BEHAVIORAL BIASES AND PORTFOLIO DIVERSIFICATION: MODERATING ROLE OF SOCIAL INFLUENCE AND GRIT

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Portfolio diversification
Behavioural finance
Organizational behavior
Portfolio management

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A thesis submitted in partial fulfillment of the requirements for the Degree of **Doctor of Philosophy** in Management with specialization in Finance at

the Faculty of Management Sciences

International Islamic University,

Islamabad

August 2023

In the name of Allah, the most merciful and beneficent

DEDICATION

I dedicate this thesis to my parents, to whom I owe my whole life and my supervisor whose support has enabled me to complete this research study successfully.

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DECLARATION

I hereby declare that this thesis, neither as a whole nor as a part thereof, has been copied out from any source. It is further declared that I have prepared this thesis entirely on the basis of my personal effort made under the sincere guidance of my supervisor and colleagues. No portion of work, presented in this thesis has been submitted in support of any application for any degree or qualification of this or any other university or institute of learning.

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APPRECIATION AND GRATITUDE

No words of gratitude will ever be sufficient for the Allah Almighty who made me capable of learning, blessed me with the knowledge & intellect and facilitated me with the finest of the mentors all through my academic years. Allah gave me strength to complete this dissertation.

I would to thank Dr. Muhammad Faisal Rizwan, Associate Professor, IIU Islamabad, who made me, realize that no matter how high you think of your work, there is always a room for improvement. I present my deep gratitude to him, for being the most marvelous and enduring supervisor. His guidance throughout the theses work was valuable and has enabled me to complete the dissertation.

Thirdly, I would like to acknowledge the support of some special people who have been a great support and motivation during the thesis work. Dr. Adnan Riaz (Assistant Professor, AIOU, Pakistan), Professor Dr. Syed Zulfiqar Ali Shah (Professor, IIUI, Pakistan) and Mr. Hamid Mahmood (Coordinator, IIUI). I also appreciate my colleagues, for their consistent encouragement and continuous support especially in increasing my knowledge.

And finally, to my parents, most wonderful parents of the world without whom I wouldn't have been able to achieve anything in my life.

Mr. Ahmed Hassan Jamal

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Title of Thesis: "Behavioral Baises and Portfolio Diversification: Moderating Role of Social Influence and Grit"

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FORWARDING SHEET

The thesis entitled "Behavioral Biases and Portfolio Diversification: Moderating Role of Social Influence and Grit", submitted by Mr. Ahmed Hassan Jamal as partial fulfillment of PhD degree in Management Sciences with specialization in Finance, has completed under my guidance and supervision. The changes advised by the external and the internal examiners have also been incorporated. I am satisfied with the quality of student's research work and allow her to submit this thesis for further process as per IIU rules & regulations.

Date:__ _____ _____ . Signature:_____ _____

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ABSTRACT

Purpose - This study aims to explore the impact of behavioral biases on the portfolio diversification of the investors of Pakistan Stock Exchange (PSX) with the moderating role of Social Influence and Grit. Biases used in this study are Disposition Effect, Hot Hand Fallacy, Religion Bias, Salience and overconfidence.

Design/Methodology/Approach – Deductive approach is used in this study. This study is based on the quantitative data. The respondents of this study are the investors operating in Pakistan Stock Exchange. Sample size of the study is 1247. Out of them 806 valid responses are interpreted in this study. Questionnaire is used to collect the data from the investors. 1350 questionnaires were distributed to gather the data for the analysis. Out of the questionnaires that 1247 were received, 806 valid responses are assessed and analyzed. For analysis, reliability and the validity of the instruments are checked using AMOS 22. Moderation effects in the study are tested through PROCESS macro plugin of SPSS designed by Preacher and Hayes.

Findings - The results of the study, in general, found negative relationship between behavioral biases (hot hand fallacy, overconfidence, salience and disposition effect) and the portfolio diversification. Only religion bias is found to have a positive effect on the portfolio diversification. Moderators of the study i.e. social influence and grit showed positive moderation in the relationship between biases and portfolio diversification. That implies that in general, social influence and grit diffuse the negative relationship between behavioral biases and portfolio diversification.

Implication of the study - This research is helpful for both the investors and the regulator. Investors will be able to realize what biases are restricting their ability to diversify their portfolio. On the other hand, this study also provides them with the solution how the effect of these biases can be mitigated. For regulators, this study provides them with the areas where education of the investors is required. It is the responsibility of the regulators to education the investors on the issues that are limiting their investment capabilities.

Originality - The research gap that is filled by this study is firstly this study is focused on the portfolio diversification of investors. Previous studies had mostly concentrated on investment decision, investment horizon, investors' risk preferences and perceived market efficiency. Secondly, impact of religion on the portfolio diversification is unexplored in the literature. The research makes an attempt to find the impact of religious belief on the ability of investors to maintain a diversified portfolio. Thirdly, the moderators used in this study e.g. Social Influence and Grit are novel in nature and the study of them will help to add more factors in literature as well as for the investors and regulators that can diffuse the effect of biases has on investor portfolio diversification.

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CHAPTER 1

INTRODUCTION

This chapter illustrates the theoretical background of the study. It also narrates the problem area for the research along with the research gap. Moreover the research questions, research objectives, along with significance, and theoretical basis of the topic are mentioned in the first chapter of research.

It is believed by traditional finance theories that individual investors make decisions rationally because they incorporate all the information available into their investment decisions. Markets also perform efficiently due to this behavior. According to Efficient Market Hypotheses (EMH) share prices in the stock market are traded at fair value and it is very difficult for the investors to purchase undervalued stock or sell stock at a higher value because of the market efficiency and the only way to outperform is to do risky investments (Fama, 1970). Rational investors keep their portfolio diversified so that for a particular return the level of risk can be minimized (Markowitz 1952). Diversification of a portfolio can help investors to avoid losses in case of a market anomaly (Mangram, 2013). Diversification, if done properly, will minimize the risk to investor and, ultimately, the chances of a loss (Jayeola et. al., 2017).

Researchers have now argued that the literature of traditional finance theories is at odd because behaviors, personality and other factors impact the investor's decision making process and the investor's lack of ability to diversify their portfolio and often investors portfolio comprise of low number of stocks (Barber and Odean, 2000) and they often select stock based on lack of information or geographical reasons. These beliefs and behaviors that lie within individuals and affect their decision-making are termed as behavioral biases. Traditional finance explains the decisions in an ideal way that what should be done. However, reality is different. Behavioral finance focus on what is actually happening in terms of the decision making of the investors. Compare to the traditional finance theories, in practice, investors' decision making process are subject to limitations and they do not make an optimal decision in every situation.

Behavioral Biases of the investors have been keen interest to researchers from a long time (Jaiyeoba et. al., 2020). The interest in behavioral biases is not by coincidence, but there has been a need to study how psychology and sociology play their role in the mind of investors (Çal and Lambkin, 2017). Behavioral finance guides investors on how psychology and sociology impact the decision-making process and how the investors can act to reduce the effect of biases in their decision-making process (Dash and Mahakud, 2015). The area tries to find out the causes of undiversified portfolios and suboptimal investments by investors (Aren et. al., 2016). Behavioral finance states that human beings are not rational in their decision making and personality and psychological factors

influence their decision-making process (Menkhoff & Nikiforow, 2009; Ahmad et. al., 2017).

Investors tend to make irrational decisions while making decisions about their investments as they face both cognitive and emotional biases. They are limited by the amount of knowledge, time and information they have about the investment alternatives. They can get influenced by the behaviors of their family, friends, and colleagues or even by society in their decisions leading them to irrationality in their decision-making. Behavioral biases tends to be present in the subconscious of the investors and lead the investors, either institutional or individuals, to a decision that can be hurtful for them. Biases are part of human nature and they draw all type of investors to a decision that is not optimal and at times not rational (Byrne and Utkus, 2013). One such decision is having an undiversified investment portfolio.

1.1 Background of the study

Markowitz (1952) argued that portfolios need to be diversified in order maintain an optimal risk-return factor in the portfolio. Previous studies have found that the investors in practice keep few risky stocks and their portfolio is not diversified (Haliassos, 1995).

Recent studies have found that investors often do not diversify their portfolios due to the biases and also they tend to keep low number of different stocks (Bonna and Amoah, 2019). This in turn lead them to irrational decision making (Barber and Odean, 2000).

Traditional finance asserts that rational investors are supposed to keep a diversified portfolio (Mouna and Jarboui, 2015). The study of biases is helpful in determining the factors that are critical in understanding the reason of why investors do not behave in a rational way.

Simon (1956) introduced the concept of bounded rationality. This concept was much more realistic rather than theoretical. He argued that people tend to make errors in the decisions they take due to their limited knowledge or the tendency to make errors. Behavioral biases affect the choice of investment in the investors (Barber & Odean, 2001). Many studies have found out that investors make irrational decisions due to the biases which ultimately result in underperforming investments. Behavior can be described as tendency to make irrational decisions because of their mental and emotional state. There are several biases in human psychology (Hoffmann et al., 2010). Few examples of these biases are overconfidence (when investors' over rely on their own predictions), herding (when investors' follow the crowd while making their investment) and availability bias (where investors rely on the information that is available to them). Many studies were conducted to explore dimensions in addition to the behavioral biases in the investment decisions. For example, Hoffmann et al. (2010) in their study explained that the investors who are overconfident tends to have higher trading frequency and are risk takers in their investment decisions. Lin (2011) explained the phenomena and argued that primary reason of behavioral biases in the lack of technical ability and if investors can gain technical expertise they can make much better investment decisions. Nicolosi et al. (2009) in their study found out that despite certain irrationality in the behavior,

investors learn from their investment experiences. Further studies diagnosed that education can reduce the effect of behavioral biases on the investment decisions of the investors (Pompian and Wood, 2006) and behavioral biases can be reduced through influence of other variables (Pompian, 2012). Mouna and Jarboui (2015) concluded in their study that financial literacy is an important determinant of portfolio diversification of investors. Thus, it can be said that behavioral biases may work differently according to the other factors that are influencing the investors, e.g. financial literacy. It was argued that individual investors are more subject to behavioral biases as compared to the institutional investors (Chou and Wang, 2011).

Furthermore, there is a need to study more biases that play in the investors' mind in the decision making process. It is also important to know what factors can reduce the impact of behavioral biases from the investors' investment decisions.

1.2 Problem Area

Stock market provides a platform for trading of stock. It is part and parcel of every economy for financing investment of business organizations (Samuel, 1996). Stock markets wave financing path between borrower (organizations) and lenders (investors). Stock exchanges are famous to generate long and short term financing (Zuravicky, 2005). Markets are used as yardstick for development of country (Rasheed et. al, 2018). Stock exchange acts like money spinner of country. That's why mobility in stock exchange shows country's economic condition. Increase in stock prices are healthy sign for economy (Jaswani, 2008). Stock markets are segmented into developed economies like

US, UK, Germany, Russia, EU, China, Japan etc. emerging markets like Malaysia, India etc. and under developed economies like Vietnam, Kenya etc. Pakistan is a developing economy, which is heaven for local and foreign investors after breakdown in international stock markets. Pakistan Stock Exchange (PSX) was best performing in Asia in the year 2016 (Mangi, 2016) but it has been behaving worst from 2017 to today in market index as noted. Owing to geographical positions and only Islamic state in world that has nuclear power increased its importance. Pakistan stock exchange not only affected by internal affairs but external world is also cause of stress. So, it is really very important to study and be aware of the behavior of investors operating in Pakistan Stock Exchange and the dynamics which are manipulating their behavior.

Traditional finance has stressed on the maintaining of diversified portfolio in order to minimize the risk related to certain level of required return. Portfolio diversification is an effective strategy that keeps the risk of an investor minimized at a particular level of return. In this process, investment is generally spread across the industries in order to minimize the risk level associated with the investment (Yu and Kim, 2021). Investment, if well diversified, can be more secure economically because if an industry goes into a bad run, investments in other industries will make up for the investor and significant losses to an investor are avoided. So it can be said that portfolio diversification can make risk minimized for the investors (Giannotti et. al., 2011). Poor performance of stock exchanges has brought a focus on the need to keep a well-diversified portfolio (Lee and Stevenson, 2006). One main reason that investors do not maintain a well-diversified portfolio is the presence of biases in their overall personality. It is argued that behavioral

biases play its role in the decision making process and lead the investors to an undiversified portfolio (Jaiyeoba et. al., 2020). Because the behavioral biases lead to higher risk of losses to the investors as they do not keep a diversified portfolio, such investors often quit the market when they suffer heavy losses. This is one of the key reasons of poor performing stock exchanges. As portfolios of the investors are not diversified, these leads to either securities are underpriced or overpriced and hence the market efficiency is disturbed. Shefrin (2000) argued that stock prices are influenced by the behavioral biases of investors. The effect of such biases can be both short and long term. It can be said behavioral biases are one of the prime reasons of stock prices deviating from their fundamental value in reality.

Keeping in view the above argument, there is a dire need to study the biases that effect the decision making process of the investors. There are many biases that have been studied by different researchers (Theerthaana & Manohar, 2021; Rasheed et. al., 2018). Herding, Home Bias, Regret Aversion, Optimism Bias, Representative Bias, Availability Bias, etc. are few biases that have been studied in the previous literature. However, all the researchers are of the common view that there are other biases that effect the decision making process of the investors and these biases need to be studied too. Furthermore, it is also important to study the factors that help the investors to overcome their biases and the effect of biases is reduced by their presence. Previous studies highlighted that presence of few variables like financial literacy, emotional intelligence or locus of control can moderate the effect on biases on the investment decisions. But more factors need to be tested, the presence of which can reduce the effect of biases making investment decision.

1.3 Research Gap

Nigam et. al. (2018) studied the mediators that influence the financial decision making of individuals. It was a meta-analysis on the factors that influence financial decision. They suggested that religiosity is an area that is unexplored in the context of behavioral finance. Jaiyeoba et. al., (2020) conducted a study to check the effect of psychological biases on investors. They suggested that more biases can be used so that effect of other biases can be added to the literature. Their study focused on knowing how behavior and the psychological biases play in the minds of individual and institutional investors in Malaysia. They found that psychological biases along with the other factors effect decision making of investors whether institutional or individual. Their study focused on overconfidence, herding, anchoring and representative biases. However, they suggested that there are other psychological biases and factors that need to be studied to add to the literature and also to enable the investors and the regulators to mitigate effect of biases in the investment decisions. The first gap this research will fill is how religion effects the portfolio diversification of the investors.

According to Rashid et. al (2022), most of the studies in the context of behavioral financial has been conducted in the developed countries. The domain of such studies has been the behavioral of individual investors and institutional investors' biases and their effects on the decision making or the market parameters. Hence, there is a need to study the biases in developing countries as well as cultural and behavior differences exist in the people of developed countries and the developing countries.

Khan et. al., (2021) conducted a study to find the impact of personality traits and investment performance. He suggested that more factors can be studied can be studied that can influence to reduce the impact of biases of investor's decision making process. They use availability bias and representativeness bias in their study and checked long term orientation is moderating the relationship. They in the end suggested that other biases and the factors will lead to better understanding of the phenomenon. The study was conducted on the individual investors of Delhi, India. Some of the biases he used in his study are herding, overconfidence and risk aversion. He recommended more biases can be focused in future researches to have understanding of how other biases effect investment decisions. Aren and Hamamcı (2020) checked the effect on emotional biases and they suggested that more factors can be examined to enhance the literature of behavioral finance.

Further stated that most of the studies have focused on checking the effect of biases on investment decision, investment intentions, investors risk preferences and perceived market efficiency e.g. Shah et. al. (2018); Aydemir & Aren (2017) and Goyal (2016). Using portfolio diversification directly has not been the focus of previous researches. Financial brokers should guide investors on maintaining a diversified portfolio so that their risk level can be mitigated. Second gap this research will fulfill is that it will focus on portfolio diversification of the investors.

On the other hand, government has a duty to educate the investor on the risks and the mechanism to reduce it. Such knowledge when available can be disseminated (Akhtar et al., 2018a). Hence, it need to be studied what are the factors that lead the investors to take

higher risk than necessary and then looking at the other factors that mitigate the effect of those factors. Once it is studied, it can be helpful for the investors and the regulators both. This study will fill the said research gap focus on the studying psychological biases in the investor's decision about keeping their portfolio diversified and also studying the influencing factors so that it may help the investors and the regulators to mitigate the impact of biases in their decision making. Adil et. al (2021) conducted the study to investigate the moderating effect of financial literacy on between the behavioral biases and investment decision. The third gap this study will fill is the use of moderating variable that are not studied and can mitigate the effect of behavioral biases in the investor's decision making process. Specifically, this study will highlight the role of social influence and investor's grit that are unexplored in the literature yet.

1.4 Research Questions

1. What is the impact of Behavioral Biases (i.e. Hot Hand Fallacy, Disposition Effect, Religion Bias, Salience and Overconfidence) on portfolio diversification of the investors?

2. What is the role of social influence in the relationship between Behavioral Biases (i.e. Hot Hand Fallacy, Disposition Effect, Religion Bias, Salience and Overconfidence) and portfolio diversification of investors?

3. What is the role of Investor's Grit in the relationship between Behavioral Biases (i.e. Hot Hand Fallacy, Disposition Effect, Religion Bias, Salience and Overconfidence) and portfolio diversification of investors?

1.5 Research Objectives

The main objectives of the study are to find the effect of biases on the portfolio diversification of the investors. In this study, the biases that will be used are religion bias, hot hand fallacy, salience, over confidence and disposition effect. Further stated that this study not only intends to find the impact of biases on making a diversified portfolio but also intend to suggest solutions to it. In this study we have studied the moderating role of social influence and grit between the relationship between biases and portfolio diversification. So in this study the main objective are stated as follows:

1. To find the impact of Behavioral Biases (i.e. Hot Hand Fallacy, Disposition Effect, Religion Bias, Salience and overconfidence) on the portfolio diversification of the investors.

2. To study the moderating role of social influence in the relationship between Behavioral Biases (i.e. Hot Hand Fallacy, Disposition Effect, Religion Bias, Salience and overconfidence) and portfolio diversification of investors.

3. To study the moderating role of Investor's Grit in the relationship between Behavioral Biases (i.e. Hot Hand Fallacy, Disposition Effect, Religion Bias, Salience and overconfidence) and portfolio diversification of investors.

1.6 Significance of the study

The basic objective of this research is firstly to study the effect of biases that has little literature available and also it will also study the variables that will influence the effect of biases on the portfolio diversification and educating investors on them can lead them to reduce the effects of biases in their decision making process. This study will be helpful for both, the investors and the regulators. Investors will be able to realize the biases that are embedded in their personalities and what factors can reduce their effect in their decision making process. Similarly, the study will be helpful for the regulator as it's the duty of the regulator to educate investors on the investment decision making (Mohanty, 2023). Regulator can educate them on the biases that have significant effects on their decision making process and also guiding them on what they could do to reduce the effect of such biases.

Behavioral biases play an important role in determining the decisions of the investors (Mohanty, 2023). The investors at times are not themselves aware of what biases are play role in the decision making. Many biases have been studied in the previous studies but many biases are unexplored as well. This study firstly will help the investors to identify the biases that are in their personality and is affecting their investments decisions and investment performance. By this investors can be conscious about the role of biases in their personality. Secondly, this study is not only identifying the biases but is also providing them with the solution. The study has highlighted variables that can mitigate the effect of biases in their decision making.

Secondly, it is the duty of the stock exchange regulators to educate the investors on the issues related to their investment. This study will help the regulators to identify areas where the education of the investors in essential for their investment efficiency and ultimately that can lead to overall increase in stock market trading. This study also provides the regulators with the solutions for investors when impact of behavioral biases is high in their decision making. These can be the areas where the stock market regulator can educate the investors. According to Saivasan and Lokhande (2022), attitude is one of key element that effect investors' decision. In this study, Grit is studied as an attitude that can effect decisions of the investors.

1.7 Theories

1.7.1 Theory of Bounded Rationality

Simon (1956) introduced the concept of bounded rationality. This concept was much more realistic rather than theoretical. He argued that people tend to make errors in the decisions they take due to their limited knowledge or the tendency to make errors. There are limits in the decision making ability of the people. These limits are both internal (e.g. skills and ability) and external (e.g. availability of information). The limits in the cognition process of people limits their rationality in their decision making. Hence, decision making of the people is not rational but has bounded rationality. However, it is not irrational.

1.7.2 Prospect Theory

Kahneman and Tversky (1979) presented prospect theory stating that people make irrational decisions in the situation of risk and uncertainty. Prospect theory states that individuals tend to value the losses and gains differently, hence they take decisions on the basis of the gains they perceive rather than perceive losses. The basic concept of theory is if the individual is given two choices, both equal, with first offered in terms of possible gains and the other in terms of potential losses, first alternative will be taken.

1.7.3 Theory of Reasoned Action

Theory of Reasoned Action targets to describe the association between attitudes and behaviors in decisions of human beings. The main objective of Theory of Reasoned Actions is to predict how humans behave based on their pre-existing attitudes and perceived outcome. The decision of the individual to occupy a specific behavior is based on the outcomes the individual expects will result because of the performing the behavior.

1.7.4 Theory of Planned Behavior

Azjen (1985) in his Theory of Planned Behavior states that individual's behavioral intentions and his/her attitudes about a particular behavior are determined by being able to understand that person's behavioral and normative beliefs as well as the social norms for the society that they are within. He stated Behavioral outcome are dependent on Attitude, Subjective Norm and Perceived Behavior Control.

1.8 Theorization

The model of this study is supported by Theory of Planned Behavior. The theory states that the behavioral outcome of an individual is dependent on three factors i.e. attitude towards behavior, subjective norm and perceived behavior. The first factor is the individual intention to perform or the attitude towards behavior. In our study, investor's Grit, disposition effect, hot hand fallacy and salience are the part of attitude of the investors. Subjective norm are the belief of the certain individual and society. Subjective Norm can be defined as the way in which society view a particular behavior. The behavioral outcome depends on the subjective norms of the society. Religion and social influence used in our model can be viewed here as subjective norm. The theory suggests that resources and opportunities available to the individual will define their behavior. Here in the model social influence is the cultural factor that can be seen as the as the resources and opportunities available to the investors. Thirdly, overconfidence is the perceived behavioral control that lies in the investors. Lastly, portfolio diversification of the investors is the outcome of their behavior towards their investment.

Theory of Planned Behavior was introduced by Azjen (1985). The main focus of his theory was to identify the factors that lead to an individual's behavioral outcome. He argued that overall behavioral outcome of an individual can be determined by the individual's attitude i.e. how he personally believes things to be. Secondly, behavioral outcome depends on the subjective norm i.e. external factors influencing his/her opinion i.e. friends and family's opinion, etc. Thirdly, decision making depends on perceived control he/she thinks to have on the outcome.

The theoretical model of this study is supported by Theory of Planned Behavior and it has all the three elements i.e. attitude, subjective norm and perceived behavioral control that are affecting the investors' decision making process. In our study, investors' keeping his/her portfolio diversified is the behavioral outcome of the investors.

1.9 Plan of the study

This study includes six chapters. Second chapter is based on the literature review. Third chapter includes the methodology of the study. Fourth chapter is on the empirical findings of the data. Fifth chapter includes analysis and discussions of the study. Sixth chapter is based on conclusion and recommendation.

CHAPTER 2

LITERATURE REVIEW

This chapter discusses the theoretical and empirical literature on behavioral biases and the portfolio diversification. This chapter is divided into eight sections. Section 2.1 discusses the literature and form an argument for the relationship between the religion bias and the portfolio diversification of the individual investors. Section 2.2 highlights the literature on the relationship between overconfidence and the portfolio diversification. Section 2.3 deliberates on the relationship of salience and the portfolio diversification based on the literature available. Section 2.4 construct an argument on how hot hand fallacy impacts the ability of the investor to maintain a diversified portfolio. Section 2.5 looks at the literature support on the relationship between overconfidence of the investor and his/her ability to maintain a well-diversified portfolio. Section 2.6 uses literature support to construct the moderating role of the social influence of the investor in the relationship between the biases and portfolio diversification. Section 2.7 provides the details on the literature to support the moderating role of investor's Grit and maintaining a diversified portfolio. Section 2.8 represents the theoretical model of the study. Section 2.9 concludes the chapter.

Portfolio diversification is the process of investing your money in different securities in order to minimize the overall risk of the portfolio. Diversification protests the investors in a market place from the loss that may occur from an individual occurrence (Kirchner and Zunckel, 2011). If an investment of an investor is diversified, such investment is lesser exposed to an anomaly in a particular market. According to Statman (1987), portfolios of most of the individual investors consist of small number of stocks in the portfolio that means individuals in practice do not maintain a diversified portfolio. Elton and Gruber (1977) investigated the relationship between risk and the number of stocks in a portfolio and found that adding the number of securities to portfolio reduces the risk of the portfolio. One prime reason that investors do not maintain a diversified portfolio is the presence of biases in the individual investors.

Psychologists and academicians have identified many behavioral biases that affect the investor's decision making. One of the prime reasons of individual investor anomalies is the behavioral biases. Investors' decision making is dependent on the biases in them (Jain et. al., 2019). For instance, Kahneman and Tversky (1979) presented prospect theory stating that people make irrational decisions in the situation of risk and uncertainty and the portfolio of such investors remain undiversified. Individuals differ in the choices they make in a similar situation (Simon, 1955). Sahi et al. (2013) argued that understanding behavioral biases is of utmost importance if individual decision making process is to be understood. Investors are not rational in their decision making and they construct their portfolios based on the mental categories (Thaler, 1985). Rather than aiming to maximize the return of the portfolio as a whole, investors try to have different strategies for

different investment and overall profitability in compromised.

Investors' decision making abilities are shaped by factors that are external and internal, like, biological factors, psychological factors and social factors (Ahmad et al., 2017). These factors are collectively affecting the cognitive frame of mind. Psychological factors are produced within an individual through the process of thinking. It can be said that decision-making is a dual cognitive–affective process (Carmerer et al., 2005). A decision making system that has the ability to make errors is called heuristics (Fuller, 1998). Other reasons of biases in the decision making process are emotions and feelings (Lowenstein et al., 2001; Summers and Duxbury, 2012). As discussed, psychological factors are internal factors that influence decision making process, sociological factors that are external also play a significant role in the influencing the decision making process of investors. Sociological factors include culture, religion and social network (Shiller, 2002; Seyfert, 2012).

There are many instances in the real world where theories of traditional finance do not work in reality, in such situations behavioral finance works (Thaler, 1999). He identified several areas in the practical situation where the reality in stock market in different from that suggested by the traditional finance theories. Few of those areas are volatility in stock prices, volume of trading, forecasting of return and dividend policy.

Cognitive biases can be significant determinants of the individual portfolio diversification (Mouna and Jarboui, 2015). Biases can be the prime reason of investors keeping undiversified portfolio that is a deviation from the traditional finance theories.

2.1 Religion Bias and Portfolio Diversification

Religion plays an important role in the investors' investment decisions (Jaiyeoba et. al., 2020). There is very limited research on how religion bias impacts the investor decision making process (Jaiyeoba and Haron, 2016). The terminology religion bias is used because religion can influence the investor's decision making (Chang and Lin, 2015). Religion bias is termed as bias as people facing this bias are more concerned about their religious belief rather than making an optimal investment decisions. Religion always has its influence over an individual like a culture. It has continuous effect on the cognitive abilities of an individual. This advocates that religion always matters and it is persistent (Canepa and Ibnrubbian, 2014). It is therefore needed to study the religion bias of the investors as it plays a role in the decision making process. Highly religious people are often people with limited financial resources and limited professional advice. Hence, effect of religion bias can be quite significant in their investment decisions (Adeyemi & Haron, 2016). Some investors avoid investing in a certain types of companies. For example, Jaiyeoba and Haron (2016) found in their study in Malaysia that it is of utmost importance that the investment option is Sharia'h compliant to be considered. This shows that investors do not only consider investing for wealth maximization but it is also important for them that such investment is in accordance with their faith. Lucey and Zhang (2010) used religious commonality as a proxy for cultural distance, as people's behavior and attitudes can be influenced by their beliefs. The study showed a positive relationship between the stock market and the religious commonality. Renneboog and Spaenjers (2011) conducted the study on the religious difference between the Catholics and the Protestants in the household finance. They found that both religious groups have

different risk appetite in their decision making. Canepa and Ibnrubbian (2014) examine the effects of religious beliefs on stock prices; they show that individuals' religion tenets have an important effect on the investors' portfolio choices. They found out that sharia'h compliant stocks are more rewarding. Jiang et al. (2015) conducted a study on family owned firms and found out that religious family firms tends to take lesser risk as compare to the other firms. It is quite evident that religious beliefs tend to influence the investor's decision making process. Such investors are more inclined to maintain a portfolio that is in accordance with their beliefs rather than worrying about maintaining a well-diversified portfolio. Hence, we propose the hypothesis that:

H1a: Religion Bias affects negatively the portfolio diversification of the investors

2.2 Over confidence and Portfolio Diversification

Overconfidence refers to the tendency that investor possess to overestimate their ability to evaluate and forecast investment decisions. They also overestimate the accuracy of information available to them and the knowledge they possess. When investors are overconfident, they are very optimistic about the results of their forecasts and do not diversify their portfolios (Odean, 1998a). Overconfidence of the investors leads them to construct portfolios that are poorly diversified, trade excessively, overestimate their expected returns and under estimate the risk associated to their investments. Overconfidence in investors can lead them to trade too much and ultimately market volatility increases (Odean, 1998b). Overconfident investors are not inclined to keep a diversified portfolio and the reason behind it is they have a strong believe that the

investment they have chosen will perform well. Chuang and Lee (2006) conducted their study on New York Stock Exchange and found that investors who are overconfidence underreact to information that is available publicly and they over react when they get private information. Menkhoff et al. (2013) conducted an online-experiment regarding overconfidence in the perspective of financial markets. The subject of their experiment was 74 institutional investors, 78 investment advisors and 344 individual investors. All of the targeted samples were registered users of a large online platform for market sentiment data. The findings of the experiment were that the level of overconfidence in the three groups studied was different. The study also highlighted that age and investment experience has a significant impact on the level of overconfidence. Durand et al. (2013) conducted their study in the context of Australian financial market and their study found out that personality traits have a significant relationship with overconfidence and overreaction. Lai et al. (2013) scrutinized the behavior of retail and institutional investors in Malaysaia in the periods of bull and bear markets and concluded that both types of investors are overconfident in these phases. Broihanne et al. (2014) in their study highlighted that individuals are overconfident when they make their forecast about stock performance and are willing to take higher level of risk. Kiymaz et al. (2016) studied the effect of various personal attributes finance sector professionals on their risk choices derived from their portfolio allocation and personal wealth data. They concluded that professionals with higher expected returns invest more in equities and are overconfident about their portfolio choices. Pikulina et al. (2017) conducted his study on 14 financial professionals and 111 students and concluded that there exist a positive relationship between overconfidence in one's financial knowledge and choice of investment.

Overconfidence generally results in excess trading, under confidence leads to underinvestment, however moderate overconfidence leads to correct investment decisions. At times, investors are too confident about their abilities and they believe their forecasts can be accurate and hence they do not diversify their portfolio. Of late, Lewis (2018) confirmed that overconfidence considerably decreases the probability of customers who seek investment advice and as a result the investment decision-making impact on their long-term financial well-being. Overall it can be argued that overconfident investors overestimate their knowledge and the information available to them and tend to keep a portfolio that is poorly diversified. Hence we propose the hypothesis:

H1b: Overconfidence negatively affects the portfolio diversification of the investors

2.3 Salience and Portfolio Diversification

Salience can also be termed as the phenomenon that investors tend to focus on the investments they are familiar about (Yalcin et al., 2016) and familiarity breeds investment (Huberman, 2001). The idea of availability heuristic was introduced by Tversky and Kahneman (1973) suggesting that selective alternatives trigger salience and availability effects. Merton (1987) in his model argued that investors often avoid unfamiliar investments due to the fear of unknown. They are of the belief that unknown assets are often highly risky. Investors while making investment decisions are more focused on those securities that they know about and such investors are probable to not diversify their portfolio rationally. People recall to find cues existing in their mind in their assessments (Huberman, 2001). Salience is difficult to over some because to make any

decision it requires efforts to assess different alternatives and then choosing the best out of them. So people find it easier to make investment in the options they know about rather than going through a hectic evaluation process. Hence, it can be said that investors use information they are familiar about to avoid the difficulties of decision making process (Yalcin et al., 2016). It is found out that familiar investments are also chosen by investors due to their optimism (Barber et. al., 2005). Chaudary (2019) conducted the study to find impact of salience on long term and short term investment decisions. The results of her study indicated that salience have a positive impact on both short-term and long-term investment decisions. Moreover, Heath and Tversky (1991) were the ones that laid down foundation of the familiarity bias. They suggested that individuals are likely to take a gamble where they think they are informed rather than in situations where they believe that they lack information. Such investors often focus on the stocks of familiar companies and their portfolios often remain undiversified. Similarly, when they counter a choice to opt for equally risk assets, they choose the one they are familiar with (Fox and Tversky, 1995). One of the prime reasons that investors do not go for an unfamiliar investment is the fear of making an error. Many researches have concluded that when an investor makes an investment in familiar securities they are more confident and optimistic about it (Sirri and Tufano, 1998; Barber et al., 2005). As investors tend to make decision based on their familiarity to the options available, they often do not explore all the alternatives available and their portfolio is not diversified. Based on the above arguments we propose that:

H1c: Salience negatively affects the portfolio diversification of the investors

2.4 Hot Hand Fallacy and Portfolio Diversification

Hot hand fallacy can be defined as the incorrect belief that certain random sequences may in fact be non-random (human-related) and therefore positively auto correlated (Gilovich et al., 1985). Investors believe that certain events will be repeated (Kudryavtsevet al., 2013). If an investor has made profit from a stock recently, he/she will belief that such history will be repeated (Kudryavtsevet al., 2013). This attitude is opposite to the gambler's fallacy (Baker and Ricciardi, 2014). If investors believe that past market trend will continue they will invest aggressively in high performing securities of the past and would not diversify their portfolio. Gilovich et. al. (1985) were the first to use the term "hot hand". They studied the phenomena in basketball shooting that the players believe that success in serially correlated. However, the results showed that it is incorrect that success in basketball shooting is related to past results. They put forward that the hot hand also arises out of the representativeness heuristic similar to the gambler's fallacy. It is argued that once the investor earn from a particular investment, such investors are quite optimistic about the recent history to be repeated. They believe that investment that has earned them is the best option available. Resultantly, they increase their investment in the securities that have performed well for them in the recent past. Hence, they do not focus on maintaining a diversified portfolio. So the following hypothesis is proposed:

H1d: Hot Hand Fallacy negatively affects the portfolio diversification of the investors

2.5 Disposition effect and Portfolio Diversification

Disposition effect is the tendency of the investors to retain losing securities for too long. On the other hand, they sell the profit making securities too early (Shefrin and Statman, 1985). Kahneman and Tversky's (1979) in prospect theory tried to explain the phenomena of disposition effect. Prospect theory states that in gaining position investors are risk averse and on the contrary in the position of losses investors are risk takers. It can be said that investors become loss averse when they are in profits and they accept higher risks when they are in losses. Investors who are actually making high profits out of their portfolio in the stock market are taking more risk (Thaler and Johnson, 1990). According to Shefrin and Statman (1985), investors are more likely to keep the loss-making asset whereas attempts to sell the gaining stock.

Prospect theory laid the foundation of disposition effect. Odean (1998a) supported the statement of prospect theory. Many researches have supported the relationship of disposition effect with investment decision making (Barber et al., 2007; Satish, 2019; Weber and Camerer, 1998; Jordan and Diltz, 2004). For example, Barber et al. (2005) conducted their research on the mutual funds investors. Their results were in line with the prospect theory. They found that investors are reluctant to sell loss making funds and are at times eager to realize profits in the funds too early. Dhar and Zhu (2006) studied the difference in disposition effect among certain individuals and found out that disposition effect is higher among individuals who are not professionals and individuals that belongs to the low income class. Shafran et al. (2009) examined the effect of disposition effect on investors that found out that trading conditions significantly influence the disposition

effect in individual investors. Goetzmann and Massa (2008) concluded in his study that dispositions effect has a negative effect on portfolio returns and the trading volume.

It is therefore argued that as investors tends to hold loss making funds for too long, in doing so they are not even concerned about keeping a portfolio diversified and end up taking too much risk in their investments. Investors also have the tendency to hold loss making assets without any rationality behind it and the portfolio diversity is compromised. Reluctance to realize losses becomes their inability in the process of maintaining a diversified portfolio. Hence, it is hypothesized that:

H1e: Disposition effect negatively affects the portfolio diversification of the investors

2.6 Moderating Role of Social Influence in the relationship between behavioral biases and portfolio diversification

Normally studying the effect of behavioral biases on the decision making of the investors is of keen interest to the researchers but there are many other factors that influence the investment decision of the investors. Social influence can be defined as the extent to which the attitudes, beliefs and behaviors of the individuals are influenced by others (Wang et al., 2013). Social influence includes the influence of someone who is respected like family or friend. People tend to agree to such belief in public or privately but these opinions has an effect on the decision making of the individuals. In behavioral studies, social influence is considered as a critical factor affecting the decision making of the people (Kelman, 1958). Easy access to media along with the social interactions with

friends and relatives and using internet for information seeking have become vital methods for obtaining information. One of the important factors that influence the investor's decision making process is the media. Media is helpful source for obtaining the information about market and exploring the updates about the potential investment options (Davis, 2006). It is also explored that media keep the investors informed and they at times lack intend to analysis alternatives themselves (Baker and Nofsinger, 2002). Other factor that can influence an investment decision of the investor is the interaction with friends and family. According to Hirshleifer (2001), interaction with people and the media is source of learning for the individuals. People interact with each other about certain topics, the discussion can lead to formation of an opinion that ultimately can influence the decision making. Interaction with people and media is also the source of information for people as they exchange opinions and emotions while interacting. In the stock exchanges, interaction with other people is quite important because by this the individual interact with brokers and other investors to gain knowledge about the market (Nofsinger, 2014a, 2014b). Often people interact with each other for sharing of information. Few studies have found the impact of interaction with friends and family on the trading volume (Abreu and Mendes, 2012). It is also documented that investor are at ease when choosing to invest in an option they have knowledge about (Guiso and Jappeli, 2006); social interaction may provide information about the financial performance of the company (Tauni et al., 2015).

Social influence impacts significantly the investor's decision making process (Akhtar et. al., 2018b). If social influence of the investor is strong i.e. he has knowledgeable friends

and family and he has social media involvement, the effect of biases in its decision making is influenced. Investment decisions of individual investors are also influenced by other factors like information through the newspaper or other media, advice from friend and family, etc. Such advices and information can change the mind of the investors and can reduce the impact of biases in the decision making process. Similarly, it can also lead to wrong asset allocation of asset and can hinder the investment objectives of an individual investor. Individual investors, therefore, need to safeguard against these social influences, to avoid any investment loss and at the same time good social influence can also help individuals to overcome biases in them. Correct investment decisions, i.e. correct asset allocation and a well-diversified portfolio, are very necessary to achieve both long-term and short-term investment objectives. It is can be argued that social influence plays its part in limiting the biases of the investors. Hence we propose that:

H2: Social influence moderate the relationship between behavioral biases and portfolio diversification

H2a: Social influence moderate the relationship between Religion Bias and portfolio diversification

H2b: Social influence moderate the relationship between Hot Hand Fallacy and portfolio diversification

H2c: Social influence moderate the relationship between Salience and portfolio diversification

H2d: Social influence moderate the relationship between overconfidence and portfolio diversification

H2e: Social influence moderate the relationship between Disposition Effect and portfolio diversification

2.7 Moderating Role of Investor's Grit in the relationship between behavioral biases and portfolio diversification

Grit can be defined as passion and perseverance to achieve the goals (Duckworth et al., 2007). Grit include two main components i.e. persistence of efforts and consistency of goals (Duckworth et. al., 2009). Hence, it can be said that people that have grit in them works harder than the other persons and are more committed to achieve their set goals (Duckworth et al., 2007, 2009). Grit is an evolving conception that deals with fact that some people perform better than equally intelligent individuals (Duckworth et al., 2007). People who are higher in grit perform better in real life (Duckworth et. al., 2011). It is a personality trait that such people are persistent in their efforts to achieve and outcome. Many researches have concluded that grit is the reason behind success of the individuals. According to Arli et. al. (2020), the desire to achieve their goal, people who are gritty and persistently focusing their intended objectives. People that have grit and resilience in them tend to have better outcome. As per Doney et al. (1998), investors that are long term oriented will carefully assess the investments and will not indulge in an opportunistic behavior. This implies that long term oriented investor will carefully examine the associated risk and rewards associated with the potential investment opportunities. While the individuals that are long term oriented might sacrifice short term benefits to gain long term advantages (Alcantara-Pilar and Barrio-García, 2015). Jin & Kim (2017) concluded that students having grit are more successful. Similarly other researches have shown that

gritty people achieve better than their counterparts. Eskreis-Winkler et al. (2014) conducted their research on military people and found the people that have grit in their personality excel better in life. Duckworth et al. (2007) argued that such people are more likely to achieve their goals not because of their intelligence but because they are committed to their goals in long term and are persistent about their efforts for achieving the desired outcome despite any difficulty or problem faced during the journey. Individual who have long term orientation, are more determined towards achieving their objectives compare to the short term oriented people (Hofstede; 2001). To be success in some endeavors like education, investment, etc. persistence of effort is the key. Hence, gritty people are more like to make better investment decisions as they are consistent with their goals and persistent with their efforts. The investors that are hardworking and consistent in their effort for the investment goals, the effect of biases in such investors are influenced by this personality trait. Similarly, as Gritty people set long term goals, it is argued effect of biases is higher to decisions when investors are looking for short-term gains. If investor is long term oriented he/she tends to carefully assess before making any decisions. Such investors are expected to keep better diversified portfolio.

Grit people consistent with their goals in the long term and hence it can be argued that investors who are focused on long term goals would put more time and effort to analyze their prospective investment alternative before making an investment and then make optimal investment decisions that are linked to their long term goals (Khan et. al., 2021) and these investors are expected to keep their portfolio diversified. Long term oriented investors will consider all the risks and factors that are affecting the long term return of

their investments and will gather more information before making an investment decision. Thus, long term investment behavior is a risk management strategy because as investment horizon is extended the risk of investment also increases (Valkanov, 2003). It is also argued that long term oriented investor is likely to hold his/her investments for longer period of time and hence possibly will incorporate all relevant factors in his investments while making an investment portfolio (Lydenberg, 2009).

As gritty investors are persistent despite the tough phases, they are more likely to make better investment decisions and can have better future earnings. (Von Cullen et al., 2014; Suzuki et al., 2015). Investment decisions are decisions that require the investor to be persistent and passionate about their decisions. These decisions are required to be evaluated and monitored regularly without changing overall investment objectives. Gritty investors have the tendency to keep evaluating their investment and making corrections in the portfolio they have kept and keeping it well diversified. Therefore, it is hypothesized:

H3: Investor's Grit moderate the relationship between behavioral biases and portfolio diversification

H3a: Investor's Grit moderate the relationship between Religion Bias and portfolio diversification

H3b: Investor's Grit moderate the relationship between Hot Hand Fallacy and portfolio diversification

H3c: Investor's Grit moderate the relationship between Salience and portfolio diversification

H3d: Investor's Grit moderate the relationship between overconfidence and portfolio diversification

H3e: Investor's Grit moderate the relationship between Disposition Effect and portfolio diversification

2.8 Research Model

After the thorough gap analysis, theorization and the literature review, Figure 1 is representing the theoretical framework of the study. This research model is to study the effect to behavioral biases on the portfolio diversification of the individual investors. Behavioral Biases are the independent variables of the study. Five biases are takes as behavioral biases in the study namely Religion Bias, Overconfidence, Hot Hand Fallacy, Salience and Disposition Effect. Portfolio diversification is the dependent variable. Moderators that will be studied in the relationship between behavioral biases and portfolio diversification are social influence and investor's grit. Few control variables that will be used in the study are income level of the investors, experience of the investors, portfolio size of the investors, investors' risk preference and the level of financial literacy of the investors. These control variables are important to study along with the independent variables and the moderators because these all are the factors that actually effect the overall portfolio diversification of the investors.

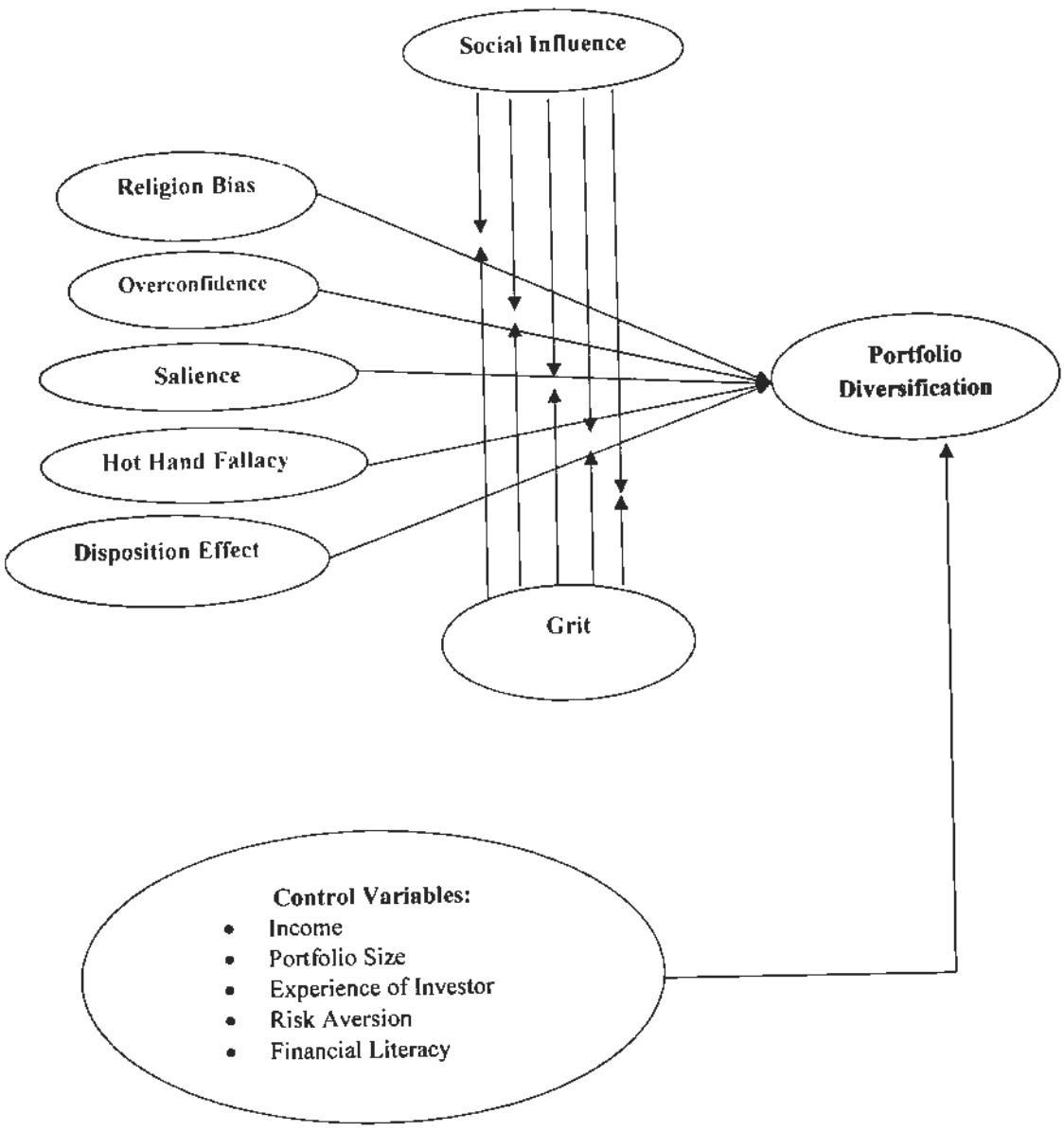

Figure 2.1: *Theoretical Framework*

2.9 Conclusion of the chapter

Primary focus of this chapter is to form a literature support for the investors' biases used in the study and their relationship with the portfolio diversification (dependent variable). It focuses on the literature review of all the biases used in the study i.e. religion bias, over confidence, salience, hot hand fallacy and disposition effect and their effect on ability of the investor to maintain the well-diversified portfolio. Following the literature in the support of biases and portfolio diversification, the chapter discussed the use of moderating variables i.e. social influence and grit to nullify the negative impact of behavioral biases and portfolio diversification. At the end, the chapter provides the theoretical support for the model of the study.

CHAPTER 3

METHODOLOGY

This chapter will provide the overall mechanism of how the research will be conducted and how the hypothesis will be tested in the study. The chapter consist of several parts namely research philosophy, population and sampling design, data collection, instruments and its measurement and the statistical tests to be used in the study.

3.1 Research Philosophy

Methodology to answer the research questions can either be qualitative or quantitative. Qualitative approach can be used to discover the realties and phenomena that are inter-connected. On the other hand, quantitative approach can be used where data is available or be transformed in numbers and then using the statistical methods for analysis. Both approaches have their advantages and disadvantages and researchers consider both while deciding the methodology for the research (Queirós et. al., 2017). Qualitative approach is helpful when the aim is to develop understanding of the problem and exploring different dimensions of the problem. According to Queiros et. al. (2017), "in qualitative researches the researcher is both the subject and the object of his research". For example, when exploring a social phenomenon, own behavior can be studied by the researcher to understand the problem, hence, we can say that researcher is both the subject as well as

the object of the research. In the simplest of the term, it can be said that qualitative studies are helpful when it is not possible to gather the data is not quantifiable. The advantage of this type of research approach comes when it is difficult to operationalize the variables. Furthermore, in such studies the sample size smaller than used in the quantitative approach. When qualitative approach is followed, research design revolves around in-depth interview, focus group, etc. The other approach that can be used in research is quantitative approach. This approach requires variables to be quantified. Larger sample size is used when using the quantitative approach of research. Quantitative approach allows the researcher to test the hypothesis of the study using statistical methods through statistical software packages like AMOS, SPSS, EVIEWS, etc. Results generated from these software packages can then be interpreted and analyzed by the researcher.

This study involves demographics, biases in investors, personality, social and cultural factors and portfolio decisions. These variables have the tone of qualitative approach. However, previous researches done on these variables have provided the mechanism to quantify these variables though already developed instruments. Details of the instruments that will be used in this a study is given in the upcoming section of this chapter. As this study requires testing of the relationship of the variables involved. Statistical analysis is the requirement of the study to prove the causal relationship between the variables. Hence, quantitative approach is used in this study.

3.2 Population and Sampling

The aim of the study is analyze the behavior and the decision making of the investors of Pakistan Stock Exchange. Hence, the data that is gathered is from the individual investors of Pakistan Stock Exchange. The population of the study is the individual investors of Pakistan Stock Exchange. As per an estimate, there are over 200,000 investors that own and are involved in the trade of shares in Pakistan Stock Exchange. There are 282 brokerage houses in Pakistan. Convenience sampling is used in the study because the data pertaining to Pakistan stock exchange investors' and number of stocks they hold is not publicly available. Researcher has to gather the data through questionnaire from investors who are trading at brokerage houses physically. Most recent studies conducted on investors of Pakistan Stock Exchange have used convenience sampling technique (Samra, 2018; Khan et. al., 2020; Out of them 32 are in Islamabad and Rawalpindi, 86 in Lahore and 165 are in Karachi. Out of these, in this study we have taken at least 10 responses from the investors from each brokerage house in Lahore, Islamabad and Rawalpindi.

Sampling can be defined as a process of selecting subset from the whole population so that estimates can be made on them and result can be generalized on the whole population. Sampling size of the research is above 1247 individual investors. This sample size is more than the sample size used in number of researches that were conducted previously on the investors of Pakistan Stock Exchange (Adil et. al., 2021; Chaudary, 2019; Rasheed et. al., 2018). According to Krejcie and Morgan (1970), when the population exceeds 100,000, sample required is 384. This is the minimum criteria for the

sample. Our sample size was 1247, out of which 806 valid responses were analyzed in the study, which is above than the previous researches conducted on investors of Pakistan Stock Exchange (PSX)

3.3 Data Collection

The study uses primary data from the investors of Pakistan Stock Exchange investing at the stock exchanges. Individual investors in Pakistan Stock Exchange are trading through the brokerage houses. There are 282 brokerage houses in Pakistan. Out of them 32 are in Islamabad and Rawalpindi, 86 in Lahore and 165 are in Karachi. Out of these, in this study, at least 10 responses have been obtained from the investors from each brokerage house in Lahore, Islamabad and Rawalpindi. Out of those responses, only valid responses were analyzed and interpreted.

Primary data obtained from the investors of Pakistan Stock Exchange from the two major cities of Pakistan i.e. Lahore and Islamabad through a structured questionnaire. The data is obtained through the questionnaire using 5-point likert scale ranging from Strongly Disagree (1) to Strongly Agree (5).

More than 1350 questionnaires were distributed personally to the investors operating in Pakistan Stock Exchange. Out of those, 1247 were received and out of them 806 valid responses are analyzed in this study.

3.4 Instruments and the measurement

There are thirteen variables in the study. All measures are adopted from previously tested

sources. For the nine variables, the scale is used at 5-point likert scale with value 1 representing 'strongly disagree' and 5 representing 'strongly agree'. Categories were developed to capture other three variable, i.e. Income of the investors, portfolio size and the experience of investment. For all the other nine variables namely, religion bias, overconfidence, salience, hot hand fallacy, disposition effect, social influence, grit, risk aversion and financial literacy, scales are adopted from the previous studies. Cronbach Alpha value is used to check the reliability of the scales. Reliability value of all the scales used is greater than 0.7 in the previous studies where they were used. The detail of the measures used for collection of data is listed as follows:

1. **Overconfidence**

   To measure overconfidence, scale is adopted from Lin (2011). The instrument contains four questions. The sample item includes "I am confident of my ability to do better than others in investment decision". The item of the scale is used at 5-point likert scale with value 1 representing 'strongly disagree' and 5 representing 'strongly agree.

2. **Hot Hand Fallacy**

   Three items scale which is developed by Kudryavtsev et al. (2013) has been adopted and is used to capture Hot Hand Fallacy in the investors. In previous studies where the scale is used the reliability value of the scale were above 0.7. The scale consists of two items. The sample item include "After I manage to realize a profit on my stock portfolio, I increase the sum of my stock market

holdings". One item is added from Luong & Ha (2011), Mahmood et al. (2016) as used by Ahmed and Noreen (2021).

3. **Religion Bias**

Scale from the study of Jaiyeoba et. al., (2020) is adopted for religion bias. The item of the scale is used at 5-point likert scale with value 1 representing 'strongly disagree' and 5 representing 'strongly agree. The sample item of the scale is "Religion plays important role in the choice of my investment".

4. **Salience**

The scale for salience is adopted from Yalcin et. al. (2016). It consists of 5 items. The scale is used in number of previous studies where it has reported the reliability value of above 0.7 (e.g. Chaudary, 2019). The sample item includes "It is risky to invest in relatively unknown public companies rather than known ones".

5. **Disposition Effect**

Scale is adopted from Lin (2011) to assess the disposition effect in the behavior of the respondents. It is a 5-item scale. The scale is used in number of previous studied where it has reliability of above 0.7 (e.g. Adil et. al., 2021).

6. **Social Influence**

The 3-item scale was developed by Shanmugham and Ramya (2012) for measuring social influence. One item was adopted from Lu (2014). The

mentioned scale is used in the study to capture social influence of the investors of Pakistan Stock Exchange.

7. Grit

The measure is adopted from Duckworth et al. (2007). The scale has 2 dimensions i.e. consistency of goals and persistence of efforts. In total, it is a 13-item scale. The sample item includes "I have overcome setbacks to conquer an important challenge".

8. Portfolio Diversification

The measure to capture the portfolio diversification of the individual investors of Pakistan Stock Exchange in this study is adopted from Sotiropoulos and Rutterford (2017). The simplest, and the most commonly used, measure of diversification is the number of holdings in a portfolio (Blume et. al., 1974). The most common measure of diversification is simply to count the number of different stocks in the portfolio (Woerheide and Persson, 1993). Elton and Gruber (1977) argued that adding the number of securities to portfolio reduces the risk of the portfolio. According to Statman (1987), keeping 30 or more stocks in the portfolio means portfolio is fully diversified. In this study, to measure portfolio diversification number of different stocks in the portfolio of the investor is used and rating from 1 to 5 is developed based on the number of different stocks held in the portfolio. If more than 30 stocks are present in the portfolio or more than 50% of the portfolio is invested in mutual funds "5" rating is given to the portfolio. Mutual funds already comprise of high number of stocks so it is considered a diversified investment.

9. Risk Aversion

7-item scale is used to measure the risk aversion of the investors. The scale was formed and used by Aydemir and Aren (2017). The scale was formed using three items of Donthu and Gilliand (1996) with four items of Burton et al. (1998).

10. Financial Literacy

The scale developed by Al–Tamimi and Anood Bin Kalli (2009) is used to measure financial literacy of the investors in this study. The sample item include "Do you accept that the time value of money and risk-return trade-off has any impact on investment?".

3.5 Statistical Tests

3.5.1 Reliability

Reliability refers to the consistency of the items of the scale used to measure a construct. Cronbach Alpha values is used to check the inter consistency of the items of each scale. Value of 0.7 and above is used as a benchmark, where values were found below 0.7, invalid responses are eliminated from the analysis.

3.5.2 Validity

Construct validity is the degree to which the items measures and reflect the construct they were actually supposed to measure. To address the validity, both convergent validity and discriminant validity are used in this study. Convergent validity checks that construct that should be related are actually related. To check convergent validity Average Variance Extracted (AVE) is used. On the other hand, discriminant validity checks whether the

measures of the constructs that should be unrelated are unrelated. In order to maintain discriminant validity Confirmatory factor Analysis (CFA) is used through IBM AMOS to check discriminant validity.

3.5.3 Correlation and Multicollinearity

Correlation test is applied to check the strength of the relationship between the variables. Spearman correlation is used to check the correlation between the variables. Correlation between the independent variables is a strong indicator of multicollinearity. If correlation between the independent variables is higher than 0.9, there is a chance of multicollinearity between the variables. To check multicollinearity, variance inflation factor (VIF) is used to further diagnose the multicollinearity. Variance inflation factor is used to measure the intensity of the influence of one independent variable by other independent variables. Variance inflation factors allow a quick measure of how much a variable is contributing to the standard error in the regression. When there are significant multicollinearity issues, the variance inflation factor is very high for the variables involved. Threshold value of VIF is less than 5. In this study researcher has used both correlation analysis and the VIF to diagnose the issue of multicolinearity.

VIF is calculated in three steps:

Step 1:

In the first step, an ordinary least square regression is run that has X_i, an independent variable, as a function of all the other independent variables in the first equation.

Step 2:

In the second step, VIF factor for β is calculated using the following formula:

$$VIF = \frac{1}{1-R\hat{}2}$$

Step 3

Magnitude of multicollinearity is assessed using the VIF value. Higher the value of VIF higher the multicollinearity. A rule of thumb is that if VIF>10 then multicollinearity is high (a cutoff of 5 is also commonly used). Here we have 5 as a cut off value.

3.5.4 Analysis Techniques

Firstly, descriptive analysis is used to report the descriptive characteristics of the data. Here the researcher has evaluated the mean and the frequency distribution. Then, structural equation modeling is used to test the model. Structural equation modeling (SEM) is a multivariate technique designated as a blend of path analysis and the factor analysis (Tabachnick & Fidell, 2007). By the use of this technique the researcher can analyze series of relations between the variables in a single run (Tabachnick & Fidell, 2007). Structural Equation Modeling is a way to testing complex relationships in a multivariate data (Grace, 2008). Structural Equation Model (SEM) is used to analyze the data of the study.

There are certain steps that need to be followed in order to produce valid results using the structural equation modeling. Steps that need to followed are: (1) theoretical base model need to be developed. This model is developed in previous chapter. (2) Path diagram

needs to be constructed. This diagram is also depicted in chapter 2. (3) forming structural equation using the path diagram. (4) input matrix selection. (5) assessing the model. (6) making modification for appropriate goodness of fit measures.

SEM is run through AMOS and individual moderation tests are applied through PROCESS MACRO of SPSS as recommended by Preacher and Hayes (2004). The significance of path coefficients for the hypothesis testing is estimated at 5,000 bootstrap values at 5% level of significance which is consistent with Hair et al. (2017). Certain model fitness criteria are also be used e.g. GFI, RMSEA, RMR, CFI, etc.

CHAPTER 4

EMPIRICAL RESULTS

The aim to this chapter is to present the empirical results got through the use of statistical techniques and to report on the basis of these finding whether the hypothesis developed in the chapter 2 are accepted or rejected. Initially in the chapter, descriptive statistics are presented and discussed. Then the reliability of the scales used in the study is reported and analyzed. Following that, validity tests results are reported and analyzed. Once the reliability and validity of the scale used for each construct is proven, then the chapter provide details of correlation analysis so that relationship of the variables can be understood and multicollinearity statistics can be identified. Finally, results of hypothesis testing are reported in the chapter.

4.1 Descriptive Statistics

The table 4.1 given below shows the demographics of the individual investors that are the respondents of the study.

Table 4.1: Demographic Statistics of Investors

Demographics	Categories	Frequency	Percentage
Gender	Male	708	87.8
	Female	98	12.2
Age	Below 30 years	273	33.9
	31-40 years	258	32.0

	41-50 years	240	29.8
	50 years and above	35	4.3
Education	Matric	26	3.2
	FA/F.Sc	74	9.2
	Bachelors	450	55.8
	Masters and Above	256	31.8
Experience	Less than 1 year	33	4.1
	1-5 years	266	33.0
	5-10 years	257	31.9
	More than 10 years	250	31.0
Portfolio Size	Less than 5 lac	187	23.2
	5 lac to 1 Million	130	16.1
	1 Million to 5 Million	235	29.2
	5 Million and Above	254	31.5

The above table is showing the demographics of the investors. Gender is categorized in two categories male and females. 1 value was given to "male" and 2 value to the "Females". Out of the 806 respondents, analyzed in the study, 708 are males and 98 are females. Percentage of male respondents is 87.8% and female respondents are 12.2%.

Age of the investors is categorized in four categories i.e. less than 30 years, 31 years to 40 years, 41 years to 50 years, and 51 and above. Total of 806 responses for the individual investors are analyzed in this study. Out of them 273 respondents are less than 30 years old. Hence, it can be said 33.9% respondents were less than 30 years of age. The age of 258 respondents was between 31 years and 40 years. 240 respondents were between 41 years of age and 50 years of age. Only 35 respondents of the study are above 50 years of age.

Education of the investors are categories in the four i.e. Matric, Intermediate, Bachelors, and Masters and above. Out of the total of 806 respondents 26 respondents were having the education level of Matriculation. 74 respondents has intermediate level of education. 450 respondents have a bachelor level degree. Percentage of respondents that have a bachelor level of education is 55.8 percent; hence, most investors fall in this category of education. 256 respondents have a master's level degree of above.

Experience of the investor was also categorized in four categories i.e. less than one year, more than one year and less than 5 years, more than 5 years and less than 10 years, and more than one year. Out of the total of 806 responses analyzed in the study, 33 have an experience of trading in stock exchange of less than one year. 266 investors had a trading experience between 1 year and 5 years. 257 had experience of trading between 5 years and 10 years. Out of the total of 806 investors, 250 investors had more than 10 years of trading experience.

Portfolio size of the investor represents the amount of investment of the investor. It is categorized in four categories i.e. less than Rs. 500,000, more than Rs. 500,000 and less Rs. 1,000,000, Rs.1000,000 or above but less than Rs. 5,000,000, and above Rs.5,000,000. Out of the 806 respondents, 187 investors had a portfolio of less than 5 lac rupees. 130 investors had a portfolio between 5 lac and 1 million. 235 investors had a portfolio ranging between 1 million to 5 million. 254 investors had a portfolio of above 5 million rupees.

The table 4.2 given below is representing the mean values, maximum values, minimum values and the standard deviation of the each variable.

Table No. 4.2: Descriptive Statistics

Variable	Minimum	Maximum	Mean	Std. Deviation
Hot Hand Fallacy	1.00	5.00	2.3660	1.16943
Overconfidence	1.00	5.00	2.3046	1.15316
Salience	1.00	5.00	2.4600	1.19285
Religion Bias.	1.00	5.00	3.1513	.97504
Disposition Effect	1.00	5.00	2.3002	1.01712
Social Influence	1.00	5.00	3.4671	.96161
Risk Aversion	1.00	5.00	3.6377	.94830
Financial Literacy	1.00	5.00	3.6737	1.02881
Grit	1.25	5.00	3.6273	.89019

4.2 Reliability Statistics

Reliability refers to the "inter consistency of the scale". Cronbach α value is used to estimate the reliability of the constructs in the study. It measures the inter consistency between the items of a scale (Cooper & Schindler, 2013, p. 260). The reliability statistics of the scales used for each variable in the study are reported in the following table:

Table 4.3: Reliability Statistics

Variable Name	Cronbach's Alpha Value
Hot Hand Fallacy	0.721
Overconfidence	0.835
Religion Bias	0.832
Salience	0.872
Disposition Effect	0.828
Social Influence	0.913
Grit	0.937
Risk Aversion	0.952
Financial Literacy	0.919

Reliabilities of all measures were found greater than the threshold value of 0.7 (Nunnally & Bernstein, 1994). Cronbach's Alpha values are used for the measure of reliability of the scales used in the study.

4.3 Confirmatory Factor Analysis

The purpose of Confirmatory Factor Analysis (CFA) is to test the fitness of the model based on the observed data that hypothesis the causal relationship between the latent variables (Gerbing & Hamilton, 1996). In order to maintain discriminant validity Confirmatory factor Analysis (CFA) is used through IBM AMOS to check discriminant validity. Confirmatory Factor Analysis of the proposed model of the study is used to evaluate the distinctiveness of the measurement model through factor structure. Confirmatory factor analysis includes the maximum likelihood estimates to perform a CFA on hot hand fallacy, religion bias, overconfidence, salience, disposition effect, risk aversion, financial literacy, Grit and social influence to confirm that measurement model is acceptable fit to data.

The graphical model for this designed and test in AMOS is given as follow:

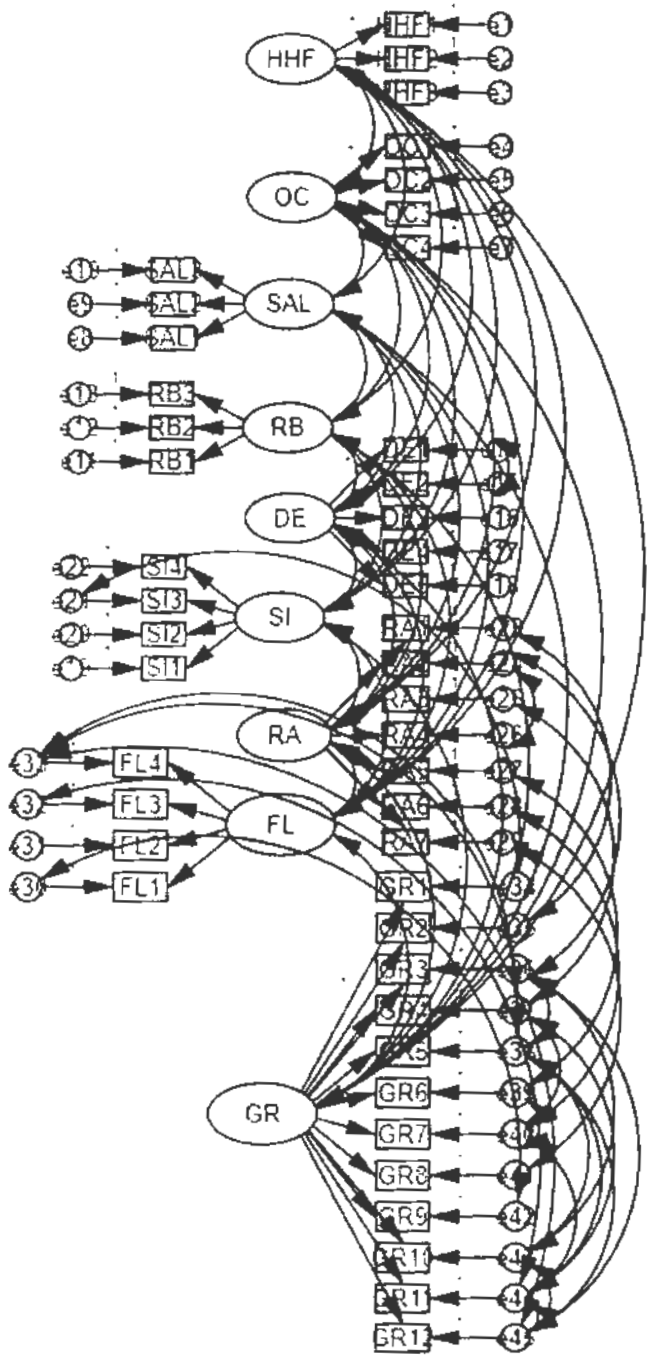

Figure 4.1 Confirmatory Factor Analysis

4.4 Construct Validity

Validity of a construct is concerned with the and is often calculated through average variance extracted (AVE). Factors loadings and the discriminant validity in this study are measured using the AMOS 20 and SPSS 22 respectively. The factor loadings generally ranged from 0.50 to 0.75. As per Fornell and Larcker (1981), to measure the validity of the construct, following criteria is used:

1. To confirm the convergent validity, the value of Average Variance Extracted must be greater than 0.5 (latent variables account of 50% of variance)
2. To confirm the discriminant validity, Average Variance Extracted must be greater than the Maximum Shared Variance (MSV).

The validities of each construct and their reliabilities were found above the acceptable range and are shown in the table as follows:

Table 4.4: Validity Measures

Variables	CR	AVE	MSV	MaxR(H)
Hot Hand Fallacy	0.9	0.749	0.714	0.902
Overconfidence	0.92	0.742	0.73	0.92
Salience	0.895	0.741	0.73	0.901
Religion Bias	0.887	0.724	0.258	0.889
Disposition Effect	0.873	0.588	0.584	0.905
Social Influence	0.829	0.55	0.363	0.843
Risk Aversion	0.932	0.672	0.282	0.955
Financial Literacy	0.924	0.752	0.571	0.929
Grit	0.962	0.68	0.571	0.97

Composite reliability of each scale is above 0.7 which is the acceptance criteria for the composite reliability value.

For convergent validity, Average Variable Expected (AVE) is calculated for each variable by first finding the load of each factor of the construct. Formula used to calculate the Average Variance Extracted (AVE) is given as follows:

Average Variance Extracted = sum of square of factor loadings / number of items

Average Variance Extracted (AVE) for all the variable is greater than 0.5 which mean convergent validity holds for all the variables.

For discriminant validity, the AVE should be greater than MSV. In the table given, AVE value of all the variables is greater than its MSV value which implies discriminant validity also hold for all the instruments.

4.5 Model Fitness

Once the convergent and discriminant validities were ensured, it was further observed that the fit indices of measurement model which also produced adequate results for key indices. The values and the threshold for these indices are given as follows:

Table 4.5: Model Fitness Indices

Measure	Estimate	Threshold	Interpretation
CMIN	3743.759	--	--
DF	883	--	--
CMIN/DF	4.24	Between 1 and 3	Acceptable
CFI	0.926	>0.95	Acceptable
SRMR	0.059	<0.08	Excellent
RMSEA	0.063	<0.06	Acceptable

CMIN/DF value for the model was 4.240 which is acceptable. CFI value was less than 0.95 which is also acceptable. SRMR value was significantly below 0.08 which is excellent value for a model to be tested. Similarly, RMSEA value was near 0.06 too which implies that model is acceptable for further analysis.

4.6 Correlation among Variables

Correlation matrix provides the relationship between the variables under study. It is often used to diagnose any existence of the multicollinearity in the model. If relationship among the independent variables is significantly high it gives an indication of the existence of the multicollinearity. The correlation matrix is given as under:

Table No. 4.6: Correlation Matrix

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Portfolio Size	1.000															
Portfolio Diversification	.523**	1.000														
Hot Hand Fallacy	-.349**	-.439**	1.000													
Overconfidence	-.233**	-.574**	.176**	1.000												
Salience	-.428**	-.822**	.428**	.419**	1.000											
Religion Bias	.432**	.678**	-.429**	-.363**	-.619**	1.000										
Disposition Effect	-.318**	-.642**	.209**	.253**	.543**	-.356**	1.000									
Social Influence	.459**	.727**	-.335**	-.401**	-.563**	.532**	-.405**	1.000								
Grit	.353**	.748**	-.230**	-.622**	-.572**	.498**	-.393**	.556**	1.000							
Risk Aversion	.024	.329**	-.063	-.160**	-.242**	.104**	-.244**	.160**	.251**	1.000						
Financial Literacy	.269**	.625**	-.240**	-.424**	-.455**	.407**	-.316**	.432**	.554**	.319**	1.000					
Income	.328**	.372**	-.170**	-.405**	-.261**	.371**	-.095**	.410**	.386**	-.123**	.246**	1.000				
Gender	-.052	-.112**	.054	.067	.082*	-.068	.131**	-.057	-.092**	-.068	-.090*	-.041	1.000			
Age	.026	.026	.014	-.016	-.014	-.032	-.001	.027	.071*	.039	.006	.045	-.030	1.000		
Education	.072*	.031	.025	.008	-.013	-.030	-.002	.049	.079*	.026	.022	.061	-.026	.844**	1.000	
Experience	.037	.023	-.074*	.013	-.005	.049	.005	.033	.030	.000	.023	-.016	.006	-.357**	-.254**	1.000

The table above reports the correlation between the variables under the study. The table provides the basic direction of the relationship between the variables as well. It can be observed that all the biases have a negative relationship with the portfolio diversification of the investors except the religion bias. The correlation coefficient for the relationship between hot hand fallacy and portfolio diversification is -0.439 and is significant. It suggests a moderate negative relationship between the hot hand fallacy and portfolio diversification. The correlation coefficient between the overconfidence and portfolio diversification and overconfidence has a value of -0.574 and is significant. It can be deduced from the value that overconfidence and portfolio diversification has a moderate negative relationship. Similarly, salience and portfolio diversification has a correlation coefficient that has a value of -0.822 and is also significant. This implies that salience and portfolio diversification has a strong negative relationship among each other. The correlation coefficient between religion bias and portfolio diversification has a value of 0.678 which implies that there is a moderate positive relationship between religion bias and portfolio diversification. Disposition effect and portfolio diversification has a correlation coefficient of -0.642. This means there is a moderate negative relationship between the disposition effect and the portfolio diversification.

There are certain control variables used in the study i.e. Income, Experience of investor, Portfolio Size, Financial Literacy and Risk Aversion. The correlation table is also indicating the basic relationship of these variables with the portfolio diversification. Income and portfolio diversification has a correlation coefficient's value of 0.372 and is

significant. This implies that there is positive relationship between income of the investors and portfolio diversification of the investors. Correlation coefficient between the experience of the investor and portfolio diversification has a value of 0.23 but is insignificant. Hence, it can be said there is relationship between the experience of the investors and the portfolio diversification. Portfolio size and portfolio diversification has correlation coefficient's value of 0.523 and is significant. Hence, it can be said that there is a moderate positive relationship between the portfolio size and portfolio diversification. Financial literacy and portfolio diversification has a correlation coefficient's value of 0.625 and is significant. It implies that financial literacy and portfolio diversification has a moderate positive relationship among them. The correlation coefficient between risk aversion and portfolio diversification has a correlation coefficient that has a value of 0.329 and is significant. It can be concluded from the correlation coefficient's value that there is a weak position relationship between risk aversion and portfolio diversification.

Correlation table is also providing the correlation between independent variables. When the correlation among the independent variable is high, it is indicative of multicollinearity. However, as the correlation table suggests the relationship between the independent variables is not high. In fact none is higher than 0.7 between the independent variables. However, still we further analyze the Variance Inflation Factor (VIF) test to rule out the possibility of multicollinearity. The VIF statistics are given as follows:

Table No. 4.7: Multicollinearity Diagnostics

Variables	Tolerance	VIF
Risk Aversion	.799	1.252
Financial Literacy	.648	1.543
Hot Hand Fallacy	.758	1.320
Overconfidence	.662	1.510
Salience	.433	2.308
Religion Bias	.514	1.945
Disposition Effect	.683	1.465
Portfolio Size	.700	1.429
Age	.391	2.555
Education	.416	2.406
Experience	.879	1.138
Income	.699	1.431

As reported in the table above. VIF is less than 5 for all the independent variables which concludes that there is no multicollinearity in the model. Hence, now we can move further for our analysis.

4.7 Regression analysis

Regression can be defined as a statistical process used to find out the impact of independent variables on the dependent variable. When there are more than one independent variables in the model, multiple regression is used to estimate the impact of independent variables on the dependent variable. Regression analysis is a way of mathematically finding out whether the independent variables do have an impact on the dependent variable. Now here multiple regression analysis is used to find the impact of independent variables on the dependent variables i.e. portfolio diversification. The regression results are reported as under:

Table No. 4.8: Regression Results

Variables	β	Std. Error	t	Sig.
(Constant)	3.691	.176	21.016	.000
Religion Bias	.198	.020	10.051	.000
Overconfidence	-.189	.017	-11.295	.000
Salience	-.343	.020	-16.925	.000
Hot Hand Fallacy	-.078	.017	-4.496	.000
Disposition Effect	-.277	.019	-14.658	.000
Risk Aversion	.092	.014	6.496	.000
Financial Literacy	.180	.016	11.145	.000
Portfolio Size	.091	.017	5.304	.000
Experience	.019	.020	.970	.332
Income	.061	.018	3.457	.001

N = 806 *Dependent variable is Portfolio Diversification

Based on the regression results reported in the above regression table, results are analyzed hypothesis wise.

H1a: Religion Bias affects negatively the portfolio diversification of the investors:

Based on the literature review, it was hypothesized that religion bias negatively affects the portfolio diversification of the investor. It was argued that investors are concerned about the stocks they feel are aligned with their religious belief and hence diversifying the portfolio often remains the second priority of the investors. However, empirical results shown in the regression table shows there is significant positive relationship between the religion bias and the portfolio diversification in Pakistani context. As the hypothesis was rejected but the religion bias has a significant effect on the portfolio diversification in opposite direction. Open ended interviews were conducted with the brokerage houses' senior managers and some individual investors to interpret such result. It is then interpreted as there is a large Muslim majority in Pakistan and in Islam

speculation is forbidden. For the same reason, the investors who has strong religious belief do not invest based on speculation and their concerns are long term dividends rather than short term gain and therefore religion bias in Pakistan stock exchange is positively related to the portfolio diversification of the investors. However, here we report that hypothesis 1a of the study is rejected.

H1b: Overconfidence affects the portfolio diversification of the investors

When investors are overconfident, they are very optimistic about the results of their forecasts and do not diversify their portfolios (Odean, 1998a). That's why it was hypothesized the overconfidence leads to lesser diversified portfolio. This hypothesis is accepted through regression. The value of overconfidence's regression coefficient is -0.177 and the level of significance is less than 0.05. This implies that investors who are overconfident about their analysis rely heavily on their analysis of few stocks and often therefore do not maintain a diversified portfolio. The hypothesis 1b of the study is therefore supported.

H1c: Salience affects the portfolio diversification of the investors

The regression coefficient of the salience is -0.328 and level of significant is 0.00 which is lesser that 0.05. According to Yalcin et al. (2016), investors are too concerned and focus on the investment options they are familiar about and do not consider other option. As such investors consider limitation options in their investment, their portfolio remains

undiversified. This hypothesis is confirmed through the regression results and hence it is reported that hypothesis 1c of the study is supported.

H1d: Hot Hand Fallacy affects the portfolio diversification of the investors

The value of the coefficient for hot hand fallacy is -0.66 and is significant at 0.00. This implies that hypothesis 1d is also supported. Hot hand fallacy mean that investor believe that history will he repeated that means they overinvest in the stock that has done well in the past without analyzing much about their potential for the future and hence they do not maintain a diversified portfolio. It is confirmed through the regression results that hot hand fallacy negatively effects the portfolio diversification of the investors. Hence, it is reported that hypothesis 1d of the study is also supported.

H1e: Disposition effect affects the portfolio diversification of the investors

Investors in the stock market often keep their loosing stocks for too long and sell the profit making stock too early. Hence, in such dynamics it is tough for the investors to maintain a diversified portfolio. In the study it was hypothesized that disposition effect has a negative effect on portfolio diversification. Regression analysis has shown that the slope for the disposition effect is -0.226 and is signification at 0.00. This implies that disposition effect negatively affect the portfolio diversification ability of the investors. The investor often are reluctant to sell their loosing securities and their investment remains concentrated in the securities that has loosing position in their portfolio. It limits the ability of the investor to maintain a well-diversified portfolio. Here it is reported that hypothesis 1e of the study is supported.

Regression Results of Control Variable

In this study certain variables are used as the control variables namely, Income of the investors, Experience of the investors, Portfolio Size of the investors, Financial Literacy and Risk Aversion. The results of the regression analysis have revealed that β-value of the Income of the investors is 0.061 and is significant at p-value of 0.001. It can be said here that investors who have higher income level tends to maintain their investments in more number of stock and hence maintain a diversified portfolio. The regression results also showed an insignificant impact of experience of trading of the investors and the portfolio diversification. It is interpreted that investors' experience does not determine whether investors tends to keep a diversified portfolio or not. Portfolio size has a β value of 0.091 and is significant at p-value of 0.00. This implies that investors that have a larger portfolio size tend to keep more number of different stocks in their portfolio and their portfolios are better diversified. Financial literacy has a β-value of 0.180 at p-value of 0.00 when regressed with portfolio diversification. It is therefore found that financially literate investors tend to keep a better diversified portfolio compare to the investors that lack financial literacy. Similarly, risk aversion has a β-value of 0.092 at a p-value of 0.00. Hence, it can he interpreted that investors that are risk averse are more inclined towards maintaining a diversified portfolio.

4.8 Testing of Moderating Effect

Moderation analysis is used to examine the effect of an independent variable on the dependent variable when another variable is changing (moderating variable). In other

words, moderating variables influence the relationship between independent variable and dependent variable without directly intervening in the relationship among them. When testing moderation interaction term (multiplicative term of independent variable and the moderator) is calculated and regressed with the outcome variable so test the moderating analysis. In this study, method developed by Preacher and Hayes (2004) is used to test the moderation. A PROCESS macro plugin in SPSS is used to test the moderation effect.

When interaction term is regressed with the dependent variable, the multicollinearity is often the issue with the independent variable and the interaction term. One method to deal with the situation is using mean centering. In mean centering, mean of the variable is subtracted from its values. In our study, interaction term is mean centered and PROCESS macro plugin is used to test the moderation effect.

H2a: Social influence moderate the relationship between Religion Bias and Portfolio Diversification

In this study, Bootstrap method introduced by Preachers & Hayes is used to examine the effect of moderation. The model-1 is used with the confidence interval of 95 % and 5,000 bootstrap value of samples (Hayes, 2015) to test effect of Religion Bias on Portfolio Diversification where Social Influence moderates the relationship between Religion Bias and Portfolio Diversification. Moderation is accepted if zero doesn't lie between lower limit confidence interval and upper limit confidence interval.

Table No. 4.9: Interaction effect 1

Variable	B	SE	t	p	LLCI	ULCI
Constant	-1.19	0.34	-3.52	0.00	-1.85	-0.53
SI	1.23	0.1	12.4	0.00	1.03	1.42
RB	1.08	0.12	9.17	0.00	0.85	1.32
Int_1 (RB x SI)	-0.037	0.045	-0.825	0.41	-0.31	0.18

Outcome Variable: Portfolio Diversification (PD)
SI = Social Influence; RB = Religion Bias

As provided above the coefficient of the interaction term of the religion bias and social influence in insignificant so we conclude that social influence is not moderating the relationship between the religion bias and portfolio diversification. As the effect of religion is strong and persistent, often the influence friends, family and media is not enough to influence the decision making that is effected by the religious belief. Hence, it is concluded that hypothesis 2a of the study is rejected.

H2b: Social influence moderate the relationship between Hot Hand Fallacy and Portfolio Diversification

Similarly, Bootstrap method developed by Preachers & Hayes was again used to check the moderation effect of social influence between hot hand fallacy and portfolio diversification. The model-1 was employed with the confidence interval of 95 % of 5,000 bootstrap re-samples (Hayes, 2015) to test effect of hot hand fallacy on portfolio diversification where social influence moderates the relationship between hot hand fallacy and portfolio diversification.

Table No. 4.10: Interaction Effect 2

Variable	B	SE	t	p	LLCI	ULCI
Constant	3.7	0.28	13.40	0.00	3.16	4.25
SI	0.16	0.08	2.10	0.00	0.01	0.31
HHF	-0.63	0.08	-7.63	0.00	-0.79	-0.47
Int_2 (HHF x SI)	0.12	0.02	5.05	0.00	0.08	0.17

Outcome Variable: Portfolio Diversification (PD)
SI = Social Influence; HHF = Hot Hand Fallacy

As reported in the results, interaction term of social influence and hot hand fallacy has a positive coefficient at significance vale of 0.00 where zero is not lying between LLCI and ULCI. Hence, it is concluded that social influence in moderating the relationship between hot hand fallacy and portfolio diversification. When people are more socially interacted they are influenced on the basis of information gained through friends, family and the social media. Hence, they might link their bias of expecting past results will repeat itself with the influence of information gain. And hence the relationship between hot hand fallacy and portfolio diversification is diffused with the presence of good social influence. Hence, here it is concluded that hypotheses 2c of the study is supported.

H2c: Social influence moderate the relationship between Salience and Portfolio Diversification

Preachers & Hayes Bootstrap method was again used to check the moderation effect of social influence between salience and portfolio diversification. The model-1 was used of moderation analysis with the confidence interval of 95 % with the value of 5,000 for bootstrap re-samples (Hayes, 2015) to test the effect of Salience on portfolio diversification where social influence moderates the relationship between Salience and

portfolio diversification.

Table No. 4.11: Interaction Effect 3

Variable	B	SE	t	p	LLCI	ULCI
Constant	3.51	0.28	12.64	0.00	2.97	4.06
SI	0.2	0.08	2.57	0.00	0.05	0.35
Sal	-0.56	0.08	-7.00	0.00	-0.72	-0.41
Int_3 (Sal x SI)	0.11	0.02	4.75	0.00	0.07	0.16

Outcome Variable: Portfolio Diversification (PD)
SI = Social Influence; Sal = Salience

Interaction term of social influence and salience has positive beta value with 0.00 level of significance which implies that social influence positively moderates the relationship between salience and portfolio diversification. When investors have a good social influence they gain information from discussions with friends, family and social media. Such investors don't only rely on events and investment they are familiar about but consider information obtained from social circle when making a decision. So it can be said that existence of good social influence reduces the effect of salience bias on the decision making process of the investor. In our study such decision is keeping a diversified portfolio. So it is concluded that hypothesis h2c is supported.

H2d: Social influence moderate the relationship between Overconfidence and Portfolio Diversification

Repeating the same process to test the moderation, Preachers & Hayes Bootstrap method was again used to check the moderation effect of social influence between overconfidence and portfolio diversification. The model was employed to test the

moderating effect with the confidence interval of 95 % with the bootstrap value of 5,000 (Hayes, 2015) to test effect of Overconfidence on Portfolio diversification where Social influence moderates the relationship between Overconfidence and portfolio diversification.

Table No. 4.12: Interaction Effect 4

Variable	B	SE	t	p	LLCI	ULCI
Constant	3.58	0.27	13.44	0.00	3.06	4.1
SI	0.19	0.07	2.69	0.00	0.05	0.34
OC	-0.61	0.08	-7.50	0.00	-0.77	-0.45
Int_4 (OC x SI)	0.12	0.02	4.85	0.00	0.07	0.16

Outcome Variable: Portfolio Diversification (PD)
SI = Social Influence; OC = Overconfidence

Results of the test revealed that social influence moderates the relationship between overconfidence and portfolio diversification. The possible reason is that people do have a influence of opinion of friends, family and media in the decision making process. Despite investors being too confident sometimes about the performance of certain securities, information and awareness brought to them through social influence lead them to better diversifying their portfolio. It is therefore concluded that hypothesis 2d of the study is supported.

H2e: Social influence moderate the relationship between Disposition Effect and Portfolio Diversification

Repeating the same process to test the moderation, Preachers & Hayes Bootstrap method is again used to check the moderation effect of social influence between disposition effect

and portfolio diversification. The model-1 is employed with the confidence interval of 95% with the bootstrap value of (Hayes, 2015) to test effect of disposition effect on portfolio diversification where social influence moderates the relationship between disposition effect and portfolio diversification.

Table No. 4.13: Interaction Effect 5

Variable	B	SE	t	p	LLCI	ULCI
Constant	3.8	0.29	12.92	0.00	3.22	4.38
SI	0.15	0.08	1.95	0.00	0	0.31
DE	-0.70	0.09	-7.46	0.00	-0.88	-0.52
Int_5 (DE x SI)	0.13	0.03	4.94	0.00	0.08	0.19

Outcome Variable: Portfolio Diversification (PD)
SI = Social Influence; DE = Disposition Effect

Interaction term of disposition effect and social influence is having a positive beta value with significance level of 0.00 which is lesser than the threshold of 0.05. This implies social influence is moderating the relationship between disposition effect and portfolio diversification. Often the knowledgeable friends and family influence an investor to sell their loosing securities which are expected to lose more in future or is expected to gain lesser than other alternatives. Hence, social influence positively moderated the negative relationship between disposition effect and portfolio diversification. Hypothesis 2e of the study is supported.

H3a: Investor's Grit moderate the relationship between Religion Bias and Portfolio Diversification

Using Preachers & Hayes Bootstrap method again to check the moderation effect of

investor's between religion bias and portfolio diversification. The model is used to test the moderating effect with the confidence interval of 95% with the bootstrap value of 5,000 (Hayes, 2015) to test effect of religion bias on portfolio diversification where Grit moderates the relationship between religion bias and portfolio diversification.

Table No. 4.14: Interaction Effect 6

Variable	B	SE	t	p	LLCI	ULCI
Constant	-1.79	0.32	-5.61	0.00	-2.42	-1.16
Grit	1.37	0.09	15.49	0.00	1.2	1.55
RB	1.05	0.12	8.9	0.00	0.82	1.28
Int_6 (RB x GR)	0.083	0.087	1.239	0.216	-0.3	0.17

Outcome Variable: Portfolio Diversification (PD)
GR = Grit; RB = Religion Bias

The p-value of the interaction term (RB x GR) is 0.216 which is greater that the threshold of 0.05. This implies that grit do not moderate the relationship religion bias and portfolio diversification. As religious sentiments are so strong, even the investors who are passionate and persistent about the results of the decisions they make, do not bother about maintaining a diversified portfolio if some class of securities do not match with their religious belief. Hence, it is concluded that hypothesis 3a is rejected.

H3b: Investor's Grit moderate the relationship between Hot Hand Fallacy and Portfolio Diversification

Using bootstrap method developed by Preachers & Hayes again to check the moderation effect of investor's grit between hot hand fallacy and portfolio diversification. The model was employed with the confidence interval of 95% having bootstrap re-samples of 5000

(Hayes, 2015) to test effect of Hot hand fallacy on portfolio diversification where Grit moderates the relationship between Hot hand fallacy and portfolio diversification.

Table No. 4.15: Interaction Effect 7

Variable	B	SE	t	p	LLCI	ULCI
Constant	2.12	0.30	7.10	0.00	1.53	2.70
Grit	0.52	0.08	6.68	0.00	0.37	0.68
HHF	-0.37	0.09	-4.32	0.00	-0.54	0.20
Int_7 (HHF x GR)	0.07	0.02	2.98	0.00	0.03	0.12

Outcome Variable: Portfolio Diversification (PD)
GR = Grit; HHF = Hot Hand Fallacy

The moderation results revealed that interaction term of hot hand fallacy and grit has a positive coefficient of 0.07 which is significant at the p-value of 0.00. This implies that investor's grit positively moderates the relationship between hot hand fallacy and grit. When hard work and perseverance are the characteristics of the personality of the investor, he/she tend to rely on the analysis when making an investment decision. Hence, the relationship between hot hand fallacy and portfolio diversification is diffused. Here the hypothesis 3b is supported.

H3c: Investor's Grit moderate the relationship between Salience and Portfolio Diversification

Preachers & Hayes method of Bootstrap is used to examine the moderation effect of investor's grit in the relationship between salience and portfolio diversification. The model-1 is again employed with the confidence interval of 95% and 5,000 bootstrap re-samples value (Hayes, 2015) to test effect of salience on portfolio diversification where

Grit moderates the relationship between salience to portfolio diversification.

Table No. 4.16: Interaction Effect 8

Variable	B	SE	t	p	LLCI	ULCI
Constant	1.86	0.3	6.29	0.00	1.28	2.44
Grit	0.58	0.08	7.41	0.00	0.43	0.73
Sal	-0.3	0.08	-3.57	0.00	-0.46	-0.13
Int_8 (Sal x GR)	0.06	0.02	2.44	0.00	0.01	0.11

Outcome Variable: Portfolio Diversification (PD)
GR = Grit; Sal = Salience

The interaction term of the salience and grit is showing a positive coefficient with the p-value lesser than 0.05, hence it is interpreted that grit is moderating the relationship between salience and portfolio diversification. Gritty investors are hard working and their behavior tends to nullify the effect of salience on their ability to diversify their portfolio. Here hypothesis 3c of the study is supported.

H3d: Investor's Grit moderate the relationship between overconfidence and Portfolio Diversification

Using Preachers & Hayes Bootstrap method, moderation effect of investor's grit between overconfidence and portfolio diversification is examined. The model is again employed with confidence interval of 95% and having a bootstrap value of 5,000 (Hayes, 2015) to test effect of overconfidence and portfolio diversification where Grit moderates the relationship between overconfidence and portfolio diversification.

Table No. 4.17: Interaction Effect 9

Variable	B	SE	t	p	LLCI	ULCI
Constant	1.96	0.29	6.81	0.00	1.40	2.53
Grit	0.57	0.08	7.54	0.00	0.42	0.71
OC	-0.33	0.08	-3.92	0.00	-0.50	-0.17
Int_9 (OC x GR)	0.06	0.02	2.51	0.00	0.00	0.11

Outcome Variable: Portfolio Diversification (PD)
GR = Grit; OC = Overconfidence

Interaction term of overconfidence and grit has a positive coefficient with p-value lesser than 0.05 and hence concluded that investor's grit moderates the relationship between overconfidence and investor's grit. People that have grit in the personality, even when they are overconfident about information they have, tend to work hard on their investment by analysis and research and hence their Grit tends to reduce the negative effect of their overconfidence on the ability to maintain a diversified portfolio.

H3e: Investor's Grit moderate the relationship between Disposition Effect and portfolio diversification

Using Preachers & Hayes Bootstrap method again, the moderation effect of investor's grit is examined in the relationship between disposition effect and portfolio diversification. The model is used with 95% confidence interval and a bootstrap re-sample value of 5000 (Hayes, 2015) to test effect of disposition effect and portfolio diversification where Grit moderates the relationship between disposition effect and portfolio diversification.

Table No. 4.18: Interaction Effect 10

Variable	B	SE	t	p	LLCI	ULCI
Constant	2.24	0.31	7.32	0.00	1.64	2.84
Grit	0.5	0.08	6.28	0.00	0.34	0.66
DE	-0.44	0.09	-4.64	0.00	-0.62	-0.25
Int_10 (DE x GR)	0.09	0.03	3.25	0.00	0.03	0.14

Outcome Variable: Portfolio Diversification (PD)
GR = Grit; DE = Disposition Effect

The interaction term of disposition effect and the portfolio diversification is showing positive β-value with a p-value of less than 0.05. This implies that investor's grit positively moderates the relationship between disposition effect and portfolio diversification. When investor are passionate and have consistency of effort about the investor, they often look at their investment on the basis of analysis and information and their tendency of holding loosing investment securities is negatively influence it lead them to maintaining a diversified portfolio. Here, hypothesis 3e of the study is supported.

Table below is showing the acceptance or rejection of the hypothesis in the study:

Table No. 4.19: Results of hypothesis testing

Alternative Hypothesis	Accepted/ Rejected
Religion Bias affects negatively the portfolio diversification of the investors	Rejected
Overconfidence negatively affects the portfolio diversification of the investors	Accepted
Salience negatively affects the portfolio diversification of	Accepted

the investors	
Hot Hand Fallacy negatively affects the portfolio diversification of the investors	Accepted
Disposition effect negatively affects the portfolio diversification of the investors	Accepted
Social influence moderate the relationship between Religion Bias and portfolio diversification	Rejected
Social influence moderate the relationship between Hot Hand Fallacy and portfolio diversification	Accepted
Social influence moderate the relationship between Salience and portfolio diversification	Accepted
Social influence moderate the relationship between overconfidence and portfolio diversification	Accepted
Social influence moderate the relationship between Disposition Effect and portfolio diversification	Accepted
Investor's Grit moderate the relationship between Religion Bias and portfolio diversification	Rejected
Investor's Grit moderate the relationship between Hot Hand Fallacy and portfolio diversification	Accepted
Investor's Grit moderate the relationship between Salience and portfolio diversification	Accepted
Investor's Grit moderate the relationship between	Accepted

overconfidence and portfolio diversification	
Investor's Grit moderate the relationship between Disposition Effect and portfolio diversification	Accepted

This chapter provided detail about the statistical results of the study. In section 4.1, descriptive results of the study were discussed. Then, section 4.2 provides details about the reliability of scales used for gathering of the data. Once scales were found reliable, their validity analysis is provided in section 4.3 and 4.4 along with the graphical model of Confirmatory Factor Analysis. Then section 4.5 of this chapter discusses the model fitness indices and their values in the study. Once a model fitness criterion is met, section 4.6 provides correlation and VIF is done to check the multicollinearity in the model. No multicollinearity was found so discussion on each hypothesis and the regression results is given in section 4.7. In the end, in section 4.8, the results of moderation analysis were discussed.

CHAPTER 5

ANALYSIS AND DISCUSSION

The aim of this chapter is to discuss the empirical findings of the study reported in Chapter 4 in context of the research questions of the study, and the previous literature available in the area. The findings of the study are compared with the previous literature and results are linked with the previous findings. The aim of this chapter is to find the answers for the research questions of the study based on the empirical findings so that purpose of the study can be met. The results of the study are discussed, compared and contrasted with the previous literature available.

5.1 Discussion

Portfolio diversification is the process of investing your money in different securities in order to minimize the overall risk of the portfolio. In the market place, diversification reduces risk and provides protection against extreme events by ensuring that one is not overly exposed to individual occurrences (Kirchner and Zunckel, 2011). According to Statman (1987), portfolio of most of the individual investors consist of small number of stocks in the portfolio that means individuals in practice do not maintain a diversified portfolio.

One of the fundamental reasons that investors do no maintain a diversified portfolio despite literature available on the subject is because there are certain biases that are embedded in the decision making process of the investors. This study mainly focused on five biases i.e. religion bias, overconfidence, salience, hot hand fallacy and disposition effect.

The results of the study, in general showed negative relationship between the behavioral biases and portfolio diversification of the investors. The results are consistent with the study of Anwar et. al. (2017). When the investor is biased, he/she does not maintain a diversified portfolio despite an extensive literature available on the issue. There are certain types of biases that play role in investor's decision making process. The study mainly focuses on the investors of Pakistan stock exchange (PSX). However, as the behaviors are common across the globe, the results can be generalized for other economies too.

The results of study proved that when investors are overconfident about their analysis, they tend to over invest in such securities they are confident about and hence do no maintain a diversified portfolio of investment. They also overestimate the accuracy of information available to them and the knowledge they possess. When investors are overconfident, they are very optimistic about the results of their forecasts and do not diversify their portfolios. The results of the study are consistent with Odean (1998). These results are also supported by Theory of Planned Behavior and the Theory of Reasoned Action.

Similarly, the results of the study also proves that when investor rely heavily on the fact that stocks that performed well in the past will perform well again (hot hand fallacy), they invest too much in such securities without a prudent analysis and hence their portfolio remains undiversified. The results of the study are consistent with Kudryavtsev et. al. (2013). The results of the study also provide the support to Theory of Bounded Rationality and Theory of Reasoned Action.

One of the other biases that study tested was disposition effect. Often investors are so reluctant to sell the securities making loss and sell gaining securities too early (disposition effect). Because investors keep their money bound in the securities that is in the loosing position, their portfolio remains undiversified. The results of the study are in line with Satish (2019). These results are also supported by Prospect Theory.

Findings of the study also highlighted that investor prefer to invest in familiar stocks and do not consider options unfamiliar to them and hence again their portfolio remain undiversified. They are of the belief that unknown assets are often highly risky. Investors while making investment decisions are more focused on those securities that they know about and such investors do not diversify their portfolio. Investors find it easier to make investment in the options they know about rather than going through a hectic evaluation process. Hence, it can be said that investors use information they are familiar about to avoid the difficulties of decision making process (Yalcin et al., 2016). The results of the study are consistent with few previous researches (Merton, 1987; Chaudary, 2019; Yalcin et. al, 2016). The results of the study are also consistent with the Theory of Planned Behavior and Theory of Bounded Rationality.

The only bias that showed opposite result to the literature was religion bias. It showed a positive relationship with portfolio diversification. It is interpreted as there is a large Muslim majority in Pakistan and in Islam speculation is forbidden. For the same reason, the investors who has strong religious belief do not invest based on speculation and their concerns are long term dividends rather than short term gain and therefore religion bias in Pakistan stock exchange is positively related to the portfolio diversification of the investors. The results of the study are consistent with Jiang et al. (2015). However, they differ with the results of Jaiyeoba and Haron (2016). Still the results of the study find a support from Theory of Planned Behavior.

Overall it is found that biases tends to lead the investors in maintaining an undiversified portfolio that often results in the losses to the investors and that can ultimately effect overall stock market of Pakistan in the long run.

Furthermore, this study not only highlighted the role of biases in the investor's decision of keeping a diversified portfolio. It also provided the solution through the moderating variables tested in the study, namely, social influence and grit. There are few variable, if they are present in the environment and personality of the investors, such investors are lesser influenced by the behavioral biases in their decision making process. The study proved two such variables are social influence grit.

Social influence is the friends, family and role of media in the environment of investors. If social influence is positive, investment decisions can be better. Knowledgeable friends and family can help the investors overcome biases in the investment decision making process and can take optimal decision of maintaining a diversified portfolio.

The results of the study showed that social influence do no influence the relationship of religious belief and the diversification of the portfolio. As the effect of religion is strong and persistent. often the influence friends, family and media is not enough to influence the decision making that is effected by the religious belief. The results of the study find the support of Theory of Planned Behavior. The results of the study are consistent with Jaiyeoba and Haron (2016).

The results of the study also found that social influence diffuses the relationship between hot hand fallacy and portfolio diversification. When people are more socially interacted they are influenced on the basis of information gained through friends, family and the social media. Hence, they might link their bias of expecting past results will repeat itself with the influence of information gain. And hence people with good social circle are able to make better investment decision despite presence of biases and are more likely to maintain a diversified portfolio. The results of the study are supported by Theory of Planned Behavior. Results of the study are consistent with Akhtar et. al. (2018b).

The results of the study also confirm that when investors have a good social influence they gain information from discussions with friends, family and social media. Such investors don't only rely on events and investment they are familiar about but consider information obtained from social circle when making a decision. So it can be said that existence of good social influence reduces the effect of salience bias on the decision making process of the investor. Results of the study are consistent with Akhtar et. al. (2018b). The results are supported by Theory of Planned Behavior.

Results of the study also revealed that social influence the relationship between overconfidence and portfolio diversification. The possible reason is that when people do have an influence of opinion of friends, family and media in the decision making process. Despite investors being too confident about the performance of certain securities, information and awareness brought to them through social influence lead them to better diversifying their portfolio. Results of the study are in line with the results of Akhtar et. al. (2018b).

The results of the study also found that social influence is moderating the relationship between disposition effect and portfolio diversification. Often the knowledgeable friends and family influence an investor to sell their loosing securities which are expected to lose more in future or is expected to gain lesser than other alternatives. Hence, social influence positively moderated the negative relationship between disposition effect and portfolio diversification. The results are consistent with previous studies e.g. Akhtar et. al. (2018b).

Similarly, personality attributes are often contributing the investors' decision making. This study proved one such attribute in investors' grit. If investors have self-belief and they have perseverance about their investment, they are tend to overcome biases in them and invest optimally and make diversified investments.

The study further highlighted that investor's grit do not moderate the relationship between religion bias and portfolio diversification. As religious sentiments are so strong, even the investors who are passionate and persistent about the results of the investment decisions they make, do not bother about maintaining a diversified portfolio if some class

of securities do not match with their religious belief. These finding are consistent with Jaiyeoba and Haron (2016). These results of the study find support and at the same time provide confirmation to Theory of Planned Behavior.

The results of study also revealed that investor's grit positively moderates the relationship between hot hand fallacy and grit. When hard work and perseverance are the characteristics of the personality of the investor, he/she tend to rely on the analysis when making an investment decision. Hence, the effect hot hand fallacy on portfolio diversification is diffused. The results of the study are consistent with Von Cullen et al. (2014) and Suzuki et al. (2015).

Study also highlighted the moderating influence of investor's grit in the relationship between salience and portfolio diversification. The results of the study highlighted that gritty investors are hardworking and their behavior tends to nullify the effect of salience on their ability to diversify their portfolio. As they are dependent of the analysis when making an investment decision, the effect of familiarity is diffused from their investment decision making process. The results of the study are consistent with Von Cullen et al. (2014). The results of the study also provide confirmation to Theory of Planned Behavior.

The results of the study also showed that people that have grit in the personality, even when they are overconfident about information they have, tend to work hard on their investment by analysis and research and hence their grit tends to reduce the negative effect of their overconfidence on the ability to maintain a diversified portfolio. The results are supported by the Theory of Planned Behavior.

The results of the study also found that investor's grit positively moderates the relationship between disposition effect and portfolio diversification. When investor are passionate and have consistency of effort about the investor, they often look at their investment on the basis of analysis and information and their tendency of holding loosing investment securities is negatively influence it lead them to maintaining a diversified portfolio. The results of the study are consistent with Von Cullen et al. (2014) and Suzuki et al. (2015). The results are supported by Theory of Planned Behavior.

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

The aim of this chapter is to summarize the findings of the study which are related to behavioral biases and their effect on portfolio diversification and also to summarize the effect of social influence and investor's grit in the relationship of biases and portfolio diversification. The chapter also provides the investors on the mechanism to overcome biases and maintaining a diversified portfolio of investment. Then this chapter will present the contribution of this research in the domain of behavioral finance and give the directions for future research. This chapter is presented in the given sequence: Section 6.1 gives the conclusion of the study. Section 6.2 gives the contribution of the research in the domain of behavioral biases. Section 6.3 provides the implication for the policy makers. Section 6.4 gives the directions for the future research.

6.1 Conclusion

This study aimed to find the impact of behavioral biases on the portfolio diversification of the investors of Pakistan Stock Exchange. The behavioral biases that this study focused are religion bias, hot hand fallacy, salience, over confidence and disposition effect. This study also examined the moderating role of social influence and grit in the relationship between portfolio diversification and grit. Social influence and investor's grit are the factors that can diffuse the effect of behavioral bias on the portfolio diversification of the investors and hence studied in this research.

To achieve the objectives of this research, deductive approach is used in the study. Biases and other factors explored in this study are quantified using the 5-point likert scale. All scales used in this study are adopted from previous studies. The data is obtained from investors of Pakistani Stock Exchange through structured questionnaire. At least 10 investors were asked for responses from most brokerage houses in Islamabad, Rawalpindi and Lahore. Overall 806 valid responses of the investors of Pakistan Stock Exchange are analyzed in the study. To test the hypotheses of the study using the data obtained, SPSS 22 and AMOS 21 are used. Preacher and Hayes, PROCESS macro is used to analyze the moderating effects in the study.

Overall results of the study revealed that behavioral biases negatively affect the ability of the investors to diversify their portfolio. The result of the study showed that behavioral biases such as hot hand fallacy, overconfidence, salience and disposition effect lead to sub optimal decision making. In this case, when these behavioral biases are present in investors subconscious, investors are inclined towards placing their investment in lower number of different stocks and hence their portfolio remain undiversified.

Specifically, results of the study reported that hot hand fallacy lead to a lesser diversified portfolio of the investors. When investor rely heavily on the fact that stocks that performed well in the past will perform well again (hot hand fallacy), they invest too much in such securities without a prudent analysis and hence their portfolio remains undiversified.

Overconfidence also showed a negative impact of the portfolio diversification of the investors. When investors are overconfident about their analysis, they tend to over invest in such securities they are confident about and hence do no maintain a diversified

portfolio of investment. They also overestimate the accuracy of information available to them and the knowledge they possess. When investors are overconfident, they are very optimistic about the results of their forecasts and do not diversify their portfolios.

The result of the study also revealed that investors are more inclined towards investing in familiar stocks and hence do not diversify their portfolio optimally. People are of the belief that unknown assets are often highly risky. Investors while making investment decisions are more focused on those securities that they know about and such investors do not diversify their portfolio.

The results of the study also demonstrated that disposition effect negative effect the portfolio diversification. Often investors are so reluctant to sell the securities making loss and sell gaining securities too early. Because investors keep their money bound in the securities that is in the loosing position, their portfolio remains undiversified.

The only bias that showed positive effect with portfolio diversification is religion bias. as there is a large Muslim majority in Pakistan and in Islam speculation is forbidden. For the same reason, the investors who has strong religious belief do not invest based on speculation and their concerns are long term dividends rather than short term gain and therefore religion bias in Pakistan stock exchange is positively related to the portfolio diversification of the investors.

The study also highlighted the moderating effect of social influence in the relationship between behavioral biases and portfolio diversification. The prime reason of study social influence as a moderator is that in literature there are variables that can mitigate the negative effect of behavioral biases in the investment decision making process. Few such variables that have been studied in past are financial literacy, risk aversion, long term

orientation, etc. This research focused on moderating influence of social influence and investor's grit.

The study also found that social influence diffuses the relationship between hot hand fallacy and portfolio diversification. When people are more socially interacted they are influenced on the basis of information gained through friends, family and the social media. Hence, they might link their bias of expecting past results will repeat itself with the influence of information gain. And hence people with good social circle are able to make better investment decision despite presence of biases and are more likely to maintain a diversified portfolio.

Results of the study also revealed that social influence the relationship between overconfidence and portfolio diversification. The reason is that when people do have an influence of opinion of friends, family and media in the decision making process. Despite investors being too confident about the performance of certain securities, information and awareness brought to them through social influence lead them to better diversifying their portfolio.

The results of the study also confirm that presence of good social influence mitigate the effect of salience on portfolio diversification. When investors have a good social influence they gain information from discussions with friends, family and social media. Such investors don't only rely on events and investment they are familiar about but consider information obtained from social circle when making a decision. So it can be said that existence of good social influence reduces the effect of salience bias on the decision making process of the investor.

The results of the study also found that social influence is moderating the relationship

between disposition effect and portfolio diversification. Often the knowledgeable friends and family influence an investor to sell their loosing securities which are expected to lose more in future or is expected to gain lesser than other alternatives. Hence, social influence positively moderated the negative relationship between disposition effect and portfolio diversification.

However, this study also highlighted that social influence do no influence the relationship of religious belief and the diversification of the portfolio. As the effect of religion is strong and persistent, often the influence friends, family and media is not enough to influence the decision making that is effected by the religious belief.

The results of study also revealed that investor's grit positively moderates the relationship between hot hand fallacy and grit. When hard work and perseverance are the characteristics of the personality of the investor, he/she tend to rely on the analysis when making an investment decision. Hence, the effect hot hand fallacy on portfolio diversification is diffused.

The results of the study also showed that people that have grit in the personality, even when they are overconfident about information they have, tend to work hard on their investment by analysis and research and hence their grit tends to reduce the negative effect of their overconfidence on the ability to maintain a diversified portfolio.

Study also highlighted the moderating influence of investor's grit in the relationship between salience and portfolio diversification. The results of the study highlighted that gritty investors are hardworking and their behavior tends to nullify the effect of salience on their ability to diversify their portfolio. As they are dependent of the analysis when making an investment decision, the effect of familiarity is diffused from their investment

decision making process.

The results of the study also found that investor's grit positively moderates the relationship between disposition effect and portfolio diversification. When investor are passionate and have consistency of effort about the investor, they often look at their investment on the basis of analysis and information and their tendency of holding loosing investment securities is negatively influence it lead them to maintaining a diversified portfolio.

The study further highlighted that investor's grit do not moderate the relationship between religion bias and portfolio diversification. As religious sentiments are so strong, even the investors who are passionate and persistent about the results of the investment decisions they make, do not bother about maintaining a diversified portfolio if some class of securities do not match with their religious belief.

6.2 Contribution of the study

This study contributes to the existing literature and the body of literature in certain ways. Firstly, it explored the effect of few biases that have to been focused in previous researches. The effect of religion on the ability to keep a diversified portfolio is one such variable. This study studied the domain to religion in investment decision making which novel in the domain of behavioral finance. Secondly, it confirmed the effect of few biases that existed in the literature to provide better generalizability. Overconfidence, disposition effect and hot hand fallacy are the examples of such behavioral biases.

Thirdly, this study not only focused on the role of behavioral biases in maintaining a

diversified portfolio but it has also attempted to find the solution to it. This study explored the moderating role of social influence and investor's grit in the diffusing the negative of the biases. This study finds that if knowledgeable social circle that includes authentic media reports, learned friends and family is present in the environment of the investor the role of behavioral biases in the investment decisions can be mitigated. So this research has added this aspect to the body of knowledge and also guides investors to have access to authentic media form to right investment opportunities. Discussing investment matters with knowledgeable friends and family can be beneficial rather than taking every decision at own. Role of investor's grit in uniqueness of the study as this has not been studied in the previous literature. Personality of an investor is of utmost of importance when making a decision. Personality attributes can change over time too. So investors if add commitment and hard work in their personality, role of biases can be mitigated in the decision making.

Further stated that most of the studies have focused on checking the effect of biases on investment decision, investment intentions, investors risk preferences and perceived market efficiency e.g. Shah et. al. (2018); Aydemir & Aren (2017) and Goyal (2016). Using portfolio diversification directly has not been the focus of previous researches. This study adds this dimension in the body of knowledge.

6.3 Policy Implications

This research will help both the investors and the regulator. Investor will be able to realize what biases are restricting their ability to diversify their portfolio. On the other hand, this study will also provide them with the solution how the effect of these biases

can be mitigated. Stock market investors will be benefitted from this research, firstly, in assessing the importance of maintaining a well-diversified portfolio. Secondly, this study provides them with role of five biases that effect the decision making process. Lastly, they can assess the role of social influence and grit that can reduce the effect of biases in the investment decision making process.

For regulators, this study will provide them with the areas where education of the investors is required. It is the responsibility of the regulators to education the investors on the issues that are limiting their investment capabilities. This study can guide the regulators in educating the investors on the areas of biases and how to eliminate these biases in the decision making process. They can provide them with such knowledge through seminars, webinars, social media pages and investors' guide.

Investors must look at the social environment around them and try to make it a positive one. If they have good interaction with knowledgeable people and can join investment forums for guidance they can make better investment decisions. Investors must also belief in analysis of the investment before doing and investment and constantly monitoring it. They, if have in their personality to be perseverance about their investment they will make better investment choices.

6.4 Limitations and Directions for Future Research

This study was conducted in the domain to behavioral biases and their effect on portfolio diversification. It also used two moderators to highlight the effect of social effect and investor's grit in the relationship of biases and portfolio diversification. There are certain

limitations of the study that can be addressed in the future researches to improve the body of knowledge.

Firstly, this research is conducted in the context of Pakistan and studied behaviors of Pakistani investors. More diverse respondents can be analyzed from different countries to improve the generalizability of the study and also cross cultural aspects of behavioral can be studied as well. Secondly, this research used primary data from the investors investing in the brokerage houses of Pakistan. Therefore, high percentage of the respondents of the study is males and mostly male investors trade physically at the Pakistan Stock Exchange. Further studies and conduct research keeping equal proportion of males and females so that effect of gender can be captured on the investment decision making.

Thirdly, this study focuses on five behavioral biases that effect the portfolio diversification of the investors namely religion bias, overconfidence, disposition effect, hot hand fallacy and salience. Further researches can study the impact of other biases that can affect the investment decisions of the investors. In this study, religion bias has been studied. The study is conducted in Pakistan where large percentages are of Muslims. Similar studied can be conducted different countries with different religious faiths to capture the effect of religious beliefs on the investment decision making. There are other biases like intuition of the investor and ego that can be explored in further studies as well.

Fourthly, this study explored the moderating role of social influence and grit that can diffuse the effect of behavioral biases and portfolio diversification. There are other factors that can be helpful in minimizing the effect of behavioral biases and irrational decision making. Such factors can be studied.

Lastly, the research is based on the primary data collected using a questionnaire. The

reliability of the can be increased if the same data can be obtained through some secondary sources e.g. brokerage houses information system. The researcher therefor has to rely on the information given by the investors through survey. In this research, the measurement of portfolio diversification was limited to the number of stocks the investors hold. If the data of stock names and the quantities of each stock available in the portfolio of each investor can be obtained, the covariance between the stocks can be used to ascertain the portfolio diversification of the investors. However, currently such data is not available publicly hence this opens a domain for future research whenever data becomes publicly available.

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QUESTIONNAIRE

Dear Sir/Madam,

I am a PhD scholar at International Islamic University Islamabad. I am conducting a Research. Data will be used only for Research Purposes and will be kept Confidential.

It will hardly take 20 minutes of your precious time.

Please tick the relevant answers from this questionnaire.

1. Name (optional) _____

2. Gender ( )Male ( )Female

3. Age ( ) 20-30 ( )31-40 ( )41-50 ( ) 51 and above

4. Education ( ) Matric ( ) FA/FSc ( ) Bachelors
( ) Masters and above

5. Experience of Investment: ( ) Less than 1 year
( ) More than 1 year and less than 5 years
( ) More than 5 years and less than 10 years
( ) More than 10 years

6. Income Level: ( ) Less than Rs. 50,000
( ) Rs. 50.000 or more but less than Rs.100,000
( ) Rs. 100.000 or more but less than Rs.200,000
( ) More than Rs. 200,000

7. Number of Different Stocks in your portfolio: ( ) 2 or less ( ) 3 to 6 ( ) 7 to 15
( ) 15 to 29 ( ) 30 or more

8. Is more than 50% of your portfolio invested in mutual funds? ( )Yes ( )No

9. Portfolio Size: ( ) Less than Rs. 500,000
( ) Rs. 500.000 or more but less than Rs.1000,000
( ) Rs. 1.000.000 or more but less than Rs.5,000,000
( ) More than Rs. 5,000,000

Sr. No	Questions	Strongly Disagree	Dis agree	Moderate	Agree	Strongly Agree
	Hot Hand Fallacy					
1	After I manage to realize a profit on my stock portfolio, I increase the sum of my stock market holdings.	1	2	3	4	5
2	If I find out that the market price of one of the stocks I hold decreased dramatically, I decrease the sum of my stock market holdings.	1	2	3	4	5

3.	I buy 'hot' stocks and avoid the stocks that performed poorly in recent past.	1	2	3	4	5
	Overconfidence					
4	I am confident of my ability to do better than others in investment decision.	1	2	3	4	5
5	I have the ability to control the results according to investment objectives.	1	2	3	4	5
6	My past investment successes were due to my specific skills.	1	2	3	4	5
7	I have complete knowledge of the financial market.	1	2	3	4	5
	Salience					
8	It is risky to invest in relatively unknown public companies rather than known ones	1	2	3	4	5
9	I believe that investors should purchase the stock of the company the work for if it is well run	1	2	3	4	5
10	To invest in companies that have a good brand name is important work	1	2	3	4	5
	Religion Bias					
11	Religion plays important role in the choice of my investment.	1	2	3	4	5
12	Religion plays important role in the selection of stock in my portfolio.	1	2	3	4	5
13	Religious beliefs are more important to me when making investment decisions.	1	2	3	4	5
	Disposition effect					
14	I would rather prefer to hold the stock with an increasing price.	1	2	3	4	5
15	I avoid selling shares whose market value is falling consistently and would sell shares with consistently rising market price	1	2	3	4	5

16	I would not prefer to hold stock too long whose market value is consistently falling	1	2	3	4	5
17	I prefer to hold stock whose Intrinsic Value is greater than market value	1	2	3	4	5
18	I would rather prefer to quickly dispose of the stock with decreasing price.	1	2	3	4	5
	Social Influence					
19	The members of my family (e.g.: parents. spouse or children) think that I should make financial investments in stock markets	1	2	3	4	5
20	I often get information from my friends on the evaluation of an investment.	1	2	3	4	5
21	I often try to get information regarding the evaluation of stock prices	1	2	3	4	5
22	Mass media influence me in making investment decision.	1	2	3	4	5
	Grit					
23	I often set a goal but later choose to pursue a different one. [R]	1	2	3	4	5
24	New ideas and new projects sometimes distract me from previous ones. [R]	1	2	3	4	5
25	I become interested in new pursuits every few months. [R]	1	2	3	4	5
26	My interests change from year to year. [R]	1	2	3	4	5
27	I have been obsessed with a certain idea or project for a short time but later lost interest. [R]	1	2	3	4	5
28	I have difficulty maintaining my focus on projects that take more than a few months to complete. [R]	1	2	3	4	5
29	I have achieved a goal that took years of work.	1	2	3	4	5
30	I have overcome setbacks to conquer an important challenge.	1	2	3	4	5
31	I finish whatever I begin.	1	2	3	4	5

32	Setbacks don't discourage me.	1	2	3	4	5
33	I am a hard worker.	1	2	3	4	5
34	I am diligent.	1	2	3	4	5
	Risk Aversion					
35	I don't like to take risks.	1	2	3	4	5
36	Compared to most people I know, I like to live life on the edge. [R]	1	2	3	4	5
37	I have no desire to take unnecessary chances on things	1	2	3	4	5
38	Compared to most people I know, I like to gamble on things. [R]	1	2	3	4	5
39	I would rather be safe than sorry.	1	2	3	4	5
40	I want to be sure before I purchase anything.	1	2	3	4	5
41	I avoid risky things.	1	2	3	4	5
	Financial Literacy					
42	Do you think that investing in more than one stock is safe?	1	2	3	4	5
43	Do you accept that inflation has any impact on investment?	1	2	3	4	5
44	Do you expect that in compound interest you earn interest on your interest as well as on your principal?	1	2	3	4	5
45	Do you accept that the time value of money and risk-return trade-off has any impact on investment?	1	2	3	4	5