E+08
9/1/2017	1675.33	1682.74	1665.94	1672.5	1672.5	6.16E+08
16/1/2017	1672.02	1672.42	1658.36	1664.89	1664.89	5.13E+08
23/1/2017	1665.92	1695.72	1664.35	1686.36	1686.36	6.33E+08
30/1/2017	1686.45	1686.83	1667.68	1685.01	1685.01	4.21E+08
6/2/2017	1686.07	1702.27	1684.63	1698.94	1698.94	5.39E+08
13/2/2017	1701.14	1713.47	1700.97	1707.68	1707.68	7.37E+08
20/2/2017	1706.17	1719.76	1696.48	1698.35	1698.35	6.97E+08
27/2/2017	1697.9	1717.14	1690.64	1708.38	1708.38	7.52E+08
6/3/2017	1706.59	1734.07	1706.21	1717.58	1717.58	6.69E+08
13/3/2017	1716.75	1752.1	1713.92	1745.2	1745.2	9.65E+08
20/3/2017	1744.07	1757.99	1738.4	1745.75	1745.75	8.25E+08
27/3/2017	1745.08	1759.76	1740.09	1740.09	1740.09	6.73E+08
3/4/2017	1742.38	1747.19	1736.21	1741.72	1741.72	6.75E+08
10/4/2017	1739.73	1744.08	1730.51	1730.99	1730.99	5.24E+08
17/4/2017	1731.13	1756.05	1729.13	1756.05	1756.05	5.98E+08
24/4/2017	1765.08	1772.21	1758.47	1768.06	1768.06	6.54E+08
1/5/2017	1769.16	1784.79	1754.23	1762.74	1762.74	5.39E+08
8/5/2017	1765.05	1780.49	1763.29	1775.87	1775.87	4.73E+08
15/5/2017	1775.4	1787.54	1762.04	1768.28	1768.28	6.65E+08
22/5/2017	1772.15	1782.54	1767.17	1772.3	1772.3	6.4E+08
29/5/2017	1774.25	1776.95	1759.73	1776.95	1776.95	8.66E+08
5/6/2017	1777.37	1795	1775.02	1788.89	1788.89	6.36E+08
12/6/2017	1789.7	1796.75	1784.31	1791.31	1791.31	6.12E+08
19/6/2017	1792.13	1793.39	1773.66	1779.45	1779.45	5.53E+08
26/6/2017	1787.19	1788.87	1755.65	1763.67	1763.67	3.67E+08
3/7/2017	1761.73	1770.53	1756.37	1759.93	1759.93	5.08E+08
10/7/2017	1759.1	1760.66	1751.59	1755	1755	5.19E+08
17/7/2017	1759.12	1760.82	1752.4	1759.16	1759.16	5.06E+08
24/7/2017	1761.35	1772.3	1757.22	1767.08	1767.08	4.95E+08
31/7/2017	1767.9	1774.53	1760.03	1774.53	1774.53	4.68E+08
7/8/2017	1775.52	1782.63	1766.96	1766.96	1766.96	4.12E+08
14/8/2017	1766.5	1776.31	1766.37	1776.22	1776.22	3.7E+08
21/8/2017	1774.72	1777.18	1764.07	1769.17	1769.17	4.74E+08
28/8/2017	1766.59	1773.16	1756.92	1773.16	1773.16	3.07E+08
4/9/2017	1785.69	1785.69	1766.05	1779.9	1779.9	4.53E+08
11/9/2017	1780.27	1793.22	1776.87	1786.33	1786.33	5.71E+08
18/9/2017	1782.93	1787.01	1770.44	1771.04	1771.04	3.05E+08
25/9/2017	1771.39	1772.19	1753	1755.58	1755.58	6.56E+08
2/10/2017	1755.22	1764	1750.94	1764	1764	4.46E+08
9/10/2017	1763.65	1765.48	1751.2	1755.32	1755.32	4.56E+08

16/10/2017	1759.12	1759.31	1740.65	1740.65	1740.65	4.31E+08
23/10/2017	1742.29	1751.5	1733.67	1746.13	1746.13	5.35E+08
30/10/2017	1747.91	1751.26	1739.6	1740.93	1740.93	5.1E+08
6/11/2017	1743.25	1750.94	1740.94	1742.28	1742.28	4.82E+08
13/11/2017	1743.14	1746.72	1716.97	1721.66	1721.66	6.2E+08
20/11/2017	1723.77	1728.18	1713.26	1717.23	1717.23	5.83E+08
27/11/2017	1718.37	1727.62	1709.94	1717.86	1717.86	7.89E+08
4/12/2017	1717.98	1724.84	1708.48	1721.25	1721.25	8.34E+08
11/12/2017	1720.93	1760.02	1717.32	1753.07	1753.07	9.5E+08
18/12/2017	1754.05	1760.24	1732.93	1760.24	1760.24	6.66E+08
25/12/2017	1758.51	1796.81	1753.25	1796.81	1796.81	4.39E+08
1/1/2018	1783.1	1817.97	1772	1817.97	1817.97	5.92E+08
8/1/2018	1819.74	1840.35	1812.78	1822.67	1822.67	8.07E+08
15/1/2018	1825.24	1831.32	1818.64	1828.83	1828.83	7.29E+08
22/1/2018	1835.21	1853.92	1825.86	1853.92	1853.92	6.53E+08
29/1/2018	1855.09	1880.56	1855.09	1870.48	1870.48	5.02E+08
5/2/2018	1847.85	1857.39	1795.85	1819.82	1819.82	9.74E+08
12/2/2018	1825.43	1842.73	1824.89	1838.28	1838.28	4.12E+08
19/2/2018	1843.02	1864.95	1841.78	1861.5	1861.5	5.59E+08
26/2/2018	1864.21	1872.35	1851.51	1856.07	1856.07	8.1E+08
5/3/2018	1853.75	1853.75	1834.66	1843.92	1843.92	6.55E+08
12/3/2018	1851.66	1864.31	1838.4	1846.39	1846.39	6.8E+08
19/3/2018	1846.92	1876.87	1841.47	1865.22	1865.22	5.57E+08
26/3/2018	1860.88	1867.11	1852.55	1863.46	1863.46	4.97E+08
2/4/2018	1863.06	1864.17	1811.56	1837.01	1837.01	4.67E+08
9/4/2018	1837.68	1873.62	1833.14	1868.47	1868.47	5.81E+08
16/4/2018	1868.69	1896.03	1867.21	1887.75	1887.75	6.35E+08
23/4/2018	1890.46	1891.59	1846.54	1863.47	1863.47	5.46E+08
30/4/2018	1860.84	1873.39	1841.83	1841.83	1841.83	2.53E+08
7/5/2018	1842.56	1851.73	1819.28	1846.51	1846.51	3.07E+08
14/5/2018	1814.45	1876.62	1797.14	1854.5	1854.5	1.2E+09
21/5/2018	1858.31	1864.94	1768.18	1797.4	1797.4	1.06E+09
28/5/2018	1793.45	1793.54	1709.51	1756.38	1756.38	3.5E+08
4/6/2018	1761.61	1801.42	1745.75	1778.32	1778.32	7.04E+08
11/6/2018	1774.42	1788.16	1745.45	1761.78	1761.78	6.68E+08
18/6/2018	1745.58	1748.67	1678.03	1694.15	1694.15	8.32E+08
25/6/2018	1707.02	1707.02	1657.78	1691.5	1691.5	7.21E+08
2/7/2018	1694.93	1697.15	1663.86	1663.86	1663.86	5.55E+08
9/7/2018	1663.96	1721.93	1662.58	1721.93	1721.93	5.79E+08
16/7/2018	1722.65	1764.15	1717.17	1754.67	1754.67	5.92E+08
23/7/2018	1753.14	1769.22	1749.95	1769.14	1769.14	5.41E+08
30/7/2018	1767.59	1788.31	1764.21	1780.09	1780.09	6.08E+08
6/8/2018	1781.76	1812.69	1777.78	1805.75	1805.75	5.81E+08
13/8/2018	1803.65	1804.41	1773.74	1783.47	1783.47	5.95E+08
20/8/2018	1784.43	1810.87	1782.74	1808.59	1808.59	2.83E+08
27/8/2018	1807.6	1826.9	1804.89	1819.66	1819.66	5.54E+08
3/9/2018	1821.06	1822.52	1794.79	1799.17	1799.17	5.49E+08
10/9/2018	1810.19	1822.68	1777.45	1803.76	1803.76	1.46E+08

17/9/2018	1791.86	1813.53	1788.52	1810.64	1810.64	6.88E+08
24/9/2018	1809.23	1812.19	1787.62	1793.15	1793.15	5.91E+08
1/10/2018	1795.99	1799.8	1776.52	1777.15	1777.15	5.04E+08
8/10/2018	1773.51	1781.79	1682.98	1730.74	1730.74	8.18E+08
15/10/2018	1729.4	1742.8	1718.13	1732.14	1732.14	5.73E+08
22/10/2018	1730.26	1730.27	1670.34	1683.06	1683.06	5.96E+08
29/10/2018	1682.55	1720.13	1680.59	1713.87	1713.87	5.8E+08
5/11/2018	1720.07	1726.1	1699.6	1708.09	1708.09	1.02E+09
12/11/2018	1704.08	1708.96	1678.82	1706.38	1706.38	5.32E+08
19/11/2018	1712.81	1712.97	1689.03	1695.88	1695.88	3.41E+08
26/11/2018	1693.04	1702.98	1677.45	1679.86	1679.86	1.22E+09
3/12/2018	1685.74	1700.67	1670.88	1680.54	1680.54	6.7E+08
10/12/2018	1674.67	1677.91	1652.63	1661.96	1661.96	5.51E+08
17/12/2018	1649.28	1672.21	1626.93	1670.28	1670.28	6.89E+08
24/12/2018	1669.99	1694.08	1658.1	1692.07	1692.07	2.37E+08
31/12/2018	1693.76	1701.1	1666.07	1669.78	1669.78	2.65E+08
7/1/2019	1674.92	1687.13	1667.83	1683.22	1683.22	7.93E+08
14/1/2019	1683.05	1692.22	1668.43	1692.22	1692.22	6.09E+08
21/1/2019	1698.88	1702.12	1680.84	1701.03	1701.03	5.4E+08
28/1/2019	1705.41	1705.5	1681.57	1683.53	1683.53	5.54E+08
4/2/2019	1698.97	1699.66	1683.61	1686.52	1686.52	2.48E+08
11/2/2019	1688.7	1693.85	1681.64	1688.83	1688.83	5.09E+08
18/2/2019	1693.92	1732.27	1690.19	1721.42	1721.42	7.21E+08
25/2/2019	1722.34	1726	1696.71	1700.76	1700.76	6.82E+08
4/3/2019	1688.22	1698.87	1678.66	1679.9	1679.9	5.44E+08
11/3/2019	1680.14	1683.25	1664.63	1680.54	1680.54	6.73E+08
18/3/2019	1681.83	1694.89	1657.01	1666.66	1666.66	4.68E+08
25/3/2019	1652.14	1654.26	1638.69	1643.63	1643.63	5.23E+08
1/4/2019	1646.43	1647.59	1628.44	1641.81	1641.81	4.56E+08
8/4/2019	1643.67	1645.72	1622.45	1630.17	1630.17	4.75E+08
15/4/2019	1634.95	1638.87	1609.83	1622.07	1622.07	4.81E+08
22/4/2019	1622.56	1640.96	1620.93	1638.38	1638.38	5.91E+08
29/4/2019	1637.3	1644.35	1625.56	1637.3	1637.3	3.74E+08
6/5/2019	1632.04	1641.86	1610.27	1610.27	1610.27	6.1E+08
13/5/2019	1610.55	1617.43	1572.03	1605.36	1605.36	6.09E+08
20/5/2019	1608.74	1614.23	1589.79	1598.32	1598.32	3.49E+08
27/5/2019	1604.44	1650.76	1597.25	1650.76	1650.76	8.62E+08
3/6/2019	1649.93	1656.68	1642.66	1649.33	1649.33	2.69E+08
10/6/2019	1651.93	1657.36	1636.32	1638.63	1638.63	4.75E+08
17/6/2019	1638.93	1682.23	1636.18	1682.23	1682.23	6.47E+08
24/6/2019	1679.28	1679.28	1670.73	1672.13	1672.13	5.21E+08
1/7/2019	1674.91	1694.55	1674.91	1682.53	1682.53	5.46E+08
8/7/2019	1679.65	1683.69	1668.99	1669.45	1669.45	4.68E+08
15/7/2019	1670.4	1672.47	1648.93	1658.19	1658.19	4.45E+08
22/7/2019	1658.28	1659.38	1647.7	1647.96	1647.96	5.92E+08
29/7/2019	1647.96	1648.71	1623.66	1626.76	1626.76	5.29E+08
5/8/2019	1621.12	1621.68	1588.98	1615.05	1615.05	8.81E+08
12/8/2019	1615.24	1615.24	1581.26	1599.22	1599.22	4.99E+08

19/8/2019	1595.51	1609.33	1594.17	1609.33	1609.33	5.05E+08
26/8/2019	1598.28	1612.14	1584.83	1612.14	1612.14	6.34E+08
2/9/2019	1612.78	1616.34	1591.11	1604.47	1604.47	4.01E+08
9/9/2019	1590.83	1608.39	1589.78	1601.25	1601.25	5.11E+08
16/9/2019	1609.92	1609.97	1590.02	1597.41	1597.41	5.73E+08
23/9/2019	1597.59	1597.59	1583.45	1584.14	1584.14	4.27E+08
30/9/2019	1584.26	1589.64	1551.96	1557.67	1557.67	4.18E+08
7/10/2019	1557.79	1565.16	1548.45	1556.84	1556.84	3.58E+08
14/10/2019	1562.65	1577.04	1562.65	1571.15	1571.15	4.55E+08
21/10/2019	1568.78	1574.09	1564.08	1570	1570	3.79E+08
28/10/2019	1573.16	1599.77	1570.18	1593.34	1593.34	5.22E+08
4/11/2019	1598.28	1614.19	1595.2	1609.73	1609.73	5.45E+08
11/11/2019	1610.66	1614.21	1592.22	1594.75	1594.75	4.72E+08
18/11/2019	1593.09	1605.31	1587.07	1596.84	1596.84	4.16E+08
25/11/2019	1595.08	1596.3	1560.72	1561.74	1561.74	5.67E+08
2/12/2019	1562.55	1570.55	1550.92	1568.44	1568.44	4.39E+08
9/12/2019	1566.18	1579.23	1558.76	1571.16	1571.16	4.93E+08
16/12/2019	1568.43	1610.18	1564.25	1610.18	1610.18	4.38E+08
23/12/2019	1606.45	1615.11	1598.48	1610.61	1610.61	1.87E+08
30/12/2019	1609.45	1617.43	1588.76	1611.38	1611.38	3.66E+08
6/1/2020	1611.16	1612.6	1587.43	1591.46	1591.46	4.22E+08
13/1/2020	1593.1	1595.81	1571.89	1595.81	1595.81	5E+08
20/1/2020	1596.39	1596.39	1568.64	1572.81	1572.81	5.55E+08
27/1/2020	1551.64	1554.42	1530.69	1531.06	1531.06	4.05E+08
3/2/2020	1522.14	1555.63	1517.61	1554.49	1554.49	7.93E+08
10/2/2020	1557.07	1557.07	1534.97	1544.46	1544.46	5.81E+08
17/2/2020	1542.97	1545.92	1527.57	1531.2	1531.2	5.1E+08
24/2/2020	1501.47	1510.42	1473.77	1482.64	1482.64	1.08E+09
2/3/2020	1471.34	1497.31	1456.08	1483.1	1483.1	9.06E+08
9/3/2020	1459.81	1459.81	1320.96	1344.75	1344.75	1.35E+09
16/3/2020	1319.37	1319.37	1207.8	1303.28	1303.28	1.74E+09
23/3/2020	1259.88	1353.35	1259.88	1343.09	1343.09	7.77E+08
30/3/2020	1336.23	1352.2	1316.94	1330.65	1330.65	8.86E+08
6/4/2020	1332.61	1371.35	1324.43	1357.5	1357.5	6.96E+08
13/4/2020	1357.94	1414.67	1352.78	1407.34	1407.34	6.78E+08
20/4/2020	1411.69	1428.95	1359.54	1369.85	1369.85	8.32E+08
27/4/2020	1371.6	1418.42	1367.44	1407.78	1407.78	5.32E+08
4/5/2020	1388.83	1398.07	1375.39	1382.31	1382.31	4.29E+08
11/5/2020	1379.44	1411.08	1377.56	1403.44	1403.44	6.21E+08
18/5/2020	1409.39	1455.13	1405.65	1436.76	1436.76	6.85E+08
25/5/2020	1446.91	1473.77	1446.42	1473.25	1473.25	9.75E+08
1/6/2020	1474.86	1564.13	1473.55	1556.33	1556.33	1.15E+09
8/6/2020	1572.8	1590.83	1509.16	1546.02	1546.02	8.54E+08
15/6/2020	1548.05	1548.05	1490.44	1507.26	1507.26	9.73E+08
22/6/2020	1505.95	1511.65	1483.05	1488.14	1488.14	4.88E+08
29/6/2020	1485.19	1552.65	1476.28	1552.65	1552.65	5.79E+08
6/7/2020	1553.79	1591.84	1553.79	1591.84	1591.84	7.1E+08
13/7/2020	1596.4	1617.36	1563.01	1596.33	1596.33	6.91E+08

20/7/2020	1607.35	1609.02	1580.39	1589.61	1589.61	6.24E+08
27/7/2020	1594.68	1618.01	1584.95	1603.75	1603.75	4.67E+08
3/8/2020	1595.01	1599.34	1549.62	1578.14	1578.14	5.74E+08
10/8/2020	1579.29	1581.93	1539.61	1564.59	1564.59	5.11E+08
17/8/2020	1561.94	1584.36	1543.04	1577.12	1577.12	5.27E+08
24/8/2020	1578.55	1581.27	1525.21	1525.21	1525.21	7.72E+08
31/8/2020	1541.55	1544.18	1498.72	1515.86	1515.86	7.13E+08
7/9/2020	1514.63	1520.89	1474.23	1504.85	1504.85	1.11E+09
14/9/2020	1513.43	1541.14	1503.19	1506.63	1506.63	1.03E+09
21/9/2020	1510.42	1516	1491.17	1509.14	1509.14	8.09E+08
28/9/2020	1510.26	1519.05	1489.66	1500.3	1500.3	6.16E+08
5/10/2020	1501.08	1532.53	1489.56	1530.35	1530.35	5.77E+08
12/10/2020	1525.92	1527.04	1503.84	1503.84	1503.84	7.51E+08
19/10/2020	1507.21	1521.91	1485.77	1494.64	1494.64	7.4E+08
26/10/2020	1495.56	1505.64	1461.05	1466.89	1466.89	5.14E+08
2/11/2020	1465.47	1519.64	1452.13	1519.64	1519.64	5.64E+08
9/11/2020	1521.63	1592.28	1513.21	1589.69	1589.69	1.41E+09
16/11/2020	1593.35	1613.34	1579.49	1593.75	1593.75	1.4E+09
23/11/2020	1593.26	1618.68	1578.39	1607.59	1607.59	9.11E+08
30/11/2020	1606.77	1628.82	1562.71	1621.85	1621.85	1.19E+09
7/12/2020	1624.07	1689.77	1618.98	1684.58	1684.58	1.07E+09
14/12/2020	1682.46	1695.96	1644.8	1652.49	1652.49	1.15E+09
21/12/2020	1651.86	1657.82	1625.39	1641.17	1641.17	4.77E+08
28/12/2020	1642.23	1655.96	1627.21	1627.21	1627.21	4.75E+08

Source: Yahoo Finance

APPENDIX D: Construct Reliability and Validity

	Cronbach Alpha	Rho_A	Composite Reliability	Average Variance Extracted (AVE)
Investment Decision	0.757	0.784	0.861	0.675
Overconfidence Bias	0.798	0.938	0.904	0.825
Herding Bias	0.791	0.915	0.858	0.604
Representativeness Bias	0.707	0.725	0.820	0.535
Loss Aversion Bias	0.678	0.774	0.818	0.604
Regret Aversion Bias	0.605	0.730	0.825	0.705

APPENDIX E: Discriminant Validity

Discriminant Validity
Fornell-Larcker Criterion

	Herding Bias	Investment Decision	Loss Aversion Bias	Overconfidence Bias	Regret Aversion Bias	Representativeness Bias
Herding Bias	**0.777**					
Investment Decision	0.225	**0.821**				
Loss Aversion Bias	0.430	0.308	**0.777**			
Overconfidence Bias	-0.201	0.338	0.134	**0.908**		
Regret Aversion Bias	0.489	0.186	0.536	-0.077	**0.840**	
Representativeness Bias	0.152	0.440	0.320	0.376	0.255	**0.732**

APPENDIX F: Path Coefficients

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T-Statistic (|O/STDEV|)	P-Values
Herding Bias -> Investment Decision	0.196	0.192	0.092	2.12	0.034
Loss Aversion Bias -> Investment Decision	0.109	0.117	0.085	1.288	0.198
Overconfidence Bias -> Investment Decision	0.253	0.257	0.085	2.974	0.003
Regret Aversion Bias -> Investment Decision	-0.021	-0.010	0.099	0.216	0.829
Representativeness Bias -> Investment Decision	0.285	0.287	0.087	3.296	0.001

APPENDIX G: Outer Loadings

	Herding Bias	Investment Decision	Loss Aversion Bias	Overconfidence	Regret Aversion Bias	Representativeness Bias
HB1	0.716					
HB2	0.746					
HB3	0.883					
HB4	0.753					
ID1		0.733				
ID2		0.838				
ID3		0.883				
LA1			0.882			
LA2			0.623			
LA3			0.805			
OC1				0.863		
OC2				0.951		
RA1					0.746	
RA2					0.924	
RB1						0.619
RB2						0.856
RB3						0.681
RB4						0.749