

Ph.D Thesis

on

**“Financial Literacy and Behavioural Biases- A
Study of Indian Investors”**

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CERTIFICATE

This is to certify that thesis entitled “**Financial Literacy and Behavioural Biases- A Study of Indian Investors**” is being submitted by **Ms. Nisha Goyal (ID No: 2013RBM9009)** to the Malaviya National Institute of Technology Jaipur for the award of the degree of **Doctorate of Philosophy**. This is a bonafide record of original research work carried out by him. She has worked under our guidance and supervision and has fulfilled the requirement for the submission of this thesis, which has reached to the requisite standard.

The results contained in this thesis have not submitted to any other University or Institute for the award of a degree or diploma

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CANDIDATE DECLARATION

I, Nisha Goyal (2013RBM9009) declare that the work presented in the thesis entitled “Financial Literacy and Behavioural Biases- A Study of Indian Investors” is my own work, I further declare that:

1. The work has been done while in candidature for Ph.D. degree at MNIT, Jaipur.
2. Where I have consulted the published work of other, the same has been clearly attributed.
3. Where I have quoted from the work of others, the source has been given, with the exception of such quotations; this thesis is entirely my own work.
4. I have acknowledged all main sources of help.

(Nisha Goyal)

ID: 2013RBM9009

Date: 09.10.2017

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(Nisha Goyal)

ABSTRACT

Behavioural finance emerged as a new concept that combined the psychological and behavioural aspects in investment decision making that supplemented the classical theories of traditional finance. Behavioural finance challenges the efficient market perspective and analyses the cognitive abilities and psychological phenomenon of investors in investment decision making. The present study aims to shed light as comprehensively as possible on the investment behaviour of individual investors in India. Barber and Odean (2011) advocated that the study of investor performance had focused almost exclusively on the performance of institutional investors. However, unlike institutional investors, individual investors tend to be less informed, more biased and proverbial noise traders in the financial market (Kyle, 1985; Black, 1986).

In a developing country like India, Individual investors play a significant role because of their big share in savings. Indian investors have been exposed to a plethora of investment opportunities, after the liberalization process which commenced in 1991 (Sahi and Arora, 2012). Due to the stable economic growth in the country and increase in household savings, middle class investors are gradually investing in the financial service sector. However, this increased competition in the financial service sector has led to an information overload, where the Indian investor is definitely exposed to a range of investment products to choose from, but investors have limited skills and financial knowledge to evaluate and understand these financial products. Hence, individual investors have to rely on their beliefs and preferences to guide their financial investment decision making. These beliefs and preferences are referred to as systematic deviations from the rational behaviour, and are called biases/heuristics. However, very little work has been done to understand the biases of Indian individual investors (Sahi and Arora, 2012). Thus, it is essential to identify these behavioural biases that affect the investment decisions of individual investors in India.

The present study is developed on the lines of conceptual and empirical literature available on individual investors' behavioural factors. Empirical evidence reveals that individual investors exhibit various anomalies that lead to poor judgement and mispricing in financial markets (Barber and Odean, 1999; Barberis and Thaler, 2003). These biases can get reflected in the form of market anomalies such as economic crises (e.g., the dot-

com bubble of the 1990s and the global financial crisis of 2007). Despite there being extensive literature on behavioural finance, there is only limited academic research done to attempt to unravel the relationship between financial literacy and behavioural biases. Thus, it becomes imperative to develop a framework that can provide information about the predisposition to behavioural biases and relationship between financial literacy and behavioural biases among individual stock investors. The present study is also motivated by the limited literature on personality traits of individual investors investing in the Indian stock market, though findings reveal that personality traits also significantly influence investment behaviour of individual investors (Mayfield *et al.*, 2008; Tauni *et al.*, 2016). Thus, this study also aims to examine the relationship between personality traits and behavioural biases of individual investors in India.

The prime objective of this study was to develop an understanding of the behavioural biases of Individual investors in India. It also highlights the need for assessing the financial literacy of individual investors. The behavioural biases of individual investors are incomplete without the study of the socio-demographic and psychographic factors of individual investors. Therefore, the present study also incorporates socio-demographic variables such as gender, age, marital status, education, occupation, income, investment experience and psychographic factors (e.g. personality traits) while studying behaviour of individual investors. In this way, the objectives of this study were intended by the integration of all the essential factors influencing the behavioural biases of individual investors.

This study was mainly based on the primary survey conducted with the help of a structured questionnaire. The present study used a mixed method approach to achieve the stated objectives. First, to identify different behavioural biases and to develop the research instrument, a qualitative study was conducted and then those identified behavioural biases were studied with a sample of individual investors, using the survey approach. To attain the objectives of the study, a structured questionnaire was designed on the basis of findings from the qualitative study and the previous studies conducted on behavioural biases and financial literacy. The target population for this study represents individual investors who invest in the share market in India. In the present study, the contact information of retail investors was obtained from one of India's largest brokerage firm that provided a list of the accounts that had been opened during 2010-2015. Statistical software, for example, SPSS version 21.0 and AMOS version 21.0, were used for data analysis.

The main research findings of the study reveal that on average respondents answered 56.08 percent of the questions correctly. This implies that individual investors have a low level of financial literacy. Moreover, individual investors have a fair knowledge of questions related to basic financial literacy, such as compound interest, diversification of portfolio and risk and return. Further, results revealed that mental accounting, representativeness, overconfidence and self-attribution, disposition effect, anchoring, emotional bias and herding bias were prominent biases that influenced individual investors. However, most respondents are not prone to familiarity, availability and hindsight biases. Multiple regression was applied to examine the effect of financial literacy and socio-demographic variables including gender, age, marital status, education, occupation, income and investment experience on behavioural biases. Financial literacy, Gender, age, education, occupation and investment experience were important factors that significantly influence the behavioural biases of individual investors.

Socio-demographic variables also significantly influence the level of financial literacy. Financial literacy is negatively related to gender, education, income- level and investment experience. This implies that females have more financial awareness compared to their counterparts. Investors having >10 years of experience are more financially literate compared to less experienced investors. Respondents having a higher degree, such as doctorate, are more financially literate compared to others. SEM was applied to analyse the relationship between personality traits and behavioural biases among individual investors. Our results reveal that four personality traits (neuroticism, extroversion, openness and conscientiousness) are significantly associated with the different behavioural biases among stock investors in India.

The present study provides a deeper understanding of financing literacy and predisposition to behavioural biases of individual investors in India. This study depicts the prominent biases among individual investors. It adds to the theoretical knowledge by providing the new empirical evidences about investment behaviour of Indian investors. The findings of this study will enable individual investors to get a better understanding of behavioural biases and financial knowledge that may influence their investment decisions and results into suboptimal returns. This finding may contribute for financial educators in promoting the financial awareness programs for the individuals. Financial advisors can potentially become more effective by understanding their clients' investment decision-making, which in turn can result in providing customized financial services based on their clients' predisposition.

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LIST OF ABBREVIATIONS

AGFI	Adjusted Goodness-of-Fit Index
AMOS	Analysis of A Moment Structures
AVE	Average Variance Extracted
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
EFA	Exploratory Factor Analysis
EMH	Efficient Market Hypothesis
EUT	Excepted Utility Theory
GFI	Goodness-of-Fit Index
H-L Test	Hosmer-Lemeshow Test
INFE	International Network on Financial Education
KMO	Kaiser-Meyer-Olkin
ML	Maximum Likelihood
NEO-FFI	NEO- Five Factor Inventory
NFI	Normed Fit Index
OECD	Organisation for Economic Co-operation and Development
PCA	Principal Component Analysis
RMSEA	Root Mean Square Error of Approximation
SEM	Structural Equation Modeling
SMCs	Squared Multiple Correlations
SPSS	Statistical Package for the Social Sciences
TLI	Tucker-Lewis Coefficient
VIF	Variance Inflation Factor

CHAPTER 1

INTRODUCTION AND PROBLEM STATEMENT

1.1 INTRODUCTION

The present study aims to identify the level of financial literacy and behavioural biases of individual investors investing in the Indian stock market. This chapter is organized as follows: Section 1.2 presents the background of the study; it mainly focuses on behavioural finance research. Section 1.3 presents the research problem and rationale for the study. Section 1.4 presents the research objectives formulated for the study. Section 1.5 provides a discussion on the research design used for the study. Section 1.6 gives the contributions of this thesis, and finally, section 1.7 gives the organization of this thesis.

1.2 BACKGROUND OF THE RESEARCH

Standard finance, also known as traditional finance, is based on various theories and principles, for example, the arbitrage principles of Miller and Modigliani; the portfolio principles of Markowitz; the capital asset pricing theory of Sharpe, Lintner and Black and the option-pricing theory of Black, Scholes and Merton. These classical theories are based on the assumptions of an investor's rationality and market efficiency. According to these approaches, markets and market agents are efficient and systematic. Efficient Market Hypothesis also believes that security prices reflect the true value by incorporating all the available information in the efficient market condition (Fama, 1970). Traditional finance considers that investors' decisions are based on the Expected utility theory¹. Despite all the assumptions of traditional finance regarding an investor's rationality and market efficiency, behavioural economists argue that investors' behaviour and market behaviour can be irrational and inefficient.

In the 1970s, behavioural finance emerged as a new concept that combined the psychological and behavioural aspects in investment decision making that supplemented the classical theories of traditional finance. Behavioural finance challenges the efficient market perspective and analyses the cognitive abilities and psychological phenomenon of investors in investment decision making. Behavioural finance explicates that because

¹ EUT proposes that investors behave rationally by judging all the alternatives on the basis of their utility and the associated risk and make a balanced decision.

of their psychology an individual investor in investment decisions may be irrational and the market may be inefficient.

Kahneman and Tversky (1979) proposed the prospect theory,² which criticized the EUT in the financial decision making under uncertainty. Behavioural finance recognizes that an investor's decision making is influenced by individual psychology and market psychology. Shefrin (2010) stated that the root cause of the 2008 global financial crisis was psychological pitfalls that influenced the judgements and decisions of financial firms, rating agencies, government regulators and institutional investors. It indicates that issuers (corporates and governments) are also prone to making mistakes. Some researchers (Shefrin and Statman, 1985; Daniel *et al.*, 1998) have suggested that individual investors are susceptible to various behavioural anomalies, which can become the biggest obstacle in their attempt to maximize wealth. Barber and Odean (2011) advocated that the study of investor performance had focused almost exclusively on the performance of institutional investors. However, unlike institutional investors, individual investors tend to be less informed, more biased and proverbial noise traders in the financial market (Kyle, 1985; Black, 1986). Moreover, the poor performance of individual investors is also documented by Odean (1998, 1999). Therefore, it becomes imperative to study the behaviour of individual investors while making financial decisions.

1.3 RESEARCH PROBLEM AND RATIONALE FOR THE STUDY

In a developing country like India, Individual investors play a significant role because of their big share in savings. According to "*Household survey on India's citizen environment and consumer economy, 2016*", 99% of the households in both rural and urban India have at least one member with a bank account. Indian investors have been exposed to a plethora of investment opportunities, after the liberalization process which commenced in 1991 (Sahi and Arora, 2012). Due to the stable economic growth in the country and increase in household savings, middle class investors are gradually investing in the financial service sector. The financial service sector of India has become highly diversified because it now provides a wide range of investment and saving products. However, this increased competition in the financial service sector has led to an

² People assign values to the gains and losses rather than to the final outcomes.

information overload, where the Indian investor is definitely exposed to a range of investment products to choose from, but investors have limited skills and financial knowledge to evaluate and understand these financial products. Hence, individual investors have to rely on their beliefs and preferences to guide their financial investment decision making. These beliefs and preferences are referred to as systematic deviations from the rational behaviour, and are called biases/heuristics. What are these biases and how do they impact the financial investment decisions is an area that requires in-depth research, so as to understand the psychology behind the investment decisions. Thus, it is essential to identify these behavioural biases that affect the investment decisions of individual investors in India.

Most of the research that looks at the psychology of the individual investors and the biases in investment decision making have been conducted in the US, European Union and other developed countries (Kumar and Goyal, 2015). However, very little work has been done to understand the biases of Indian individual investors (Sahi and Arora, 2012). Moreover, it would be difficult to generalize the findings of those studies (Funfgeld and Wang, 2009) in Indian context because of differences in culture, life style, saving and spending habits of individuals, risk attitude, personality traits, etc. For example, Chang *et al.* (2000) analysed the presence of herding in 5 financial markets, including both developing and developed. They found that herding prevails in emerging economies like South Korea and Taiwan, while, it was not detected in developed countries like US & Hong Kong. This is due to the fact that these markets are considered riskier and less mature than those of developed nations. Therefore, there is scope for conducting research exclusively on the behaviour of Indian individual investors while investment decision making.

Moreover, earlier studies and surveys done worldwide have demonstrated that the level of financial literacy is very low. The poor level of financial literacy shows that individuals investing in different financial instruments are not financial aware. Van Rooij *et al.* (2011) reported that a lack of financial knowledge deters households from participating in stock markets. Lusardi and Mitchell (2007) concluded that people with financial illiteracy are less likely to have planned for retirement. Calvet *et al.* (2007) found that more financially sophisticated investors are more likely to buy risky assets and invest more efficiently. Therefore, the question of how consumer financial literacy affects

behavioural biases and investment decision making has been raised, and there have been calls for more research in this area (e.g., Lusardi, 2008). The present study is motivated by the limited literature on financial literacy and behavioural biases of individual investors investing in the Indian stock market.

Further limitation of the earlier work can be identified as limited research on the influence of personality traits on behavioural biases, though findings reveal that personality traits also significantly influence investment behaviour of individual investors (Mayfield *et al.*, 2008; Tauni *et al.*, 2016). Therefore, given the significant role of personality traits on investment behaviour, this study aims to examine the relationship between personality traits and behavioural biases among Indian individual investors.

1.4 OBJECTIVES OF THE STUDY

The present study aims to develop an understanding of the behavioural biases of Individual investors in India. It also highlights the need for assessing the financial literacy of individual investors. The behavioural biases of individual investors are incomplete without the study of the socio-demographic and psychographic factors of individual investors. Therefore, the present study also incorporates socio-demographic variables such as gender, age, marital status, education, occupation, income, investment experience and psychographic factors (e.g. personality traits) while studying behaviour of individual investors. In this way, the objectives of this study were intended by the integration of all the essential factors influencing the behavioural biases of individual investors.

The main objective of the study was to assess the level of financial literacy and to identify which behavioural biases exist among individual investors in India. More specifically, the present study intends to achieve the following objectives:

1. To assess the level of financial literacy among individual investors in India
2. To identify the existence of behavioural biases among individual investors in India
3. To explore the effect of financial literacy and socio-demographic variables on behavioural biases among individual investors
4. To analyse the influence of socio-demographic variables on the financial literacy of individual investors

5. To establish the relationship between personality traits and behavioural biases of individual investors.

1.5 RESEARCH DESIGN AND METHODOLOGY

Creswell *et al.* (2003) stated that a research design is a blueprint or a detailed plan of the complete process for identifying research problems, describing the location chosen for the data collection, listing the ethical requirements for the research and conditions for collection and analysis of data. In short, it tells us how to conduct a research study. It ensures the effectiveness in addressing the research problem. All the components of the research design have been comprehensively explained in chapter 4 of the present study. Table 1.1 presents the elements of the research design adopted in the current study.

Table 1.1 Summary of the Research Design

This table presents the elements of research design used in the current study.

S. No	Elements	Nature of Elements
1.	Research Purpose	Exploratory, Descriptive and Explanatory
2.	Research Philosophies	Positivism
3.	Research Approach	Deductive
4.	Research Strategies	Interview and Survey
5.	Research Choices	Qualitative and Quantitative
6.	Time Horizon	Cross-sectional
7.	Procedures	Structured Questionnaire

The present study used a mixed method approach to achieve the stated objectives. The mixed method approach is more appropriate where researchers know little about an issue and it is essential to first examine what variables to study by using qualitative research, and then study those variables with a large sample of individuals using quantitative research (Creswell *et al.*, 2003). Therefore, first, to identify different behavioural biases and to develop the research instrument, a qualitative study was conducted and then those identified behavioural biases were studied with a sample of individual investors, using the survey approach.

1.5.1 Research Design for the Preliminary Study

The present study used in-depth semi-structured interviews to gather preliminary information through the exploratory stage of the research. The interviews were conducted face to face with open-ended questions to collect preliminary information from experienced financial advisors, analysts and brokers working with individual investors. This study used non-probabilistic sampling, namely, purposive sampling, to select participants. In keeping with the qualitative approach to the study, interviews were carried out until similar and repetitive responses were gathered on the subject, and new data could no longer bring any additional insights into the research objectives. The data were recorded through an audiotape recorder, with the prior permission of informants. In this study, thematic content analysis was used to evaluate interview transcripts. The information obtained from respondents was used to develop the research instrument for the main study.

1.5.2 Research Design for the Main Study

To attain the objectives of the study, a structured questionnaire was designed on the basis of findings from the qualitative study and the previous studies conducted on behavioural biases and financial literacy (Lusardi and Mitchell, 2007; Van Rooij *et al.*, 2011; Al-Tamimi and Bin Kalli, 2009; Ibrahim and Alqaydi, 2013; Wood and Zaichkowsky, 2004; Goo *et al.*, 2010; Lin, 2011; Kudryavtsev *et al.*, 2013; Chun and Ming, 2009). To check the content validity of the questionnaire, both academicians and industry experts were asked to review the survey instrument. The final draft of the questionnaire was prepared after incorporating the suggestions received from the experts. To check the reliability of the survey instrument, a pilot study was conducted on the data collected from 102 individual investors who had invested in the stock market. The research instrument consists of four sections. Section (A) describes respondent socio-demographics, section (B) focuses on questions related to financial literacy, Section (C) describes respondent behaviour when making investment decisions and section (D) captures the personality traits of the respondents.

The target population for this study represents individual investors who invest in the share market in India. In the present study, the contact information of retail investors was obtained from one of India's largest brokerage firm that provided a list of the

accounts that had been opened during 2010-2015. The data were on 2,000 active accounts from the 10 major cities in India (Mumbai, Ahmedabad, Delhi, Hyderabad, Kolkata, Bangalore, Chennai, Pune, Jaipur and Kochi) and we used e-mail to administer our survey. A total of 515 respondents returned the questionnaire. This resulted in an initial response rate of 25.75%. After excluding 14 responses due to missing data, our final sample consisted of 501 respondents.

1.5.3 Methods of Analysis

The study makes use of various statistical techniques for analysing the data collected through the structured questionnaire. Statistical software, for example, SPSS version 21.0 and AMOS version 21.0, were used for data analysis. This study was mainly based on primary data and was conducted with the help of a structured questionnaire. The assumptions related to all the statistical techniques were examined before application. We applied univariate and multi-variate analyses. Table 1.2 maps the research objectives with the respective methods of analysis to accomplish our research objectives.

Table 1.2 Methods of Analysis

The table shows the methods of analysis applied in the study to accomplish the research objectives.

S. No.	Research Objectives	Methods of Analysis
1.	To assess the level of financial literacy among individual investors in India	Descriptive statistics
2.	To identify the existence of behavioural biases among individual investors in India	Factor analysis and Descriptive Statistics
3.	To explore the effect of financial literacy and demographic variables on behavioural biases among individual investors	Multiple regression and logistic regression
4.	To analyse the influence of demographic variables on financial literacy of individual investors	Logistic regression
5.	To establish the relationship between personality traits and behavioural biases of individual investors	Factor analysis and Structure equation modeling

1.6 CONTRIBUTION OF THE STUDY

This study contributes to the theoretical, practical and methodological knowledge in developing an understanding towards the investment behaviour of individual investors in India. It examines the financial literacy and prominent behavioural biases of individual investors in India. Thus, it adds to the theoretical knowledge by providing new empirical evidence about the investment behaviour of Indian investors. This research is probably the first attempt to unravel the relationship between financial literacy and behavioural biases, especially in India. Thus, it contributes to this literature by trying to fill this gap. The present study also contributes to the behavioural finance literature by bridging the gap of the limited research on the personality traits and behavioural biases of individual investors in India.

The findings of this study will enable individual investors to get a better understanding of behavioural biases and financial knowledge that may influence their investment decisions and results in suboptimal returns. This study also highlights the fact that financial knowledge among individual investors is poor. This finding may help financial educators in promoting financial awareness programs for individuals.

The present study also creates a methodological contribution to the literature by using the mixed method approach to investigate the behavioural biases of individual investors in India. This study applied qualitative and quantitative methods for collecting information about investment behaviour of individual investors in India.

1.7 ORGANIZATION OF THE THESIS

This thesis is organized to provide a critical examination of relevant information regarding financial literacy and behavioural biases of individual investors, association of personality traits with behavioural biases. Conceptual framework, research hypotheses and research methodology will be discussed next. Further, data collected were analysed to provide evidence for support of research hypotheses. The research findings obtained from the data analysis were then used to suggest the contribution of the study. This study encompasses seven chapters. A summary of each chapter is specified as follows:

Chapter 1 gives the introduction and background of the research. It specifically discusses the research problem and rationale for the study, research objectives, expected research design and research methodology, and the contribution of the research study.

Chapter 2 reviews the literature on behavioural biases including overconfidence bias, disposition effect, anchoring bias, representativeness, self-attribution, mental accounting, loss aversion, regret aversion, framing effect, familiarity bias, availability, hindsight and herding bias; financial literacy, the impact of financial literacy and socio-demographic variables on behavioural biases, and the effect of personality traits on behavioural biases. It reveals the existing research gaps in the literature and will further assist in the developing of a conceptual framework for the present study.

Chapter 3 proposes a conceptual framework which is based on the research gaps identified through the literature review in chapter 2. Research hypotheses are then proposed.

Chapter 4 explains the research methodology and methods of data analysis applied to study the conceptual framework designed in the previous chapter. This chapter discusses the research purpose (exploratory, descriptive and explanatory), philosophies (positivism), research strategies (interview and survey) and research choices (qualitative and quantitative). Further, it also confers the process of data collection, methods of data analysis, sample selection, design of the research instrument and pilot study.

Chapter 5 describes the findings of the preliminary study conducted by using in-depth semi-structured interviews. The findings were further used in the development of a questionnaire for the main study.

Chapter 6 presents the data analysis and key findings of the main study. It includes the examination of non-response bias, assumptions of multivariate analysis and data analysis by using descriptive statistics, multiple regression analysis, logistic analysis and SEM.

Chapter 7 summarizes key findings of the preliminary and main study. It precisely presents the contribution and suggestion of the current study. It further proposes avenues for future research on the basis of the limitations of the current study.

CHAPTER 2

REVIEW OF LITERATURE

2.1 INTRODUCTION

A literature review entails a systematic and explicit assessment of the body of research related to a particular area. This chapter presents an extended literature review of behavioural finance and financial literacy research conducted worldwide. It further describes the impact of individuals' socio-demographics such as gender, age, marital status, education, occupation, income-level and investment experience on behavioural biases and financial literacy followed by the influence of personality traits on behavioural biases in investment decision making. This literature review helps to identify the research gaps and the previous findings in this area.

2.2 BEHAVIOURAL FINANCE

Traditional finance is built on the notion of “*homo economics*”, which states that humans always make perfectly rational choices to maximize their wealth and minimize risk (Pompian, 2012). This implies that traditional finance has concern about how investors should behave rather than how investors are actually behaving (Baker and Nofsinger, 2002). The efficient market hypothesis (EMH) is a classic theory in traditional finance. It states that in an efficient market, all the available information is incorporated while estimating the prices of financial assets. EMH is based on the belief that investors behave rationally in the financial market. However, research studies on judgement and decision making have revealed that an individual's behaviour is inconsistent with rationality (Tourani-Rad and Kirkby, 2005; Baker and Nofsinger, 2010; Barberis and Thaler, 2003; Fama, 1998; Miller, 1986; Shefrin, 2000; Statman, 1995; Statman, 1999; Shiller, 2003; von Neumann and Morgenstern, 1944).

In the 1980s, behavioural finance emerged as a new concept that combined behavioural and psychological aspects in economic and financial decision making. Behavioural finance challenges the efficient market perspective and helps to understand why investors behave in a specific manner while investing in financial assets (Ackert and Deaves, 2009; Baker and Nofsinger, 2010; Hirshleifer, 2001; Pompian, 2011; Statman, 1999). Thaler (1993) suggested that behavioural finance “*entertains the possibility that some of the agents in the economy behave less than fully rationally some of the time*” (p.

17). Behavioural finance researchers have made significant contributions to understanding the factors that influence individual investors (Johnson and Tversky, 1983; Barberis and Thaler, 2003; Fama, 1998; Shefrin and Statman, 1985; Thaler, 1999). A brief description of some of the research work reported in the behavioural finance literature is given below.

Initially, Tversky and Kahneman (1974) identified the presence of three heuristics (representativeness, availability and anchoring) in decision making under uncertainty and risk, whereas Kahneman and Tversky (1979) developed the prospect theory for decision making under uncertainty. Further, Tversky and Kahneman (1981) explained the concept of framing and Kahneman *et al.* (1982) also analysed the concepts of heuristics and biases. In addition, Tversky and Kahneman (1986) analysed the issues of framing and prospect theory. Furthermore, Tversky and Kahneman (1991) documented evidence of loss aversion theory and endowment effect. Banerjee (1992) developed a model on investors' herding behaviour. Later, Jegadeesh and Titman (1993) created an investment strategy based on the idea that stocks exhibit momentum in the market to see whether one could make profits based on momentum. Lakonishok *et al.* (1994) researched the opposite side of the spectrum on contrarian investing.

Moreover, Benartzi and Thaler (1995) addressed the causes for a historically high equity risk premium. Chan *et al.* (1996) reported that the market has a tendency to underreact to new information. In addition, Shleifer and Vishny (1997) discussed “*The limits of arbitrage.*” Kahneman and Riepe (1998) stated that people make judgements about the probabilities of the occurrence of an outcome and assign values to these outcomes. Daniel *et al.* (1998) created a theory to explain momentum through market overreactions and underreactions based on many of the psychological biases. Shiller (1999) used the foundations of behavioural finance to predict a large collapse in stock prices, which is known as the tech bubble. Further, Wermers (1999) found a high level of herding in trading of small stocks. Thaler (1999) analysed various theories of behavioural finance and emphasized mental accounting. Odean (1999) found evidence of the overconfidence and disposition effect in equity markets. Moreover, Veronesi (1999) discovered that prices overreact to bad news in good times and underreact to good news in bad times. Barber and Odean (2001a) documented that males are more overconfident than are females and also trade more than females do. Additionally, Lamont and Thaler

(2003) identified inefficiencies and mispricing in financial markets. Anderson *et al.* (2005) found that behavioural characteristics systematically affect investment performance.

Olsen (2008) analysed how cognitive dissonance is the biggest problem that arises between behavioural finance and traditional financial theory. Vasiliou *et al.* (2008) documented how behavioural finance can be used to predict future prices. Ekholm and Pasternack (2008) documented that large investors react more positively to good news and vice versa than do small investors. Anagol and Gamble (2013) examined the effect that presentation of results has on equity allocation. Doviak (2015) analysed behavioural finance from the point of view of a financial planner. Asness *et al.* (2015) discussed value investing.

Because behavioural finance is a relatively new area, it is evident from the literature that most of the empirical research studies (see, e.g. Daniel *et al.*, 1998; Barber and Odean, 2001; Barber and Odean, 2000; Odean, 1999; Odean, 1998; Grinblatt *et al.*, 1995) have been conducted in developed countries, with only little attention given to Indian investors.

2.3 BEHAVIOURAL BIASES IN INVESTMENT DECISION MAKING

According to Sahi and Arora (2012), behavioural science has long attempted to solve the connection between the human mind and behaviour. Empirical evidence reveals that individual investors exhibit various anomalies that lead to poor judgement and mispricing in financial markets (Barber and Odean, 1999; Barberis and Thaler, 2003). These anomalies are cognitive errors or biases that influence investment decision making (Tversky and Kahneman, 1974). Behavioural psychologists and financial academics have identified various behavioural biases that affect investors. However, Heuristics often work well within some domains and for some types of problems, but they work badly in other cases. For example, Kahneman and Tversky (1979) introduced prospect theory which suggests that people make irrational decisions under risk and uncertainty and violate axioms of expected utility theory. According to prospect theory, people tend to deviate from rational behaviour.

Empirical evidence from psychological research suggests that individuals consider each decision to be unique. Kahneman and Lovallo (1993) explained that people

generally engage in narrow framing and isolate their current decisions from their other decisions. Because of narrow framing, people ignore their portfolio and experience a relatively poor portfolio performance. Additionally, Kahneman (2003) stated that when people make decisions based on their intuition, they adopt the most readily available frame, which is narrow and entails suboptimal outcomes. Sahi *et al.* (2013) stated that to understand the behaviour of individuals' financial investment decisions, it is necessary to understand the various behavioural biases that influence their decision-making behaviour. According to Pompain (2006), behavioural biases can be classified into two broad categories: cognitive deviation and emotional deviation. Both categories result in irrational choices and judgements. Cognitive deviations originate from faulty reasoning and logical errors and can often be corrected by providing better information and advice. On the contrary, emotional deviations are generated from intuitions. Therefore, they are difficult to rectify. Cognitive biases include overconfidence, disposition effect, anchoring and adjustment, availability bias, mental accounting, representativeness, ambiguity aversion and self-attribution bias. In contrast, emotional biases include endowment effect, loss aversion, status-quo bias and regret aversion.

Recently, empirical evidence on irrational investor behaviour that influences individuals' investment decision making has been identified. A few of the most important of these concepts, which will also be examined in the current research, include Overconfidence, Disposition Effect, Representativeness, Familiarity, Mental Accounting, Availability, Anchoring, Hindsight Bias, Herding, Financial Literacy, Demographic and Personality traits (Dhar and Zhu, 2006; Grinblatt and Keloharju, 2009; Chen *et al.*, 2007; Chang, 2008; Ekholm and Pasternack, 2008; Obernarcher and Osler, 2008; Grinblatt *et al.*, 2008; Menkhof *et al.*, 2008; Kudryavtsev and Cohen, 2011; Lusardi and Mitchell, 2011; Takeda *et al.*, 2013; Kumar and Goyal, 2016; Tekçe *et al.*, 2016). The major research studies on these biases are summarized in Table 2.1.

These biases can get reflected in the form of market anomalies such as economic crises (e.g., the dot-com bubble of the 1990s and the global financial crisis of 2007). These crises affected the stock market and were found to be very costly. Further, researchers found that poor financial decisions also hurt productivity in the workplace (Garman *et al.*, 1999; Garman *et al.*, 1996). Hence, it has become vital to investigate investors' behaviour.

Table 2.1 Summary of the Literature on Various Behavioural Biases

This table presents the summary of previous studies on different behavioural biases.

Bias	Author (Year)	Journal of Publication
Overconfidence	Odean (1999)	<i>The American Economic Review</i>
	Daniel <i>et al.</i> (1998)	<i>Journal of Finance</i>
	Barber and Odean (2000)	<i>Journal of Finance</i>
	Gervais and Odean (2001)	<i>Review of Financial Studies</i>
	Lakonishok <i>et al.</i> (1992)	<i>Journal of Financial Economics</i>
Herding	Scharfstein and Stein (1990)	<i>The American Economic Review</i>
	Christie and Huang (1995)	<i>Financial Analysts Journal</i>
Familiarity	French and Poterba (1991)	<i>American Economic Review</i>
	Massa and Simonov (2006)	<i>Review of Financial Studies</i>
Disposition effect	Shefrin and Statman (1985)	<i>Journal of Finance</i>
	Odean (1998)	<i>Journal of Finance</i>
Overreaction	Grinblatt and Keloharju (2001)	<i>Journal of Finance</i>
	De Bondt and Thaler (1985)	<i>Journal of Finance</i>
Mental accounting	Thaler (1999)	<i>Financial Analysts Journal</i>
	Barberis and Huang (2001)	<i>Journal of Finance</i>
Loss aversion	Kahneman and Tversky (1979)	<i>Econometrica: Journal of the Econometric Society</i>
	Berkelaar and Kouwenberg (2009)	<i>Journal of Banking & Finance</i>
	Hwang and Satchell (2010)	<i>Journal of Banking & Finance</i>
Status-quo bias	Samuelson and Zeckhauser (1988)	<i>Journal of Risk and Uncertainty</i>
	Brown and Kagel (2009)	<i>Annals of Finance</i>
Anchoring	Tversky and Kahneman (1974)	<i>Science</i>
	Campbell and Sharpe (2009)	<i>Journal of Financial and Quantitative Analysis</i>
Gambler's fallacy	Croson and Sundali (2005)	<i>Journal of Risk and Uncertainty</i>

2.3.1 Overconfidence

Overconfidence is the most frequently studied cognitive bias in which people have unwarranted faith in their intuitive reasoning, judgements and cognitive abilities (Pompian, 2006). Overconfident people become too confident about their skills and knowledge while underestimating the various risks associated with investment (Barber and Odean, 2001; Ritter, 2003). Some researchers have identified that overconfidence affects an individual's behaviour in many ways (Lichtenstein *et al.*, 1982; Fischhoff *et al.*, 1977; Griffin and Tversky, 1992). For instance, Barber and Odean (2000) collected data from 78,000 households from 1991 to 1996 from a large discount brokerage house in the U.S. They documented that investors are overconfident and trade excessively and that because of the excessive trading gross returns (before accounting the transaction cost) earned by the households were normal, whereas net returns were poor. Similarly, De Bondt and Thaler (1995) also stated that overconfidence is the key behavioural factor needed to understand the excessive trading puzzle. In an experimental study, Trinugroho and Sembel (2011) found that overconfident investors believe that they have specialized knowledge and abilities about stock market investments and tend to practise aggressive and higher trading activity. Also, they claimed that highly overconfident investors have no trading activity differences between pre and post bad news compared to less confident investors.

These results (i.e. overconfidence increases trading volume) are empirically consistent with the findings of several studies (Statman *et al.*, 2006; Grinblatt and Keloharju, 2000; Gervais and Odean, 2001; Benos, 1998; Caballe and Sakovics, 2003; Kyle and Wang, 1997; Wang, 1998; Barberis and Thaler, 2003). Moreover, overconfident investors overreact to private information signals while ignoring publicly available information (Daniel *et al.*, 1998). Ekholm and Pasternack (2008) documented that large investors react in more positively to good news and vice versa than do small investors. In addition, Odean (1999) advocated that individual investors' performance is reduced due to excessive trading. Odean (1998b) also supported that overconfident investors make biased judgements that may lead to poor returns. However, DeLong *et al.* (1990) and Wang (2001) claimed that overconfident investors earn higher returns than do less confident investors. Furthermore, Kahneman and Riepe (1998) reported that overconfidence causes people to overestimate their knowledge and underestimate risks.

Because of underestimating risk, overconfident investors hold more risky assets. Barber and Odean (2002) investigated individual investors who switched to internet trading. They documented that after switching to internet trading investors trade more actively and perform poorly.

2.3.2 Disposition Effect

Disposition effect is another important behavioural bias wherein investors exhibit a tendency to realize gains while they are reluctant to realize losses (Shefrin and Statman, 1985). Firstly, Shefrin and Statman (1985) developed a framework based on different elements (i.e. mental accounting, regret aversion, self-control and tax consideration) and formally analysed the disposition effect. Most of the empirical studies are based on the prospect theory of Kahneman and Tversky (1979) to explain the disposition effect. Prospect theory states that people become more risk averse after experiencing gains, whereas risk seekers after suffering from losses. Grinblatt and Keloharju (2001) found evidence for the disposition effect for five investor types, namely, Non-financial corporations; financial and insurance institutions; governmental organizations; non-profit institutions and households. Several research studies have supported the existence of disposition effect (Barber *et al.*, 2007; Shapira and Venezia, 2001; Weber and Camerer, 1998; Grinblatt and Keloharju, 2000; Jordon and Diltz, 2004; Grinblatt and Keloharju, 2001; Dhar and Zhu, 2002).

Further, Lakonishok and Smidt (1986) stated that the disposition effect dominates tax-related motives for selling stocks at a loss. Odean (1998) analysed 10,000 customer accounts from a nationwide discount brokerage house and also empirically supported the implications of the prospect theory. Further, author also reported that because of tax consideration, investors are involved in loss realized selling at the end of the year (i.e. December). Furthermore, Shapira and Venezia (2001) documented that individual investors are more prone to disposition effect than are professional investors. However, Leal *et al.* (2010) analysed the disposition effect on the basis of trades, volume and value traded using a unique database that consists of trading records of 1496 Portuguese individual investors. They suggested that in a bullish market, investors are more prone to being influenced by the disposition effect than they are in a bearish market. Further, they reported that even at the end of the fiscal year, the disposition effect still holds, as

opposed to the evidence found in other markets. Similarly, the findings of Ferris *et al.* (1988) are inconsistent with tax loss selling.

Fogel and Berry (2006) provided empirical support for the presence of the disposition effect among individual investors. They find that individuals report regret for holding a losing stock too long and selling a winning stock too soon. Barber *et al.* (2005) analysed mutual fund purchase and sale decision of investors. They found that investors sell those funds which have realized positive returns and are reluctant to sell the loss-making funds. Moreover, empirically, it has been observed that disposition effect occurs in the financial market, and tax consideration alone cannot explain the patterns of realized gains and losses. In an experiment, Shafran *et al.* (2009) investigated that investors are prone to disposition effect and are also affected by trading conditions. Barberis and Xiong (2009) advocated that investors' tendency for disposition effect depends on the performance of past investments. If past investments were set at a gain, these individuals will be gradually less risk averse and will show more disposition effect.

Goetzmann and Massa (2008) found a negative correlation between disposition effect and returns, volatility and trading volume. In contrast, Svedsater *et al.* (2009) stated that in the short run, past returns are positively correlated with disposition effect, whereas in the long run, past returns are negatively correlated with disposition effect.

2.3.3 Anchoring Bias

Tversky and Kahneman (1974) defined anchoring to occur when “*people make estimates by starting from an initial value that is adjusted to yield the final answer.*” In other words, Phung (2008) explained that anchoring is a tendency to attach or “anchor” our thoughts to a reference point - even though it may not have any logical relevance to the decision at hand. To elaborate the definition of anchoring, Tversky and Kahneman (1974) conducted an experiment. In this experiment, subjects were asked to estimate the percentage of African countries involved in the United Nations. The subjects were instructed to answer after first spinning a wheel between 0 and 100. They found that subjects exhibited random anchoring behaviour. For example, when the wheel landed on 10, the subjects gave the median estimate of 25 percent; however, when the wheel landed on 60, they gave a median estimate of 45 percent. This indicates that although number has no correlation to the questions subjects get affected by mental anchoring.

For investors, stock purchase price and highest stock prices are important reference points. Health *et al.* (1999) studied the detailed record of 50,000 employees at seven publicly traded corporations in the USA for a period of ten years and found that employees have set the stock's highest price in the previous year as a reference point to exercise their options. Nguyen and Schuessler (2012) analysed the influence of irrelevant information on investors' decision making based on the anchoring experiment of Tversky and Kahneman (1974). After the survey, they revealed that the anchoring factor does exist among investors of Germany, which means people get influenced by irrelevant information. Further, He and Shen (2010) documented that for individuals previous returns also serve as an anchor for expected returns. In addition, Kaustia *et al.* (2008) surveyed financial market professionals and students to analyse the effect of anchoring in stock return estimates. They found that students exhibit a very large effect of anchoring bias (considered historical return as a reference point) in the expected returns than do professionals. This indicates that individuals are more inclined to heuristics than are professional investors.

2.3.4 Mental Accounting

Tversky and Kahneman (1981) described mental accounting as a process by which investors divide their current and future assets into a separate and non-transferable account. Further, Thaler (1999) stated that "*mental accounting is a set of cognitive operations used by individuals and households to organize, evaluate, and keep track of financial activities.*" Further, they focused on three components of mental accounting: (1) the first pertains to how outcomes are perceived and experienced, the second includes the assignment of different activities to specified accounts and the third explains the frequency (daily, weekly or yearly) with which accounts are evaluated. Each of the components of mental accounting interrupts the economic principle of fungibility (a good or asset's interchangeability with other individual goods or assets of the same type). For instance, Individual investors that exhibit mental accounting bias take profits attained as dividends (cash) differently from identical "paper" profits realized from an increased exchange rate or share price (Winnett and Lewis, 1994).

According to Shefrin and Thaler (1988), the major classes of mental accounting are current income, current wealth and future income. All of these are treated and valued differently in individuals' minds. Further, Katarachia and Konstantinidis (2014) also

found that in investment decisions individuals mainly focus on organizing losses and gains separately rather than concentrating on the aggregate value of their portfolio. They also suggested that by separating losses in other accounts, individuals feel less pain. Moreover, mental accounting is also connected to narrow framing. If an individual investor is disposed to narrow framing then he or she will be unable to understand his/her investments as a portfolio and will instead consider it as a collection of different assets (Kahneman and Lovallo, 1993).

It has also been seen that individuals do not close losing positions and investing the fund realized from losing position in new assets because they treat these shares as a separate mental account (Odean, 1998). Moreover, Kahneman and Tversky (1979) stated in the prospect theory that decision makers pass through an editing phase in which they frame the choices in terms of potential gains and losses relative to a defined reference point. In mental accounting theory, investors frame the choices in which they tend to hold loss realization assets while they sell the assets for which they enjoy gain. Shams *et al.* (2012) studied the relationship between investors' feeling towards gains and losses and the difference between holding periods of profit making and loss realizing assets in the Tehran Stock Exchange. The findings of the study were consistent with mental accounting theory, which means there was a significant difference between holding periods of winners and losers to sale.

2.3.5 Representativeness

In 1974, psychologists Amos Tversky and Daniel Kahneman first described representativeness bias. Tversky and Kahneman (1974) suggested that representative heuristic generally occurs when people are interested to know what the probability is that object A belongs to class B. In this case, probability is evaluated by the degree to which A resembles/originates/representative of B. If A is highly representative of B, then the probability that A belongs to B is judged to be high and vice versa. In other words, due to representativeness, an individual categorizes a scenario based on a pattern of previous experiences or beliefs about the scenario. Generally, representativeness heuristic occurs due to uncertainty and lack of information. When individuals believe representativeness to make decisions, it may lead to systematic mistakes also due to a stereotype effect. For example, if an individual experiences a continuous good (poor) performance of a stock, then Representativeness bias makes individuals believe that good (poor) performance is

likely to continue in the future also, and fails to distinguish that most stock cannot grow (or lose) indefinitely. In a study, Fama (1970) suggested that historical stock performance is not a good indicator to estimate the future performance or returns. Moreover, De Bondt and Thaler (1985) documented that due to representativeness investors become overly pessimistic about past losers and overly optimistic about past winners, and this type of heuristic reasons prices to deviate from the fundamental value. Lakonishok *et al.* (1994) reported that firms that experienced high sales in previous years performed more poorly than firms that experienced lower sales growth.

Further, Swallow and Fox (1996) found strong empirical evidence that investors in the New Zealand Stock Exchange invest according to the representative heuristic and overreact to the good and bad news that led to abnormal returns. Dhar and Kumar (2001) examined the price trends of stocks bought by households at a discount brokerage during a 5-year period. They found that investors select and buy stocks that had recently enjoyed some positive abnormal returns. This is consistent with the thought that the historical price trend is representative of the future price trend. Chen *et al.* (2007) investigated representative bias among a sample of 46,969 individual investor accounts and 212 institutional investors in Chinese stock markets. They documented that Chinese investors opine that past returns are good indicators for future returns.

2.3.6 Self-attribution Bias

Self-attribution bias arises when people attribute successful outcomes to their own skills and abilities and they attribute failures to external factors (Miller and Ross, 1975; Bradley, 1978). Zuckerman (1979) stated that individuals are inclined to self-attribution bias to generate self-esteem. Daniel *et al.* (1998) proposed a theory of securities market under-reactions and overreactions based on overconfidence and self-attribution bias. They found that investors overreact to private information and they underreact to publicly available information. Hoffmann and Post (2014) studied self-attribution bias among individual investors by combining their survey data with matching brokerage records of clients of a large Dutch discount broker. They revealed that when the previous period's returns were higher, most of the investors agreed with the statement claiming that their performance reflects their own skills and abilities. This shows that investors are influenced by self-attribution bias in financial decision making.

However, it seems that markets can also influence the confidence of investors: the overconfidence of successful investors can be reinforced through self-attribution bias, that is, a belief that their trading success should be attributed mostly to their own abilities (Odean, 1999). Lovric *et al.* (2009b) studied emerging overconfidence due to self-attribution bias. Further, Mishra and Metilda (2015) confirmed the presence of self-attribution bias among mutual fund investors. In addition, they found that self-attribution bias is a significant predictor of overconfidence bias.

2.3.7 Loss Aversion

Loss aversion bias was developed by Daniel Kahneman and Amos Tversky in 1979 based on the Prospect Theory. Kahneman and Tversky (1979) proposed that people sense twice as much pain for what they lose than pleasure for equal gains. Therefore, they feel a stronger instinct to avoid losses than to acquire gains. Tversky and Kahneman (1991) assumed that losses loom larger than corresponding gains. Kahneman *et al.* (1991) documented that investors became more sensitive to those investments in which they are losing relative to their reference point. Similarly, Benartzi and Thaler (1995) also found empirical evidence that loss has a negative impact that is twice as much as the impact gains have. Loss aversion can cause people to hold loss making assets too long and sell winners too soon. Because of loss aversion, individuals avoid trading their underperforming assets because they realize that these assets will outperform in the future. Moreover, Odean (1998) also confirmed that investors have a tendency to sell winners and hold loss making assets. Dimmock and Kouwenberg (2010) studied Dutch households and revealed that individuals with higher loss aversion tend to participate less in the stock market. However, in an experimental study, Walasek and Stewart (2015) manipulated the possible range of gains and losses; thereafter, they found loss neutrality or even reverse of loss aversion also. This indicates that an individual's memory to gains and losses also influences his/her behaviour.

Further, Haigh and List (2005) incorporated the two concepts of loss aversion and mental accounting and tried to discover the behavioural difference between professionals and non-professionals (students). They found that students exhibited myopic loss aversion in their investment behaviour; however, professional traders' behaviour was more consistent with myopic loss aversion than was students' behaviour. Bogan *et al.* (2013) analysed the relationship between gender diversity and investment decision-making

behaviour. They found that having a male investor in the team decreases the probability of choosing an investment which realizes more losses.

2.3.8 Regret Aversion

Regret is an emotional factor which is generated when people make a wrong decision and consider their past decisions when making decisions. Bell (1982) suggested that regret is one of the most key emotions in decision making. Generally, regret aversion is the concept used to explain the emotion of regret after making a decision that turns into a bad or poor decision. In investment decision making, because of the fear of regret individuals can become either risk averse or risk seeking. Individuals exhibiting regret aversion may be reluctant to sell the stock whose prices escalated recently. Regret aversion arises when an investor desires to avoid the pain of regret because of any past poor decision. For example, investors will be tempted to hold poor performing assets in a situation in which they sold shares that were continuously going down in the past and later within two weeks the prices of these shares had touched the 52-week high.

2.3.9 Framing Effect

Framing effect is a cognitive error in which individuals react to a particular choice in different ways depending on how the choices have been framed. In prospect theory, Kahneman and Tversky (1979) documented that people become risk seekers when choices are presented positively while they tend to avoid risks when choices are presented negatively for mathematical identical outcomes. Prospect theory also states that losses are more significant than the same amount of gains. Tversky and Kahneman (1981) explained how different frames can lead to different choices and decisions. In an experiment, they presented a series of demonstrations and made a significant change in the formulation of choice that caused shifts in an individual's preferences or choices.

Further, Plous (1993) also stated that people have a tendency to select different choices; this depends on whether the questions are framed in terms of losses or gains. Mishra *et al.* (2012) also confirmed the framing effect in behavioural decision making through an experiment. They explained that individuals engaged significantly in higher risk acceptance to the negative frame compared to the positive frame. Moreover, In addition, Seo *et al.* (2010) analysed the role of affect (pleasant and unpleasant feelings) and decision frames (gain and losses) in risk taking while making investment decisions.

They documented that due to framing effect, after realizing losses (gains) individuals made more risky choices (avoid risks); this tendency however decreased when losses (gains) were simultaneously experienced with other pleasant or unpleasant feelings.

2.3.10 Familiarity

Familiarity bias is a psychological phenomenon in which individuals have a tendency to prefer things that are already familiar to them. Familiarity is caused by preferring domestic stock to international stock. People select the familiar to the unfamiliar (Shefrin, 2000). Initially, French and Poterba (1991) and Tesar and Werner (1995) analysed equity home bias in their studies. French and Poterba (1991) analysed the portfolio holdings of major countries in December 1989. They documented that investors in the U.S., Japan and the U.K. have 93.8%, 98.11% and 82% domestic securities in their portfolio, respectively. The possible reasons behind home bias may be investment barriers, transaction costs, information asymmetry, inflation hedging and non-tradable assets. Generally, preference for domestic securities in international investment portfolios has been discussed.

Further, Coval and Moskowitz (1999) found that US investment managers tend to invest in small, highly levered and locally headquartered firms. This indicates that even professional investors also prefer to allocate a larger portion of their investments to familiar stocks. Moreover, Zhu (2002) confirmed that individual U.S. investors also exhibit strong home bias. They found that both professional and individual investors exhibit local bias, though it is significantly stronger among individuals. In addition, researchers documented that investors are more optimistic and have faith in their domestic markets compared to foreign markets (Strong and Xu, 2003; Baker and Nofsinger, 2002).

Moreover, Tesar and Werner (1995) reported that due to transaction cost individuals are disposed to investing in local securities instead of investing in foreign securities that are realizing higher returns. Ackert *et al.* (2005) investigated a sample of US and Canada students to test home bias and found that all students exhibit familiarity with domestic stock compared to foreign stocks. Similarly, Seasholes and Zhu (2010) found empirical evidence that investors are more likely to hold local stocks in their portfolios. Moreover, they described that there is information asymmetry among

investors. They found that information asymmetry is an indirect obstruction to foreign investment individuals in the home bias puzzle. In their research studies, Feng and Seasholes (2004) described individual Chinese investors; De Vries *et al.* (2017) found that individual investors in South Africa exhibit familiarity bias in their purchasing of local companies.

2.3.11 Availability Bias

Tversky and Kahneman (1974) defined that “*there are situations in which the people assess the frequency of a class or the probability of an event by the ease with which instances or occurrences can be brought to mind. This judgemental heuristic is called availability.*” In other words, availability refers to an individual’s tendency to make decisions based on whatever information is easily available to him/her rather than on all the relevant information. Availability bias can be an effective inducement in portfolio decisions (Kim and Nofsinger, 2008). Due to availability bias, events that are easily recollected to mind are supposed to have a greater probability of occurring. Investors exhibit availability heuristic while making decisions, which may later hinder their own investment success. For example, during Franklin Templeton’s annual Global Investor Sentiment Survey¹ individuals were asked how they thought the S&P 500 Index performed in 2009, 2010 and 2011. A large number of survey respondents assumed the benchmark was either down or flat. However, in reality, the S&P 500 saw 26.5 percent annual returns in 2009, 15.1 percent annual returns in 2010 and 2.1 percent annual returns in 2011. This means prolonged observations based on painful events impact decision making even when those events are over.

Moreover, Wang *et al.* (2011) found that individuals feel more comfortable in making decisions based on superior information. For instance, most investors, if asked to identify the “best” mutual fund company, are likely to select a firm that engages in heavy advertising. Because of availability bias, an individual tends to incline towards more recent information while making investment decisions, and tends to make any new opinion biased towards that latest news.

2.3.12 Hindsight Bias

Here, people rely on past experiences to predict future events or market behaviour. In other words, hindsight tends to arise in situations where an individual believes that some past event was predictable and totally apparent; however, the event could not have been logically expected. Generally, people who suffer from hindsight bias become more overconfident and predict that they can forecast the future in a better way (Shiller, 2000). Earlier in the literature, hindsight bias was studied by Fischhoff (1975) and Fischhoff and Beyth (1975). Fischhoff (1975) found that receipt of outcome knowledge affects a subject's decision making in the future. This is termed creeping determinism. Hussain *et al.* (2013) analysed the impact of hindsight bias and its impact on asset selection and sign of return in investment decision making. Their study was conducted in two phases by dividing the sample into three groups, namely, (1) bank financial managers, (2) stock market investors and (3) students. They found significant evidence that stock market investors are more exposed to the hindsight bias effect in asset selection, whereas bank financial managers are more influenced by hindsight bias in the sign of return effect.

Tavor (2012) examined hindsight bias effect of an asset's past performance on trading decision through an experiment. In the experiment, 204 students were divided into two groups, one is a control group and the other is the test group. During the experiment, five past events were selected; of these, two events were related to a positive performance, two events were related to negative performance and one event was neutral. The study findings show that hindsight bias exists in every event and it has the strongest effect in the neutral event. Further, Biaisi and Weber (2009) conducted an experiment using a sample of students and investment bankers and found that investment bankers who are more inclined to hindsight bias have a lower investment performance.

2.3.13 Herding

Herding refers to the tendency of individuals to imitate the judgements (rational and irrational) of others. Thus, herding behaviour of investors is the primary cause of bubbles in finance. There can be numerous reasons for herd behaviour. These include information-based herding (Bikhchandani *et al.*, 1992; Welch, 1992), reputational-based herding (Scharfstein and Stein, 1990; Graham, 1999) and compensation-based herding (Admati and Pfleiderer, 1988). Previous research studies analysed that herding behaviour exists in the trading of both institutional and individual investors (Banerjee, 1992;

Bikhchandani *et al.*, 1992). The literature documents that studies that analysed the herding behaviour of individual investors are fewer compared to studies conducted on institutional investors (Merli and Roger, 2013). Herding behaviour of institutional investors have been performed particularly in the US (Lakonishok *et al.*, 1992; Grinblatt *et al.*, 1995; Wermers, 1999); UK (Wylie, 2005); Germany (Oehler, 1998; Frey *et al.*, 2014); Portugal (Loboa and Serra, 2007); China (Zheng, 2015) and Poland (Voronkova and Bohl, 2005). However, studies have been performed on individual investors in the U.S. (Barber *et al.*, 2009); Germany (Dorn *et al.*, 2008); Israel (Venezia *et al.*, 2011); Taiwan (Lin, 2011); China (Feng and Seasholes, 2004) and India (Kumar and Goyal, 2016).

Lee *et al.* (2004) suggested that individual investors are noise traders and trade for liquidity than do institutional investors. Fernandez *et al.* (2011) proposed an interdependent relationship between information availability and herding behaviour. They found that when the information is uncertain, investors are more prone to imitating the decisions of others or of the group. Trueman (1994) reported that analysts exhibit herding behaviour and thus underestimate the available information and release forecasts based on other analysts' earlier decisions. Moreover, Dasgupta *et al.* (2011) showed through a model that because of reputational concern fund managers exhibit herding behaviour in their trades. Nofsinger and Sias (1999) documented that in the US institutional investors' herding affects stock prices more than individuals' herding does.

However, Lakonishok *et al.* (1992) proposed that during the trade of large stocks U.S. pension fund managers are less influenced by herd behaviour and have no impact on stock prices. Further, Grinblatt *et al.* (1995) also found weak evidence of herd behaviour for US mutual funds. Wermers (1999) found less evidence of herding for average stocks, while they noticed a high level of herding for small and growth-oriented stocks.

Further, Feng and Seasholes (2004) found a positive relationship between the herding behaviour of individual Chinese investors and their trading location. In addition, Merli and Roger (2013) analysed a sample of trade records of 87, 377 individual French investors and found that sophisticated investors are less inclined to exhibiting herding bias; moreover, they confirmed a link between past performance and herding behaviour.

2.4 RESEARCH ON FINANCIAL LITERACY

Organisation for Economic Co-operation and Development (OECD) International Network on Financial Education (INFE) defined the financial literacy as “*A combination of awareness, knowledge, skill, attitude and behaviour necessary to make sound financial decisions and ultimately achieve individual financial wellbeing.*” Moreover, Lusardi and Mitchell (2011b) stated that financial literacy creates awareness in individuals about financial decision making, such as for investment and retirement planning, and enables them to use credit wisely.

Research studies and surveys have pointed out the low level of financial literacy existing in both developed and developing countries. According to Lusardi and Mitchell (2011), financial illiteracy is widespread worldwide and knowledge about the stock market is particularly low. In a recent survey, according to the annual MasterCard’s index for financial literacy, India has a poor ranking among 16 countries of the Asia-Pacific region with only 62 index points. The survey was conducted in 2014 with 8,087 respondents aged 18–64 years in 16 countries across the Asia Pacific region. This is the fourth survey of financial literacy conducted by the Master Card Inc. since 2010. In the survey, the following three aspects have been considered: basic money management (50% weight), financial planning (30% weight) and investment (20% weight) to reach the overall financial literacy index. In this survey, Taiwan has acquired the topmost position with 73 index points, whereas Japan is at the bottommost position with just 55 index points in the Asia-Pacific region. Table 2.2 gives the ranking of different countries in the Asia-Pacific region with the corresponding financial literacy index points.

Beal and Delpachitra (2003) conducted a survey among the students of regional Australian Universities. They identified five areas of financial skills (Basic concepts; Market and Instruments; Planning, Analysis & Decisions and Insurance) in their research questionnaire. They concluded that the level of financial literacy was low among students because of the lack of financial skill-related education in high schools. Further, they documented that decision-making skills and knowledge of insurance were particularly less developed compared with other skills among these students

Table 2.2 The Ranking of Different Countries in the Asia-Pacific Region

This table reports the ranking of 16 different countries in the Asia-Pacific region based on the financial literacy index.

Rank	Country	Overall financial literacy index
1	Taiwan	73
2	New Zealand	71
3	Hong Kong	70
4	Australia	69
5	Malaysia	69
6	Singapore	68
7	Thailand	67
8	Philippines	66
9	Myanmar	66
10	China	65
11	Vietnam	65
12	India	62
13	Korea	62
14	Indonesia	61
15	Bangladesh	60
16	Japan	55

Source: MasterCard's index of financial literacy 2013

Moreover, Danes and Hira (1987) assessed the knowledge of college students at the IOWA state university in five money management areas, such as credit card, insurance, record keeping, personal loans and overall financial management. Respondents showed a low level of knowledge on money management, specifically in insurance, credit card and overall financial management. Van Rooij *et al.* (2011) measured the level of financial literacy and its association with stock market participation. They analysed data from 2000 households from the 2005 De Nederlandsche Bank's Household Survey, based on two modules to evaluate basic financial literacy and advanced financial literacy. Van Rooij *et al.* (2011) found that only 40.2% of the respondents could correctly answer all the questions related to basic financial knowledge. Further, it was reported that a lack of financial knowledge deters households from participating in stock markets. The findings were reaffirmed in Germany (Bucher-Koenen and Lusardi, 2011), in the US (Lusardi *et al.*, 2011; Lusardi and Scheresberg, 2013) and in the UAE (Al-Tamimi and Bin kalli, 2009). The results showed that financial literacy is moderate or low for most respondents.

Similarly, Cole *et al.* (2011) measured household financial literacy and the relationship between financial literacy and demand for financial services in Indonesia and

in India. The results of the survey suggest that financial literacy is comparatively low in India. Fifty two percent of the respondents in Indonesia and thirty four percent of the respondents in India answered the questions correctly. Further, they identified that financial literacy undeniably has a modest effect on the increasing demand for financial services but that price also significantly affects the demand in emerging markets. Moreover, Bhushan and Medury (2013) conducted a survey on 516 salaried individuals in India. They documented that the level of financial literacy was only 58.30%, which is rather unsatisfactory. Further, Agarwalla *et al.* (2012) attempted to study the level of financial literacy among the working young in urban India and reported a poor level of financial literacy. Hence, research findings show that financial illiteracy is a worldwide phenomenon.

2.5 FINANCIAL LITERACY AND BEHAVIOURAL FINANCE

According to behavioural finance, agents and market actors are not rational while making investment decisions and follow irrational and simplified mechanisms of choice (heuristics). The tendency to behave in such a way is enlarged by widespread financial illiteracy, because it does not allow individuals to deliberately pursue their financial welfare. A growing body of literature suggests that investment knowledge is necessary to improve consumer behaviour related to financial products and services. For instance, Van Rooij *et al.* (2011) and Arrondel *et al.* (2015) found that people with low literacy, specifically those less knowledgeable about stocks and bonds, participate less often in the stock market. Calvet *et al.* (2007) found that more financially sophisticated individuals are more likely to buy risky assets and invest more efficiently. Moreover, Allgood and Walstad (2016) used the combined measure of financial literacy that includes the actual literacy and perceived financial literacy. They found that both actual and perceived financial literacy appear to influence financial behaviours of households in USA.

Various studies in behavioural finance focus on the financial literacy or knowledge of investors (Takeda *et al.*, 2013). However, scant evidence is available on the relationship between financial education or literacy and behavioural biases affecting investment decision making.

Several researchers claim that financial literacy affects individual differences in disposition bias (Dhar and Zhu, 2006; Jonsson *et al.*, 2017). Dhar and Zhu (2006)

investigated differences in the disposition effect based on an individual investor's characteristics. They found that educated and professional investors have a low disposition bias. Takeda *et al.* (2013) analysed the effect of investment literacy of Japanese stock investors on their decision making and found that individuals with high investment literacy are less prone to being overconfident. Moreover, Ates *et al.* (2016) analysed the relationship between financial literacy and various behavioural biases. They documented a positive significant association between the level of financial literacy and overoptimism, confirmation and representativeness bias, whereas a significant negative relationship between the level of financial literacy and overconfidence, cognitive dissonance, framing and loss aversion biases. Therefore, the question of how consumer financial literacy affects behavioural biases and investment decision making has been raised, and there have been calls for more research in this area (e.g., Lusardi, 2008).

2.6 SOCIO-DEMOGRAPHIC VARIABLES AFFECTING FINANCIAL LITERACY

From the aforementioned studies, it is clear that, in general, people worldwide have a low level of financial literacy. However, research studies have also reported that certain demographic groups displayed financial illiteracy as compared to others.

Many studies reported that gender difference is statistically significant in financial literacy in developed and developing nations. In various studies, researchers reported that males are more financially literate or have more financial knowledge than females (Worthington, 2006; Chen and Volpe, 1998; Al-Tamimi and Bin Kalli, 2009; Volpe *et al.*, 1996; Chen and Volpe, 2002; Lusardi, 2008; Lusardi and Mitchell, 2011b; Cole *et al.*, 2011; Bucher-Koenen and Lusardi, 2011; Lusardi *et al.*, 2012; Van Rooij *et al.*, 2011; Bhushan and Medury, 2013; Almenberg and Dreber, 2015). Further, Danes and Hira (1987) reported that male students have more knowledge of insurance and personal loans, whereas female students are good in overall financial management.

A difference in financial literacy based on age also has been found to exist. Worthington (2006) measured financial literacy based on demographic, socioeconomic and financial characteristics in Australian adults. They found that older individuals aged 50–60 years have a better knowledge on finance. On the contrary, Van Rooij *et al.* (2011) studied basic and advanced financial literacy by designing two modules. They

documented that advance financial literacy is low among young people and that it declines slightly in older people (i.e. ≥ 61 years). In another study, Lusardi and Mitchell (2008) reported that older women in the United States have a low level of financial literacy and are less likely to plan for their retirement. Lusardi and Mitchell (2011b) also found a low level of knowledge among elderly respondents in the U.S. Lusardi *et al.* (2012) reported that older people are less financially sophisticated in the U.S. However, Bujan *et al.* (2016) documented that age has a positive impact on financial literacy.

Various research studies have identified that education level also plays a vital role in differences existing in financial literacy. Researchers have found that individuals with a high level of education are more financially literate than are those with a low level of education (Bhushan and Medury, 2013; Worthington, 2006; Al-Tamimi and Bin Kalli, 2009; Lusardi and Mitchell, 2011b). Lusardi *et al.* (2011) examined financial fragility among US respondents in the case of an emergency. They found that less educated respondents are more fragile than are other respondents. Chen and Volpe (1998) examined the personal financial literacy of college students and reported that the educational background of respondents has a significant effect on their financial knowledge.

Few research studies such as those by Worthington (2006) considered that higher income groups and people in professional occupations are more financially literate in Australia. These findings are consistent with those of other studies (Al-Tamimi and Bin Kalli, 2009; Chen and Volpe, 1998).

Marital status is also correlated with financial literacy level as has been reported by several investigators. Brown and Graf (2013) analysed that singles have a significant propensity to lower financial literacy levels, when compared to married individuals. However, Bujan *et al.* (2016) found no significant relationship between marital status and financial literacy. These findings are consistent those of a previous study (Potrich *et al.*, 2015).

2.7 SOCIO-DEMOGRAPHIC FACTORS AFFECTING BEHAVIOURAL BIASES

There are research studies to support the notion that an investor's socio-demographic profile also influences an individual's behaviour. For example, various researchers documented that male investors are more overconfident than are female investors (Barber

and Odean, 2001; Bhandari and Deaves, 2006; Lin, 2011; Kumar and Goyal, 2016). Goo *et al.* (2010) found that investors with a higher education have a lower disposition effect. Tekçe *et al.* (2016) identified that overconfidence and familiarity bias decrease with an increase in age and wealth of individual investors. Eagly and Carli (1981) found that males are less prone to herding bias than are females. Prosad *et al.* (2015) examined the influence of demographic characteristics such as age, gender, income, profession and experience on overconfidence, optimism, disposition effect and herding bias. They found that age, profession and experience have a greater influence on behavioural biases than the other factors examined.

Tavor (2012) examined hindsight bias effect in short-term investment decisions among different genders. They documented strong evidence that women tend to be more influenced by hindsight bias than men. Moreover, Goetzmann and Kumar (2005) found that young and low-income investors hold more under-diversified portfolios. This indicates that they may have stronger behavioural biases. In line with the findings of the literature, the present study investigated the effect of the following socio-demographic variables on behavioural biases.

2.7.1 Gender

Gender differences in attitudes and behaviour have been widely studied in the psychology and behavioural literature (Croson and Gneezy, 2009; Powell and Ansic, 1997; Weber *et al.*, 2002). Gender is an important factor that influences an individual's overconfidence (Tyynela and Perttunen, 2003). There are studies that have reported that males are apparently more disposed to overconfidence bias than are females (Grinblatt and Keloharju, 2009; Hoffmann *et al.*, 2010; Lin, 2011; Mishra and Metilda, 2015; Prosad *et al.*, 2015). Barber and Odean (2001) analysed the common stock investment of men and women by using a dataset of 35,000 households from a large discount brokerage house. They proposed that men are more overconfident and trade excessively than do women and incur high transactions costs and lower returns.

Further, Bhandari and Deaves (2006) empirically supported the findings of Barber and Odean (2001). Similarly, Hair *et al.* (1998) analysed that men are more overconfident than are women. In their study, Shu *et al.* (2004) reported that even though males trade more excessively than females, their performance is not lower than that of females.

Da Costa *et al.* (2008) investigated the disposition effect and gender difference with a reference point. They conducted an experiment and identified that if the previous price is set as a reference point, then females tend to be less influenced by the disposition effect. Lin (2011) studied the relationship between demographic factor and behavioural biases. However, the results contradict the findings of Da Costa *et al.* (2008).

Mishra and Metilda (2015) analysed the data of 309 mutual fund investors and found that gender has no significant relationship with self-attribution bias. Researchers who investigated herding (Eagly and Carli, 1981; Lin, 2011) documented that woman investors are more disposed to herding behaviour than are men. Considering the level of loss aversion, Schubert *et al.* (1999), Brooks and Zank (2005) and Schmidt and Traub (2002) found that women had a higher level of loss aversion than did men. Moreover, Hon-snir *et al.* (2012) analysed the impact of behavioural biases such as disposition effect, herding and availability bias on Israeli portfolio managers and reported that female investors are more influenced by these biases than are their male counterparts.

Further, Ates *et al.* (2016) surveyed 596 individual investors in Turkey and documented that males are more prone to overconfidence hindsight and framing biases than are females. Similarly, Singh *et al.* (2016) reported that Gender has a statistically significant effect in the case of overconfidence bias, self-attribution bias and regret avoidance bias.

2.7.2 Age

An individual's age plays a crucial role in their behavioural biases and success of their investment decisions. Rekik and Boujelbene (2013) conducted a study on the Tunisian Stock market and documented that older investors were less affected by behavioural biases because they had more experience. For example, Richards *et al.* (2011) documented that older investors tend to realize their losses and are less likely to realize their gains. This indicates that older people are less prone to disposition effect compared to younger people. Similarly, Prosad *et al.* (2015) and Kumar and Goyal (2016) confirmed that the disposition effect is present in younger and middle-aged investors who have a tendency to increase their trading activity if they have experienced past success in their stocks.

In their study, Tekce *et al.* (2016) used nationwide individual stock investor transaction data for 244,146 investors with a total of 64 million buy and sell transactions and revealed that younger investors exhibit more overconfidence, familiarity bias and status quo bias. These findings are consistent with the results of Pliske and Mutter (1996) and Touron and Hertzog (2004). However, Hansson *et al.* (2008) argued that individuals' overconfidence increases with their age.

Considering herding, it is evident that younger investors have a greater tendency to exhibit herding bias than do older investors (Lin, 2011). However, these results are inconsistent with the findings of Prosad *et al.* (2015). Zaidi and Tauni (2012) studied the relationship between demographic variables and overconfidence bias among the investors of Lahore Stock Exchange and documented that age has no significant relationship with overconfidence bias. Moreover, older investors are more likely to show loss aversion than their younger counterparts (Brooks and Zank, 2005; Gong and Wright, 2013).

2.7.3 Marital Status

According to Ates *et al.* (2016), among unmarried investors, level of overoptimism, overconfidence and loss aversion biases is significantly higher than for married investors. On the contrast, cognitive dissonance is considerably higher for married investors.

2.7.4 Education

Socioeconomic factors such as the educational background influence the level of an individual's overconfidence. Research studies by Bhandari and Deaves (2006) and Deaves *et al.* (2010) supported that individuals with a higher educational background are more overconfident than those who have a lower level of education. Similarly, Mishra and Metilda (2015) confirmed that with education, overconfidence and self-attribution bias also increases. This indicates people who are more educated exhibit more overconfidence. However, Zaidi and Tauni (2012) reported that there is no significant relationship between education and overconfidence bias.

Moreover, in investigating disposition effect, Dhar and Zhu (2006) reported that individuals in professional occupation and those who have a higher education exhibit lower disposition effect. Moreover, the findings of Calvet *et al.* (2009) and Goo *et al.* (2010) also revealed that educated and wealthier individuals are less prone to being

influenced by disposition effect and can more efficiently rebalance their portfolio. Similarly, Ates *et al.* (2016) suggested that investors with lower education are more influenced by representative bias compared to those with a higher education. Further, Menkhoff *et al.* (2006) found that the people without a college degree are more prone to being influenced by herding bias. The overall findings indicate that highly educated people are less inclined to be affected by behavioural biases.

2.7.5 Occupation

Prosad *et al.* (2015) revealed that profession influences overconfidence, optimism and disposition effect but does not impact herding bias. However, Research studies conducted by Lin (2011) and Kumar and Goyal (2016) documented that occupation has no significant relationship with overconfidence, disposition and herding bias while making investment decisions. Further, Barber and Odean (2008) argued that professional investors are less influenced by familiarity bias compared to individual investors. Moreover, Garvey and Murphy (2004) analysed the data from a US proprietary stock trading team and documented that professional investors are also engaged in disposition effect. This indicates that professional investors are also not immune to behavioural biases.

2.7.6 Income

The literature on behavioural finance advocates a significant relationship between income and behavioural biases (Dhar and Zhu, 2006; Kumar and Goyal, 2016; Prosad *et al.*, 2015). Dhar and Zhu (2006) analysed the difference in the disposition effect among individuals and reported that low-income group investors exhibit more disposition effect than do others. Similarly, Kumar and Goyal (2016) reported that there is a significant difference in overconfidence bias across income of individual investors. Investors in the higher-income group are less confident than are investors belonging to the low-income group. Prosad *et al.* (2015) documented that income level affects three out of four biases which include overconfidence, optimism (pessimism), disposition effect but not herding bias. On the contrary, Lin (2011) found that income has no significant relationship with overconfidence, disposition effect and herding bias.

2.7.7 Investment Experience

Zaidi and Tauni (2012) stated that investors' past experience influences their behaviour and reflects in overconfidence. According to Alrabadi *et al.* (2011), investors' experience is the most important factor that makes them overconfident. They reported that experienced investors are more prone to overconfidence bias in the Amman Stock Exchange. Similarly, Zaidi and Tauni (2012) also documented that an investor's experience is significantly associated with the investor's overconfidence. This implies that the higher the investor's investment experience, the more confidence will the investor have. Glaser *et al.* (2004) also found in their experiments that experienced individuals are significantly more overconfident in most tasks than are inexperienced people. These findings are consistent with those of previous studies (Heath and Tversky, 1991; Frascara, 1999; Kirchler and Maciejovsky, 2002; Griffin and Tversky, 1992; Obernarcher and Osler, 2008; Park *et al.*, 2010; Mishra and Metilda, 2015).

However, according to the model of Gervais and Odean (2001), a trader's overconfidence decreases when his experience increases. Locke and Mann (2001) consistently found that inexperienced traders are overconfident. Ekholm and Pasternack (2008) confirmed that investors with smaller portfolios are more overconfident compared to investors with larger portfolios. This is because these investors are more experienced. Further, Wilson *et al.* (1996) found that experts (those with a good knowledge, experience or expertise in some topic) are less influenced by anchoring effect.

More recently, Ates *et al.* (2016) reported that experienced investors are significantly more likely to be affected by overconfidence, self-attribution, hindsight, cognitive dissonance, conservatism, framing and anchoring biases compared to investors who are less experienced. Chen *et al.* (2007) analysed Chinese investors based on proxy measures of experience and found that "*experienced investors are not always less prone to behavioural biases than are inexperienced*" ones.

2.8 PERSONALITY TRAITS AND BEHAVIOURAL BIASES

In psychology, personality plays an important role in determining investor behaviour and performance in the stock market (Sadi *et al.*, 2011; Borghans *et al.*, 2008). Personality traits refer to an individual's pattern of thoughts, feelings, and behaviours that differentiate one person from another and reflect the tendency to respond in specific ways

under certain circumstances (Roberts, 2009). The literature on the individual's personality traits often focuses narrowly on specific areas such as portfolio selection (Hunter and Kemp, 2004; Bucciol and Zarri, 2015), risk tolerance and investment management (Mayfield *et al.*, 2008; Statman and Wood, 2004; Borghans *et al.* 2008, Duckworth and Weir, 2011; Ferguson *et al.*, 2011; Pak and Mahmood, 2015) and money management (Ksendzova *et al.*, 2017; Donnelly *et al.*, 2012). However, only a few studies focused on the relation between personality traits and exposure to different behavioural biases among stock market investors (Sadi *et al.*, 2011; Durand *et al.*, 2009; Baddeley *et al.*, 2010; Lin, 2011; Sadi *et al.*, 2011; Zaidi and Tauni, 2012). This important topic has not been sufficiently examined in financial and behavioural studies (Rzeszutek, 2015).

Among personality models, the "Big Five" model is one of the most common, comprehensive and accepted, particularly in management and psychology literature (Costa and McCrae, 1992a; Mayfield *et al.*, 2008; Bucciol and Zarri, 2015). The five fundamental dimensions of Big Five model are - openness, conscientiousness, extraversion, agreeableness, and neuroticism. The score of an individual on these dimensions provides stable pattern of thoughts and feelings (Rustichini *et al.*, 2012). For instance, using the NEO- five factor inventory (NEO-FFI) Model of Personality (Costa and McCrae, 1992a), which is a shortened version of Big Five model, Mayfield *et al.* (2008) found that conscientiousness and openness to experience are unrelated to short-term investment intentions, whereas openness to experience is positively associated with long-term investing intentions among a sample of US retail investors. Ksendzova *et al.* (2017) analysed the relation between Big Five personality traits and money management among individuals in US. They report that money management is associated positively with conscientiousness and negatively with neuroticism trait.

More recently, Rizvi and Fatima (2015) studied the relation between personality traits and the stock investment and find that agreeableness; conscientiousness; neuroticism, and openness significantly affect stock market investment. By contrast, Baddeley *et al.* (2010) identified an association between Eysenck and Eysenck's (1978) personality traits (impulsivity, venturesomeness, and empathy) and the susceptibility to herding behaviour among British investors. Similarly, Rzeszutek (2015) also investigated whether susceptibility to selected behavioural biases (overconfidence,

mental accounting, and the sunk-cost fallacy) is correlated with the Eysenck and Eysenck's personality traits.

Further, Durand *et al.* (2008) documented a positive relation between extraversion and the susceptibility to the disposition effect and overconfidence among Australian investors. The findings were reaffirmed by (Lin, 2011) among Taiwan stock market investors, (Sadi *et al.*, 2011) among investors of Tehran, (Zaidi and Tauni, 2012) among individual investors associated with Lahore Stock Exchange. They have shown that dimensions of Big Five model significantly influence the psychological biases of individual investors in investment decisions. Nga and Yien (2013) examined the impact of personality traits and demographics of generation Y on financial decision-making by surveying undergraduate students in Malaysia. Their findings revealed a significant impact of conscientiousness trait on risk aversion, openness trait on cognitive biases, and agreeableness trait on socially responsible investment. To the best of our knowledge, no previous study has been conducted so far to explain the impact of Big Five dimensions of personality traits on numerous behavioural biases among individual investors.

2.9 MOTIVATION AND JUSTIFICATION OF THE STUDY

While reviewing the literature, following gaps and limitations in the existing studies were identified; this serves as a strong base for undertaking the present study: These gaps in the literature of behavioural finance serves as a strong base for undertaking the present study.

1. As the area of behavioural finance is relatively new, most of the empirical research studies (Daniel *et al.*, 1998; Barber and Odean, 2001; Barber and Odean, 2000; Odean, 1999; Odean, 1998; Grinblatt *et al.*, 1995 and others) have been conducted in developed countries, especially in the USA. Literature on behavioural finance about emerging economies specifically in India is limited. However, the findings of these studies may differ in Indian context because of differences in culture, life style, saving and spending habits of individuals, risk attitude, personality traits, etc. It presents an opportunity to examine the relevance of behavioural finance theories in emerging markets.
2. Literature review indicates that major focus has been given on the performance of institutional investors in case of herding bias, in general, and, more specifically,

equity mutual funds while institutional investors are more rational and informed than the individuals. Moreover, literature prevailing in this area (Lin, 2005; Shu *et al.*, 2004; Avramov *et al.*, 2006) documented that individual investor's behaviour acts as a significant determinant of movement in stock prices, volume and subsequent returns. Thus, it provides an opportunity to study the behavioural factors of individual investors in investment decision making.

3. A careful review of literature indicates that many of the studies have investigated the influence of various demographical factors (gender, age, income, experience, education) on behavioural biases in investment decision making (e.g. Dhar and Zhu, 2006; Da Costa *et al.*, 2006; Barber and Odean, 2001; Bhandari and Deaves, 2006). Recently, researchers (e.g. Nga and Yien, 2013; Durand *et al.*, 2013) have focused on psychographic factors (personality traits) to identify its relationship with behavioural biases while investment decision making. Findings reveal that personality traits also significantly influence investment behaviour of the individual investors. Thus, it will be interesting to explore the relationship between personality traits and behavioural biases in individuals' investment decision making.
4. After the literature review on behavioural finance it has been found that to date, the existence of biases like, overconfidence bias, disposition effect, herding, home, loss aversion, anchoring and regret aversion bias among individual investor's investment decision making are more frequently empirically tested because these behavioural biases usually affect individual investor's behaviour. Comparison to these biases, empirical evidences are limited on the other important biases like, representativeness, mental accounting, availability bias, self-attribution, hind sight bias and status- quo bias in financial context. Therefore, it provides an opportunity to explore the effect of these additional biases along with the frequently tested behavioural biases in individual investor's investment decision making.
5. Literature review documented the influence of demographic factors and personality traits on behavioural biases but according to a report of financial literacy and education, Russia trust fund (2013) financial illiteracy and behavioural biases are two related but distinct aspects that results in poor investment decision making. Most of the studies (Lusardi and Mitchell, 2011b;

Danes and Hira, 1987; Worthington, 2006; Barber and Odean, 2001; Odean, 1999; Grinblatt *et al.*, 1995; Fischhoff, 1975) have assessed the level of financial literacy and have identified the behavioural biases separately. However, question of how consumer financial literacy affects behavioural biases and investment decision making is very crucial. This provides a scope to study the relationship between the financial literacy and the behavioural biases in investment decision making.

6. Till date existing literature on behavioural finance depicts that majority of the studies (Kim and Nofsinger, 2007; Statman *et al.* 2006; Barber and Odean, 2000; Barber and Odean, 2001) are based on secondary data (trading records). However, recently, research work by (e.g. Fogel and Berry, 2006; Wong *et al.*, 2006; Rubaltelli *et al.*, 2005; Mishra and Metilda, 2015; Tourani- Rad and Kirkby, 2005) have used primary data through experiments and questionnaires to identify the behavioural biases. Behavioural factors affecting investment decisions cannot be studied with the help of quantitative data alone. Individual investors' behavioural biases can be explained in detail by integrating both quantitative and qualitative approach. More specifically, there is not study using the mixed method approach in analysis the behavioural biases of Indian stock market investors. This provides a scope to study the behavioural aspects of individual investors in investment decision by using mixed method approach.

2.10 CONCLUSION

This chapter describes the literature on behavioural finance and financial literacy. It is developed on the outlines of conceptual and empirical literature available on individual investors' behavioural factors. This chapter starts with the introduction of behavioural finance and past research work in this area. It is clear that only little attention has been given to investors in India. It further throws light on the prominent behavioural biases in investment decision making. In addition, the review of the literature also emphasizes financial literacy research conducted worldwide. It was observed that financial literacy is poor in most countries, which also influences the investment decisions of individuals. This chapter also highlights the linkage between financial literacy and behavioural biases with the help of previous empirical studies. This chapter also shows that socio-demographics such as gender, age, marital status, education, income, occupation, investment experience and psychographic characteristics such as personality traits affect

behavioural biases of individual investors. The overall review of the literature has thus assisted the researcher in identifying research gaps in this subject.

CHAPTER 3

CONCEPTUAL FRAMEWORK AND HYPOTHESES DEVELOPMENT

3.1 INTRODUCTION

A Conceptual Framework is a body of interrelated objectives and fundamentals of a study. To achieve the objectives of the study, in this chapter, we propose to develop the research hypotheses, which are conceptually related to one another. To do so, a detailed review of the literature related to theoretical and empirical research was undertaken in the previous chapter. The literature review provides the constructs that help to identify the research gaps for the study. This chapter begins with the description of various constructs of the conceptual framework. This is followed by the development of research hypotheses motivated primarily by the conceptual and empirical findings of the behavioural finance literature.

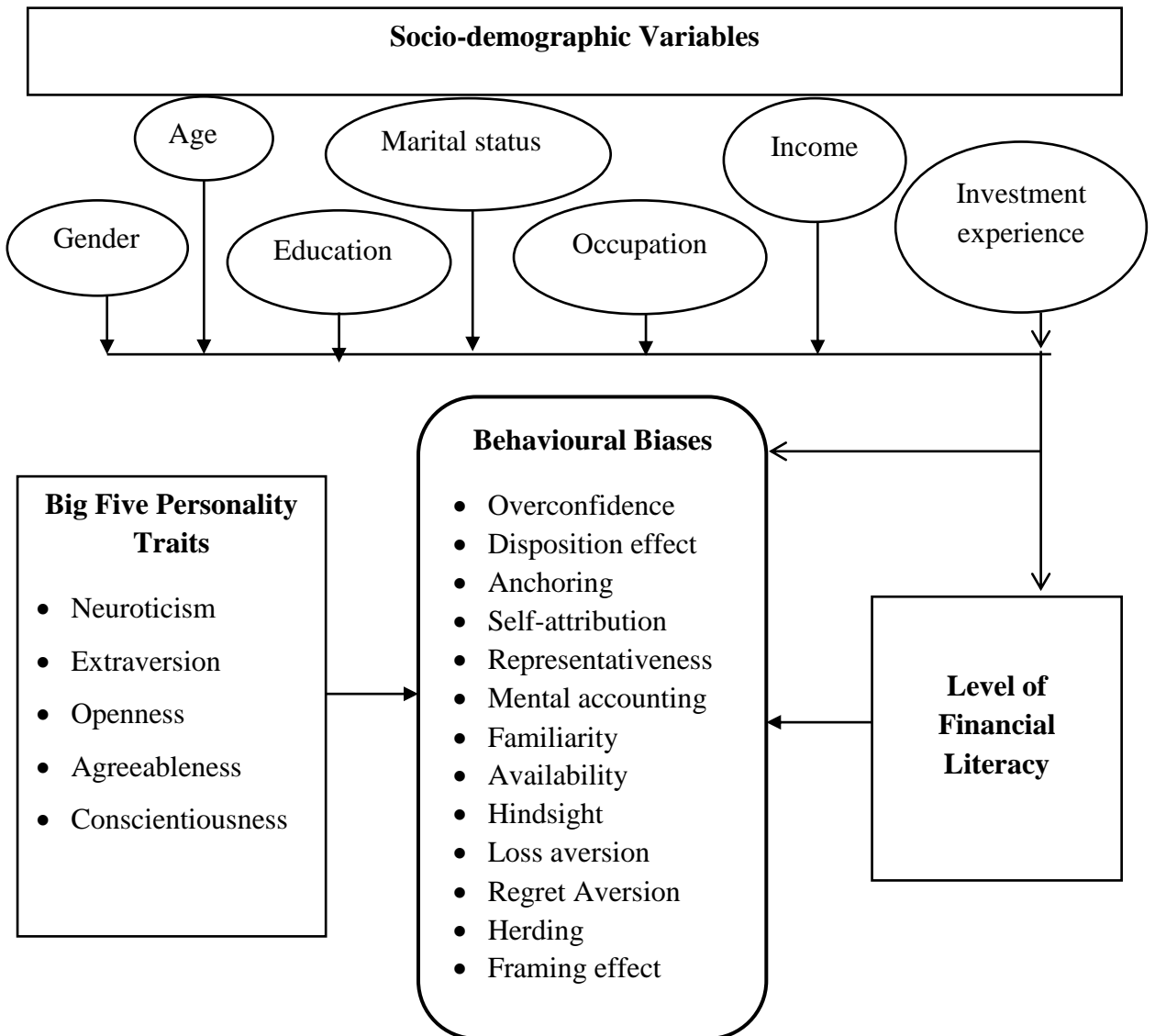
3.2 CONCEPTUAL FRAMEWORK

The conceptual framework developed for the current study (Figure 3.1) is based on the research gaps identified through the literature review in the previous chapter. Daniel *et al.* (1998) suggested that individual investors are susceptible to various behavioural anomalies, which can become an obstacle in maximizing wealth. Therefore, understanding an individual's tendency to exhibit different behavioural biases and their influence on investment decision making is important. The tendency to behave in such a way is enlarged by widespread financial illiteracy, because it does not allow individuals to deliberately track their financial welfare. A growing body of literature suggests that financial knowledge is necessary to improve consumer behaviour related to financial products and services (Abreu and Mendes, 2010; Hastings *et al.*, 2013). Despite there being extensive literature on behavioural finance, there is only limited academic research done to attempt to unravel the relationship between financial literacy and behavioural biases. Thus, it becomes imperative to develop a framework that can provide information about the predisposition to behavioural biases and relationship between financial literacy and behavioural biases among individual stock investors.

The conceptual framework gives the outline to study the level of financial literacy and susceptibility to behavioural biases among individual investors who invest in the stock market. It also examines the relationship between financial literacy and behavioural

biases in investment decision making. It is evident from the literature review that socio-demographic factors such as gender, age, marital status, occupation, income, education and investment experience also significantly affect the financial literacy and behavioural biases among investors. Thereby, in the current study, the effect of socio-demographic factors on financial literacy and behavioural biases was examined. In addition, the literature also advocates that a psychographic factor such as personality traits is an important factor that influences the behavioural biases of investors. Thus, this study also analysed the impact of Big Five model personality traits, namely, neuroticism; extroversion; openness; agreeableness and conscientious on identified behavioural biases of individual stock investors.

Figure 3.1 Conceptual Framework



3.3 HYPOTHESES DEVELOPMENT

A hypothesis is a proposition or assumption of the research study that a researcher tests. “*Hypothesis is a formal statement that presents the expected relationship between an independent and dependent variable*” (Creswell, 1994). These assumptions are developed on the theoretical and empirical findings of the previous research. Hypotheses are mainly based on the theoretical model framed by the researcher. The hypotheses for the current study were developed in accordance with the stated research objectives. This study examines the financial literacy and predisposition to behavioural biases in investment decision making. The next section explains the different hypotheses developed for accomplishing the objectives of the present study.

3.3.1 Effect of Financial Literacy and Socio-Demographics on Behavioural Biases of Individual Investors

Research studies on judgement and decision making have revealed that an individual’s behaviour is inconsistent with rationality (Tourani-Rad and Kirkby, 2005; Baker and Nofsinger, 2010; Barberis and Thaler, 2003; Fama, 1998). It is evident from the literature that individual investors exhibit various anomalies that lead to poor judgement and mispricing in financial markets (Barber and Odean, 1999; Barberis and Thaler, 2003). Therefore, it becomes imperative to study the behaviour of individual investors while making financial decisions. Moreover, it is established that irrational behaviour is enlarged because of worldwide poor financial literacy among individual investors. Calvet *et al.* (2009) found that more financially sophisticated households are more likely to buy risky assets and invest more efficiently. Therefore, the question of how consumer financial literacy affects behavioural biases and investment decision making has been raised, and there have been calls to conduct more research in this area (e.g., Lusardi, 2008). Similarly, socio-demographic variables are also significant factors that influence the behaviour of investors (Barber and Odean, 2001; Bhandari and Deaves, 2006). Thus, there is a need to understand the effect of financial literacy and socio-demographic variables on behavioural biases.

To examine the stated objective, financial literacy (FL) and socio-demographic variables, namely, gender, age, marital status, education, occupation, income and investment experience, are taken as explanatory variables. Contrarily, the dependent variables

identified are behavioural biases, namely, overconfidence and self-attribution (OS), disposition effect (DE), anchoring bias (ANCH), representativeness (REP), Mental accounting (MA), Emotional bias (EM), Herding bias (HERD) and Framing effect (FE).

The following section explains the hypotheses formulated based on the relationship expected between financial literacy, socio-demographics factors of individual investors and behavioural biases.

3.3.1.1 Financial Literacy- Financial literacy is necessary to improve consumer behaviour related to financial products and services. According to Lusardi and Mitchell (2011), financial illiteracy is widespread worldwide, and knowledge about the stock market is particularly low. This leads to irrational behaviour while making investment decisions. Recently, few studies have investigated the relationship between financial literacy and behavioural biases. Researchers have documented that financially illiterate people show more overconfidence (Takeda *et al.*, 2013; Ates *et al.*, 2016). This shows that the level of financial literacy is negatively related to overconfidence bias. However, Takeda *et al.* (2016) reported a significant positive impact of level of financial literacy on representativeness bias. These arguments lead to the formulation of the following hypotheses for the current study:

H1: Level of financial literacy significantly influences the behavioural biases of individual investors.

The following subhypotheses were formulated in accordance with the first hypothesis:

H1_a: Level of financial literacy significantly influences overconfidence and self-attribution bias.

H1_b: Level of financial literacy significantly influences disposition effect.

H1_c: Level of financial literacy significantly influences anchoring bias.

H1_d: Level of financial literacy significantly influences representativeness bias.

H1_e: Level of financial literacy significantly influences mental accounting bias.

H1_f: Level of financial literacy significantly influences emotional bias.

H1_g: Level of financial literacy significantly influences herding bias.

H1_h: Level of financial literacy significantly influences framing effect.

3.3.1.2 Gender- This is an important and most widely examined demographic predictor in behavioural finance literature. The significant body of literature in behavioural finance revealed the differences between males and females regarding the investment decision-making process. For example, Barber and Odean (2001) observed behavioural differences among men and women investors in common stock investment and found that male investors are more overconfident and trade excessively than do their female counterparts. Further, several studies (Grinblatt and Keloharju, 2009; Hoffmann *et al.*, 2010; Lin, 2011; Mishra and Metilda, 2015; Prosad *et al.*, 2015) also provided evidence in support of difference in overconfidence on the basis of gender.

Moreover, Da Costa *et al.* (2008) argued that female investors are less inclined to exhibiting disposition effect than are male investors. While considering herding, Eagly and Carli (1981) and Lin (2011) found that women are more disposed towards herding behaviour than are men. In a similar research study, Ates *et al.* (2016) surveyed individual investors in Turkey and reported that males are more prone to overconfidence, hindsight and framing biases than are females. Therefore, based on the literature, the following was hypothesized.

H2: Gender significantly influences the behavioural biases of individual investors.

The following subhypotheses were formulated:

H2_a: Gender significantly influences overconfidence and self-attribution bias.

H2_b: Gender significantly influences disposition effect.

H2_c: Gender significantly influences anchoring bias.

H2_d: Gender significantly influences representativeness bias.

H2_e: Gender significantly influences mental accounting bias.

H2_f: Gender significantly influences emotional bias.

H2_g: Gender significantly influences herding bias.

H2_h: Gender significantly influences framing effect.

3.3.1.3 Age- Age is a key determinant that influences behavioural biases and determines investment success. The prior research findings on age suggest that older investors are less affected by behavioural biases because they have more experience (Rekik and Boujelbene, 2013). For instance, Richards *et al.* (2011) also provided evidence that older

people are less prone to disposition effect compared to younger people. This is inconsistent with the findings of Kumar and Goyal (2016). In addition, several studies (Tekce *et al.*, 2016; Pliske and Mutter, 1996; Touron and Hertzog, 2004) revealed that younger investors exhibit overconfidence, familiarity bias and status quo bias more than older investors did. On the contrary, Hansson *et al.* (2008) supported that individual's overconfidence increases with their age. Lin (2011) documented that younger investors are more engaged in herding bias than are older investors. However, Zaidi and Tauni (2012) found no significant relationship between age and overconfidence bias of individual investors. The following hypotheses were developed based on the explanations provided in the literature:

H3_a: Age significantly influences overconfidence and self-attribution bias.

H3_b: Age is negatively related to disposition effect

H3_c: Age is negatively related to anchoring bias.

H3_d: Age significantly influences representativeness bias.

H3_e: Age significantly influences mental accounting bias.

H3_f: Age significantly influences emotional bias.

H3_g: Age significantly influences herding bias.

H3_h: Age significantly influences framing effect.

3.3.1.4 Marital Status- Unlike age and gender, which are remarked as the most significant factors, marital status has been examined to a lesser extent in behavioural finance literature. Ates *et al.* (2016) pointed out that among unmarried investors level of overoptimism, overconfidence and loss aversion biases are significantly higher than that of married investors. This leads to the design of the following hypotheses for the present study:

H4_a: Marital Status significantly influences overconfidence and self-attribution bias.

H4_b: Marital Status significantly influences disposition effect.

H4_c: Marital Status significantly influences anchoring bias.

H4_d: Marital Status significantly influences representativeness bias.

H4_e: Marital Status significantly influences mental accounting bias.

H4_f: Marital Status significantly influences emotional bias.

H4_g: Marital Status significantly influences herding bias.

H4_h: Marital Status significantly influences framing effect.

3.3.1.5 Education- This is a significant socio-demographic variable that influences behavioural biases of individual investors. Studies indicate a positive association between level of education and overconfidence (Bhandari and Deaves, 2006; Deaves *et al.*, 2010). This means that investors who are highly qualified are more overconfident while investing than are others who have a lower level of education. However, Zaidi and Tauni (2012) found no significant relationship between education and overconfidence bias.

Moreover, studies reported that individuals with a higher level of education are less inclined to disposition effect (Dhar and Zhu, 2006; Goo *et al.*, 2010), representative bias (Ates *et al.*, 2016) and herding bias (Menkhoff *et al.*, 2006). Based on the above findings, the following hypotheses were formulated:

H5_a: Education level is positively related to overconfidence and self-attribution bias.

H5_b: Education level is negatively related to disposition effect.

H5_c: Education level is negatively related to anchoring bias.

H5_d: Education level is negatively related to representativeness bias.

H5_e: Education level is negatively related to mental accounting bias.

H5_f: Education level is negatively related to emotional bias.

H5_g: Education level is negatively related to herding bias.

H5_h: Education level is negatively related to framing effect.

3.3.1.6 Occupation- Occupation of individuals also significantly affects their investment behaviour. However, limited empirical evidence is available on this socio-demographic variable in the behavioural finance literature. Prosad *et al.* (2015) documented that profession influences overconfidence, optimism and disposition effect but does not impact herding bias. However, research studies documented that occupation has no significant association with overconfidence, disposition and herding bias while making investment decisions (Lin, 2011; Kumar and Goyal, 2016). Therefore, On the basis of the conflicting evidences about occupation, the following hypotheses were formulated:

H6_a: Occupation significantly influences overconfidence and self-attribution bias.

H6_b: Occupation significantly influences disposition effect.

H6_c: Occupation significantly influences anchoring bias.

H6_d: Occupation significantly influences representativeness bias.

H6_e: Occupation significantly influences mental accounting bias.

H6_f: Occupation significantly influences emotional bias.

H6_g: Occupation significantly influences herding bias.

H6_h: Occupation significantly influences framing effect.

3.3.1.7 Income- This is also an important determinant of the investment behaviour among individual investors. Dhar and Zhu (2006) found a negative association between income level and tendency of being influenced by disposition effect. In line with this research, Kumar and Goyal (2016) also advocated a negative relationship between income level and overconfidence bias. Prosad *et al.* (2015) documented that income level affects three out of four biases which include overconfidence; optimism (pessimism); disposition effect but not herding bias. On the contrary, Lin (2011) found no significant relationship of income with overconfidence, disposition effect and herding bias. Thus, based on the above arguments, the following hypotheses were developed:

H7_a: Income significantly influences overconfidence and self-attribution bias.

H7_b: Income significantly influences disposition.

H7_c: Income significantly influences anchoring bias.

H7_d: Income significantly influences representativeness bias.

H7_e: Income significantly influences mental accounting bias.

H7_f: Income significantly influences emotional bias.

H7_g: Income significantly influences herding bias.

H7_h: Income significantly influences framing effect.

3.3.1.8 Investment Experience- This is explicitly an important and significant socio-demographic factor that influences behavioural biases of individual investors. Zaidi and Tauni (2012) stated that investors' past experience influences their behaviour and reflects in overconfidence. Alrabadi *et al.* (2011) found a positive relationship between investment experience and overconfidence bias. This is consistent with the findings of Park *et al.* (2010) and Mishra and Metilda (2015). However, there is conflicting empirical evidence about the investment experience and overconfidence bias in investment decision making. Some studies also documented that investors' income level is positively

associated with overconfidence bias (Gervais and Odean, 2001; Ekholm and Pasternack, 2008). Further, Ates *et al.* (2016) reported that experienced investors are significantly more likely to be affected by overconfidence; self-attribution; hindsight; cognitive dissonance; conservatism; framing and anchoring biases compared to investors who are less experienced. The above explanation leads to the development of the following hypotheses with respect to different behavioural biases:

H8_a: Investment experience significantly influences overconfidence and self-attribution bias.

H8_b: Investment experience significantly influences disposition effect.

H8_c: Investment experience significantly influences anchoring bias.

H8_d: Investment experience significantly influences representativeness bias.

H8_e: Investment experience significantly influences mental accounting bias.

H8_f: Investment experience significantly influences emotional bias.

H8_g: Investment experience significantly influences herding bias.

H8_h: Investment experience significantly influences framing effect.

3.3.2 Influence of Individual Investors' Socio-Demographic Factors on Financial Literacy

Most of the empirical evidence pointed to a poor level of financial literacy worldwide. However, researchers have found that individuals' socio-demographics are important and significant determinants that influence the level of financial literacy. Research studies reported that gender difference is one of the key factors that significantly affect financial literacy. Empirical evidence points that males are more financially literate and have more financial knowledge than females do (Worthington, 2006; Chen and Volpe, 1998; Al-Tamimi and Bin Kalli, 2009; Volpe *et al.*, 1996; Chen and Volpe, 2002; Lusardi, 2008; Lusardi and Mitchell, 2011b; Cole *et al.*, 2011).

Moreover, researchers have reported that age difference also significantly influences level of financial literacy. Research studies documented that age is positively associated with the level of financial literacy (Worthington, 2006; Bujan *et al.*, 2016). However, there is conflicting empirical evidence in that Lusardi and Mitchell (2011b) and Lusardi *et al.* (2012) found that older people have a low level of financial literacy compared to adults. Brown and Graf (2013) reported that individuals who are

unmarried have a significant tendency to having lower financial literacy levels compared to married investors.

Like gender and age, education, income and occupation are also important and significant socio-demographic factors that influence level of financial literacy. Empirical evidence indicates a positive significant association between education level and financial literacy (Bhushan and Medury, 2013; Worthington, 2006; Al-Tamimi and Bin Kalli, 2009). Moreover, findings of studies indicate that individuals with a higher income level and professional occupation are more financially literate than are others (Al-Tamimi and Bin Kalli, 2009; Chen and Volpe, 1998). The following hypotheses are formulated based on the relationship expected between socio-demographic factors of individual investors and level of financial literacy.

H9: Gender has a significant influence on the level of financial literacy.

H10: Age has a positive significant influence on the level of financial literacy.

H11: Marital status has a significant influence on the level of financial literacy.

H12: Education level has a positive significant influence on the level of financial literacy.

H13: Occupation has a significant influence on the level of financial literacy.

H14: Income level has a positive significant influence on the level of financial literacy.

H15: Investment experience has a significant influence on the level of financial literacy.

3.3.3 Relationship between Personality Traits and Behavioural Biases of Individual Investors

Personality traits refer to an individual's pattern of thoughts, feelings and behaviours that differentiate one person from another and reflect the tendency to respond in specific ways under certain circumstances (Roberts, 2009). In psychology, individuals' personality plays an important role in determining investor behaviour and performance in the stock market (Sadi *et al.*, 2011; Borghans *et al.*, 2008). The present study is based on the Big Five model of personality traits because it is one of the most common, comprehensive and accepted model particularly in management and psychology literature (Costa and McCrae, 1992a; Mayfield *et al.*, 2008; Buccioli and Zarri, 2015). The five fundamental dimensions of the Big Five model are neuroticism, extraversion, openness, agreeableness and conscientiousness. The score of an individual on these dimensions provides a stable pattern of thoughts and feelings (Rustichini *et al.*, 2012). The following section explains

the hypotheses formulated based on the relationship expected between Big Five personality traits and behavioural biases of individual investors.

3.3.3.1 Neuroticism Trait- This is an important and significant trait that influences behavioural biases in investment decision making. Neuroticism is a state of emotional instability and impulsiveness related to high anxiety and stress (Migliore, 2011; McCrae and Costa, 1997). Investors with neuroticism traits tend to be pessimistic and high risk tolerant. There is empirical evidence to show that neuroticism is positively related to disposition effect and herding bias, although it has no association with overconfidence bias (Lin, 2011). However, Zaidi and Tauni (2012) found a negative correlation between neuroticism and overconfidence bias. Further, Sadi *et al.* (2011) reported that neuroticism is positively correlated with randomness bias and escalation of commitment. On the contrary, Nga and Yien (2013) reported that there is no significant relationship between neuroticism and cognitive biases. Based on the above arguments, the following hypotheses were formulated:

H16_a: Neuroticism has a significant relationship with overconfidence and self-attribution biases.

H16_b: Neuroticism has a significant relationship with disposition effect.

H16_c: Neuroticism has a significant relationship with anchoring bias.

H16_d: Neuroticism has a significant relationship with representativeness bias.

H16_e: Neuroticism has a significant relationship with mental accounting bias.

H16_f: Neuroticism has a significant relationship with emotional bias.

H16_g: Neuroticism has a significant relationship with herding bias.

3.3.3.2 Extraversion Trait- This is a state which makes individuals focus on external elements and likely influences them. An extrovert is usually associated with gregariousness, high level of excitement, assertiveness, optimism and ambitiousness (McCrae and Costa, 1997). Extrovert investors have a positive significant influence on herding bias and overconfidence bias (Lin, 2011). This is consistent with the findings of Zaidi and Tauni (2012) and Durand *et al.* (2008). However, Nga and Yien (2013) found no significant relationship between extraversion and cognitive biases. This forms the basis of our next hypotheses.

H17_a: Extraversion has a significant relationship with overconfidence and self-attribution bias.

H17_b: Extraversion has a significant relationship with disposition effect.

H17_c: Extraversion has a significant relationship with anchoring bias.

H17_d: Extraversion has a significant relationship with representativeness bias.

H17_e: Extraversion has a significant relationship with mental accounting bias.

H17_f: Extraversion has a significant relationship with emotional bias.

H17_g: Extraversion has a significant relationship with herding bias.

3.3.3.3 Openness Trait- This is an important variable used to influence the investment behaviour of individual investors. Openness defines the fascination an individual has towards novelty, aesthetics and new ideas (McCrae and Costa, 1997). Individuals with openness traits are imaginative, creative and broadminded (Martins, 2002). Empirical evidence has been documented that openness is positively and significantly associated with hindsight and overconfidence biases, whereas it is negatively associated with availability bias (Sadi *et al.*, 2011). In line with these findings, Nga and Yien (2013) reported that openness has a positive significant relationship with cognitive biases in financial decision making. Further, Lin (2011) also found a positive significant relationship between openness traits and overconfidence and herding biases. However, Zaidi and Tauni (2012) found no significant relationship between openness and overconfidence bias of individual investors. The above argument shows inconclusive findings. Thus, our hypotheses for this study are as follows:

H18_a: Openness has a significant relationship with overconfidence and self-attribution biases.

H18_b: Openness has a significant relationship with disposition effect.

H18_c: Openness has a significant relationship with anchoring bias.

H18_d: Openness has a significant relationship with representativeness bias.

H18_e: Openness has a significant relationship with mental accounting bias.

H18_f: Openness has a significant relationship with emotional bias.

H18_g: Openness has a significant relationship with herding bias.

3.3.3.4 Agreeableness- This is a state that supports a person's friendliness, warmth and cooperativeness in social interactions (McCrae and Costa, 1997). Individuals who score

high on agreeableness are forgiving, tender hearted, good natured and are well accepted by their peers (Martins, 2002). Zaidi and Tauni (2012) argued that agreeableness trait has a positive relationship with overconfidence bias in investment decision making. However, other studies pointed that there is no significant relationship between agreeableness trait of investors and behavioural biases while making financial decisions (Lin, 2011; Sadi *et al.*, 2011, Nga and Yien, 2013; Durand *et al.*, 2008). This leads to the development of the following hypotheses:

H19_a: Agreeableness has a significant relationship with overconfidence and self-attribution biases.

H19_b: Agreeableness has a significant relationship with disposition effect.

H19_c: Agreeableness has a significant relationship with anchoring bias.

H19_d: Agreeableness has a significant relationship with representativeness bias.

H19_e: Agreeableness has a significant relationship with mental accounting bias.

H19_f: Agreeableness has a significant relationship with emotional bias.

H19_g: Agreeableness has a significant relationship with herding bias.

3.3.3.5 Conscientiousness- This is another important and significant psychographic factor used to determine the investment behaviour of individuals. Individuals who score high on conscientiousness are dependable, trustworthy, organized and efficient (McCrae and Costa, 1997). Sadi *et al.* (2011) found that conscientiousness is negatively related to randomness bias. This indicates that conscientious investors rely less on luck and are careful in their investment decisions. Further, Lin (2011) reported that conscientiousness is positively associated with overconfidence and disposition effect, but it is not related to herding bias. This may be possible because of their careful and organized behaviour in investment decision making. In line with these findings, Zaidi and Tauni (2012) also suggested a positive significant relationship between conscientiousness and overconfidence bias. However, Nga and Yien (2013) found no significant relationship between conscientiousness and cognitive biases. Their results indicate that conscientiousness has a significant relationship with behavioural errors among individual investors. This leads to the formation of the following hypotheses:

H20_a: Conscientiousness has a significant relationship with overconfidence and self-attribution biases.

H20_b: Conscientiousness has a significant relationship with disposition effect.

H20_c: Conscientiousness has a significant relationship with anchoring bias.

H20_d: Conscientiousness has a significant relationship with representativeness bias.

H20_e: Conscientiousness has a significant relationship with mental accounting bias.

H20_f: Conscientiousness has a significant relationship with emotional bias.

H20_g: Conscientiousness has a significant relationship with herding bias.

3.4 CONCLUSION

This chapter provides the constructs of the conceptual model and the interlinkages between the constructs. It gives an insight into the potential association between behavioural biases of individual investors and other variables, namely, financial literacy, socio-demographic and personality traits. Further, the chapter describes the research hypotheses in the contextual setting of Indian stock market investors. Based on different variables, a total of 20 hypotheses were proposed in the model. The probable reasons have been also supported by previous studies reported in the literature. In the next chapter, the research methodology and methods used to test research hypotheses will be discussed to validate the paths presented in this chapter. The following chapters present the research findings and implications of the present study.

CHAPTER 4

RESEARCH METHODOLOGY

4.1 INTRODUCTION

Research Methodology provides a systematic way of solving a problem. It entails a systematic process of gathering, recording and analysing data that provide information to guide research findings. This chapter outlines the research methodology used for the current study. It commences with the explanation of the research design that includes research purpose, research approach, research paradigm, research choice, strategies and time horizon adopted in this study. This is followed by the research methodology of the preliminary and main study. The subsequent sections distinctively provide information about the population, sample and data collection procedure for the preliminary and the main study. Finally, this chapter describes the methods of data analysis and conclusion of the chapter.

4.2 RESEARCH DESIGN AND METHODOLOGY

A research design is a plan, structure and strategy of the investigation to attain the answer to research questions. It is a blueprint or detailed plan for how to conduct a research study. Creswell (2003) stated that a research design is the overall process for identifying research problems, describing the location chosen for the data collection, ethical requirements for the research and conditions for collection and analysis of data. But how all these can be achieved depends mainly on the research purpose. Assortment of a particular research design is mainly based on the type of research problems under study. The research questions relating to the financial literacy and behavioural biases of individual investors are as follows:

1. What is the level of financial literacy among Indian investors?
2. What behavioural biases do Indian investors exhibit?
3. Do the level of financial literacy and socio-demographic variables affect behavioural biases among Indian investors?
4. Do socio-demographic variables affect the financial literacy of Indian investors?
5. Is there any significant relationship between personality traits and behavioural biases of individual investors?

4.2.1 Research Purpose

Research purpose is related to the approach of research questions and research objectives in the study. Saunders *et al.* (2009) categorized the research purpose into three types, namely, exploratory, descriptive and explanatory. Further, it is possible that the study undertaken may have more than one purpose. In this case, the study can be both descriptive and explanatory. The major classification of the research purpose has been defined below:

4.2.1.1 Exploratory Study- Exploratory studies are also called formulative research studies. They help in finding out “*what is happening; to seek new insights; to ask questions and to assess phenomena in a new light*” (Robson, 2002, p. 59). Exploratory studies focus mainly on the discovery of ideas and insights. They are basically useful if individuals need to enhance the understanding of a problem, or are uncertain about the particular nature of the problem. There are mainly three methods for conducting an exploratory study, namely, the survey of the literature concerned, interviewing ‘experts’ in the subject and conducting focus group interviews (Saunders *et al.*, 2009).

4.2.1.2 Descriptive Study- Descriptive studies portray an accurate profile of persons, events or situations (Robson, 2002). It is an extension of, or a precursor to, the exploratory research or explanatory research (Saunders *et al.*, 2009). It describes the characteristics of a particular individual, or of a group. Most of the social research comes under descriptive study. In descriptive studies, researchers must have a clear picture of the phenomena, that they want to measure and must discover suitable methods for measuring it.

4.2.1.3 Explanatory Study- This is also known as Causal research study. Explanatory research is directed to ascertain the extent and nature of cause-and-effect relationships (Saunders *et al.*, 2009). It mainly focuses on examination of a situation or a specific issue to describe the patterns of relationships between variables.

The present study consists mainly of three parts. The first part includes a review of the relevant literature. This helped establish a conceptual understanding of the problems in the study. The second part comprises the basics of the preliminary study conducted on financial advisors and brokers. This study was directed to identify the behavioural factors influencing the investment decisions of individual Indian investors. In

the preliminary study, in-depth semi-structured interviews were conducted. This part of the research was exploratory in nature. In the third part, that is, the main study, the objectives were formulated based on the literature review and the preliminary study. The main objective of the study was to identify the level of financial literacy and prominence of behavioural biases among individual stock market investors in India. This part of the research is descriptive in nature. Further, other objectives of this study include the influence of financial literacy and socio-demographic variables on the behavioural biases and the relationship between personality traits and behavioural biases among individual investors. Thus, these research objectives are explanatory in nature. Overall, the present study is descriptive and explanatory because the objectives of the research were to identify the level of financial literacy and behavioural biases along with the relationship between socio-demographics, personality traits and behavioural biases.

4.2.2 Research Philosophy

Saunders *et al.* (2009) suggested that research philosophy “*relates to the development of knowledge and the nature of that knowledge*”. It is a prospect that facilitates a researcher to observe reality in the manner in which it is defined, and its association with knowledge that elucidates how the reality has been perceived. Johnson and Clark (2006) argued that a researcher should focus on philosophical choices. The philosophy will be influenced by practical considerations. Saunders *et al.* (2009) suggested that a research question can fall into more than one philosophical domain.

Research philosophy can be categorized into three basic groups, namely, ontology, epistemology and axiology. Ontology concerns questions about the nature of the reality. Epistemology is a branch of philosophy that is concerned with what constitutes acceptable knowledge in a field of study. Axiology philosophy studies judgements about value. Research philosophies are also recognized as research paradigms (Hussey and Hussey, 1997). Research paradigms state the selection of what is to be studied and how it should be studied. In social science research, there are two main research paradigms, namely, positivist and phenomenological (Hussey and Hussey, 1997). A positivist paradigm is also called quantitative, objectivist, scientific, experimentalist and traditionalist. A phenomenological paradigm is termed qualitative, subjectivist, humanistic and interpretive.

The positivist paradigm indicates that the researcher and research process are independent of each other. It states that real events can be observed empirically and explained with logical analysis. Thus, this approach is quantitative, scientific and based on deductive logic. In the phenomenological paradigm, researchers are not free from the research process; rather, they are a primary part of the research process. The phenomenological paradigm emphasizes more on individuals and provides them a prospect to explain their situation and behaviour. Thus, this approach is mainly qualitative, interpretive and based on inductive logic.

The present study is designed under the positivist research paradigm to accomplish the stated objectives. Quantitative data were collected through a structured questionnaire using survey research. The data obtained were statistically analysed and research findings were used to describe the financial literacy and behavioural biases of individual investors. This shows that positivistic research paradigm has been applied in the study.

4.2.3 Research Approach

According to Creswell (2013), research approaches are plans and the procedures for research that extend the decisions from broad assumptions to complete methods of data collection and analysis. It comprises the intersection of philosophical assumptions, designs, and specific methods. The research approach can be classified based on the nature of research questions and data collection method. The research approach can be mainly classified into two types, namely, deductive approach and inductive approach

4.2.3.1 Deductive Approach- Blackstone (2012) stated that in a deductive approach, researchers start with a compelling theory and then investigate its associations with data. Specifically, researchers move from a general level to a more specific one. A deductive approach to research is a scientific investigation (Saunders *et al.*, 2009). According to Collis and Hussey (2003), it is a prominent research approach in natural sciences. The deductive approach has the following important characteristics (Saunders *et al.*, 2009):

1. It is a search to explicate causal relationships between variables.
2. It controls the variables to allow the testing of hypotheses.
3. It uses a highly structured methodology to facilitate replication and to ensure the reliability.

4. There is a need to operationalize concepts in a way that facts can be measured in quantitative terms.
5. It follows the principle of reductionism.
6. It allows generalization of findings.

4.2.3.2 Inductive Approach- The purpose of the inductive approach is to understand the nature of the problem. It works on the formulation of theory. Researchers using the inductive approach are likely to be particularly concerned with the context. Specifically, researchers using this approach move from a specific level to a general one. Easterby-Smith *et al.* (2008) suggested that this approach is likely to use qualitative data and various methods to collect data to create different views of phenomena. The main features of the inductive approach are as follows:

1. It emphasizes on attaining an understanding of the meanings humans attach to events.
2. It is a context-driven approach.
3. It is based on qualitative data.
4. It underlines the insight that the researcher is part of the research process.
5. It is comparatively less concerned with the feature of generalization of research findings.

The present study used the deductive approach because the research objectives were developed based on a conceptual and theoretical understanding of behavioural theories relevant to individual investors' decision making. Further, it examines the influence of socio-demographic variables on behavioural biases and relationship between personality traits and behavioural biases based on the theoretical foundation.

4.2.4 Research Strategies

Research strategies are directed by research question(s) and objectives, the extent of existing knowledge, availability of resources and philosophical underpinnings (Saunders *et al.*, 2009). Research strategies are not mutually exclusive and researchers can use more than one strategy to answer their research objectives. Saunders *et al.* (2009) considered the main research strategy, namely, experiment, survey, case study, action research, grounded theory, ethnography and archival research. The present study used the survey research to answer the stated research objectives.

4.2.4.1 Surveys- The survey strategy is generally linked with the deductive approach. It is the prevalent and popular strategy in business and management research. This strategy is used most commonly to answer questions pertaining to who, what, where, how much and how many (Saunders *et al.*, 2009). Therefore, the survey strategy is very useful in exploratory and descriptive research. The main advantage of using the survey strategy is that it is economical and enables researchers to collect a large amount of data from a population. It is easy to compare and analyse the data obtained from the survey strategy. Moreover, quantitative data can also be collected and analysed using descriptive and inferential statistics in the survey strategy. Surveys provide more control to researchers over the research process than other strategies. Hence, the survey approach is used in the present study because of its ability to facilitate the approach of a large number of individuals dispersed geographically in a less expensive and time-saving manner.

4.2.5 Research Choices

Research choices entail data collection techniques and data analysis procedure. There are two types of research choices, namely, qualitative and quantitative. These choices can be distinguished on the basis of numeric and non-numeric data. The qualitative term is used for any data collection techniques such as interviews that create non-numerical data. However, the quantitative term is used for data collection techniques such as questionnaire method that generates numerical data.

In research choices, methods of data collection and data analysis are broadly divided into two types, namely, mono method and mixed method. In the mono method, researchers choose a single data collection technique and a consistent analysis procedure. However, in multiple methods, researchers use more than one data collection technique and data analysis procedure. Generally, multiple method choice is increasingly promoted within business and management research (Curran and Blackburn, 2001). Here researchers can use qualitative and quantitative methods of data collection and analysis together or can use primary and secondary data. Further, multiple methods choices are subdivided into multi-methods and mixed methods. In multi-methods, more than one quantitative or qualitative data collection techniques may be used in the study. However, researchers cannot combine qualitative and quantitative data collection techniques and analysis procedures in a study.

On the contrary, in the mixed method approach, both quantitative and qualitative data collection techniques and analysis procedures can be combined. Further, it is also subdivided into two classes, namely, mixed method research and mixed model research. In the mixed method, researchers use quantitative and qualitative data collection techniques and analysis procedures either parallel or sequential but do not merge them. In contrast, mixed-model research merges quantitative and qualitative data collection techniques and analysis procedures to answer the stated research objectives.

The present study used a mixed method approach for data collection techniques and analysis procedure. The preliminary study identifies the potential behavioural biases influencing investment decisions among individual investors. In the preliminary study, an in-depth semi-structured interview was conducted for data collection. These factors were further used in the main study for the development of the research instrument and to explain the research findings.

4.2.6 Time Horizons

On the basis of time horizons, the research study can be a cross-sectional study or a longitudinal study depending on the research questions under study. A cross-sectional study is mainly concerned with a particular phenomenon at a given time. It is also called a one-shot study. A cross-sectional study generally uses the survey strategy (Robson, 2002). Qualitative methods such as interviews may also be used in a cross-sectional study. On the contrary, a longitudinal study is conducted at more than one point in time to comprehend the change in dependent variables (Sekaran, 2000). We used a cross-sectional study for our research work. This was because the research objectives of the study, which is identification of behavioural biases and influence of socio-demographics on behavioural biases, are analysed using multivariate analysis technique. A minimum of 200 samples are required to attain the finest results in multivariate studies using structural equation modelling (SEM) techniques (Hair *et al.*, 2010).

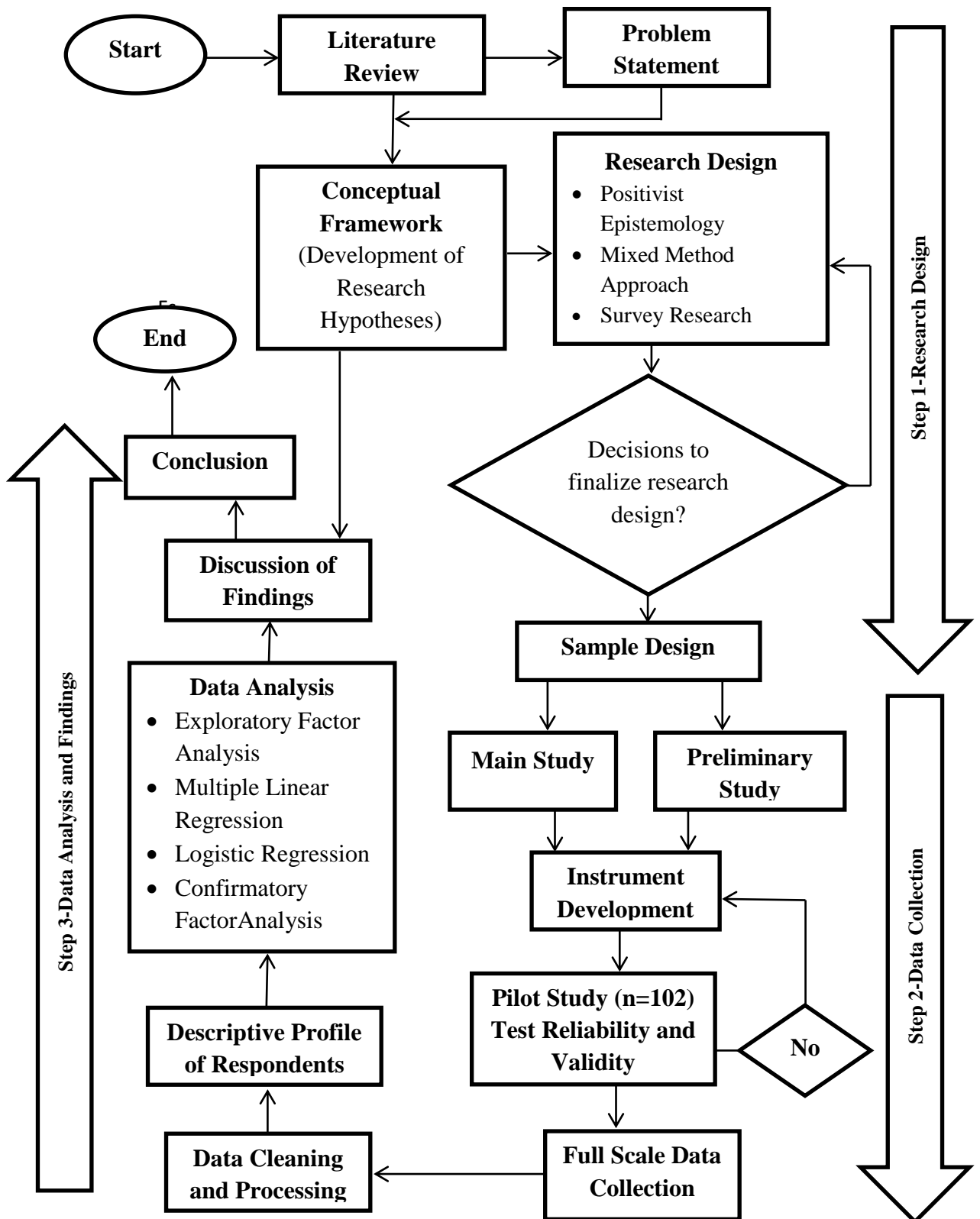
4.2.7 Research Design for the Present Study

The present study is based on the positivist research paradigm. It used a deductive approach with survey strategy. For the data collection, qualitative and quantitative data collection techniques and analysis procedures were followed. The research process adopted in the present study was as follows (Figure 4.1):

1. Based on the literature review, research gaps were identified and a conceptual model was designed.
2. On the basis of a conceptual model, research hypotheses were formulated.
3. A preliminary study was conducted to identify the behavioural factors influencing investment decisions using in-depth semi-structured interviews.
4. The research instrument was designed based on the extant literature on individual investors' investment decision making and information obtained from the preliminary study.
5. The main study was conducted by using survey research and a cross-sectional study.

The current study was conducted in two parts: (1) preliminary study and (2) main study. The preliminary study was conducted to identify the behavioural factors influencing investors' decision making using the in-depth semi-structured interviews of the financial advisors and brokers. Thereafter, the main study was designed on the basis of research objectives. Further, the data for the main study were collected using the survey strategy.

Figure 4.1 Research Design Applied in the Present Study



4.3 PRELIMINARY STUDY

The present study used in-depth semi-structured interviews to collect preliminary information during the exploratory stage of the research. The interviews were conducted face to face with open-ended questions to gather preliminary information from experienced financial advisors, analysts and brokers working with individual investors. Agarwalla *et al.* (2012) reported that the level of financial literacy is poor among individuals in India and that individuals are mostly dependent on advisors for their investments. Thus, industry experts can provide more detailed and thorough information about the behaviour of individual investors. The information obtained from informants was used to develop the research instrument for the main study.

4.3.1 Sample Selection

In Quantitative research studies, sampling is a crucial issue, and requires a representative sample to attain the objective of the study. In the case of qualitative research however, sample size tends to be small because researchers have to establish a fruitful relationship with the informants to address the research objective in depth (Crouch and McKenzie, 2006). In a qualitative study, the number of required subjects usually becomes obvious as the study progresses and adding more participants to the study does not result in additional perspectives or information (data saturation) (Glaser and Strauss, 1967; Marshall, 1996). Research has shown this usually occurs once 10-18 participants have been interviewed (Korb, 2010). This study used the non-probabilistic sampling, namely, purposive sampling, to select the participants. This was done because purposive sampling assists in identifying and selecting individuals that are knowledgeable about and experienced with a phenomenon of interest (Cresswell and Plano Clark, 2011). For this study, target participants were investment advisors, analysts and brokers having a minimum of 5 years of experience in various popular securities firms in India.

To facilitate the identification of investment advisors, a snowball method was used. In the snowball method, “*one subject gives the researcher the name of another subject, who in turn provides the name of a third, and so on*” (Vogt, 1999). In keeping with the qualitative approach to the study, interviews were carried out until similar and repetitive responses were gathered on the subject, and new data could no longer bring any additional insights into the research objectives (Korb, 2010; Mack *et al.*, 2005). In this

study, new themes stopped emerging after about 13- 15 interviews and an acceptable interpretative framework was created after 20 interviews.

4.3.2 Data Collection

In the present study, 20 face-to-face in-depth semi-structured interviews were conducted to explore the behavioural factors of individuals that affect investment decisions. Each interview lasted for 40 minutes to 1 hour. For the interview, a formal letter conveying the details of the research and the information about the nature of interview, confidentiality and timing was communicated to the informants through email. The interviews were carried out at the offices of informants who agreed to participate in the interview.

The data were recorded through an audiotape recorder, with the prior permission of informants. The informants supported tape recordings, which assisted in producing complete verbatim (word-for-word) transcripts of interviews. The transcripts can be used to interpret the results of interviews more systematically and completely than is possible with notes (Ticehurst and Veal, 2000). In this study, to obtain informants' viewpoints in their own words, interview guidelines with open-ended questions were followed (Kavle, 1996, 2007; Paetzold and Busch, 2014). Initially, in the interview, the interviewer asked the informants as to what factors individuals consider when investing in securities. Further, the interview was continued and respondents were asked some prepared questions from the extant literature review, and follow-up questions were based on the answers given to the initial question. By following this approach, the interviewer could obtain detailed information from the informants.

4.3.3 Research Technique

The data for this study were gathered from interview transcripts recorded through an audiotape recorder during the interviews. Further, notes were written down by listening to the recording of these interview transcripts. However, this is a difficult process as one hour of interview may take as much as six hours to transcribe (Ticehurst and Veal, 2000). These notes helped to reconstruct the original comments, observations and feelings (Schutt, 2014). "*The basic data are these observations and conversations, the actual words of people reproduced to the best of my ability from the field notes*" (Diamond, 1992, p. 7). In this study, thematic content analysis was used to evaluate interview transcripts. According to Burnardet *al.*(2008) and Boyatzis (1998), the thematic content

analysis process involves analysis of transcripts, coding and identification of themes from data.

Hence, all the information collected from the informants was thoroughly reviewed and notes were made in the form of summary statements or short phrases. This is known as coding to uncover themes. These transcripts were categorized into different codes, namely, volatility, risk factor, safe playing, avoid losses, greed and risk averse, overconfident, effect of rumours and investment in familiar assets. The main motive is to develop a coding system that it will facilitate the conversion of data into meaningful and explicit units of information. All the phrases and statements noted were later analysed, and duplicate phrases (which gave the same meaning) were eliminated. From these codes, appropriate themes with strong arguments supported by many informants were identified as major biases that affect investors' investment decision making.

4.4 MAIN STUDY

The main study was designed to test the hypotheses and generalize the results to the population. It was constructed based on research objectives under study and the survey strategy was used for the data collection. A structured questionnaire was used because it is a proficient data collection method when researchers know accurately what is needed and how to measure the variables of interest. Sekaran (2003) recommended that the main benefit of using the survey questionnaire method is that administering questionnaires to a large number of individuals all together is less expensive and less time consuming than is interviewing. It can be remarked that survey research methodology has been applied in earlier research, and that most researchers adopted a questionnaire survey. Examples for this include Zaidi and Tauni (2012), Bhandari and Deaves (2006), Sahi and Arora (2012), Nga and Yien (2013), Goo *et al.* (2010) and Lin (2011).

4.4.1 Target Population

The determination of a target population or research frameworks is a very important part of a study (Baker, 1994). According to Bryman and Bell (2007, p.182), the term 'population' defines "*the universe of units from which the sample is to be selected*". In simple words, 'population' represents the total of all the samples or components that follow some targeted specifications, such as group of people, companies, communities, hospitals, stores, college students, state, nations, or similar that share some characteristics

(Zikmund, 2003; Baker, 1994). The target population for this study represents individual investors who invest in the share market in India. India is a developing economy that is culturally different from developed economies such as the USA, where most behavioural finance studies have been carried out. In a survey, Mint (2017) analysed the statistics of the Bombay Stock Exchange (BSE) and identified 3.23 crore total investors that were registered in the stock market. Although industry experts state that there may be duplication as one person has more than one account and many of the demat accounts are hardly used. Another estimation of the stock market investors lies in tax data. According to income tax statistics for the assessment year 2014-15, only 4.72 lakh people recorded any short-term capital gain and losses. Thus, 4.72 lakhs is a small fraction of the aggregate figure of 3.23 crores. Short-term capital gains tax is paid for securities held for less than a year. It can also relate to other transactions such as land and gold. This means that not everyone who has filed gains or losses is investing in the stock market. It indicates that <4.72 lakh investors are active investors in the stock market. Hence, it would be difficult to collect the information of the whole population and impractical to use the whole population in this study; thereby, a selected sampling frame is taken and described in the next section.

4.4.2 Sample Frame

A sampling frame is the list of all the elements in the population from which the sample is drawn (Zikmund, 2003; Sekaran, 2000). In the current study, the choice of a suitable sampling frame is based on the principles recommended by Rice (1997) such as completeness of frame, adequacy of frame, up-to-date frame, convenience to reach subjects and non-duplication. The sampling frame resulted from the contact information of retail investors provided by one of India's largest brokerage firm. The firm provided a list of all accounts opened between 2010 and 2015 from the 10 major cities in India (Mumbai, Ahmedabad, Delhi, Hyderabad, Kolkata, Bangalore, Chennai, Pune, Jaipur and Kochi). According to National Securities Depository Limited, these are the top 10 cities in terms of trading volume on the BSE. Surveying the entire population for a study is very challenging and too expensive (Sproull, 1995). Thus, in this study, the sampling frame included only active demat accounts. The final sampling frame contains 2,000 active demat accounts from different cities. The sampling frame was prepared based on the availability of information regarding investors' contact number and e-mail addresses.

4.4.3 Sample Size

Sampling design and the sample size are two important elements to establish the representativeness of the sample generalizability (Sekaran, 2003). Collis and Hussey (2009) suggested that “*larger the sample, the better it will represent the population*”. Hair *et al.* (2010) documented that if the sample size is smaller than the estimated size, it results in a greater chance of failure convergence, improper solution and lower accuracy of parameters. In the present study, sample size was determined by observing the most cited rules of thumb within multivariate analysis and the requirements of data analysis technique, that is, SEM using AMOS. However, before applying this approach, the scientific method given by Yamane (1967) was used for determining the sample size. According to Yamane (1967) for the present study, the size of the population was 2,000. Hence, sample size is required to be 333 at the 5% precision level and 95% confidence level.

For the sample size determination, other techniques were based on data analysis methods and techniques (Fowler, 2002). Before analysing the ‘rules of thumb’ to determine the sample size, the method of data analysis used in the current study was SEM. This method is related to multiple regression and comprises statistical techniques such as confirmatory factor analysis (CFA), structural path analysis (β), total variance extracted (R^2). Stevens (1996) recommended that when least square multiple regression method is used in the study, 15 cases per construct are adequate. Bentler and Chou (1987) suggested at least five cases per item when the data are thoroughly normalized, distributed and without any missing or outlying cases, etc. Comrey and Lee (1992) documented a sample size of 50 as very poor, 100 as poor, 200 as fair, 300 as good, 500 as very good, and 1,000 as excellent. Tabachnick and Fidell (2007) advocated that as a general rule of thumb, it is decent to have at least 300 cases for factor analysis; if standard factor loading is >0.80 , then a sample of about 150 cases is adequate.

Following the criteria of variable to the number of cases ratio (Bentler and Chou, 1987; Tabachnick and Fidell, 2007), the current study intends to analyse 16 constructs with 64 items in the model; thus, the minimum required sample size is 320 (i.e., $64 \times 5 = 320$). However, using the Yamane (1967) formula and rule of thumb of Comrey and Lee (1992) the present study aims to achieve at least a sample size of 333 (after

treating missing data) to analyse the paths proposed in the conceptual model with reliable estimates.

4.4.3.1 Instrument Development- According to Fowler (1993), questionnaire development mainly comprises designing measures for the research instrument. Hair et al. (2010) stated that a research instrument is an organized framework developed to gather primary data from the selected respondents. In the present study, the structured questionnaire was developed based on the findings of the preliminary study and the extant literature of behavioural finance. Surveys that were previously used in the behavioural finance research for individual investors were also reviewed. The previous studies referred for the development of the research instrument are Al-Tamimi and Bin Kalli (2009), Wood and Zaichkowsky (2004), Goo *et al.* (2010), Lin (2011), Chung and Ming (2009), Waweru *et al.* (2008), Kudryavtsev *et al.* (2013), Bakar and Yi (2016), Mayfield *et al.* (2008).

At this stage of questionnaire development, researchers considered all the key aspects and issues related to this study. The research objectives facilitated as guidelines in collecting the information for the accomplishment of the study. It further helps in determining the variables and type of measurement to be included in the study. A well-designed instrument can minimize errors and make it easier for the participants to answer correctly (Sreejesh *et al.*, 2014).

Questions can be classified based on content, type and scale. As per the content, questions can be divided into two categories namely, factual and subjective. The factual questions are used to classify respondents based on their demographic characteristics. However, subjective questions are used to capture the respondents' behaviour, attitude or opinions. The present study used both factual and subjective type of questions for designing the questionnaire. It helps the researchers to obtain information for the accomplishment of the research objective. Further, Dillman (2000) suggested that questions can be categorized into four types, namely, open-ended questions, close-ended questions with ordered choices, close-ended questions with unordered choices and partially close-ended questions. Open-ended questions allow researchers to discover more than they expect because the participants are not restricted to any particular set of responses. Open-ended questions are normally used in qualitative research. In contrast, in

the close-ended questions with ordered choice participants are provided with a specific set of responses and also probed to provide the most relevant place on a specific continuum. In the third type of questions, participants allow choosing from among distinct, unordered categories by independently evaluating each choice and selecting the best possible situation. The fourth type of question is partially closed-ended; where for answering options are provided along with the flexibility to have the possibility of creating own responses.

Based on the scale of measurement, questions are divided into different types, namely, category questions, dichotomous questions, multiple choice questions, ranking questions, Likert scale type of questions and questions based on semantic differential. Category questions ask the respondents to answer in a category. These types of questions are used for studying the participants' characteristics. Dichotomous questions are a particular type of multiple choice questions used when there are only two possible answers to a question, such as, Yes/No, True/false. The third category of questions, allows participants to choose more than one option. Ranking questions ask respondents to compare a list of different objects to one another. These types of questions help in studying the relative importance of variables. Likert scale types of questions are mainly designed to measure attitude or opinions of the respondents. These questions are usually on a three, five or seven point rating scale. The final type of question is semantic differentials; these questions are used to determine underlying features. The participants were asked to rate a single object on a series of a bipolar rating scale. The present study has used category questions, dichotomous questions and Likert scale type questions on 5 point rating scale.

4.4.3.2 Layout and Content of the Questionnaire- The research instrument for this study was prepared in the form of a booklet. It was mainly designed in English. The questionnaire included background information and an explanatory cover letter to ensure confidentiality of responses (Smith and Dainty, 1991). The questionnaire comprises close ended questions. Some questions comprised an item entitled "others, please specify". This was done to encourage participants for providing any other information that was not included in the study. Further, the questionnaire consists four sections (Annexure I).

Section A describes respondents' background information including socio-demographic characteristics. It mainly includes category questions, dichotomous questions. The first question was related to their current location. This is because the sample was collected from 10 different cities and it helps researchers to obtain the information about response rate from each place. The respondents' socio-demographic characteristics were enclosed in the form of gender, age, marital status, education level, occupation, income- level and investment experience. The measures for socio-demographic variables were as follows: gender (male, female), age groups (18-30, 31-45, 46-60, >60), marital status (married, unmarried), education level (up to schooling, graduate, post graduate, doctorate), occupation (private sector employee, public sector employee, self-employed, retired, other), income (<3 lakhs, 3-6 lakhs, >6-10 lakhs, >10 lakhs) and investment experience (<2 years, 2-5 years, >5-10 years, >10 years).

Section B focuses on questions related to financial literacy. The level of financial literacy was measured using categorical questions including options 'agree', 'disagree' and 'don't know'. The 'don't know' option was used to discourage respondents from predicting the correct answer if they did not know. This section was mainly developed by Al-Tamimi and Bin Kalli (2009). The measures for financial literacy were knowledge about risk and return, compound interest, portfolio diversification, investment management.

Section C describes the respondent behaviour when making investment decisions using a five-point scale, where 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. This section ends with a category type of question measuring the framing effect.

The final section of the questionnaire measures personality traits using Big Five theory (Goldberg, 1992; Costa and McCrae, 1992b, 1995). Specifically, this study used the NEO-FFI (Costa and McCrae, 2003; Mayfield et al., 2008). In this section, personality traits were also measured using the same five –point Likert type scale. Table 4.1 presents the details of the Big Five traits.

Table 4.1 The Big Five Personality Traits

Personality trait	Description
Neuroticism (N)	Anxiety, impulsiveness, tenseness, and shy
Extraversion (E)	Active, assertiveness, energetic, optimism, sociability, talkative, and outgoing
Openness (O)	Curious, imaginative, original, wide interests, and insightful
Agreeableness (A)	Skeptical, kind, generous, sympathetic, and trustful
Conscientiousness (C)	Organized, reliable, responsible, efficient, and determined

Source: Revised NEO Personality Inventory (NEO-PI-R) and NEO five factor inventory (NEO-FFI) by Costa and McCrae (1992a) and McCrae and John (1992).

4.4.3.3 Data Collection Procedure- According to Sekaran (2000), determining the method of data collection is an important part of research design. Dillman (2000) suggested that a well-designed questionnaire supplemented with appropriate data collection methods is essential for good response rate. Saunders *et al.* (2009) advocated that selection of data collection method should be based on the research objectives of the study. Numerous methods of data collection methods are available, such as, interview method, questionnaire method and case study.

The questionnaire method includes self-administered and interviewer administered (Saunders *et al.*, 2009). The respondents generally complete Self-administered questionnaires. These questionnaires can be administered electronically using the Internet (Internet-mediated questionnaires), postal or mail questionnaires or delivery and collection questionnaires. In interviewer-administered questionnaires, responses of the participants are recorded by the interviewer. These questionnaires can be classified into two categories as per their administration, namely, telephone questionnaires and structured interview. Telephone questionnaires are administered over the telephone whereas; interviewers physically meet participants and enquire the questions face to face in the case of a structured interview (Saunders *et al.*, 2009).

The current study used the survey questionnaire method of data collection for the accomplishment of research objectives under study. Specifically, a self-administered approach was adopted including email survey in this study. The rationale behind using self-administered approach is that target population for this study was individual investors

from 10 different cities of India, which are spread over a large geographical area. Therefore, contacting individual participant by the personal administration is very difficult. However, the main limitation of using self-administered questionnaires was observed low response rate. To overcome this limitation, follow up with additional emails was done in the current study. Annexure II presents the details of the number of responses and response rate obtained from different cities.

4.4.3.4 Pre and Pilot Testing of Instrument- The initial draft of the instrument was developed with the help of previous survey-based studies on financial literacy and behavioural finance along with the information obtained from the preliminary study. The questionnaire was then sent to academicians working in the area of behavioural finance and the industry experts. An expert panel was requested to check the content, wording, sequence and length of the questionnaire. After including all the suggestions received from the panel of industry and subject experts, the survey questionnaire was used for the pilot study.

A pilot study helps to identify flaws in design and instrumentation of the questionnaire. Moreover, a pilot study intended to analyse the content validity and reliability to confirm that the directions, questions were clear to understand (Sekaran, 2000). Cooper and Schindler (1998) suggested sample for the pilot study between 25 to 100 subjects. In this study, a pilot study was conducted on 102 individual investors. A list of 278 individual investors was received from a brokerage firm in April, 2016. The list confined names, email addresses and contact numbers of individual investors. The questionnaire was sent to all the 258 individual investors through email. After 20 days, a follow-up mail was sent and total 102 responses were received. After the data collection, reversed coding was done for the negatively worded items. Further, data were analysed by applying basic statistical methods using SPSS 21.0.

4.4.3.5 Reliability and Validity of the Instrument- Collis and Hussey (2009) advocated that validity is the extent to which research findings actually reflect the phenomenon under investigation. Face validity was analysed with the help of the pilot study conducted on 102 individual investors in India. It observes whether the research questions under study answered by the subsequent analysis of data. Content validity examines whether the research instrument provides sufficient coverage of research questions (Saunders *et*

al.,2009). It was studied with the help of industry and subject experts of behavioural finance in India.

Ticehurst and Veal (2000) stated that reliability is the consistency of research findings at a later date or with a different sample of subjects. The Present study used Cronbach’s alpha coefficient to check the reliability of the instrument (Cronbach, 1951). Table 4.2 presents the Cronbach’s alpha coefficient for the data set. The value of Cronbach’s alpha coefficient for all the constructs (all on interval scale) was greater than recommend threshold 0.7 (Nunnally and Bernstein, 1994). The individual construct of Cronbach’s alpha coefficient ranges from 0.734 to 0.888. The construct AG produced lower reliability than the suggested threshold value. After examining each item related to AG it was observed that one item i.e., AG4 *‘I generally try to be thoughtful and considerate’* produced lower inter-item correlation (0.21) than suggested value 0.30 (Churchill, 1979). Thus, AG4 was deleted and the value of Cronbach’s alpha for AG construct was 0.819 that was in acceptable range.

Table 4.2 Summary of Cronbach’ Alphas, KMO and Bartlett’s test of Sphericity

This table presents the summary of Cronbach’ Alphas, KMO and Bartlett’s test of Sphericity in Pilot Study.

Factor	No of items	Cronbach’s α	KMO	Bartlett’s test Sphericity
Overconfidence and Self attribution (OS)	8	0.888	0.887	0.000
Disposition effect (DE)	3	0.795	0.693	0.000
Anchoring (ANCH)	4	0.796	0.698	0.000
Representativeness (REP)	3	0.778	0.703	0.000
Mental Accounting (ME)	3	0.819	0.720	0.000
Familiarity (FAM)	3	0.778	0.680	0.000
Availability (AVL)	3	0.753	0.630	0.000
Hind Sight (HS)	3	0.734	0.674	0.000
Emotional Bias (EM)	6	0.825	0.788	0.000
Herding (HERD)	4	0.750	0.792	0.000
Neuroticism (NEU)	5	0.867	0.826	0.000
Extraversion (EV)	4	0.825	0.789	0.000
Openness to experience (OP)	5	0.821	0.805	0.000
Agreeableness (AG)	3	0.819	0.708	0.000
Conscientiousness (CON)	5	0.816	0.767	0.000

The value of Kaiser-Mayer-Olkin (KMO) statistics measuring sampling adequacy was greater than the minimum suggested value of 0.60 for all the constructs (Kaiser,

1974). The significance of Bartlett's test of Sphericity also shows that the correlation among the measurement items was greater than 0.3 and was appropriate for EFA (Hair *et al.*, 2010). These results suggested that the questionnaire was a reliable measurement tool.

4.4.3.6 Methods of Analysis- After finalizing the research design and data collection procedure, methods and techniques of data analysis were identified. The primary data collected through the survey were analysed with the help of statistical software SPSS 21.0 and AMOS 21.0. The present study applied univariate and multivariate analyses to accomplish the stated research objectives. Table 4.3 maps the research objectives with the respective methods of analysis to accomplish our research objectives. The research techniques adopted in the present study are as follows-

1. Univariate Analysis- This study is descriptive in nature and primarily focused on assessing the level of financial literacy and prominent behaviour biases among individual investors, thereby, univariate analysis was used to discuss descriptive findings. The Univariate analysis examines variables (attributes) one by one. Variables in the study can be categorical or continuous in nature. Different statistical techniques were used to investigate categorical and continuous variables.

a. Central Tendency- This is the middle point of a distribution. Measures of central tendency are also called measures of location. There are three measures widely used, namely, the mean, the mode and the median. The value that occurs most frequently in data set is known as the mode. The middle value or mid-point after the data are ranked in order of magnitude is known as the median. Mean is the most frequently used measure of central tendency. It is the value obtained by summing all of the scores and divide by the total number of scores. Mean can be used with interval and ratio data.

b. Measures of Dispersion- These are statistical measures that indicate the dispersion of the scores in the data. The important measures of dispersion are range, mean deviation and standard deviation or variance. A range is the simplest possible measure and is defined as the difference between the highest value of an item in a series and the lowest value of an item in a series. The difference between the mean and an observed value is called the mean deviation. The variance is the mean squared deviation from the mean. It basically exhibits the

scattering of data points around the mean. A smaller variance means that data points are scattered closely around the mean and vice versa. The square root of the variance is the standard deviation.

- c. **Measures of Shape** - These also help in understanding the nature of the distribution. It is measured by examining skewness and kurtosis. Skewness is a characteristic of a distribution that assesses its symmetry about the mean. Kurtosis is the measure of flat-peakedness of a curve. The kurtosis of a normal distribution is zero. Measures of shape are essential, because if a distribution is highly skewed or markedly peaked, then the statistical procedures that assume normality should be used with caution.

2. Multivariate Analysis- Multivariate analysis refers to all the statistical techniques that simultaneously analyse multiple independent (or predictor) variables with multiple or single dependent (outcome or criterion) variables. Many multivariate techniques are the extension of univariate and bivariate analysis (Hair *et al.*, 2010). In the current study, following type of multivariate techniques were applied.

- a. **Factor Analysis-** There is mainly two types of factor analysis, namely, principal component analysis and common factor analysis. It can be used to analyse interrelationships among a large number of variables. Further, it helps in explaining these variables in terms of their common underlying dimensions. In other words, Factor analysis is a statistical approach for examining whether a number of variables of interest Y_1, Y_2, \dots, Y_l , are linearly related to a smaller number of unobservable factors F_1, F_2, \dots, F_k . Factor analysis can be used in the following circumstances-

- To identify underlying dimensions, or factors, that explains the correlations among a set of variables.
- To determine a new, smaller, set of uncorrelated variables to replace the original set of correlated variables in a subsequent multivariate analysis (regression or discriminant analysis).
- To identify a smaller set of salient variables from a larger set for use in subsequent multivariate analysis.
- If the variables are standardised, the factor model may be represented as

$$Xi = A_{i1}F_1 + A_{i2}F_2 + A_{i3}F_3 + \dots + A_{im}F_m + ViUi \dots \dots \dots eq 4.1$$

Where

X_i = ith standardised variable

A_{ij} = standardised multiple regression coefficient of variable i on common factor j

F = common factor

V_i = standardised regression coefficient of variable i on unique factor i

U_i = the unique factor for variable i

m = number of common factors.

b. Multiple Regression Analysis- Regression analysis is a statistical tool for analysing the associative relationships between a metric-dependent variable and one or more independent variables. It can be used to -

- Examine a significant relationship between independent and dependent variable
- Analyse the strength of relationship between variables
- Determine the structure of the relationship
- Predict the values of the dependent variable.
- Evaluate the contributions of a specific variable or set of variables by Controlling for other independent variables

Multiple regression includes a single dependent variable and two or more independent variables. The general form of the multiple regression model is as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_k X_k + e \dots \dots \dots \text{eq 4.2}$$

Where

Y= dependent/ criterion /outcome variables

X_1, X_2, X_3, X_k = independent/predictor/explanatory variables

β_0 = constant

$\beta_1, \beta_2, \beta_k$ = regression coefficients of independent variables

e= error term

This is estimated by the following equation-

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + \dots + b_kX_k \dots\dots\dots eq 4.3$$

c. Logistic Regression- Logistic regression models are also known as logit analysis. This approach is similar to multiple regression analysis in that one or more independent variables are used to predict a single variable (Hair *et al.*, 2010). Main difference between multiple regression and logistic is that dependent variable is nonmetric. A logistic regression agrees the inclusion of both continuous and categorical variables in the regression model. Multiple logistic regressions find the equation that best predicts the value of the Y variable for the values of the X variables. The Y variable is the probability of obtaining a particular value of the nominal variable. Because of the problem of limited value of probability, these probabilities cannot be used directly in the regression models; instead, the odd [Y/ (1Y)] was used. Further, the natural log of the odds of the outcome as the dependent variable was calculated so that the relationships could be linearized and used much like multiple linear regression. The logistic model used can be expressed as follows:

$$Ln \text{ odds } (E) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_k X_k + \varepsilon \dots\dots\dots eq 4.4$$

Odds (E) is the odd that event E occurs and can be calculated as follows:

$$Odds (E) = (E) / 1-(E) \dots\dots\dots eq 4.5$$

Where P is the probability of occurrence of an event and takes a value between 0 and 1. Thus, the odd function can be defined as

$$Odds (E) = P / (1-P) \dots\dots\dots eq 4.6$$

Therefore, the final logistic regression model can be obtained as

$$Ln \text{ odds } (E) = Ln (P/(1-P)) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_k X_k + \varepsilon \dots\dots\dots eq 4.7$$

where

P = The expected probability that the outcome is present

X₁ to X_k = Distinct independent variables

β₀ to β_k = Regression coefficients

ε = Error term

d. Structure Equation Modeling- It is a statistical technique that allows separate relationships for each of a set of dependent variables (Hair *et al.*, 2010). This technique enables the estimation for a series of multiple regression equations concurrently. There are two components of SEM namely, measurement model and structure model. In measurement model, researcher uses several indicators (measured items) for an independent or dependent variable. However, structure model is the path model, which estimates the relationship between independent and dependent model.

Table 4.3 Methods of Analysis

The table shows the methods of analysis applied in the study to accomplish the research objectives.

S. No.	Research Objectives	Methods of Analysis
1.	To assess the level of financial literacy among individual investors in India	Descriptive statistics
2.	To identify the existence of behavioural biases among individual investors in India	Factor analysis and Descriptive statistics
3.	To explore the effect of financial literacy and socio-demographic variables on behavioural biases among individual investors	Multiple regression and Logistic regression
4.	To analyse the influence of socio-demographic variables on financial literacy of individual investors	Logistic regression
5.	To establish the relationship between personality traits and behavioural biases of individual investors	Factor analysis and Structure equation modeling

4.5 CONCLUSION

This chapter summarizes the research design and methodology implemented in the present study. It provides justification for the research approach, research philosophy, research choice and strategy adopted to accomplish the stated research objectives. It also provides a detailed description of the sampling frame and data collection method used in the study. The research design incorporates mixed method approach. Information

obtained from the preliminary study was used to develop the research instrument. The main study analyses the data obtained from survey strategy. Various statistical techniques were used to examine the data from different angles. In the next chapters the findings of the preliminary and main study will be discussed.

CHAPTER 5

RESULTS OF THE PRELIMINARY STUDY

5.1 INTRODUCTION

This chapter presents the results obtained from the preliminary study conducted on 20 financial advisors and brokers. It begins with the description of the sample and includes the demographic characteristics of the participants. It exhibits the gender, designation and the working experience of the participants. The next section presents the findings of the preliminary study obtained from the in-depth semi-structured interview. These results highlight the key factors related to behaviour of individual investors followed by the conclusion.

5.2 SAMPLE DESCRIPTION

A preliminary study was conducted to highlight the key behavioural factors of individual investors in investment decision making. The findings of this study supported the researchers in designing the main study. In this study, the target participants were investment advisors, analysts and brokers having a minimum of 5 years of experience in various popular securities firms in India. The rationale behind it is that due to lack of awareness about financial and investment products individual investors are mostly dependent on advisors for their investments. Thus, investment advisors can provide more detailed and thorough information about the behaviour of individuals investing in the Indian stock market. These advisors deal with their clients (i.e., individual investors) and focus on their clients' investment goals, needs and reaction to losses. Baker and Ricciardi (2015) also advocated that financial advisors are increasingly aware that cognitive and emotional biases affect individual investors' financial and investment-related decisions.

The sample selected for the interview represents 20 financial advisors, analysts and brokers. Table 5.1 presents the demographic characteristics of respondents participated in the interview. The majority of the participants were male (95%) having 5-10 years of working experience. This is because in India less number of females is involved in share market investment. The decision making related to financial investments is still the right of male members in Indian households (husband, father, brother and son) (Sahi and Arora, 2012). Similarly, less number of females is involved in

the professions related to financial advisors and fund managers. Therefore, in the present study most of the participants were males.

Table 5.1 Respondent Profile

This table reports the demographic profile of the participants' chosen for the interview.

S. No.	Designation	Gender	Working Experience
1.	Deputy Manager- Treasury and Equity	Male	5/10 years
2.	Senior Manager	Male	10/15 years
3.	Wealth Manager	Male	5/10 years
4.	Assistant Vice President	Male	10/15 years
5.	Assistant Manager	Male	5/10 years
6.	Owner	Male	10/15 years
7.	Assistant Manager	Male	5/10 years
8.	Wealth Manager	Male	15/20 years
9.	Investment Manager	Female	5/10 years
10.	Deputy Manager	Male	5/10 years
11.	Fund Manager	Male	5/10 years
12.	Owner	Male	10/15 years
13.	Fund Manager	Male	5/10 years
14.	Owner	Male	>20 years
15.	Investment Manger	Male	5/10 years
16.	Wealth Manager	Male	5/10 years
17.	Owner	Male	15/20 years
18.	Assistant Manager	Male	5/10 years
19.	Senior Manager	Male	>20 years
20.	Owner	Male	10/15 years

5.3 ANALYSIS OF THE RESULTS

Previous research studies have identified different behavioural biases as described in chapter 2. However, the analysis of the interviews highlighted certain different themes also that individuals' exhibit while making their investment decisions. Before the identification of themes, different codes were created by carefully analysing the transcripts. Ryan and Bernard (2003) identified that qualitative data are analysed by using codes and codes are attached to different themes. The main motive is to develop a coding system that it will enable the conversion of data into meaningful and specific units of information. From these codes, relevant themes with strong arguments supported by many informants were identified as major biases that affect investors' investment decision making.

The findings are presented using the traditional approach. In the traditional approach, key findings were reported under each theme and then accompanied by linking a separate discussion (Burnard *et al.*, 2008). Here, the key findings under each theme were reported by using suitable opinions of the informants.

Past market returns and volatility

People make investment decisions based on the historical returns and volatility in the stock market. This revealed that people in the stock market get intimidated by volatility. In the Indian equity market, the majority of the people invest with the desire of obtaining short-term benefits. Thus, there are more speculators than investors. Sometimes, because of these speculators, volatility increases because their decisions are generally based on rumours. This is evident from the following opinions of the informants:

“From the 2008 crisis and volatility in the market, we can see that...people moved away from the market”.

“Investors overreact when market volatility is high and they lose money”.

“In volatile situations, they panic and tend to trade excessively”.

Preference for safe returns

Research studies indicate that people lack the financial literacy necessary to make important financial decisions (Mandell and Klein, 2009). People are rather unaware of the various financial products available. They prefer to invest their money in traditional investment products, such as fixed deposits and public provident funds, where they can get safe returns. However, their investment plans can be based on three broad parameters in order of preference—returns, liquidity and safety. This is substantiated by the following:

“Investors invest their hard earned money in safe assets such as fixed assets, real estate and gold”.

“Equity is a very good asset class for the long term investment, but people lack patience and lose money”.

Tendency to believe they are better than others

Previous studies have identified that people tend to exhibit the overconfidence phenomenon while they invest (Baker and Nofsinger, 2002). In this study, informants

stated that most of the people are overconfident about their abilities to make better decisions than others. Although they do not know the right time to enter or exit from the market, they tend to make decisions based on others. Baker and Nofsinger (2002) stated that people have the illusion of knowledge and the illusion of control. This is evidenced by the following statements:

“Everyone believes that what they are doing or thinking is correct and trade excessively”.

“Investors initially listen to advisors after which they start choosing stocks on their own”.

“People believe that they are better than others while choosing stocks”.

“At the time of buying and selling the stocks, they are confident that they are right”.

“Investors go by their own choice and prefer not to listen to advisors”.

Tendency to hold on to loss-making assets

People have the tendency to hold on to loss-making stocks and sell profit-making stocks. Our interviews revealed that investors never sell their stocks on loss because they do not want to book losses. They think that their share will attain the actual purchase price. This effect is risky to the clients because it can increase the capital gains taxes that individuals incur and can reduce returns even before taxes (Baker and Ricciardi, 2015). If the share price is –INR 1 higher than the purchase price, (i.e., profit) then investors sell that share. However, if prices go below INR 10, (i.e., loss) investors will not sell stocks but will prefer to wait, as is seen by the following statements:

“It is very difficult for retail investors to book losses. They only book intended losses”.

“When they entered the market during the loss-making situation, they never sell and get affected by emotions”.

“In the case of a loss, few people sell their stocks because they lose patience”.

“Long-term investors never book losses. They always see the profit”.

“Generally, clients book profits and wait for the loss”.

Preference to invest in familiar securities

Some people prefer to invest in a particular asset class or in a particular sector because they are familiar with it. In the case of the equity market (i.e., if someone is working in the banking sector), he/she may or may not invest a major part in that particular sector.

This is because people have more knowledge and experience of such investment products and feel secure and comfortable as is seen below:

“They prefer to invest in those shares that are in the news and with which they are familiar”.

“Only a few investors invest in familiar investments”.

Tendency to have regret for making past decisions

Some people tend to avoid making certain investment decisions because they feel regretful. Baker and Nofsinger (2002) stated that large losses cause the investor emotional pain. This is the reason that there are likely chances to less participation of retail investors in the Indian equity market. If people have experienced losses earlier on any particular stocks, then they would avoid making an investment in those stocks as seen below:

“After losing patience, they never come back to invest in the equity market”.

“Regret causes a loss of their risk appetite”.

“Again individual investors will not enter the market with a large amount”.

“Because of a previous loss, they are fearful and do not want to come back to the equity market”.

“Some people will want to reinvest in the equity market, but only after a period of time”.

“They may switch over to other shares or sectors”.

“After a loss, people sometimes tend to stay away not only from that particular share but also from the share market”.

Tendency to have more sensitivity towards losses than gains

People tend to be more disheartened and unhappy in the case of losses. People give more weightage to losses rather than giving importance to the same amount of gain. Therefore, they try to avoid losses and keep them in their portfolio as seen below:

“They try to minimize losses by holding on to loss making assets”.

“People tend to feel more pain towards their loss than pleasure on the same amount of gain”.

“They book profits earlier than losses and become sensitive to loss”.

“When they have a loss, they tend to think they will recover the amount lost, and it is with this tendency that they book more loss”.

Tendency to invest by looking at the framing of the outcome

In the case of a gain, people tend to prefer a certain gain. If the same problem is presented in different frames, one is positive and the other is negative. People tend to assign values to individual outcomes rather than focusing on aggregate returns. In the situation of a gain, people may invest in a company that has a certain gain (i.e., positive frame), but in the situation of a possible loss, people are ready to take more risks (i.e., negative frame). However, both these statements have the same outcome as seen below:

“In the situation of guaranteed gain, investors do not take any risk. They want safe returns”.

“They want certainty in the case of gains but never take certainty in the case of a loss”.

“People tend to take risks in the situation of a loss”.

Tendency to buy rising stocks with the expectation that this rise will continue

Interviews revealed that people have a tendency to buy rising stocks that are already overvalued. Redhead (2008) suggested that people have a tendency to buy when the market has risen and to sell when the market falls. However, rises of the market are related to its own previous rises and due to cash inflows that shows momentum effect. People then hold these stocks and expect that this rise will continue in the future as is stated below:

“When the stock is overvalued, they keep holding that stock and wait till its value increases”.

“Clients do not do their homework related to previous stock prices and market trends”.

Follows the past trend of stocks

Some people make their investment decisions based on the past performance of a particular share. People believe that if any stock has had a good performance, this will happen again in the future. However, individuals lack knowledge of the fundamentals and technical aspects of stocks. In the Indian stock market, there are two types of investors: bullish and bearish. The former consider that if the market had exhibited a rising trend earlier, it will also continue to rise in the future; however, the latter have the opposite view:

“People believe that the past trends of stocks will continue in the future also”.

“People follow the past trend before investment”.

“People buy shares that have recently increased in price”.

Tendency to rely on other sources of information

Interviews revealed that people tend to rely on others including friends, family members and relatives. People trust the judgement of others and follow the decisions of the crowd. They also follow the news and media without looking at the fundamentals of the company, as is stated below:

“They have other sources of information including media, friends and relatives”.

“In this market, more than 50% of people invest by listening to others”.

“They believe rumours and follow others”.

“The media plays a major role in influencing investment decision making of individuals”.

Tendency to rely on the reference point

People tend to rely on a set of information or a value that is known as a reference point to make any investment decision. These values are known as the reference point, which is considered as the basis for making investment decisions in the future. Interviews revealed that people rely on the “purchase price”, “52-week high price” and “rate of return” as a point of reference. People have a sense of satisfaction by considering the reference point as a benchmark to judge their investment decisions, as is seen below:

“Investors set their reference point, and generally, it is the purchase price of the share”.

“Individuals plan to sell only if the share price goes above the initial purchase price”.

“People avoid sale stocks that have gone below the purchase price”.

Tendency to invest based on information easily available

People have a tendency to jump to conclusions based on information easily available. They feel that the information that they have is very important for decisions to be made. People remember an event or incident that happened in the stock market based on which they make future investment decisions. When decisions are made based on easily available information, people feel strongly satisfied that they have made decisions based on information, as is understood from the following:

“People have a very short-term memory. They look at the very recent event and behave accordingly”.

“Suppose it is highlighted in the news that share prices of Company X are expected to increase, people will buy these shares”.

“Sometimes, investors react to easily available news; in fact, sometimes, they even overreact”.

Tendency to rely on own skills

Some people rely on their own experience and skills while making investment decisions. They feel that they have more knowledge than advisors do and can make realistic decisions for themselves. Therefore, people tend to believe that their intuitions are correct and perhaps they do not believe others regarding decisions for their money:

“Some people do not listen to advisors and believe their own experience before making investment decisions”.

“After a certain point of time, they feel that have more knowledge than advisors do”.

Tendency to divide their money into different accounts/assets

Interviews revealed that people tend to divide their money into separate accounts based on their specific needs. People tend to make categories mentally, such as money for retirement funds and child plans, and allocate their money to these categories. People also do these kinds of accounting to evaluate the performance of their shares. Few people evaluate the overall stock market holding and feel happy or upset based on gains or losses, respectively. However, most of the investors evaluate the value of individual stocks that they own as seen below:

“They segregate their money into different assets, etc.”

“They are not systematic. They do not stick to such kind of things”.

“People value individual stocks and feel upset if they possess loss making stocks”.

Tendency to believe that past events were predictable

Interviews revealed that people have a tendency to feel what had happened in the past was already predicted (when analysed in the future). They felt that they already knew what would happen, as is stated below:

“Some people reacted as if they were already informed and felt that the listener did not pay attention to them at that time”.

“They felt that they had an intuition that prices of this share were going to rise”.

5.4 CONCLUSION

This study investigated the psychological biases of individual investors as observed by their financial advisors and brokers that affect their investment decisions in the Indian stock market. To achieve this objective, a qualitative method based on in-depth interviews was used. These advisors expressed their beliefs and observations relating to the

behaviour of their clients investing in the stock market. From the previous section, it can be observed that individuals exhibit various beliefs and psychological biases in their behaviour while investing in the Indian stock market. The findings of the interviews revealed 13 biases based on certain themes. These biases have a negative association because they produce a distortion in the calculation of an outcome. These biases were classified under three categories. Table 5.2 presents the categorization of individual investors' behavioural biases.

Table 5.2 Categorization of Individual Investor's Behavioural Biases

This table presents the categorisation of behavioural biases obtained from the identified themes.

Cognitive Errors	<i>Overconfidence bias</i>	Tendency to believe they are better than others
	<i>Disposition Effect</i>	Tendency to hold loss making assets
	<i>Familiarity bias</i>	Prefer to invest in familiar securities
	<i>Framing effect</i>	Tendency to make investment by looking at the framing of the outcome
	<i>Anchoring bias</i>	Tendency to rely on reference point
	<i>Availability bias</i>	Tendency to invest based on information easily available
	<i>Self- Attribution bias</i>	Rely on their own skills
	<i>Representativeness</i>	Tendency to buy rising stocks with the expectation that this rise will continue. Follows past trend of stocks
	<i>Mental Accounting</i>	Tendency to divide their money in to different accounts/ assets
	<i>Hindsight bias</i>	Tendency to believe that past events were predictable
Emotional Biases	<i>Regret Aversion</i>	Tendency to feel regret for past decisions
	<i>Loss Aversion</i>	Tendency to have more sensitivity towards losses than gain
Social Interaction	<i>Herding bias/Media bias</i>	Tendency to rely on other sources of information

Cognitive errors: People have patterns of thinking that may affect their behaviour. Cognitive errors originate because of faulty reasoning, statistical errors, lack of information, memory errors and logic. When a decision-making process is cognitively biased, the outcome leads to sub-optimal results or judgmental errors.

Emotional biases: Emotional errors are developed from impulse and intuitions rather than from conscious calculations. Emotionally biased decisions denote that they have been influenced by feelings, moods and emotions. This leads to irrational decisions or actions (Pompian, 2006).

Social interaction: Like other social animals, people tend to follow the behaviours and attitudes of the majority to feel safe and avoid conflict. If the majority starts to move in one direction, the others will also automatically follow. The biases of social interaction contribute to bubbles and market anomalies such as the tech bubble of 1999-2000 and the housing crisis. These bubbles went to extreme levels when people rushed into the markets and invested their money.

This study helps in understanding behavioural factors of individual investors in investment decision making. The findings also provide the fundamental basis for doing the study. The analysis of interviews findings documented the requirement of analysing the prominent behavioural biases of individual investors in India. The next chapter presents the findings of the main study. It primarily analyses the primary data collected with the help of a structured questionnaire. It thereby explains the prominent behavioural biases and effect of socio-demographic variables and personality traits on these identified biases.

CHAPTER 6

RESULTS OF THE MAIN STUDY

6.1 INTRODUCTION

This chapter commences with the examination of data using statistical techniques and their output, such as non-response biasness, normality, homoscedasticity and multicollinearity. Screened data were used for obtaining the descriptive statistics of the respondents' socio-demographic profile presented in Section 6.4. Exploratory factor analysis (EFA) was then performed for the main constructs in the conceptual framework and reliability of the instrument was determined. The findings pertaining to identification of the level of financial literacy and prominent behavioural biases of individual investors are presented in Section 6.7. The results of the multiple regression and logistic regression are given in Section 6.7.3. Next, the relationship between personality traits and behavioural biases using SEM is described in Section 6.7.5. Finally, the summary of the research findings and conclusion are presented in subsequent sections.

6.2 NON-RESPONSE BIAS

Non-response bias is a potential issue encountered in survey research. One of the essential measures taken during the data collection process is to confirm that the sample collected represents the whole population. Weiss and Heide (1993) suggested that a high response rate provides assurance that response bias is not a main issue. Generally, in survey research, individuals chosen for the sample refuse to answer all the questions or be involved in the research (Saunders *et al.*, 2009). This may give rise to a systematic difference in characteristics between responders and non-responders (Sedgwick, 2014). This disparity between respondents and non-respondents may affect survey results. Non-response bias may also question the external validity of the survey. Thus, non-response bias is an important issue that needs substantial attention in survey research.

Due to the enormous number of retail stock investors in India, it is not possible for a researcher to include all the investors in the survey. Therefore, the top 10 cities based on their trading volume were chosen for the study. Almost, 80% of the total trading volume is traded in these cities. Further, one of India's largest brokerage firms was contacted for preparing the sampling frame of stock investors in these 10 Indian cities. In this study, initially a total of 2000 respondents were contacted, and 515 respondents participated

in the survey after follow-up e-mails were sent to them. Out of the 515 filled-in questionnaires, 14 questionnaires were eliminated due to missing information. Finally, this survey resulted in a response rate of 25.05%. Thus, there is a possibility of the existence of non-response bias in the present study. In this study, the Mann-Whitney-Wilcoxon (MWW) test was used to determine whether the responses of early and late respondents differ statistically (Weiss and Heide, 1993). Thus, the order in which questionnaires were filled the first 50 responses were taken as those of early respondents and the last 50 were taken as those of late respondents. Because responses were measured on a Likert-type scale and normality of data were not examined yet, the MWW test (De Winter and Dodou, 2010) was used to compare the two groups. Table 6.1 shows no statistical difference between early and late respondents at the 0.05 level. Thus, non-response bias is not an issue in the current study.

Table 6.1 Statistical Tests for Non-Response Bias

This table reports the results of Mann-Whitney-U and Wilcoxon W tests for non-response bias, which compares the first 50 responses and the last 50 responses regarding different behavioural biases and personality traits. OS = overconfidence and self-attribution bias, DE = disposition effect, ANCH = anchoring bias, REP = representativeness bias, MA = mental accounting bias, FAM = familiarity bias, AVL = availability bias, HS = hindsight bias, EM = emotional bias, HERD = herding bias, NEU = neuroticism, EV = extraversion, OP = openness to experience, AG = agreeableness, and CON = conscientiousness. None of the tests is statistically significant at the 0.05 level.

	OS	DE	ANCH	REP	MA	FAM	AVL	HS
Mann-Whitney U	1154.5	1179.0	1203.5	1030.0	1121.5	1111.5	1164.0	1162.0
Wilcoxon W	2429.5	2454.0	2478.5	2305.0	2396.5	2386.5	2439.0	2437.0
Z	-0.662	-0.499	-0.323	-1.541	-0.897	-0.969	-0.603	-0.616
Asymptotic Sig. (2-tailed)	0.508	0.618	0.746	0.123	0.370	0.333	0.546	0.538
	EM	HERD	NEU	EV	OP	AG	CON	
Mann-Whitney U	1241.0	1110.5	1188.0	1087.0	1206.5	1198.5	978.0	
Wilcoxon W	2516.0	2385.5	2463.0	2362.0	2481.5	2473.5	2253.0	
Z	-0.062	-0.975	-0.429	-1.134	-0.302	-0.358	-1.887	
Asymptotic Sig. (2-tailed)	0.950	0.329	0.668	0.257	0.762	0.720	0.059	

6.3 ASSUMPTIONS OF MULTIVARIATE ANALYSIS

The present study used multivariate analysis techniques such as multiple regression, logistic regression, EFA and confirmatory factor analysis using SEM. Examining the data for compliance with statistical assumptions is a very important aspect for the robustness of results (Hair *et al.*, 2010). In multivariate analysis, testing of the assumptions is necessary for two reasons, namely, complexity of the variables and complexity of analyses and results (Hair *et al.*, 2010). Thus, it is imperative to understand the assumptions of multivariate techniques. In the following section, we discuss the assumptions of multivariate techniques:

6.3.1 Normality

Normality is the most important assumption in multivariate analysis (Tabachnick and Fidell, 2007). Normality refers to the “*shape of the data distribution for an individual metric variable and its correspondence to the normal distribution*” (Hair *et al.*, 2010). Normality is necessary for using F and t statistics; thus, if the deviation is sufficiently large, then results of the entire statistical tests become invalid. Hair *et al.* (2010) advocated that severity of non-normality can be assessed based on two assumptions, namely, shape of the offending distribution and sample size. According to Tabachnick and Fidell (2007), the shape of the normal distribution can be determined by either graphical or statistical methods.

6.3.1.1 Graphical Method- This method was used to check normality by visual inspection of histograms, which must be a symmetrical, bell-shaped curve with a high frequency of score in the mid and lower on the peaks (Pallant, 2007; Hair *et al.*, 2010). For assessing the normality, another more reliable approach is the probability plot (Q-Q plot). The Q- Q plot shows graphs between observed values and estimated values. These plots form a straight line, and if the distribution is normal, then the data points within the graphs are grouped around the straight line (Hair *et al.*, 2010). The Q-Q plots of all the metric variables used in this study are presented in annexure III. The Q-Q plots in the present study show that all variables were grouped around the straight line. Thus, there is no requirement for further transformation of variables.

6.3.1.2 Statistical Method- To check the normality, statistical tests, namely, Shapiro-Wilk (S-W) test and Kolmogorov-Smirnov (K-S) test were used for each variable. Each

test evaluates the level of significance for the difference from a normal distribution (Hair *et al.*, 2010). These tests are statistically non-significant if the p-value is >0.05. From this, one can infer whether data are normally distributed. Table 6.2 presents the results of the S-W and K-S tests for normality. The findings are statistically significant at the 5% significance level. This indicates that data are not normally distributed. However, the K-S test is sensitive for a large sample, and it is easy to obtain significant results from small deviations (Field, 2006).

Table 6.2 Statistical Tests for Normality

This table presents the statistics of K-S and S-W test for the metric variables.

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
OS	0.118	501	0.000*	0.971	501	0.000*
DE	0.179	501	0.000*	0.943	501	0.000*
ANCH	0.127	501	0.000*	0.957	501	0.000*
REP	0.182	501	0.000*	0.948	501	0.000*
MA	0.175	501	0.000*	0.947	501	0.000*
FAM	0.165	501	0.000*	0.933	501	0.000*
AVL	0.132	501	0.000*	0.970	501	0.000*
HS	0.142	501	0.000*	0.973	501	0.000*
EM	0.084	501	0.000*	0.978	501	0.000*
HERD	0.195	501	0.000*	0.917	501	0.000*
NEU	0.059	501	0.000*	0.980	501	0.000*
EV	0.163	501	0.000*	0.939	501	0.000*
OP	0.103	501	0.000*	0.977	501	0.000*
AG	0.107	501	0.000*	0.974	501	0.000*
CON	0.128	501	0.000*	0.974	501	0.000*

*df = degree of freedom; * indicates significant value at 0.05 significance level*

The shape of data distribution can also help assess the normality of variables. The shape of the distribution can be determined by skewness and kurtosis (Hair *et al.*, 2010). Skewness denotes the equilibrium of distribution, and kurtosis represents the flatness or peakedness of the distribution (Hair *et al.*, 2010). A positively skewed distribution specifies that data are shifted to the left, whereas a negatively skewed distribution shows that the data are shifted to the right. Further, a negative kurtosis value shows a flatter distribution, whereas a positive value denotes a peaked distribution (Hair *et al.*, 2010). The values of skewness and Kurtosis are expected to be 0 for normal distribution of data. Hence, any value above or below 0 exhibits a deviation from normality. Therefore, it

has been recommended that the value of skewness and kurtosis should be $<\pm 1$ (Holmes-Smith *et al.*, 2006). Table 6.3 shows that all the variables have skewness and kurtosis values in the acceptable range (i.e., $<\pm 2.58$, Hair *et al.*, 2010). Moreover, Pallant (2007) suggested that negative or positive skewness and kurtosis do not signify any issue until and unless they are within the normal range.

Table 6.3 Test of Normality Based on Skewness and Kurtosis values

This table presents the value of skewness and Kurtosis for the metric variables.

Variable	n	Mean	S.D.	Skewness		Kurtosis	
		stat.	stat.	stat.	S. Error	stat.	S. Error
OS	501	3.3686	0.74474	-0.586	0.109	-0.128	0.218
DE	501	3.1257	0.84770	-0.401	0.109	-0.817	0.218
ANCH	501	3.3308	0.86571	-0.547	0.109	-0.314	0.218
REP	501	3.3819	0.82548	-0.639	0.109	-0.208	0.218
MA	501	3.4265	0.83145	-0.585	0.109	-0.085	0.218
FAM	501	2.4012	0.94319	0.369	0.109	-0.935	0.218
AVL	501	2.6860	0.87297	0.156	0.109	-0.624	0.218
HS	501	2.6374	0.75309	0.170	0.109	-0.397	0.218
EM	501	3.2824	0.74529	-0.483	0.109	0.154	0.218
HERD	501	3.1685	0.81518	-0.493	0.109	-0.951	0.218
NEU	501	2.4040	0.79407	0.267	0.109	-0.324	0.218
EV	501	3.6677	0.75238	-0.760	0.109	0.498	0.218
OP	501	3.3098	0.70847	-0.511	0.109	-0.288	0.218
AG	501	3.0925	0.80283	0.044	0.109	-0.667	0.218
CON	501	3.4890	0.75608	-0.551	0.109	-0.517	0.218

stat. = Statistics, *S. Error* = Standard error

The severity of normality can be assessed based on the sample size (Hair *et al.*, 2010). A large sample size diminishes the issue of non-normality (Pallant, 2007). In this study, the sample size is 501; thus, the presence of a small non-normal univariate distribution can be avoided.

6.3.2 Homoscedasticity

According to Hair *et al.* (2010), homoscedasticity refers to the notion that dependent variable(s) exhibit(s) equal levels of variance across a range of predictor variable(s). This is desirable because variance of the dependent variable as explained in the dependence relationship should not be concentrated in only a limited range of independent values

(Hair *et al.*, 2010). The homoscedasticity is essential for performing multiple regressions (Field, 2006).

In multivariate analysis, violation of homoscedasticity assumption may lead to a serious issue. This indicates that dispersion is unequal across the values of independent variables and is known as heteroscedasticity. It arises mainly due to non-normality or errors in the measurement scale at some level in predictor variables (Hair *et al.*, 2010). In the analysis, for grouped data, homoscedasticity is known as homogeneity of variances. Homoscedasticity is primarily analysed using Levene’s test of equal variance (Field, 2009). The current study applied Levene’s test for metric variables across non-metric variables (gender) as part of the t-test (analysis of variance).

Table 6.4 illustrates the results of Levene’s test for homogeneity of variance for all the metric variables. The results indicate that most of the obtained values except DE, HERD, NEU and EV were higher than the minimum significant value (i.e. $p < 0.05$). This suggests that there is equal variance for the variables within groups of males and females and achieved the assumption of homogeneity of variance.

Table 6.4 Levene's Test for Homogeneity of Variance

This table reports the results of Levene’s test for homogeneity of variance for all the metric variables.

Variable	Levene's statistic	Degree of freedom	Sig.
OS	2.089	499	0.149
DE	11.961	499	0.001*
ANCH	3.100	499	0.079
REP	0.073	499	0.788
MA	0.942	499	0.332
FAM	0.383	499	0.536
AVL	0.586	499	0.444
HS	2.643	499	0.105
EM	1.152	499	0.284
HERD	18.836	499	0.000*
NEU	4.263	499	0.039*
EV	4.586	499	0.033*
OP	0.045	499	0.832
AG	3.003	499	0.084
CON	1.790	499	0.182

Group variable: Gender

* indicates significant value at 0.05 significance level

Additionally, Field (2006) suggested that similar to the K-S and S-W test, Levene's test is also sensitive with respect to the sample size and may be significant for a large sample. Consequently, in the present study, the sample size is 501 and the significance of few variables in Levene's test does not signify the existence of non-normality within the sample.

6.3.3 Multicollinearity

Multicollinearity is a problem associated with a correlation matrix in which three or more predictor variables are highly correlated (>0.9) to one another (Hair *et al.*, 2010). The presence of a high level of correlation results in reduction of the unique variance explained by each predictor variable and increases the shared percentage (Hair *et al.*, 2010). The presence of multicollinearity restricts the size of the regression value and makes it difficult to comprehend the contribution of each predictor variable. Thus, to increase the prediction, it is recommended to examine highly correlated variables and eliminate one of them (Tabachnick and Fidell, 2007). For detecting the multicollinearity among independent variables, in the present study, we applied the bivariate correlation matrix by using Pearson correlation. Table 6.5 shows that none of the independent variables are highly correlated (>0.8). Further, we applied variance inflation factor (VIF) and tolerance value for analysing multicollinearity. According to Pallant (2007), the tolerance effect shows that the variability explained by independent variables is distinct, while VIF is the opposite of tolerance effect. A larger VIF (>10) and lower tolerance (<0.1) indicate the existence of multicollinearity (Myers, 1997; Menard, 1995). Table 6.6 presents the results of VIF and tolerance, which indicates the absence of multicollinearity among variables.

Table 6.5 Pearson Correlation for Observing Multicollinearity

This table reports the Pearson Correlation for observing multicollinearity between variables.

	OS	DE	ANCH	REP	MA	FAM	AVL	HS	EM	HERD	NEU	EV	OP	AG	CON
OS	1														
DE	0.234**	1													
ANCH	0.238**	0.369**	1												
REP	0.374**	0.236**	0.393**	1											
MA	0.373**	0.206**	0.197**	0.392**	1										
FAM	-0.012	0.132**	0.087	0.010	-0.112*	1									
AVL	0.027	0.212**	0.151**	0.176**	-0.001	0.431**	1								
HS	0.165**	0.122**	0.228**	0.254**	0.114*	0.199**	0.255**	1							
EM	0.263**	0.413**	0.388**	0.369**	0.268**	0.179**	0.336**	0.214**	1						
HERD	0.012	0.125**	0.228**	0.154**	0.047	0.294**	0.278**	0.119**	0.284**	1					
NEU	-0.019	0.202**	0.213**	0.136**	-0.051	0.126**	0.186**	0.120**	0.316**	0.140**	1				
EV	0.359**	0.144**	0.257**	0.236**	0.316**	-0.122**	-0.081	0.097*	0.160**	0.173**	-0.087	1			
OP	0.282**	0.080	0.138**	0.214**	0.304**	-0.096*	-0.080	0.064	0.082	0.054	-0.069	0.584**	1		
AG	-0.100*	-0.127**	-0.053	-0.066	-0.029	-0.101*	-0.099*	-0.125**	-0.121**	-0.074	-0.159**	-0.119**	-0.134**	1	
CON	0.188**	-0.006	0.150**	0.147**	0.204**	-0.257**	-0.156**	-0.013	0.075	-0.021	-0.161**	0.257**	0.245**	0.138**	1

******, Correlation is significant at the 0.01 level (2-tailed), *****, Correlation is significant at the 0.05 level (2-tailed).

Table 6.6 Results of Regression

This table presents the results of regression analysis for Observing VIF and Tolerance effect

Model	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1 (Constant)	1.954	0.282		6.919	0.000		
NEU	0.016	0.038	0.018	0.414	0.679	0.950	1.053
EV	0.261	0.049	0.273	5.274	0.000	0.640	1.563
OP	0.089	0.052	0.088	1.698	0.090	0.642	1.557
AG	-0.073	0.047	-0.068	-1.566	0.118	0.923	1.083
CON	0.102	0.042	0.108	2.435	0.015	0.876	1.141

a. Dependent Variable: OS

6.3.4 Linearity

Linearity is an implied assumption of multivariate analysis, such as multiple regression, logistic regression, factor analysis and SEM. Correlation represents only the linear association between variables and non-linear effects will not be described in the correlation value (Hair *et al.*, 2010). This omission results in the underestimation of the actual strength of the relationship. It is always vital to investigate all relationships to detect any departures from linearity. The most common way to evaluate linearity is to investigate scatter plots of variables (Hair *et al.*, 2010). This is primarily done to identify any nonlinear patterns in the data. An alternative approach is the examination of residuals in simple regression analysis (Annexure IV). The residuals reflect the unexplained portion of the dependent variable. This will thereby reveal the nonlinear portion of the relationship. The above discussion on assumptions of multivariate analysis indicates that multivariate analysis techniques are valid to the study.

6.4 RESPONDENTS' BACKGROUND INFORMATION

Full-scale data were collected during June-December 2016. Overall, 2000 individual investors from top Ten Indian Cities, who had invested in the stock market, were contacted through a web-based survey. Annexure II provides the details of the survey questionnaire circulated and reverted from the different cities.

Out of a total of 2000 individual investors contacted, 515 investors (25.75%) returned the questionnaire. From these, 14 questionnaires were discarded due to incomplete information. Five hundred one respondents (25.05%) were then selected for the final analysis. Table 6.7 summarizes the respondents' demographic characteristics. The sample consisted of 86% (n=431) male participants and 14% (n=70) female participants. This is because in India, decision making related to financial investment is still the right of only male members in households. Therefore, most investment decisions are taken by male members and females are less aware of financial decisions. This justifies the relatively lower proportion of female respondents as compared to male respondents.

The age of the respondents was segregated into four categories, namely, 18-30 years, 31-45 years, 46-60 years and >60 years. The results revealed that the 49.9% respondents were between age 18 and 30 years (n=250) followed by 31-45 years (36.5%, n=183), and >60 years of age (3.8%, n=19). From the perspective of marital status, 66.1% (n=331) respondents were married and 33.9% (n=170) participants were unmarried.

The category educational level revealed that most of the respondents were postgraduates (51.7%, n=290) and fewer had a doctorate degree (3.2%, n=16). Occupation of the respondents was described as five categories, namely, private sector employment, public sector employment, self-employment, retirement and others (Housewives, students, etc.). The majority of the respondents worked in the private sector (52.3%, n=262) and fewer had retired (4.4%, n=22).

The annual income of the respondents were categorized into four levels, namely, <3 lakhs, 3-6 lakhs, >6-10 lakhs and >10 lakhs. The results indicate that the majority of the respondents earned 3-6 lakhs per annum (38.7%, n=194) followed by >6-10 lakhs per annum (24.8%, n=124). Further, based on investment experience, the largest group of respondents had <2 years of investment experience (40.7%, n=204) followed by 2-5 years (28.5%, n=143) experience, and smallest group had >10 years of experience (14.8%, n=74).

Table 6.7 Demographic Profile of the Survey Respondents

This table describes the demographic characteristics of total 501 responding individual investors.

Profile	Group	Frequency	Percentage
Gender	Male	431	86.0
	Female	70	14.0
Age	18 to 30	250	49.9
	31to 45	183	36.5
	46 to 60	49	9.8
	More than 60	19	3.8
Marital Status	Married	331	66.1
	Unmarried	170	33.9
Education	Up to schooling	23	4.6
	Graduate	203	40.5
	Post graduate	259	51.7
	Doctorate	16	3.2
Occupation	Private sector employee	262	52.3
	Public sector employee	54	10.8
	Self-employed	144	28.7
	Retired	22	4.4
	Others	19	3.8
Annual Income	Less than 3 lakhs	116	23.2
	3 to 6 lakhs	194	38.7
	> 6 to 10 lakhs	124	24.8
	> 10 lakhs	67	13.4
Investment Experience in the Stock Market	Less than 2 years	204	40.7
	2 to 5 years	143	28.5
	> 5 to 10 years	80	16.0
	> 10 years	74	14.8

6.5 FACTOR ANALYSIS

Factor analysis was applied to further analyse the measurement items used in the current study. The primary objective of using Factor analysis was to define the underlying structure among the variables in the analysis (Hair *et al.*, 2010). Factor analysing assists in condensing the information contained in a number of observed variables into a smaller set of new composite dimensions (Gorsuch, 1983; Rummel, 1970). Further, Hair *et al.* (2010) suggested that Factor analysis also plays a unique role in other multivariate methods. It serves as a tool for analysing the correlation among a large number of

variables by defining groups of variables that are highly correlated with minimum loss of information, known as factors.

Generally, factor analysis encompasses two techniques, namely, exploratory factor analysis (EFA), and confirmatory factory analysis (CFA) (Hair *et al.*, 2010; Tabachnick and Fidell, 2007). These techniques help to identify the variable of interest from a set of coherent subsets that are comparatively independent of each other. The main objective of EFA is to examine data and provide information about a number of feasible factors that best depict the data (Hair *et al.*, 2010). However, the aim of using CFA was to examine the measures of a factor are consistent with the factor. The CFA is applied through SEM. In this stage of the study, the objective was to examine the validity of the research instrument; therefore, EFA was employed to test the measurement items used in the current study.

6.5.1 EFA of Behavioural Biases

The present study applied EFA to investigate the structure of measurement items related to different behavioural biases in the conceptual framework. Among the various methods of extraction, such as principal component analysis (PCA), principle factors, maximum likelihood factoring, image factoring, alpha factoring and unweighted and generalized weighted least squares factoring (Tabachnick and Fidell, 2007), PCA was applied to create the initial solutions for the EFA. PCA considers the total variance and derives factors that contain a small proportion of unique variances and, in some instances, error variance (Hair *et al.*, 2010). The PCA extracts the maximum variance from the data set, such that the first component extracts the highest variance and the last component extracts the least variance (Tabachnick and Fidell, 2007). Moreover, the main advantage of PCA is that it can identify and reduce a large set of measurement items into a smaller number of components by converting interrelated variables into new unrelated linear composite variables (Hair *et al.*, 2010).

For the factor extraction, the orthogonal varimax rotational method was applied. This method was used because it is the most frequently used variance maximizing method and has a higher generalizability and replicability power compared to that of the oblique rotational method (Tabachnick and Fidell, 2007; Pallant, 2007). The results obtained from orthogonal rotations are best fitted with past and future data, where results generated from

the oblique rotation are fitted to only current research study (Rennie, 1997). Additionally, the results obtained from orthogonal rotation of uncorrelated factors are easier to interpret than are results from oblique rotation (Pallant, 2007; Tabachnick and Fidell, 2007).

The Present study used three criteria, namely, latent root criterion, the percentage of variance and scree plot for assessing the adequacy of extracted factors. Latent root criterion is the most commonly used technique. Hair *et al.* (2010) recommended that eigenvalues >1 satisfy the latent root criterion and the solution that explain 60% of the total variance satisfies the percentage of variance criterion. The total variance of an original variable shared with other variables is also known as communality (Hair *et al.*, 2010). A variable that has no variance has a communality of 1, and a variable which shares nothing with other variables has a communality of 0 (Field, 2006). Hair *et al.* (2010) suggested that items that show a communality <0.5 (50%) are deemed to be weak items. However, sometimes, with respect to the sample size, a cut-off value of communality of 0.3 is also accepted (Pallant, 2007).

Further, to achieve appropriate factor analysis results, Kaiser-Meyer-Olkin (KMO) test for sampling adequacy and Bartlett's test of Sphericity were applied. A value of KMO >0.6 was considered satisfactory and it indicates that the relationship between items is statistically significant (Tabachnick and Fidell, 2007). However, the significance of Bartlett's test of sphericity implies that the correlation among the measurement items is >0.3 and is thus appropriate for EFA (Hair *et al.*, 2010).

In the present study, EFA was applied to the 41 items related to behavioural biases. The results reveal that the value of KMO was 0.843 (i.e., >0.6) and Bartlett's test was significant ($p < 0.005$), which satisfies the initial assumptions for the EFA (Table 6.8) (Kaiser, 1974; Bartlett, 1954). Ten components emerged with an eigenvalue >1 and help explain 66.38% of the total variance. As a result of factor analysis, two items (i.e. Q14 and Q15) were deleted due to cross-loading between factors or absence of individual/distinct loading. These deleted items which are related to self-attribution bias (Q12 and Q13) merged with overconfidence bias (Factor 1). Therefore, in the second round of EFA, excluding two cross-loaded items, the remaining 39 were run for the purpose of data reduction.

Table 6.8 Statistical Tests for Initial Assumptions of EFA

This table reports the values of KMO for sample adequacy and Bartlett's test of Sphericity for the behavioural biases.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.843
Bartlett's Test of Sphericity	Approx. Chi-Square	8734.285
	df	741
	Sig.	0.000

Table 6.9 presents the values of communalities explained by each item. The results revealed that all the items shared >0.5 communalities with their components. This represents that all the items can be used for further analysis.

Table 6.9 Communalities Shared by Individual Items

This table shows the values of communalities explained by each item. OS = overconfidence and self-attribution bias, DE = disposition effect, ANCH = anchoring bias, REP = representativeness bias, MA = mental accounting bias, FAM = familiarity bias, AVL = availability bias, HS = hindsight bias, EM = emotional bias, and HERD = herding bias.

Items	Initial	Extraction	Items	Initial	Extraction
OS1	1.000	0.651	FAM2	1.000	0.819
OS2	1.000	0.540	FAM3	1.000	0.811
OS3	1.000	0.577	AVL1	1.000	0.815
OS4	1.000	0.540	AVL2	1.000	0.742
OS5	1.000	0.501	AVL3	1.000	0.641
OS6	1.000	0.592	HS1	1.000	0.723
DE1	1.000	0.718	HS2	1.000	0.694
DE2	1.000	0.656	HS3	1.000	0.602
DE3	1.000	0.639	EM1	1.000	0.544
ANCH1	1.000	0.727	EM2	1.000	0.637
ANCH2	1.000	0.635	EM3	1.000	0.581
ANCH3	1.000	0.720	EM4	1.000	0.556
ANCH4	1.000	0.702	EM5	1.000	0.615
REP1	1.000	0.649	EM6	1.000	0.568
REP2	1.000	0.733	HERD1	1.000	0.723
REP3	1.000	0.605	HERD2	1.000	0.775
MA1	1.000	0.632	HERD3	1.000	0.728
MA2	1.000	0.708	HERD4	1.000	0.778
MA3	1.000	0.744	HERD5	1.000	0.562
FAM1	1.000	0.709			

Extraction Method: Principal Component Analysis

Table 6.10 shows the results of eigenvalues and the total variance explained by each component. A number of factors that contributed an eigenvalue >1 were only significant and the remaining were omitted (Hair *et al.*, 2010; Tabachnick and Fidell, 2007). Table 6.10 displays the results of only the first 12 components where 10 components had an eigenvalue >1 . These 10 components explained a total variance of 66.38% (see column Cumulative %) which is higher than the suggested value (i.e., $>60\%$). Thus, only 10 components were retained and the others were discarded.

Further, Scree test criterion was used for determining the number of components. The Scree test is used to plot the graph for latent roots against the number of components in their extraction order, and the shape of the curve within the plot is used to decide the cut-off point (Hair *et al.*, 2010).

Table 6.10 Eigenvalues and Variance Extracted by Each Component

This table shows the results of eigenvalues and the total variance explained by each component.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	7.621	19.542	19.542	7.621	19.542	19.542	3.618
2	4.389	11.254	30.796	4.389	11.254	30.796	3.327
3	2.510	6.435	37.231	2.510	6.435	37.231	3.173
4	2.311	5.927	43.157	2.311	5.927	43.157	2.716
5	1.934	4.958	48.116	1.934	4.958	48.116	2.546
6	1.823	4.674	52.790	1.823	4.674	52.790	2.275
7	1.508	3.867	56.658	1.508	3.867	56.658	2.213
8	1.371	3.515	60.173	1.371	3.515	60.173	2.091
9	1.300	3.334	63.507	1.300	3.334	63.507	1.988
10	1.123	2.879	66.386	1.123	2.879	66.386	1.943
11	0.910	2.333	68.719				
12	0.822	2.108	70.826				

Extraction Method: Principal Component Analysis

The shape of the plot decreases from the first component having the maximum eigenvalue towards the lowest one until it reaches the last factor having the minimum eigenvalue (Tabachnick and Fidell, 2007). The change in the shape of the plot shows there is a clear difference between components of importance having an eigenvalue >1 and factors omitted having an eigenvalue <1 (Hair *et al.*, 2010; Pallant, 2007). In the

present study, inspection of the Scree plot (Figure 6.1) confirms a similar number of factors extracted using Kaiser’s latent root criterion, that is, eigenvalue >1. The graph presents a clear interruption between 10 and 12 components. Components 1-10 explained much more variance than the remaining components did.

Figure 6.1 Scree Plot of all the Components

This figure presents the scree plot between eigenvalue and component number to determine the number of factor for behavioural biases.

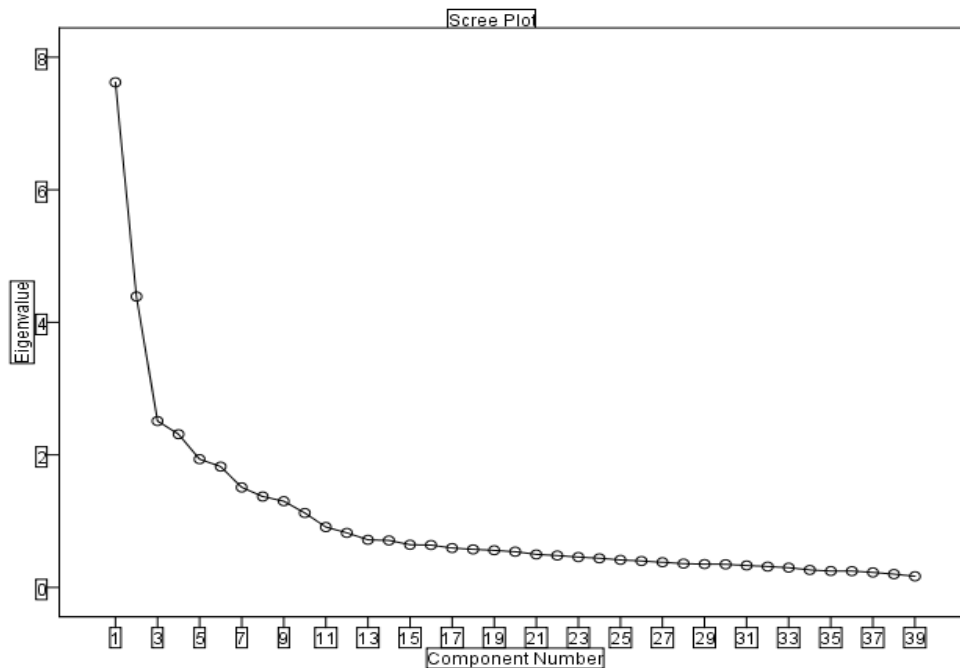


Table 6.11 presents the rotated pattern matrix with a 10-factor solution. It is suggested that the absolute correlation between a component and its measurement item (i.e. factor loading) should be >0.7 ($\sqrt{0.5}$) (Henseler *et al.*, 2009). Moreover, Churchill (1979) suggested that researchers should delete items having a factor loading <0.4. The results indicate that items were loaded on 10 factors varying from 0.589 to 0.883 and that they satisfied the minimum factor loading criteria (Hair *et al.*, 2010; Churchill, 1979; Pallant, 2007). The consistency of each component with their relevant items is determined using Cronbach’s α measure (Cronbach, 1951; Nunnally, 1978). The 10 components resulting from the factor analysis are as follows:

Table 6.11 Rotated Component Matrix from PCA

This table shows the factor loadings of different behavioural biases from using PCA. OS = overconfidence and self-attribution bias, DE = disposition effect, ANCH = anchoring bias, REP = representativeness bias, MA = mental accounting bias, FAM = familiarity bias, AVL = availability bias, HS = hindsight bias, EM = emotional bias, and HERD = herding bias.

Items	Component									
	1	2	3	4	5	6	7	8	9	10
	OS	DE	ANCH	REP	MA	FAM	AVL	HS	EM	HERD
OS1	0.776									
OS2	0.714									
OS4	0.710									
OS3	0.706									
OS6	0.657									
OS5	0.631									
DE2		0.804								
DE1		0.797								
DE3		0.746								
ANCH1			0.775							
ANCH3			0.772							
ANCH2			0.750							
ANCH4			0.717							
REP2				0.808						
REP1				0.692						
REP3				0.639						
MA2					0.818					
MA3					0.816					
MA1					0.647					
FAM2						0.883				
FAM3						0.853				
FAM1						0.793				
AVL1							0.802			
AVL3							0.760			
AVL2							0.757			
HS1								0.824		
HS2								0.804		
HS3								0.680		
EM5									0.705	
EM6									0.691	
EM2									0.687	
EM3									0.671	
EM4									0.665	
EM1									0.589	
HERD4										0.855
HERD1										0.838
HERD2										0.838
HERD3										0.802
HERD5										0.720
Cronbach's α	0.818	0.792	0.818	0.733	0.786	0.863	0.786	0.719	0.812	0.889

Note: Rotation converged in seven iterations from PCA

Factor 1: Overconfidence and self-attribution bias (OS). Investors who are overconfident have unwarranted faith in their intuitive reasoning, abilities and judgements (Pompian, 2006). Because self-attribution bias can lead to overconfidence, these two biases have a strong association (Mishra and Metilda, 2015). Two items were deleted due to either poor loading or cross-loading and the remaining six items were loaded on a single component. The factor has six items with average factor loading and a Cronbach's α of 0.818. The highest loaded item was OS1, which indicates that individuals feel that they are experienced and behave overconfidently while making investment decisions.

Factor 2: Disposition effect (DE). Investors scoring high on disposition bias exhibit a tendency to realize gains but are reluctant to realize losses. That is, these investors tend to sell shares whose price has increased, while they keep assets that have dropped in value. The factor comprised of three items with high factor loadings and a Cronbach's α of 0.792. The highest item loaded was DE2, which suggests that respondents were reluctant to realize losses.

Factor 3: Anchoring bias (ANCH). This factor deals with individuals who make estimates by starting from an initial value (i.e., reference point). For investors, the stock purchase price is an important reference point. The factor comprised of four highly loading items with a Cronbach's α of 0.818. The highest item loaded was ANCH1, which indicates that before purchasing the stock, the respondents compared the current stock price with their recent 52-week high and low price.

Factor 4: Representativeness bias (REP). This factor measures whether investors rely on past performance for making any stock purchase. They believe that if past returns of the stocks are good, good performance will continue in the future. The factor comprised of four highly loading items with a Cronbach's α of 0.733. The highest item loaded was REP2, which suggests that respondents tend to rely on past performance to buy stocks because they believe that good performance will continue.

Factor 5: Mental accounting (MA). Investors who score high on this factor tend to treat each element of their investment portfolio separately. Instead of analysing the total outcome of the portfolio, they tend to analyse each stock or asset separately. All the items were loaded on a single factor with Cronbach's α 0.786. The highest item loaded was

MA2, which suggests that the respondents' decision to buy gold or a house does not affect their investment in the stock market.

Factor 6: Familiarity bias (FAM). This factor measures an investor's attitude towards familiar assets. An investor with a high score keeps investing in assets with high media attention or those in which family or friends invest. The factor comprised of three items with high factor loadings and a Cronbach's α of 0.863. The highest item loaded was FAM2, which indicates that the respondents preferred to invest in those shares in which their father had invested.

Factor 7: Availability bias (AVL). This mental shortcut relies on the most recent, relevant, and dramatic event that comes to mind when evaluating an asset. All the three items were loaded on a single factor with a Cronbach's α of 0.786. The highest item loaded was AVL1, which suggests that respondents prefer to buy the stock on days when the value of the Nifty-50 Index increases.

Factor 8: Hindsight bias (HS). This factor measures an investor's tendency to believe (after the event) that the onset of the past event was predictable and obvious. Generally, investors suffering from hindsight bias become more overconfident and predict that they can forecast the future in a better way. The factor comprised of three items with high factor loadings and a Cronbach's α of 0.719. The highest item loaded was HS1, which shows that respondents were able to predict the collapse of Sensex in the wake of the 2007 global financial crisis.

Factor 9: Emotional bias (EM). This factor pertains to items related to loss aversion bias and regret aversion bias loaded on a single factor. For investors, losses loom greater than equivalent gains. All the items were loaded on a single factor with Cronbach's α 0.812. The highest item loaded was EM5, which indicates that the respondents felt more sorrow about holding losing stocks too long than about selling winning stocks too soon.

Factor 10: Herding bias (HERD). This dimension measures an investor's tendency to imitate the judgements of others. Investors often rely on the actions of friends, relatives and colleagues when buying and selling stocks to make their own decisions. The factor comprised of five items with high factor loadings and a Cronbach's α of 0.889. The

highest item loaded was HERD4, which shows that the respondents consulted others (family, friends or colleagues) before purchasing stocks.

6.5.2 EFA of Personality Traits

After examining and clarifying measurement items related to the respondents' behavioural biases, 23 items of the Big Five personality traits NEU, EV, OP, AG and CON were scanned using EFA. Table 6.12 indicates that the KMO measure of sampling adequacy was adequate at 0.835 (i.e., >0.6) and Bartlett's test was significant ($p < 0.005$), which satisfies the initial assumptions for the EFA (Kaiser, 1974; Bartlett, 1954).

Table 6.12 KMO and Bartlett's Test for Personality Traits

This table reports the values of KMO for sample adequacy and Bartlett's test of Sphericity for the personality traits.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.835
Bartlett's Test of Sphericity	Approx. Chi-Square	5049.575
	df	210
	Sig.	0.000

Table 6.13 shows the results of variance extracted and eigenvalues by each component using Kaiser's criterion. The results reveal that totally five components were extracted with eigenvalues > 1. The individual variance explained by each component was 24.62%, 16.76%, 12.34%, 8.09% and 6.27% and cumulative variance by five components was 68.09%. As a result of factor analysis, one items was deleted, that is, OP1 due to poor loading (<0.4). Therefore, in the second round of EFA, excluding one poorly loaded item, the remaining 21 were run for data reduction purpose.

Further, Scree plot criterion was used to determine the number of factors. Figure 6.2 shows a clear difference in the shape at the fifth and sixth components. A similar number of components were extracted using Kaiser's criterion. Therefore, only five components were retained and the others were rejected.

Table 6.13 Eigenvalues and Variance Extracted by Each Component of Personality Traits

This table shows the results of eigenvalues and the total variance explained by each component of personality traits

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	5.171	24.624	24.624	5.171	24.624	24.624	3.242
2	3.521	16.765	41.389	3.521	16.765	41.389	3.227
3	2.592	12.343	53.733	2.592	12.343	53.733	3.119
4	1.699	8.091	61.824	1.699	8.091	61.824	2.534
5	1.318	6.274	68.098	1.318	6.274	68.098	2.178
6	0.713	3.395	71.493				
7	0.642	3.057	74.549				
8	0.592	2.820	77.370				
9	0.538	2.561	79.931				
10	0.516	2.456	82.386				

Extraction Method: PCA

Figure 6.2 Scree Plot (Personality Traits)

This figure presents the scree plot between eigenvalue and component number to determine the number of factor

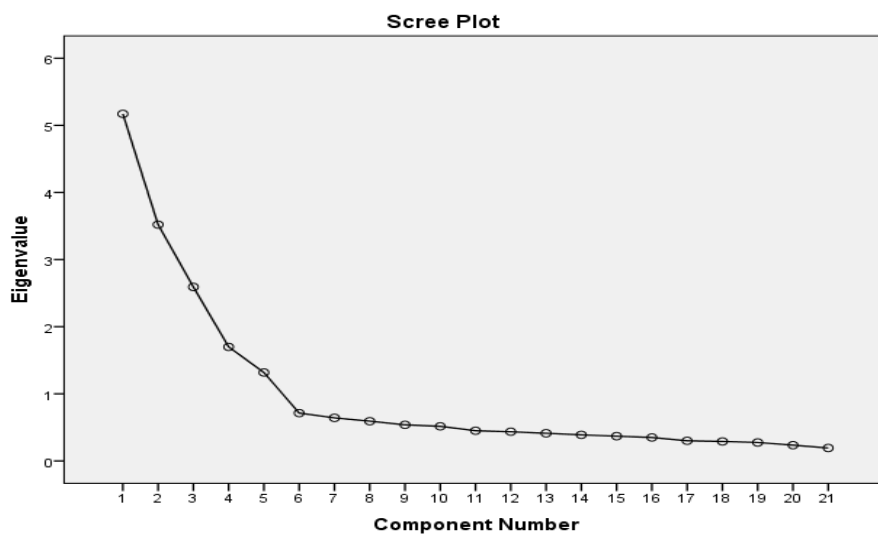


Table 6.14 presents the rotated component matrix with the five-factor solution. For measuring the Big Five personality traits, all the items were adopted from a study

conducted by Mayfield *et al.* (2008). The details of each factor with respect to reliability measure, that is, Cronbach's α value, are given below:

Table 6.14 Rotated Component Matrix (Personality Traits)

This table shows the factor loadings of Big Five personality traits from using PCA. NEU = neuroticism, EV = extraversion, OP = openness to experience, AG = agreeableness, and CON = conscientiousness.

Items	Component				
	1	2	3	4	5
NEU2	0.838				
NEU3	0.821				
NEU4	0.771				
NEU5	0.769				
NEU1	0.763				
EV3		0.845			
EV4		0.837			
EV1		0.770			
EV2		0.743			
OP3			0.769		
OP4			0.763		
OP5			0.755		
OP2			0.742		
AG2				0.836	
AG3				0.821	
AG1				0.813	
CON5					0.819
CON3					0.813
CON2					0.792
CON4					0.753
CON1					0.730
Cronbach's α	0.857	0.864	0.822	0.785	0.857

Note: Rotation converged in five iterations by PCA

Factor 1: Neuroticism (NEU). This factor extracted the items which observed Neuroticism trait, and it revealed that investors with a high score on this trait were Anxious, impulsive, tensed and shy. Five items were used for the factor analysis and all the items were loaded on a single factor with a 0.857 Cronbach's α value. The highest item loaded was NEU2, which reveals that respondents with neuroticism felt that they were under a great deal of stress and felt like they were broken.

Factor 2: Extraversion (EV). Investors scoring high on extraversion trait were energetic, active, social and cheerful. That is, these people really enjoyed talking with others. The

factor comprised of four items with high factor loadings and a Cronbach's α of 0.864. The highest item loaded was EV3, which suggests that respondents felt that they were cheerful and high spirited.

Factor 3: Openness to experience (OP). This factor measures whether individuals were curious, imaginative, original, had wide interests and insightful in decision making. Item OP1 was deleted because of poor factor loading. The remaining three items were loaded with factor loadings and a Cronbach's α of 0.822.

Factor 4: Agreeableness (AG). This factor provides information whether investors were sceptical, kind, generous, sympathetic and trustful while making decisions. Three items were applied for the factor analysis and they were above the suggested value of 0.5 (Hair *et al.*, 2010). Cronbach's α for the items loaded on the factor was 0.785.

Factor 5: Conscientiousness (CON). This factor extracted the items which measured the extent to which investors were organized, reliable, responsible, efficient and determined in their decision making. The factor comprised of five items with high factor loadings and a Cronbach's α value of 0.857.

6.6 RELIABILITY OF THE INSTRUMENT

The examination of the survey instrument is also known as analysis of psychometric properties, which entails satisfactory reliability of the measurement items (Hair *et al.*, 2010; Churchill, 1979). Reliability of scale facilitates the accuracy, consistency of measures and avoids biasness relating to the reproducibility of measurement items within different samples and time prospect.

The present study applied the Cronbach's α coefficient method to test the reliability of variables. This is because Cronbach's α (inter-item consistency reliability) is easier to compute and is well accepted within academic research (Cronbach, 1951; Nunnally, 1978; Tabachnick and Fidell, 2007). Cronbach's $\alpha > 0.7$ is normally acceptable; however, it may be accepted at 0.60 (Robinson *et al.*, 1991; Sekaran, 2000). Annexure V shows that all the items in each component are highly correlated with each other. The value of Cronbach's α for each construct is higher than the recommended value of 0.7, which suggests that all the items in each construct are closely related (Hair *et*

al., 2010). Almost all of them are considered to be good (>0.80), and only a few are just acceptable (in the 0.7 range).

Further, Hair *et al.* (2010) suggested that reliability or internal consistency of scale can also be measured by examining the item-to-total correlation (the correlation of the item to the summated scale score) and the inter-item correlation (the correlation among items). The recommended values of item-to-total correlation are ≥ 0.50 , and for inter-item correlation, they are ≥ 0.30 (Robinson *et al.*, 1991; Hair *et al.*, 2010). The results indicate that except for a few cases (i.e., HS3 and AVL3), the item-to-total correlation value is higher than the recommended value of 0.5. This indicates that measuring items of a specific construct share a high proportion of variance in common (Hair *et al.*, 2010). Besides, Cohen (1988) suggested that correlation (r) = 0.10-0.29 is small, $r = 0.30$ -0.49 is medium and $r = 0.50$ -1.00 is high correlation.

Further, inter-item correlation values of each item are also higher than the acceptable limit of 0.3, which indicates the presence of a higher correlation between items of the same construct (Robinson *et al.*, 1991). These values of Cronbach's α coefficient suggest that the instrument in the main survey is a reliable measurement tool.

6.7 DATA ANALYSIS

This section elucidates the results of the research objectives of the study. The analysis reveals the level of financial literacy among individual investors using descriptive statistics. It further states the prominent behavioural biases among individual investors using the summated score of measurement items related to a particular set of variables. Further, the study analyses the influence of financial literacy and socio-demographic variables using the multiple regression and logistic regression techniques. This is followed by examining the influence of socio-demographic variables on financial literacy using logistic regression. Finally, it analyses the relationship between personality traits and behavioural biases of individual investors using SEM.

6.7.1 Financial Literacy of Individual Investors

This study begins with the analysis of financial literacy level among individual investors. It used an exam-type questionnaire of financial literacy that includes knowledge about risk and return, compound interest, portfolio diversification, investment management, etc.

The responses to financial literacy questions are divided into three categories, namely, agree, disagree and do not know. The “do not know” option was used to deter the respondents from predicting the correct answer if they did not know the answer. It is observed in previous studies that “do not know” answers identified respondents with very low levels of financial knowledge (Lusardi *et al.*, 2010; Lusardi and Tufano, 2009; Lusardi and Mitchell, 2006). Therefore, such responses can be compared to an incorrect answer.

Table 6.15 reveals the overall respondent scores on the financial literacy test. The results indicate that on average respondents answered 56.08 percent of the questions correctly. The median percentage of correct answers is 58.33 percent. In the present study, the mean percentage of correct scores is inferred using the benchmark set in previous research studies (Chen and Volpe, 1998; 2002). The benchmark divided percentage correct scores into three categories: >80% (High Literacy), 60-79% (Medium Literacy) and <60% (Low Literacy). Thus, based on this benchmark, it is evident that individual investors have a low level of financial literacy. Moreover, the findings suggest that investors need to significantly improve their financial literacy.

Table 6.15 Overall Financial Literacy Level

This table presents the values of mean, median, minimum, maximum and standard deviation to present overall financial literacy score of respondents.

Central tendency	Value	Percentage
Mean	6.73	56.08
Median	7	58.33
Minimum	0	
Maximum	12	
Standard Deviation	2.351	

Table 6.16 shows the percentage of respondents who answered each question correctly, sorted according to the highest score. It is clear from table 6.15 that the respondents (87.4 percent) earned the highest score on question no 4, which was related to compound interest. This indicates that investors know the concept of compound interest very well. Further, the question related to diversification of portfolio was correctly answered by 82.4 % respondents. This was followed by the question related to risk and return, which was correctly answered by 71.5 respondents. These three questions

were related to basic financial literacy. This thus indicates that individuals have knowledge about basic financial literacy. These findings are consistent with Arrondel *et al.* (2015). They suggested that stockholders are more likely to provide correct answers to the basic financial literacy questions. Two other subjects had scores higher than the median, namely, knowledge about standard settlement time of shares and earnings from investment.

On the contrary, the respondents (24.8%) were least knowledgeable about the question related to earning per share and P/E ratio. In six more questions, the respondents scored lower than the median value. These questions were related to the following subjects arranged from the lower to the higher score: closing price of the index, knowledge about Market efficiency and technical analysis, relationship between interest rate and bond prices, meaning of Beta, Returns from equity, mutual funds and bonds, Return on assets and return on equities. This indicates that the respondents do not have adequate financial knowledge.

Table 6.16 Percentage of Correct Answers for Each Question

This table shows the percentage of correct answer for each question of financial literacy and their ranks.

Q. No.	Question subject	% of correct answers	Rank
4	Compound interest	87.4	1
2	Diversification of portfolio	82.4	2
1	Risk and return	71.5	3
12	Standard settlement time of shares	69.5	4
3	Earnings from investment	64.9	5
10	Return on assets and return on equities	56.1	6
7	Returns from equity, mutual funds and bonds	54.3	7
9	Beta	50.1	8
6	Relationship between interest rate and bond prices	48.3	9
5	Market efficiency and technical analysis	37.1	10
11	Closing price of Index	27.9	11
8	Concept of Earning per share and P/E ratio	24.8	12

The results are in line with the findings of Bhushan and Medury (2013). This indicates that the level of financial literacy among individual investors is <60%, which is unsatisfactory and needs to be significantly improved. Further, Agarwalla *et al.* (2013)

also concluded that the level of financial literacy is poor among young working professionals in India.

6.7.2 Behavioural Biases of Individual Investors

This study further examines the 10 behavioural biases in individual investors, as extracted from the EFA. The average of each participant's response for the measurement items loaded on the same construct was taken for analysing the behavioural biases of individual investors. Table 6.16 shows the ranking of behavioural biases in the order of their prominence among individual investors. The results indicate that out of 10 biases, means of seven biases are >3 . This shows that respondents are inclined to having different behavioural biases in investment decision making. These findings are consistent with those of previous studies (Sahi and Arora, 2012; Prosad *et al.*, 2015). Mental accounting, representativeness and overconfidence and self-attribution biases have the highest mean scores of 3.43, 3.37 and 3.36, respectively.

However, familiarity, availability and hindsight biases have mean scores <3 . This suggests that most respondents are not prone to these behavioural biases. Hence, our findings support the view that individual investors do not always act rationally. Instead, they are often guided by emotions, heuristics and other biases that affect their investment decision making. Based on findings, these prominent seven biases will be used for further analysis.

Table 6.17 Ranking of Biases in the Order of Prominence

This table reports the ranking of behavioural biases based on their mean values in order of their prominence among individual investors.

Bias Name	N	Mean	Rank
Overconfidence and self-attribution	501	3.36	3
Disposition effect	501	3.13	7
Anchoring	501	3.33	4
Representativeness	501	3.37	2
Mental accounting	501	3.43	1
Familiarity	501	2.40	10
Availability	501	2.69	8
Hindsight bias	501	2.64	9
Emotional bias	501	3.28	5
Herding	501	3.17	6

6.7.2.1 Framing Effect- This is a cognitive error that leads individuals to process and react to information based on the way it is presented. This tends to affect their decision making. To examine the framing effect, the questionnaire included a hypothetical situation with two decision frames in terms of gain and loss. However, the outcomes of the each option in every decision frame were similar. The framing effect was identified based on the responses of these two frames. If respondents chose sure gain (1a) in the first decision that was related to gains and select probabilistic loss (2b) in the second decision, then they were considered to be prone to framing effect. If respondents selected any other combination, they were not considered disposed to framing effect. Table 6.18 shows that 30.74% (n=154) respondents tended to be influenced by framing effect in their decision making. However, 69.26% (n=347) respondents show no framing effect in their decision making. The results indicate that framing effect is less prevalent in individual investors as 30.74% displayed this bias in their decision making.

Table 6.18 Identification of Framing Effect

This table presents the number of individual investors with or without framing effect

		Yes	No	Total
Framing Effect	Count	154	347	501
	Percentage	30.74	69.26	100

6.7.3 Effect of Financial Literacy and Socio-Demographic Variables on Behavioural Biases

Research studies (Dhar and Zhu, 2006; Jonsson *et al.*, 2017; Barber and Odean, 2001; Bhandari and Deaves, 2006; Lin, 2011) reported that financial literacy and socio-demographic variables significantly influence behavioural biases of individual investors. To examine the effect of financial literacy and socio-demographic variables including gender, age, marital status, education, occupation, income and investment experience on behavioural biases, multiple regression was applied. Regression analysis is mostly used to predict the outcome of a variable from several predictor variables. According to Hair *et al.* (2010), regression analysis is a statistical technique that can be used to examine the relationship between a single criterion and several predictor variables.

The present study used behavioural biases as the dependent variable and financial literacy and socio-demographics of the individual investors as the independent variable.

Criterion variables used in the multiple regressions are OS, DE, ANCH, REP, MA, EM and HERD. All the dependent variables were measured on an interval scale. However, predictor variables, such as the score of financial literacy were continuous and socio-demographics were categorical.

This study examines the relationship of behavioural biases with the help of eight predictor variables. The predictor variables, namely, age, education, occupation, income and investment experience, are required to be converted to dummy variables to satisfy the assumption of measurement. Dummy variables represent the groups using only zeros and ones. Eighteen dummy variables were created for the respondent's gender, age, marital status, education, occupation, income- level and investment experience. Table 6.19 shows the description of reference categories and dummy variables of all categorical predictor variables involved in the multiple regression analysis. This indicates that for gender, the reference category consists of male respondents.

Table 6.19 Categorical Variables in the Regression Model

This table presents the description of reference categories and dummy variables used in the regression analysis.

S. No.	Independent Variables	Reference Category	Coding of Dummy Variables
1	Gender(Nominal)	Male=0	Female=1
2	Age (Ordinal)	18 to 30 years=0	Age 2= 31-45 Age 3=46-60 Age 4=More than 60
3	Marital Status (Nominal)	Married=0	Unmarried=1
4	Education (Ordinal)	Up to schooling=0	Edu 2= Graduate Edu 3=Postgraduate Edu 4= Doctorate
5	Occupation (Ordinal)	Private sector employees=0	Ocu 2= Public sector employee Ocu 3= Self-employed Ocu 4= Retired Ocu 5= Others
6	Income (Ordinal)	less than Rs 3 lakhs=0	Inc 2= 3-6 lakhs Inc 3= >6-10 lakhs Inc 4 =>10 lakhs
7	Investment Experience(Ordinal)	Less than two years of experience=0	Exp 2= 2-5 years Exp 3= >5-10 years Exp 4= >10 lakhs

For age, the reference category comprises respondents belonging to the age group 18-30 years. For marital status, the reference category includes married respondents. For education, the reference category comprises respondents with education up to schooling, which means that the respondents have a school certificate up to 10+2. For occupation, the reference category has private sector employees. For income, the reference category includes respondents with an annual income of less than Rs 3 lakhs. For investment experience, the reference category comprises respondents having less than two years of experience.

The following regression model displays the possible model in predicting the outcome variable:

$$BB_{OS, DE, ANCH, REP, MA, EM, HERD} = \alpha + \beta_1 FL_i + \beta_2 Gender_i + \beta_3 Age_i + \beta_4 Marital\ status_i + \beta_5 Edu_i + \beta_6 Ocu_i + \beta_7 Inc_i + \beta_8 Exp_i + \varepsilon \dots \dots \dots eq\ 6.1$$

Here, BB = behavioural biases; OS = overconfidence and self-attribution bias; DE= disposition effect; ANCH= anchoring bias; REP= representativeness bias; MA= mental accounting; EM= emotional bias; HERD= herding bias; FL= financial literacy; Edu = education level; Ocu= occupation; Inc= income and Exp= investment experience. The discussion on regression results for seven outcome variables under study is as follows:

Model 1. Effect of Financial Literacy and Socio-demographic Variables on Overconfidence Bias

Table 6.20 gives the results of regression analysis for overconfidence bias and predictor variables. Durbin-Watson statistics were applied to examine the assumption of independence among residuals. It has been specified that for any two observations, the residual terms should be uncorrelated or independent. The test statistic may vary between 0 and 4 with a value of 2, which means that residuals are uncorrelated. A value >2 shows a negative correlation between adjacent residuals, whereas a value <2 indicates otherwise. Field (2009) proposed that values <1 or >3 are absolutely a cause for concern. Table 6.20 indicates that the value of Durbin-Watson was 1.989. This implies that there is no issue of autocorrelation. Further, multicollinearity was tested by VIF and is not to be assumed. This regression model is significant (F = 4.35) at the 0.01 level and the Model 1’s explanatory power is about 14.7%. The results also indicate that gender, occupation and

investment experience are statistically significant at the 5% significance level. The final model can be represented as follows:

$$BB_{OS} = 2.102 - 0.187Gender + 0.320Ocu4 + 0.331Exp1 + 0.417Exp2 + 0.377Exp3 \dots eq 6.2$$

Table 6.20 Results of Regression Analysis for Overconfidence and Self-attribution Bias

This table reports the results of linear regression on overconfidence bias across financial literacy and socio- demographic characteristics. Numbers in italics show significance at the 0.05 level or higher.

	B Coefficient	P value	VIF
Constant	2.102	0.000	
Financial Literacy	0.007	0.721	1.148
Gender (male=0)	-0.187	<i>0.023</i>	1.139
Age (18-30=0)			
Age 2	0.041	0.451	1.513
Age 3	-0.084	0.336	1.49
Age 4	-0.293	0.107	2.704
Marital status (Married=0)	0.051	0.330	1.479
Education (Up to schooling=0)			
Edu 2	-0.121	0.259	6.225
Edu 3	-0.062	0.560	6.387
Edu 4	0.063	0.698	1.8
Occupation(Private sector employee=0)			
Ocp 2	-0.088	0.228	1.148
Ocp 3	0.048	0.360	1.255
Ocp 4	0.320	<i>0.050</i>	2.491
Ocp 5	0.028	0.808	1.111
Income (< 3 lakhs=0)			
Inc 2	0.021	0.720	1.794
Inc 3	0.041	0.538	1.825
Inc 4	0.001	0.989	1.534
Investment Experience (< 2 years=0)			
Exp 2	0.331	<i>0.000</i>	1.389
Exp 3	0.416	<i>0.000</i>	1.555
Exp 4	0.377	<i>0.000</i>	1.749
R ²		0.147	
F		4.35***	
Durbin-Watson		1.989	

*Note: n=501, β = unstandardized coefficient; p= significance value; gender, age, marital status, education, occupation, income and investment experience converted into dummy variables; multicollinearity is tested by Variation Inflation factor and is not to be assumed; Autocorrelation is excluded by Durbin-Watson test; *= significant at 0.1, **= significant at 0.05 and ***= significant at 0.01 level.*

The β coefficient value shows the direction and the magnitude of the relationship between the dependent and predictor variables. Coefficient of gender is negatively related to overconfidence and self-attribution bias. This indicates that Females are less confident than are males. Similarly, coefficient of a subcategory of occupation (i.e., retired) is positively and statistically significant at the 5% level of significance. This implies that retired investors are more confident than are private sector employees. Further, a positive relationship between investment experience and overconfidence bias indicates that investors who have more investment experience are prone to greater overconfidence and self-attribution bias than are investors who have less than two years of investment experience. The findings of the effect of gender and investment experience on overconfidence are consistent with those of previous studies (Barber and Odean, 2001; Bhandari and Deaves, 2006; Lin, 2011, Kumar and Goyal, 2016; Mishra and Metilda; 2015). These findings indicate that males and respondents with high investment experience are more confident than others. These results support the hypotheses $H2_a$, $H6_a$, $H8_a$ and do not support hypotheses $H1_a$, $H3_a$, $H4_a$, $H5_a$ and $H7_a$.

Model 2. Effect of Financial Literacy and Socio-demographic Variables on Disposition Effect

Table 6.21 presents the results of regression analysis for disposition effect and predictor variables. Durbin-Watson statistics were applied to examine the assumption of independence among residuals. The value of Durbin-Watson (1.823) indicates that there is no concern of autocorrelation. Table 6.21 shows that the regression model is significant ($F = 2.59$) at the 0.01 level, but the explanatory power of Model 2 is only 9.3%. The results show that coefficients of financial literacy and demographic characteristics (i.e., gender, education, occupation and investment experience) are statistically significant. The final model can be represented as follows:

$$BB_{DE} = 3.072 - 0.030 FL + 0.190Gender - 0.457Edu2 - 0.537 Edu3 - 0.1617Ocp3 + 0.087Exp3 \dots \text{eq 6.3}$$

Table 6.21 Results of Regression Analysis for Disposition Effect

This table reports the results of linear regression for disposition effect and the predictor variables are financial literacy and socio- demographic characteristics. Numbers in italics show significance at the 0.05 level or higher.

	B Coefficient	P value	VIF
Constant	3.072	0.000	
Financial Literacy	-0.030	<i>0.022</i>	1.148
Gender (male=0)	0.190	<i>0.032</i>	1.139
Age (18-30=0)			
Age 2	-0.024	0.743	1.513
Age 3	0.060	0.611	1.49
Age 4	0.263	0.288	2.704
Marital status (Married=0)	-0.002	0.976	1.479
Education (Up to schooling=0)			
Edu 2	-0.457	<i>0.002</i>	6.225
Edu 3	-0.537	<i>0.000</i>	6.387
Edu 4	-0.174	0.426	1.8
Occupation(Private sector employee=0)			
Ocp 2	0.098	0.326	1.148
Ocp 3	-0.161	<i>0.024</i>	1.255
Ocp 4	-0.247	0.263	2.491
Ocp 5	0.011	0.947	1.111
Income (< 3 lakhs=0)			
Inc 2	0.079	0.320	1.794
Inc 3	-0.012	0.891	1.825
Inc 4	-0.114	0.276	1.534
Investment Experience (< 2 years=0)			
Exp 2	0.121	0.105	1.389
Exp 3	0.167	<i>0.087</i>	1.555
Exp 4	-0.106	0.320	1.749
R ²		0.093	
F		2.59***	
Durbin-Watson		1.823	

*Note: n=501, β = unstandardized coefficient; p= significance value; gender, age, marital status, education, occupation, income and investment experience converted into dummy variables; multicollinearity is tested by Variation Inflation factor and is not to be assumed; Autocorrelation is excluded by Durbin-Watson test; *= significant at 0.1, **= significant at 0.05 and ***= significant at 0.01 level.*

The results reveal that financial literacy is negatively related to the disposition effect, which means that an increase in the level of financial literacy leads to a decrease in the disposition effect among investors. These findings are consistent with the results of Dhar and Zhu (2006) and Jonsson *et al.* (2017). They reported that educated and professional investors have a low disposition bias. The coefficients of gender and one

category of investment experience (i.e., > 5-10 years) are positive and statistically significant at the 5% and 10% levels, respectively. This implies that females are more inclined towards disposition effect compared to their reference category. These results are in line with the findings of Hon-snr *et al.* (2012). Similarly, our findings reveal that less experienced investors are more prone to disposition effect than investors having >10 years of experience. In terms of education, graduates and postgraduates have a lower disposition effect than do investors with less education, a finding consistent with that of Dhar and Zhu (2006). Moreover, self-employed individuals are less inclined to the disposition effect than are private sector employees. These results support hypotheses $H1_b, H2_b, H5_b, H6_b, H8_b$ and do not support hypotheses $H3_b, H4_b$ and $H7_b$.

Model 3. Effect of Financial Literacy and Socio-demographic Variables on Anchoring Bias

Table 6.22 presents the results of regression analysis for anchoring bias and predictor variables. Durbin-Watson statistics were applied to examine the assumption of independence among residuals. The value of Durbin-Watson (1.897) indicates that there is no concern of autocorrelation. Table 6.22 shows that regression model of anchoring bias is significant ($F = 1.76$) at the 0.05 level and Model 3 explains 6.5%. The results show that coefficients of age and occupation are statistically significant at the 5% level. The final model can be represented as follows:

$$BB_{ANCH} = 2.727 - 0.160Age2 + 0.495 Ocp4 + 0.377 Ocp5 \dots\dots\dots eq 6.4$$

Our results show that middle-aged investors are negative and statistically significant at the 0.05 level. This finding shows that middle-aged investors (31-45 years old) are less prone to having anchoring bias than are young investors. Further, Table 6.22 indicates that the coefficients of two categories of occupation (i.e., retired investors and others) are positive and statistically significant at the 0.05 level, which denotes that retired investors and those who are housewives are more prone to having anchoring bias than are private sector employees. However, coefficient of financial literacy is negatively related to anchoring bias, but it is not statistically significant. These findings support hypotheses $H3_c, H6_c$ and do not support hypotheses $H1_c, H2_c, H4_c, H5_c, H7_c$ and $H8_c$.

Table 6.22 Results of Regression Analysis for Anchoring Bias

This table reports the results of linear regression for anchoring bias and the predictor variables are financial literacy and socio- demographic characteristics. Numbers in italics show significance at the 0.05 level or higher.

	B Coefficient	P value	VIF
Constant	2.727	0.000	
Financial Literacy	-0.019	0.154	1.148
Gender (male=0)	0.017	0.846	1.139
Age (18-30=0)			
Age 2	-0.160	<i>0.030</i>	1.513
Age 3	-0.038	0.747	1.49
Age 4	-0.017	0.947	2.704
Marital status (Married=0)	-0.008	0.911	1.479
Education (Up to schooling=0)			
Edu 2	-0.108	0.459	6.225
Edu 3	-0.098	0.498	6.387
Edu 4	-0.058	0.791	1.8
Occupation(Private sector employee=0)			
Ocp 2	0.106	0.284	1.148
Ocp 3	-0.058	0.411	1.255
Ocp 4	0.495	<i>0.026</i>	2.491
Ocp 5	0.377	<i>0.018</i>	1.111
Income (< 3 lakhs=0)			
Inc 2	0.048	0.544	1.794
Inc 3	0.033	0.712	1.825
Inc 4	-0.055	0.599	1.534
Investment Experience (< 2 years=0)			
Exp 2	0.039	0.606	1.389
Exp 3	0.052	0.594	1.555
Exp 4	0.012	0.912	1.749
R ²		0.065	
F		1.76**	
Durbin-Watson		1.897	

*Note: n=501, β = unstandardized coefficient; p= significance value; gender, age, marital status, education, occupation, income and investment experience converted into dummy variables; multicollinearity is tested by Variation Inflation factor and is not to be assumed; Autocorrelation is excluded by Durbin-Watson test; *= significant at 0.1, **= significant at 0.05 and ***= significant at 0.01 level.*

Model 4. Effect of Financial Literacy and Socio-demographic Variables on Representativeness bias

Table 6.23 presents the results of regression analysis for representativeness bias and predictor variables. Durbin-Watson statistics were applied to examine the assumption of independence among residuals. The value of Durbin-Watson (1.964) indicates that there

is no concern of autocorrelation. Table 6.23 shows that the regression model is significant (F = 2.48) at the 0.01 level and its explanatory power is 8.9 %. The results indicate that coefficients of age, education, occupation and investment experience are statistically significant at the 1%, 5% and 10% level. The final model can be represented as follows:

$$BB_{REP} = 2.528 - 0.405Age4 - 0.218Edu2 - 0.254Edu3 + 0.672Ocp4 + 0.474Ocp5 + 0.152Exp2 + 0.146Exp3 \dots\dots\dots eq 6.5$$

Table 6.23 Results of Regression Analysis for Representativeness Bias

This table reports the regression results on representativeness bias across financial literacy and socio- demographic characteristics. Numbers in italics show significance at the 0.05 level or higher.

	B Coefficient	P value	VIF
Constant	2.528	0.000	
Financial Literacy	-0.002	0.849	1.148
Gender (male=0)	-0.063	0.412	1.139
Age (18-30=0)			
Age 2	0.028	0.658	1.513
Age 3	-0.064	0.531	1.49
Age 4	-0.405	0.058	2.704
Marital status (Married=0)	0.083	0.181	1.479
Education (Up to schooling=0)			
Edu 2	-0.218	0.085	6.225
Edu 3	-0.254	0.044	6.387
Edu 4	-0.242	0.201	1.8
Occupation(Private sector employee=0)			
Ocp 2	0.072	0.402	1.148
Ocp 3	0.048	0.433	1.255
Ocp 4	0.672	0.000	2.491
Ocp 5	0.474	0.001	1.111
Income (< 3 lakhs=0)			
Inc 2	-0.103	0.133	1.794
Inc 3	0.021	0.787	1.825
Inc 4	-0.055	0.542	1.534
Investment Experience (< 2 years=0)			
Exp 2	0.152	0.019	1.389
Exp 3	0.146	0.084	1.555
Exp 4	0.054	0.561	1.749
R ²		0.089	
F		2.48***	
Durbin-Watson		1.964	

*Note: n=501, β = unstandardized coefficient; p= significance value; gender, age, marital status, education, occupation, income and investment experience converted into dummy variables; multicollinearity is tested by Variation Inflation factor and is not to be assumed; Autocorrelation is excluded by Durbin-Watson test; *= significant at 0.1, **= significant at 0.05 and ***= significant at 0.01 level*

Our results show that the coefficients of age and education are negative and statistically significant. This implies that investors who are >60 are less prone to representativeness compared to younger investors. Similarly, graduates and postgraduates are less inclined to having representativeness bias than are those with education up to schooling. These findings are consistent with those of Ates *et al.* (2016). These authors reported that investors with lower education are more influenced by representative bias compared to higher educated investors. Further, our results revealed that the coefficients of occupation and investment experience are positive and statistically significant. Similarly, retired investors show more representativeness bias in their investment decision making than do private sector employees. This finding shows that greater investment experience is associated with greater representativeness bias relative to less experienced investors. These findings are similar to those of Chen *et al.* (2007). These authors suggested that “*experienced investors are not always less prone to behavioural biases than are inexperienced*” ones. These results support hypotheses $H3_d, H5_d, H6_d, H8_d$ and do not support hypotheses $H1_d, H2_d, H4_d$ and $H7_d$.

Model 5. Effect of Financial Literacy and Socio-demographic Variables on Mental Accounting

Table 6.24 presents the results of regression analysis for mental accounting bias. The value of Durbin-Watson (2.064) indicates that there is no issue of autocorrelation. Table 6.24 shows that regression Model 5 is significant (F = 4.52) at the 0.01 level and its explanatory power is 15.2%. The results indicate that coefficients of all the predictor variables are statistically significant at the 1%, 5% and 10% levels. The final model can be represented as follows:

$$BB_{MA} = 2.090 + 0.040FL - 0.206Gender + 0.219Age2 + 0.251Marital\ status - 0.419Edu4 + 0.460\ Ocp\ 4 + 0.352Ocp5 + 0.135\ Inc\ 2 + 0.183\ Inc\ 3 + 0.152Exp2 + 0.194Exp3 + 0.312Exp4..... eq\ 6.6$$

According to Table 6.24, the coefficients of all the variables are statistically significant. This indicates a positive association between financial literacy and mental accounting. As financial literacy increases, so does mental accounting bias. Females and investors having a doctorate degree are less inclined to exhibiting mental accounting bias relative to the reference category. The graduate and postgraduate categories in education,

retired and other categories of occupation and investors who have more experience are less prone to mental accounting bias than are those in the reference category. These results support hypotheses $H1_e, H2_e, H3_e, H4_e, H5_e, H6_e, H7_e$ and $H8_e$.

Table 6.24 Results of Regression Analysis for Mental Accounting

This table reports the regression results on mental accounting across financial literacy and socio- demographic characteristics. Numbers in italics show significance at the 0.05 level or higher.

	B Coefficient	P value	VIF
Constant	2.090	0.000	
Financial Literacy	0.040	<i>0.001</i>	1.148
Gender (male=0)	-0.206	<i>0.012</i>	1.139
Age (18-30=0)			
Age 2	0.219	<i>0.001</i>	1.513
Age 3	0.149	0.174	1.49
Age 4	-0.272	0.237	2.704
Marital status (Married=0)	0.251	<i>0.000</i>	1.479
Education (Up to schooling=0)			
Edu 2	-0.133	0.327	6.225
Edu 3	-0.108	0.425	6.387
Edu 4	-0.419	<i>0.040</i>	1.8
Occupation(Private sector employee=0)			
Ocp 2	-0.118	0.200	1.148
Ocp 3	-0.076	0.252	1.255
Ocp 4	0.460	<i>0.025</i>	2.491
Ocp 5	0.352	<i>0.017</i>	1.111
Income (< 3 lakhs=0)			
Inc 2	0.135	<i>0.065</i>	1.794
Inc 3	0.183	<i>0.029</i>	1.825
Inc 4	0.051	0.596	1.534
Investment Experience (< 2 years=0)			
Exp 2	0.152	<i>0.030</i>	1.389
Exp 3	0.194	<i>0.033</i>	1.555
Exp 4	0.312	<i>0.002</i>	1.749
R ²		0.152	
F		4.52**	
Durbin-Watson		2.064	

*Note: n=501, β = unstandardized coefficient; p= significance value; gender, age, marital status, education, occupation, income and investment experience converted into dummy variables; multicollinearity is tested by Variation Inflation factor and is not to be assumed; Autocorrelation is excluded by Durbin-Watson test; *= significant at 0.1, **= significant at 0.05 and ***= significant at 0.01 level*

Model 6. Effect of Financial Literacy and Socio-demographic Variables on Emotional Bias

Table 6.25 presents the results of regression analysis for emotional bias. The value of Durbin-Watson (1.872) indicates that there is no issue of autocorrelation. Regression Model 6 of emotional bias is not statistically significant (F = 0.911). This finding shows that the predictor variables do not explain the variance in this model. However, coefficient of financial literacy is negatively related to emotional biases. This indicates that investors with a high level of literacy are less prone to emotional bias. These results do not support hypotheses $H1_f, H2_f, H3_f, H4_f, H5_f, H6_f, H7_f$ and $H8_f$.

Table 6.25 Results of Regression Analysis for Emotional Bias

This table reports the results of linear regression for emotional bias and the predictor variables are financial literacy and socio- demographic characteristics.

	B Coefficient	P value	VIF
Constant	2.195	0.000	
Financial Literacy	-0.017	0.088	1.148
Gender (male=0)	-0.010	0.880	1.139
Age (18-30=0)			
Age 2	-0.055	0.339	1.513
Age 3	0.119	0.195	1.49
Age 4	0.097	0.614	2.704
Marital status (Married=0)	0.023	0.678	1.479
Education (Up to schooling=0)			
Edu 2	0.097	0.391	6.225
Edu 3	0.053	0.641	6.387
Edu 4	0.095	0.575	1.8
Occupation(Private sector employee=0)			
Ocp 2	0.056	0.470	1.148
Ocp 3	-0.032	0.566	1.255
Ocp 4	-0.045	0.792	2.491
Ocp 5	0.142	0.249	1.111
Income (< 3 lakhs=0)			
Inc 2	-0.018	0.770	1.794
Inc 3	0.062	0.376	1.825
Inc 4	-0.070	0.388	1.534
Investment Experience (< 2 years=0)			
Exp 2	0.077	0.185	1.389
Exp 3	0.099	0.194	1.555
Exp 4	0.066	0.425	1.749
R ²		0.035	
F		0.91	
Durbin-Watson		1.872	

*Note: n=501, β = unstandardized coefficient; p= significance value; gender, age, marital status, education, occupation, income and investment experience converted into dummy variables; multicollinearity is tested by Variation Inflation factor and is not to be assumed; Autocorrelation is excluded by Durbin-Watson test; *= significant at 0.1, **= significant at 0.05 and ***= significant at 0.01 level*

Model 7. Effect of Financial Literacy and Socio-demographic Variables on Herding Bias

Table 6.26 presents the results of regression analysis for herding bias and predictor variables. The value of Durbin-Watson (1.980) shows that there is no concern of autocorrelation. Table 6.26 shows that regression Model 7 on herding bias is significant ($F = 3.15$) at the 0.01 level. The model's explanatory power is 11.1%. The results indicate that coefficients of financial literacy, age and occupation are statistically significant at the 1%, 5% and 10% levels. The final model can be represented as follows:

$$BB_{HERD} = 2.674 - 0.029FL - 0.172Age2 - 0.418 Age4 + 0.346Ocp 2 - 0.172Ocp3 + 0.278Ocp5 \dots eq 6.7$$

Table 6.23 demonstrates that the coefficient of financial literacy has a significantly negative relationship to herding bias at the 0.05 level. This implies that investors with a higher score of financial literacy are less prone to herding bias. This evidence also indicates that older investors are less inclined towards exhibiting herding behaviour relative to those in the reference category. This suggests that young or novice investors feel more secure about their returns after they discuss their investment decisions with their colleagues and friends. These findings are consistent with those of Lin (2011). The coefficients of public sector employees and other categories of occupation are positive and statistically significant. However, coefficients of the self-employed category under occupation are negative and statistically significant at the 0.05 level. These findings support hypotheses $H1_g$, $H3_g$, $H6_g$ and do not support hypotheses $H2_g$, $H4_g$, $H5_g$, $H7_g$ and $H8_g$.

Table 6.26 Results of Regression Analysis for Herding Bias

This table reports the results of linear regression for herding bias and the predictor variables are financial literacy and socio- demographic characteristics. Numbers in italics show significance at the 0.05 level or higher.

	B Coefficient	P value	VIF
Constant	2.674	0.000	
Financial Literacy	-0.029	0.026	1.148
Gender (male=0)	0.123	0.162	1.139
Age (18-30=0)			
Age 2	-0.172	0.019	1.513
Age 3	-0.002	0.989	1.49
Age 4	-0.418	0.089	2.704
Marital status (Married=0)	-0.066	0.352	1.479
Education (Up to schooling=0)			
Edu 2	0.188	0.195	6.225
Edu 3	0.129	0.373	6.387
Edu 4	0.029	0.895	1.8
Occupation(Private sector employee=0)			
Ocp 2	0.346	0.000	1.148
Ocp 3	-0.172	0.016	1.255
Ocp 4	0.108	0.624	2.491
Ocp 5	0.278	0.079	1.111
Income (< 3 lakhs=0)			
Inc 2	0.045	0.563	1.794
Inc 3	0.045	0.617	1.825
Inc 4	-0.119	0.254	1.534
Investment Experience (< 2 years=0)			
Exp 2	0.064	0.720	1.389
Exp 3	-0.140	0.643	1.555
Exp 4	0.125	0.572	1.749
R ²		0.111	
F		3.15***	
Durbin-Watson		1.980	

*Note: n=501, β = unstandardized coefficient; p= significance value; gender, age, marital status, education, occupation, income and investment experience converted into dummy variables; multicollinearity is tested by Variation Inflation factor and is not to be assumed; Autocorrelation is excluded by Durbin-Watson test; *= significant at 0.1, **= significant at 0.05 and ***= significant at 0.01 level*

6.7.3.1 Effect of Financial Literacy and Socio-Demographic Variables on Framing Effect

The present study applied binary logistic regression to examine the effect of financial literacy and socio-demographic variables on framing effect. The reason behind using a binary logistic regression was that the dependent variable, that is, framing effect in this study was a dichotomous categorical variable (Field, 2009). Thus, a binary logistic regression was used to model the relationship between the framing effect and predictor variables including financial literacy and socio-demographic characteristics of individual

investors. This study calculated the probability of a respondent being inclined to framing effect. However, because of the problem of limited value of probability, these probabilities cannot be used directly in regression models. Thus, the odd [P (1-P)] was used. In Addition, the natural log of the odds is calculated so that the relationships can be linearized as in multiple linear regressions. The logistic regression model is as follows:

$$\begin{aligned} \text{Log } (P/1 - P) \text{ FE} = & b_0 + b_1(\text{FL}) + b_2(\text{Gender}) + b_3(\text{Age}_1) + b_4(\text{Age}_2) + b_5(\text{Age}_3) \\ & + b_6(\text{Marital Status}) + b_7(\text{Edu}_1) + b_8(\text{Edu}_2) + b_9(\text{Edu}_3) + \\ & b_{10}(\text{Ocp}_1) + b_{11}(\text{Ocp}_2) + b_{12}(\text{Ocp}_3) + b_{13}(\text{Ocp}_4) + b_{14}(\text{Inc}_1) + \\ & b_{15}(\text{Inc}_2) + b_{16}(\text{Inc}_3) + b_{17}(\text{Exp}_1) + b_{18}(\text{Exp}_2) + b_{19}(\text{Exp}_3) + e_i \\ & \dots\dots\dots \text{eq 6.8} \end{aligned}$$

Here, FE = framing effect; P = probability of a respondent with framing effect; FL= financial literacy; Gender= 1 if the respondent is male, 0 otherwise; Age1 = 1 if a respondent is in the age group of 18-30 years, 0 otherwise; Age2= 1 if a respondent is in the age group of 31-45 years, 0 otherwise; Age3= 1 if a respondent is in the age group of 46-60 years, 0 otherwise; Marital status =1 if the respondent is married, 0 otherwise; Edu1= 1 if a respondent has education up to 10+2, 0 otherwise; Edu2= 1 if a respondent has a graduation degree, 0 otherwise; Edu3 = 1 if a respondent has a post-graduation degree, 0 otherwise; Ocp1= 1 if a respondent is working in the private sector, 0 otherwise; Ocp2= 1 if a respondent is working in the public sector, 0 otherwise; Ocp3= 1 if a respondent is working in the private sector, 0 otherwise; Ocp4= 1 if a respondent is retired, 0 otherwise; Inc1= 1 if a respondent has less than Rs 3 lakhs annual income, 0 otherwise; Inc2= 1 if a respondent has Rs 3-6 lakhs annual income, 0 otherwise; Inc3= 1 if a respondent has more than Rs 6-10 lakhs annual income, 0 otherwise; Exp1 =1 if a respondent in the experience category of <2 years, 0 otherwise; Exp 2=1 if a respondent is in the experience category of 2-5 years, 0 otherwise; Exp 3=1 if a respondent is in the experience category of >5-10 years, 0 otherwise.

Based on the above model, logistic regression was used to examine the effect of financial literacy and demographic variables on framing effect. Table 6.27 presents the results of logistic regression for framing effect and the predictor variables. The coefficients of each subcategory represent the effect of each subcategory with respect to a reference category.

For gender, the reference category consists of female respondents. For age, the reference category comprises respondents belonging to the age group >60 years. For marital status, the reference category includes unmarried respondents. For education, the reference category comprises respondents with a doctorate degree. For occupation, the reference category comprises respondents belonging to the category named 'other'. For income, the reference category includes respondents with an annual income of more than Rs 10 lakhs. For investment experience, the reference category comprises respondents having >10 years' experience. Our results indicate that an individual investor's tendency to be influenced by framing effect varies with his or her financial literacy and socio-demographic characteristics.

The Hosmer-Lemeshow (H-L) test is a commonly used measure for determining how well a logistic model fits data (Peng *et al.*, 2002). The use of the H-L test yielded a chi-square statistic of 14.229, which was insignificant ($p > .05$). This shows that the model was well fitted. In addition, Table 6.28 also demonstrates that the present model including coefficients (i.e. gender, age, marital status, education, occupation, income- level and investment experience) is able to correctly classify 72.7% cases, which also confirms the overall goodness of fit.

Further, Table 6.27 reveals that level of financial literacy is negative and statistically significant at the 0.01 significance level ($p < .01$). This indicates that respondents who are more financially literate are less likely to be influenced by framing effect compared to financially illiterate respondents. Additionally, in the case of marital status, the β coefficient is positive (0.839) and statistically significant at the 0.01 significance level ($p < .01$). This indicates that married respondents are more likely to be influenced by framing effect as compared to unmarried respondents (reference category). The value of expect β also shows that the odds of being prone to framing effect in the case of married investors are 2.315 times higher than the odds for unmarried investors.

Similarly, Wald statistics for income level (6.588) and investment experience (7.947) are significant at the 10% and 5% significance levels, respectively. This implies that the odds of being inclined to the framing effect are significantly affected by respondents' income level and investment experience. The coefficient of subcategory of income level (i.e., <3 lakhs) is positively and statistically significant at 5% significance

level. This indicates that the odds of respondents being influenced by framing effect in this category is 2.566 times higher than the respondents earning >10 lakhs per annum. Similar to income, less experienced investors are more inclined towards framing effect as compared to more experienced people.

Table 6.27 Results of the Logistic Regression Model for Framing Effect

*This table shows the results of logistic regression Model for framing effect. The reference categories are: Female (Gender), Age- More than 60 years, Marital status- Unmarried, Education- Doctorate, Occupation- Others, Income- More than 10 lakhs, Experience- More than 10 years exp. *= significant at 0.1, **= significant at 0.05 and ***= significant at 0.01 level*

	B	S.E.	Wald	df	Sig.	Exp(B)
Financial Literacy	-0.133***	0.046	8.257	1	0.004	0.875
Gender(1)	-0.088	0.314	0.079	1	0.778	0.915
Age			1.883	3	0.597	
Age 1	0.384	0.882	0.189	1	0.663	1.468
Age 2	0.664	0.858	0.599	1	0.439	1.943
Age 3	0.354	0.842	0.177	1	0.674	1.425
Marital status(1)	0.839***	0.284	8.709	1	0.003	2.315
Education			3.359	3	0.340	
Edu 1	-0.094	0.735	0.016	1	0.898	0.910
Edu 2	-0.715	0.597	1.435	1	0.231	0.489
Edu 3	-0.753	0.584	1.665	1	0.197	0.471
Occupation			3.353	4	0.501	
Ocp 1	0.180	0.615	0.085	1	0.771	1.197
Ocp 2	0.676	0.674	1.005	1	0.316	1.966
Ocp 3	0.103	0.631	0.027	1	0.870	1.109
Ocp 4	0.739	0.944	0.613	1	0.434	2.093
Income			6.588	3	0.086	
Inc 1	0.942**	0.386	5.952	1	0.015	2.566
Inc 2	0.576	0.361	2.550	1	0.110	1.779
Inc 3	0.397	0.384	1.070	1	0.301	1.487
Investment Experience			7.947	3	0.047	
Exp 1	-0.094	0.379	0.062	1	0.803	0.910
Exp 2	0.601*	0.359	2.807	1	0.094	1.823
Exp 3	0.056	0.389	0.021	1	0.885	1.058
Constant	-1.196	1.271	0.886	1	0.347	0.302
Model Summary	-2 Log likelihood		Cox & Snell R Square		Nagelkerke R Square	
	561.528 ^a		0.107		0.151	
Hosmer and Lemeshow Test	Chi-square		Df		Sig.	

The coefficient of subcategory of investment experience (i.e. 2-5 years of experience) is positive and statistically significant at the 10% level of significance. This concludes that odds of individual investors with 2-5 years of experience are 1.823 times higher than the odds of those with >10 years of experience. Moreover, the effect of gender, age, education and occupation of individual investors on framing effect was found to be statistically insignificant. Kim *et al.* (2005) also concluded that age groups are not significantly differing in the case of framing effect. The results supported hypotheses H1_h, H4_h, H7_h, H8_h and do not support H2_h, H3_h and H5_h.

Table 6.28 Classification Table for the Regression Model for Framing Effect

This table show the correctly classified cases based on logistic regression model for framing effect.

Observed		Predicted		
		Framing Effect		Percentage Correct
		No	Yes	
Framing Effect	No	335	12	96.5
	Yes	125	29	18.8
Overall Percentage				72.7

6.7.4 Effect of Socio-Demographics Variables on Financial Literacy

The next objective of this study was to examine the effect of socio-demographic variables on financial literacy of individual investors. Several researchers (Worthington, 2006; Chen and Volpe, 1998; Al-Tamimi and Bin Kalli, 2009; Lusardi *et al.*, 2012) have also reported that certain demographic groups also affect financial literacy. The objective was assessed by applying binary logistic regression. First, the study classified respondents into two subgroups, using the median value (i.e., 7) of correct answers of the sample. Investors with scores higher than the sample median are categorized as those with relatively more financial literacy. Investors with scores equal to or less than the median are categorized as those with relatively less literacy. Thus, scores of financial literacy were converted into a dichotomous categorical variable, which is required to fulfil the assumptions of binary logistic regression. In the logistic regression, dependent variables were financial literacy and the independent variables were categorical, namely, gender, age, marital status, education, occupation, income and investment experience. The logistic regression model was as follows:

$$\begin{aligned} \text{Log}(P/1 - P) FL = & b_0 + b_1(\text{Gender}) + b_2(\text{Age}_1) + b_3(\text{Age}_2) + b_4(\text{Age}_3) + b_5(\text{Marital} \\ & \text{Status}) + b_6(\text{Edu}_1) + b_7(\text{Edu}_2) + b_8(\text{Edu}_3) + b_9(\text{Ocp}_1) + b_{10}(\text{Ocp}_2) + \\ & b_{11}(\text{Ocp}_3) + b_{12}(\text{Ocp}_4) + b_{13}(\text{Inc}_1) + b_{14}(\text{Inc}_2) + b_{15}(\text{Inc}_3) + \\ & b_{16}(\text{Exp}_1) + b_{17}(\text{Exp}_2) + b_{18}(\text{Exp}_3) + e_i \quad \dots\dots\dots \text{eq 6.9} \end{aligned}$$

Where FL is financial literacy; P is the probability of a respondent's financial literacy; Gender= 1 if the respondent is male, 0 otherwise; Age1 = 1 if a respondent is in the age group of 18-30 years, 0 otherwise; Age2= 1 if a respondent is in the age group of 31-45 years, 0 otherwise; Age3= 1 if a respondent is in the age group of 46-60 years, 0 otherwise; Marital status =1 if the respondent is married, 0 otherwise; Edu1= 1 if a respondent has education up to 10+2, 0 otherwise; Edu2= 1 if a respondent has a graduation degree, 0 otherwise; Edu3 = 1 if a respondent has a postgraduation degree, 0 otherwise; Ocp1= 1 if a respondent is working in the private sector, 0 otherwise; Ocp2= 1 if a respondent is working in the public sector, 0 otherwise; Ocp3= 1 if a respondent is working in the private sector, 0 otherwise; Ocp4= 1 if a respondent has retired, 0 otherwise; Inc1= 1 if a respondent has <3 lakhs annual income, 0 otherwise; Inc2= 1 if a respondent has <1 lakhs annual income, 0 otherwise; Inc3= 1 if a respondent has 3-6 lakhs annual income, 0 otherwise; Inc4= 1 if a respondent has >6-10 lakhs annual income, 0 otherwise; Exp1 =1 if a respondent is in the experience category of <2 years, 0 otherwise; Exp 2=1 if a respondent is in the experience category of 2-5 years, 0 otherwise; Exp 3=1 if a respondent is in the experience category of >5-10 years, 0 otherwise.

Based on the above model, the binary logistic regression method was used to assess the effect of socio-demographic variables on financial literacy. Table 6.29 gives the results of logistic regression for financial literacy and the socio-demographic variables. The coefficients of each subcategory represent the effect of each subcategory with respect to a reference category. For gender, the reference category consists of female respondents. For age, the reference category has respondents belonging to the age group >60 years. For marital status, the reference category includes unmarried respondents. For education, the reference category comprises respondents with a doctorate degree. For occupation, the reference category has respondents belonging to the category named 'other'. For income, the reference category includes respondents with an annual income of more than Rs 10 lakhs. For investment experience, the reference category comprises respondents having >10 years' experience. Our results revealed that an individual

investor's socio-demographic characteristics significantly affect his or her financial literacy.

Table 6.29 shows that the use of the H-L test yielded a chi-square statistic of 11.684, which was insignificant ($p > .05$). This indicates that the model was well fitted. In addition, Table 6.28 also shows that the present model including coefficients (i.e. gender, age, marital status, education, occupation, income- level and investment experience) is able to correctly classify 64.9% cases, which also confirms the overall goodness of fit.

Further, Table 6.29 shows that in the case of gender, the coefficient is negative (-0.867) and statistically significant at the 0.01% significance level ($p < .01$). This indicates that males are less financially literate as compared to females (reference category). These findings are consistent with the results of Filipiak and Walle (2015). However, the finding of this study is contradictory to those of Almenberg and Dreber (2015), Worthington (2006), Chen and Volpe (1998), Volpe (1996), Chen and Volpe (2002) involving households. This contradiction may exist because the present study involved only stock investors, whose financial knowledge may differ from those of householders. The finding supports hypothesis H9.

Similarly, Wald statistics for education (15.801), income level (7.725) and investment experience (25.238) is significant at the 5% significance level. This indicates that the odds of financial literacy are significantly affected by an individual investor's education, income level and investment experience. The coefficient of two subcategories of education (i.e., up to schooling and graduate) is negatively and statistically significant at the 5% level of significance. This shows that the odds of respondents to be financially literate in these categories are lower than that of the respondents who have a doctorate degree. The results are consistent with those of the studies conducted by Bhushan and Medury (2013), Worthington (2006), Al-Tamimi and Bin Kalli (2009) and Lusardi and Mitchell (2011b). The findings support hypothesis H12.

Table 6.29 Results of the Logistic Regression Model for Financial Literacy

*This table shows the results of logistic regression Model for financial literacy. The reference categories are: Female (Gender), Age- More than 60 years, Marital status- Unmarried, Education- Doctorate, Occupation- Others, Income- More than 10 lakhs, Experience- More than 10 years exp. *= significant at 0.1, **= significant at 0.05 and ***= significant at 0.01 level*

	B	S.E.	Wald	df	Sig.	Exp(B)
Gender(1)	-0.867***	0.296	8.609	1	0.003	0.420
Age (years)			6.154	3	0.104	
Age 1	-0.365	0.861	0.180	1	0.672	0.694
Age 2	-0.923	0.836	1.219	1	0.270	0.397
Age 3	-0.849	0.832	1.042	1	0.307	0.428
Marital status(1)	-0.263	0.253	1.087	1	0.297	0.768
Education			15.801	3	0.001	
Edu 1	-1.877**	0.793	5.602	1	0.018	0.153
Edu 2	-1.651**	0.643	6.600	1	0.010	0.192
Edu 3	-0.953	0.631	2.279	1	0.131	0.386
Occupation			1.759	4	0.780	
Ocp 1	-0.511	0.517	0.977	1	0.323	0.600
Ocp 2	-0.773	0.590	1.714	1	0.190	0.462
Ocp 3	-0.529	0.534	0.984	1	0.321	0.589
Ocp 4	-0.618	0.899	0.473	1	0.492	0.539
Annual Income			7.725	3	0.052	
Inc 1	-0.594*	0.361	2.711	1	0.100	0.552
Inc 2	-0.063	0.318	0.040	1	0.842	0.939
Inc 3	-0.621*	0.347	3.212	1	0.073	0.537
Investment Experience			25.238	3	0.000	
Exp 1	-1.747***	0.361	23.434	1	0.000	0.174
Exp 2	-1.062***	0.344	9.537	1	0.002	0.346
Exp 3	-0.661*	0.360	3.364	1	0.067	0.516
Constant	4.302	1.168	13.569	1	0.000	73.836
Model Summary	-2 Log likelihood		Cox & Snell R Square		Nagelkerke R Square	
	604.052		0.1344		0.1815	
Hosmer and Lemeshow Test	Chi-square		Df		Sig.	
	11.684		8		0.165	

Similar to education, investors belonging to the low-income group have a low level of financial literacy compared to the reference category (i.e., more than Rs 10 lakhs). The coefficients of two subcategories of income level (i.e. < Rs 3 lakhs and Rs 6-10 lakhs) are negative and statistically significant at the 10% level of significance. We can thus conclude that odds of being financially literate increases with the increase in

income level. This finding is in line with the findings of Abreu and Mendes (2010), Worthington (2006) and Chen and Volpe (1998). Further, our results show that the coefficients of subcategories of investment experience are negative and statistically significant at the 5% level of significance. This indicates that investors having >10 years of experience are more financially literate compared to less experienced investors. The findings support hypotheses H14 and H15. Moreover, effect of age, marital status and occupation of individual investors on financial literacy was found to be statistically insignificant. Previous studies (Bujan *et al.*, 2016; Potrich *et al.*, 2015) also concluded that marital status has no significant relationship with financial literacy. The results do not support hypotheses H10, H11 and H13.

Table 6.30 Classification Table for Regression Model for Financial Literacy

This table show the correctly classified cases based on logistic regression model for framing effect.

Observed		Predicted		
		Financial literacy		Percentage Correct
		Financial Illiterate	Financial Literate	
Financial literacy	Financial Illiterate	240	58	80.5
	Financial Literate	118	85	41.9
Overall Percentage				64.9

6.7.5 Relationship between Personality Traits and Behavioural Biases

Few research studies examined the issue of how individual investors differ in terms of personality traits and how these differences may influence the exposure to behavioural biases (Baddeley, 2013; Fung and Durand, 2014). The present study applied SEM to analyse the relationship between personality traits and behavioural biases among individual investors. AMOS 21, SEM software was used to answer this objective. SEM leads to a set of statistical techniques that facilitate bringing the data and underlying theory together (Tabachnik and Fidell, 2006). SEM is also known as causal modelling, causal analysis, simultaneous equation modelling, analysis of covariance structure, path analysis or confirmatory factor analysis (Tabachnick and Fidell, 2007). This technique allows researchers to simultaneously model manifold layer relationships among multiple independent and dependent variables (Chin, 1998; Gefen *et al.*, 2000, Hair *et al.*, 2010). This is progressively being used in behavioural research for modelling complex

relationships and multivariate datasets which requires researchers to gather multiple measures for the proposed constructs (Hair *et al.*, 2010).

SEM comprises two interrelated models, namely, measurement model and structural model (Gefen *et al.*, 2000). Measurement model also known as confirmatory factor analysis (CFA) defines the constructs (latent variables) that the model uses, and allocates observed variables to each, whereas structural model also known as regression or path analysis defines the hypothesized relationship among latent variables (Hair *et al.*, 2010; Gefen *et al.*, 2000). Further, Hair *et al.* (2010) suggested that a latent construct is a depiction of the theoretical construct which cannot be observed directly and can have exogenous constructs (i.e. independent variable) or endogenous constructs (i.e. dependent variable) in the model. The present study used behavioural biases as dependent variables and Big Five personality traits as independent variables. The constructs used in the research model are as follows:

6.7.5.1 Constructs of the Research Model- The proposed research model contains 12 latent constructs. A latent construct is measured by one or more variables (items). Measured (observed) variables are used as indicators of latent constructs. Twelve latent constructs include five exogenous constructs and seven endogenous constructs. Exogenous constructs are not affected by any other construct in the model, whereas endogenous constructs are affected by other constructs in the model (Hair *et al.*, 2010).

In the current study, the items that belong to a specific latent construct were extracted by applying EFA in the previous section. Each construct comprises at least three items and no more than six items. Anderson and Gerbing (1988) suggested using a two-step approach rather than a single-step approach. In the two-step approach, the measurement models are first assessed to confirm whether the items used to measure each of the constructs are satisfactory. In the second step, the structural model is evaluated by verifying causal relationships based on the path significance between theoretically proposed latent constructs (Anderson and Gerbing, 1988; Garver and Mentzer, 1999). However, the single-step approach entails simultaneously evaluating measurement and structural models (Singh and Smith, 2001). Thus, the single-step approach is given less consideration because of difficulty in attaining good model fitting (Hulland *et al.*, 1996).

The current study applied the two-step approach recommended by the majority of the researchers in SEM (Chin *et al.*, 1998; Anderson and Gerbing, 1988). Table 6.29 shows the description of all the constructs used in the study. These 12 constructs were measured by a total of 51 items (21 items for exogenous constructs (independent variables) and 30 items for endogenous constructs (dependent variables) (Table 6.29).

This study used the two-step approach; therefore, the inner model was first analysed by examining the reliability and validity of the measurement items used. Reliability and validity are distinct but closely related conditions (Bollen, 1989). In the next section, both measures, that is, reliability and validity will be discussed.

Table 6.31 Twelve Constructs in the Research Model

This table reports the details of each construct including number of items, code and name of the constructs.

Construct	Number of Items	Items	Codes of construct	Names of construct
1*	5	NEU1-NEU5	NEU	Neuroticism
2*	4	EV1-EV4	EV	Extraversion
3*	4	OP2-OP5	OP	Openness to experience
4*	3	AG1-AG3	AG	Agreeableness
5*	5	CON1-CON5	CON	Conscientiousness
6**	6	OS1-OS6	OS	Overconfidence and self-attribution bias
7**	3	DE1-DE3	DE	Disposition effect
8**	4	ANCH1-ANCH4	ANCH	Anchoring bias
9**	3	REP1-REP3	REP	Representativeness
10**	3	MA1-MA3	MA	Mental accounting
11**	6	EM1-EM6	EM	Emotional biases
12**	5	HERD1-HERD5	HERD	Herding bias

* = *Exogenous Latent Construct* ** = *Endogenous Latent Construct*

6.7.5.2 Step-one: Measurement Model Results- The first step in evaluating the measurement model involves the use of CFA to assess the reliability (item-level and composite reliability) and validity (convergent and discriminant) of the model.

1. Measurement of Reliability- Reliability refers to the consistency of measurements. Reliability can be measured at the item level and the construct level. In the assessment of the measurement model, the first criterion was to measure the internal consistency of a set of measures rather than the reliability of a single latent variable. Specifically, item

reliability indicates which part of an item’s variance can be explained by the underlying latent variable (Gotz *et al.*, 2010). It captures the degree to which a set of measures specify the common latent construct. In the present study, squared multiple correlations (SMCs) was applied to analyse the item-level reliability. Further, to measure construct level reliability, composite reliability was used.

The SMC is known as item reliability coefficient. It is the correlation between a single item variable and the construct it measures. The SMC for an observed variable is the square of the indicator’s standardized loading. For example, if the standardized loading for an observed variable is 0.90, the corresponding SMC is 0.81 and the error variance is 0.19 accordingly. The SMC of a good observed variable should exceed 0.50, although an SMC of 0.30 indicates an acceptable indicator variable. An SMC of 0.50 is approximately equivalent to a standardized load of 0.70 (Holmes-Smith *et al.*, 2006).

Table 6.32 shows that most SMCs of the 21 observed variables that belong to the five exogenous latent constructs (NEU, EV, OP, AG and CON) exceeded 0.50. Seven indicators were considered and omitted from further analysis NEU4 = 0.481, NEU5 = 0.476, EV2 = 0.441, OP3 = 0.329, CON5 = 0.440, CON4 = 0.422, CON3 = 0.398 to improve the model fit to the data. The rest showed a good and acceptable reliability of indicator variables.

Table 6.32 SMCs of 21 Indicators in Five Exogenous Latent Constructs

	Estimate		Estimate
NEU1	0.518	OP4	0.665
NEU2	0.640	OP5	0.659
NEU3	0.618	AG1	0.606
NEU4	0.481	AG2	0.533
NEU5	0.476	AG3	0.516
EV1	0.551	CON1	0.488
EV2	0.441	CON2	0.597
EV3	0.772	CON5	0.386
EV4	0.728	CON4	0.422
OP2	0.539	CON3	0.398
OP3	0.329		

In addition, Table 6.33 shows that most SMCs of the 30 observed variables of the seven endogenous latent constructs (OS, DE, ANCH, REP, MA, EM and HERD) exceeded 0.50. Eight of them were excluded from further analysis to improve the model

fit. These omitted indicators were OS2 = 0.433, ANCH1 = 0.429, EM1 = 0.315, EM4 = 0.432, EM5= 0.432, EM6=0.387 and HERD5=0.410. The remaining indicator variables showed good and acceptable reliability.

Table 6.33 SMCs of 30 Indicators in Seven Endogenous Latent Constructs

This table shows the value of SMCs of endogenous latent constructs in the model

	Estimate		Estimate
OS1	0.540	REP3	0.552
OS2	0.433	MA1	0.552
OS3	0.509	MA2	0.525
OS4	0.490	MA3	0.579
OS5	0.474	EM1	0.315
OS6	0.498	EM2	0.513
DE1	0.533	EM3	0.448
DE2	0.490	EM4	0.432
DE3	0.661	EM5	0.432
ANCH1	0.429	EM6	0.387
ANCH2	0.435	HERD1	0.574
ANCH3	0.658	HERD2	0.738
ANCH4	0.573	HERD3	0.669
REP1	0.568	HERD4	0.723
REP2	0.621	HERD5	0.410

The construct-level reliability confirmed that items assigned to the same constructs show a higher relationship with each other. Even though earlier calculated individual-level item reliability is satisfactory, the construct's reliability must be measured together by the group of items within the same construct (Bagozzi and Baumgartner, 1994). The present study used composite reliability to examine construct level reliability. Composite reliability (similar to factor reliability) helps assess how well a construct was measured by its allocated items (Fornell and Larcker, 1981; Gotz *et al.*, 2010). Table 6.34 shows that composite reliability was higher than the recommended value of 0.7 (Nunnally and Bernstein, 1994).

2. Measurement of validity (Convergent validity) - Validity is the extent to which a set of measuring items correctly represents the underlying theoretical proposed concept (Hair *et al.*, 2010). Specifically, convergent validity elucidates whether the correlation between responses obtained through different methods represent the same construct (Peter, 1981). It indicates whether a group of items should represent one and the same underlying construct that can be demonstrated through their unidimensionality (Henseler *et*

al.,2009).The present study applied the most commonly used method ‘average variance extracted’ (AVE) to examine convergent validity (e.g. Hair *et al.*, 2010; Tabachnick and Fidell, 2007). Fornell and Larcker (1981) suggested AVE, which attempts to measure the amount of variance that a construct captures from its measuring items relative to the amount due to measurement error. Table 6.34 demonstrates that AVE extracted for each construct was higher than the suggested value of 0.5 (Fornell and Larcker, 1981). This indicates that each construct has competence to describe more than half of the variance to its measuring items on average.

Table 6.34 Construct Reliability and Validity for the Measurement Model

This table presents the construct reliability and validity of the constructs: OS = overconfidence and self-attribution bias, DE = the disposition effect, ANCH = anchoring bias, REP = representativeness bias, MA = mental accounting bias, EM = emotional bias, HERD = herding bias, NEU = neuroticism, EV = extraversion, OP = openness to experience, AG = agreeableness and CON = conscientiousness

	CR ^a	AVE ^b	OS	DE	ANCH	REP	MA	EM	HERD	NEU	EV	OP	AG	CON
OS	0.83	0.50	0.71											
DE	0.79	0.56	0.234**	0.75										
ANCH	0.74	0.63	0.238**	0.369**	0.79									
REP	0.81	0.58	0.374**	0.236**	0.393**	0.76								
MA	0.79	0.55	0.373**	0.206**	0.197**	0.392**	0.74							
EM	0.72	0.54	0.263**	0.413**	0.388**	0.369**	0.268**	0.73						
HERD	0.89	0.68	0.012	0.125**	0.228**	0.154**	0.047	0.284**	0.82					
NEU	0.85	0.66	-0.019	0.202**	0.213**	0.136**	-0.051	0.316**	0.140**	0.81				
EV	0.86	0.68	0.359**	0.144**	0.257**	0.236**	0.316**	0.160**	0.173**	-0.087	0.82			
OP	0.83	0.62	0.282**	0.080	0.138**	0.214**	0.304**	0.082	0.054	-0.069	0.584**	0.79		
AG	0.79	0.55	-0.100*	-0.127**	-0.053	-0.066	-0.029	-0.121**	-0.074	-0.159**	-0.119**	-0.134**	0.74	
CON	0.81	0.68	0.188**	-0.006	0.150**	0.147**	0.204**	0.075	-0.021	-0.161**	0.257**	0.245**	0.138**	0.82

*Note: ^aCR is composite reliability computed by $(\sum\lambda)^2/(\sum\lambda)^2 + (\sum\eta)$. ^bAVE is the average variance extracted computed by $(\sum\lambda^2)/(\sum\lambda^2) + (\sum\eta)$. Diagonals are square roots of the average variance extracted from observed variables. Off-diagonal are correlations between constructs. * $p < 0.05$, ** $p < 0.01$*

3. Measurement of validity (Discriminant validity) - Discriminant validity is a complementary concept of convergent validity. It reflects the extent to which the constructs in a model are dissimilar. Therefore, it is vital to assess this validity where the constructs are interrelated. Large correlations between latent constructs (>0.80 or 0.90) propose the absence of discriminant validity (HolmesSmith *et al.*, 2006). In the present study, discriminant validity at the construct level was observed by applying the Fornell and Larcker (1981) criterion. This criterion suggests that square-root of AVE for each construct should be greater than the other construct's correlation with any other construct (i.e. inter-construct correlation). Table 6.32 reveals that none of the inter-construct correlation value was above the square-root of the AVE (diagonals of the table) and fulfilled the criterion of discriminant validity.

6.7.5.3 Step-Two: Structural Model Results- After examining the reliability and validity of the measurement/outer-model, the next step was to evaluate the presumed causal and linear relationship between independent and dependent variables. The structural model helps estimate the inner model or path model, that is, established with the series of structural equations representing the theoretical model (Chin, 2010). Before analysing the structure model, it is necessary to evaluate measures of fit.

1. Measures of Fit- Once a structure model is estimated, model fit compares the theory to reality by assessing the similarity of the estimated covariance matrix to observed covariance matrix (Hair *et al.*, 2010). The present study used the following fit measures for evaluating the goodness of fit of the structure model.

- **Minimum Sample Discrepancy Function** - CMIN (Chi-square statistic (χ^2)) is the minimum value of the discrepancy. In the case of maximum likelihood estimation, CMIN contains the chi-square statistic. The chi-square statistic is a complete measure of how many of the implied moments and sample moments differ. The more the implied and sample moments differ, the bigger the chi-square statistic. CMIN/DF (χ^2 / df) is the minimum discrepancy divided by its degrees of freedom; the ratio should be close to 1 for correct models. Byrne (2006) recommended that the ratio should not exceed 3 before it cannot be accepted. Because the chi-square statistic (χ^2) is sensitive to sample size, it is necessary to look at others that also support goodness of fit.

- **Measures Based on Population Discrepancy-** The most commonly used is root mean square error of approximation (RMSEA) which is the population RMSEA. Thus, it better represents how well a model fits a population, and not just a sample used for estimation (Hair *et al.*, 2010).
- **Comparisons to a Baseline Model –** The three significant indices are NFI, TLI, and CFI. NFI is the normed fit index, while TLI is the Tucker-Lewis coefficient and CFI is the comparative fit index. CFI is truncated to fall in the range 0-1, values >1 are reported as 1, whereas values <0 are reported as 0.
- **GFI and Related Measures-** GFI is a goodness-of-fit index for ML (Maximum likelihood) and ULS (Unweighted Least Squares) estimation. AGFI is an adjusted goodness-of-fit index.

Table 6.35 indicates that all fit indices of the measurement models and structured model are satisfactory. Bentler (1990), Baumgartner and Homburg (1996) and Hu and Bentler (1999) specified the recommended level of the fit index.

Table 6.35 Fit Indices for the Measurement and Structural Model

This table reports the fit indices of measurement model for exogenous and endogenous variables as well as the structural model with the recommend level of fit index.

Fit Indices	Recommended Level of Fit Index	Measurement Model for Five Exogenous Variables (Personality Traits)	Measurement Model for Seven Endogenous Variables (Behavioural Biases)	Structural Model
χ^2		186.85	400.087	1446.065
df		67	188	549
χ^2/df	< 3	2.789	2.128	2.634
RMSEA	< 0.05 (good fit) < 0.08 (fair fit)	0.060	0.047	0.051
TLI	≥ 0.90	0.946	0.942	0.910
CFI	≥ 0.90	0.960	0.953	0.927
NFI	< 0.90	0.939	0.916	0.897
GFI	> 0.80 (acceptable)	0.952	0.933	0.875
AGFI	> 0.80	0.924	0.910	0.854

2. Path Analysis

Table 6.36 shows that each path relationship presented in the framework were analysed through regression coefficient (β). This study tested seven endogenous variables (OS, DE, ANCH, REP, MA, EM and HERD) in the model. As Table 6.36 reveals that out of 35 path relations representing five hypotheses, 18 were significant and the remaining 17 were insignificant. The graphical presentation of paths is presented in figures A-1 and A-2 (Annexure VI). The evidence indicates that NEU has a significantly positive association with all behavioural biases except OS and MA. Thus, the supported hypotheses were H16_b, H16_c, H16_d, H16_f and H16_g. These results are consistent with those of previous research conducted by Lin (2011) and Sadi *et al.* (2011). The EV trait has a significantly positive relationship with all endogenous variables (i.e., OS, DE, ANCH, REP, MA, EM and HERD) at the 0.05 level. So, the supported hypotheses were H17_a, H17_b, H17_c, H17_d, H17_e, H17_f and H17_g, respectively. This result is consistent with the findings of Lin (2011).

Although the OP trait is significantly related to MA at the 0.05 level, it has no significant relationship with OS, DE, ANCH, REP, EM and HERD biases. Therefore, the non-supported hypotheses were H18_a, H18_b, H18_c, H18_d, H18_f and H18_g. This finding is consistent with the results of Zaidi and Tauni (2012). AG does not significantly relate to any of the behavioural biases. Hypotheses not supported were H19_a, H19_b, H19_c, H19_d, H19_e, H19_f and H19_g. Prior literature also indicates that agreeableness is unrelated to overconfidence, the disposition effect and herding bias (Lin, 2011). Further, the CON trait has a significantly positive link with OS ($p < 0.001$), ANCH ($p < 0.001$), REP ($p < 0.001$), MA ($p < 0.001$) and EM ($p < 0.01$). Thus, the results supported H20_a, H20_c, H20_d, H20_e and H20_f hypotheses but did not support H20_b and H20_g. These findings are similar to those of Lin (2011) and Zaidi and Tauni (2012).

Table 6.36 Structural Relationships and Path Significance of the Basic Model

This table reports the results of the regression analysis for personality traits and behavioural biases. Here, <--- symbol indicates the proposed relation path between personality traits and behavioural biases.

Proposed Relation Path		Hypothesis	Path Coefficient	t-value	Hypothesis Supported
OS	<--- NEU	H16 _a	0.037	0.735	No
DE	<--- NEU	H16 _b	0.315	5.560***	Yes
ANCH	<--- NEU	H16 _c	0.369	7.111***	Yes
REP	<--- NEU	H16 _d	0.282	5.196***	Yes
MA	<--- NEU	H16 _e	0.018	0.343	No
EM	<--- NEU	H16 _f	0.416	6.592***	Yes
HERD	<--- NEU	H16 _g	0.171	3.224**	Yes
OS	<--- EV	H17 _a	0.313	4.296***	Yes
DE	<--- EV	H17 _b	0.246	3.213**	Yes
ANCH	<--- EV	H17 _c	0.311	4.402***	Yes
REP	<--- EV	H17 _d	0.162	2.210*	Yes
MA	<--- EV	H17 _e	0.188	2.515*	Yes
EM	<--- EV	H17 _f	0.214	2.671**	Yes
HERD	<--- EV	H17 _g	0.208	2.809**	Yes
OS	<--- OP	H18 _a	0.007	0.097	No
DE	<--- OP	H18 _b	-0.086	-1.156	No
ANCH	<--- OP	H18 _c	-0.046	-0.669	No
REP	<--- OP	H18 _d	0.078	1.078	No
MA	<--- OP	H18 _e	0.162	2.199*	Yes
EM	<--- OP	H18 _f	-0.085	-1.088	No
HERD	<--- OP	H18 _g	-0.108	-1.482	No
OS	<--- AG	H19 _a	-0.085	-1.574	No
DE	<--- AG	H19 _b	-0.087	-1.511	No
ANCH	<--- AG	H19 _c	0.057	1.076	No
REP	<--- AG	H19 _d	0.003	0.059	No
MA	<--- AG	H19 _e	0.015	0.273	No
EM	<--- AG	H19 _f	-0.078	-1.300	No
HERD	<--- AG	H19 _g	-0.055	-0.977	No
OS	<--- CON	H20 _a	0.222	3.587***	Yes
DE	<--- CON	H20 _b	0.072	1.118	No
ANCH	<--- CON	H20 _c	0.251	4.151***	Yes
REP	<--- CON	H20 _d	0.236	3.706***	Yes
MA	<--- CON	H20 _e	0.215	3.343***	Yes
EM	<--- CON	H20 _f	0.186	2.713**	Yes
HERD	<--- CON	H20 _g	0.051	0.811	No

*Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.*

6.8 RESEARCH FINDINGS

This section presents the description of research findings related to the research objectives.

6.8.1 Financial Literacy of Individual Investors

The first research objective deals with the analysis of financial literacy level among individual Indian investors. The financial literacy of individual investors was analysed based on the percentage of respondents who correctly answered questions related to financial and investment knowledge. Therefore, the first research question of this study was analysed by applying univariate analysis.

The results revealed that on average respondents answered 56.08 percent of the questions correctly. The median percentage of correct answers is 58.33 percent. This implies that individual investors have a low level of financial literacy. The findings suggest that investors need a significant improvement in their financial literacy. Moreover, individual investors have a fair knowledge of questions related to basic financial literacy, such as compound interest, diversification of portfolio and risk and return. However, they were least knowledgeable about the question related to earning per share and P/E ratio, closing price of the index, knowledge of Market efficiency and technical analysis, relationship between interest rate and bond prices, meaning of Beta. This clearly indicates that individual stock investors do not have adequate financial knowledge.

6.8.2 Behavioural Biases of Individual Investors

The next objective of this study was to identify behavioural biases in the order of their prominence among individual investors. The EFA was applied to extract 10 behavioural biases in individual investors. To analyse the behavioural bias, the average of each respondent's answer for the measurement items loaded on the same construct was taken. Behavioural biases that were examined included overconfidence and self-attribution bias, disposition effect, anchoring bias, representativeness, mental accounting, availability bias, familiarity bias, hindsight bias, emotional bias and herding bias. Our results revealed that mental accounting, representativeness, overconfidence and self-attribution, disposition effect, anchoring, emotional bias and herding bias were prominent biases that influenced individual investors. However, most respondents are not prone to familiarity, availability

and hindsight biases. Hence, our findings support the view that individual investors do not always act rationally. Instead, they are often guided by emotions, heuristics and other biases that affect their investment decision making. Further, for examining framing effect, a hypothetical situation with two decision frames in terms of gain and loss was presented. Our findings revealed that framing effect is less prevalent in individual investors.

6.8.3 Effect of Financial Literacy and Socio-Demographics Variables on Behavioural Biases

To examine the effect of financial literacy and socio-demographic variables including gender, age, marital status, education, occupation, income and investment experience on behavioural biases, multiple regression was applied. OS is negatively associated with gender and positively associated with the occupation and investment experience of respondents. This implies that males and respondents with high investment experience are more confident than are others.

Further, DE is negatively related to financial literacy, education and occupation, whereas it is positively related to gender and experience. This indicates that financially literate and highly educated investors are less prone to disposition effect compared to less educated investors. Moreover, females and less experienced respondents are more inclined towards disposition effect. ANCH is negatively related to age and positively related to occupation. This indicates that middle-aged investors (31-45 years old) are less prone to having anchoring bias than are young investors. Moreover, retired investors and housewives are more prone to having anchoring bias than are private sector employees.

REP is negatively associated with age and education, but positively related to occupation and experience. This implies that investors who are >60 years are less prone to representativeness bias compared to young investors. Similarly, graduates and postgraduates are less inclined to having representativeness bias than those with education up to schooling. MA is positively related to financial literacy, age, marital status, occupation, income level and investment experience while it is negatively associated to gender and education. This shows that females and investors having a doctorate degree are less inclined to exhibiting mental accounting bias relative to the reference category. The graduate and postgraduate categories in education, retired, and other categories of occupation, investors who have more experience are less prone to

mental accounting bias than are those in the reference category. EM has no significant relationship to any of the predictor variables. HERD is negatively related to age and occupation. This implies that financially literate and older investors are less influenced by herding behaviour relative to less literate and young investors, respectively.

Table 6.37- Summary of Multiple Regression for Behavioural Biases

This table provides summary of significant predictors for each outcome variable.

Outcome Variable	Significant Predictor(s)	Direction of Relationship
OS	Gender	-
	Ocu4	+
	Exp1	+
	Exp 2	+
	Exp 3	+
DE	FL	-
	Gender	+
	Edu2	-
	Edu3	-
	Ocp3	-
ANCH	Exp3	+
	Age2	-
	Ocp4	+
REP	Ocp5	+
	Age4	-
	Edu2	-
	Edu3	-
	Ocp4	+
	Occp5	+
	Exp2	+
Exp3	+	
MA	FL	+
	Gender	-
	Age2	+
	Marital status	+
	Edu4	-
	Ocp4	+
	Ocp5	+
	Inc2	+
	Inc3	+
	Exp2	+
	Exp3	+
Exp4	+	
EM	Not significant	
HERD	FL	-
	Age2	-
	Age4	-
	Ocp2	+
	Ocp3	-
	Ocp5	+

Further, framing effect is negatively related to financial literacy and positively related to marital status, income and experience. This implies that respondents who are more financially literate are less likely to be influenced by framing effect compared to financially illiterate respondents. Moreover, respondents earning a low income and less experienced investors are more inclined towards framing effect as compared to others.

6.8.4 Effect of Socio-Demographics Variables on Financial Literacy

Socio-demographics also significantly influence the level of financial literacy. Thus, it is imperative to examine the effect of socio-demographic characteristics on financial literacy. A binary logistic regression was applied to examine this objective under study. Financial literacy is negatively related to gender, education, income- level and investment experience. This implies that females have more financial awareness compared to their counterparts. Investors having >10 years of experience are more financially literate compared to less experienced investors. Respondents having a higher degree, such as doctorate, are more financially literate compared to others. Moreover, investors who are earning less income are less financially literate compared to others. However, in the present study, effect of age, marital status and occupation of individual investors on financial literacy was found to be statistically insignificant. This indicates that socio-demographics have a significant effect on the level of financial literacy.

6.8.5 Relationship between Personality Traits and Behavioural Biases

In the present study, we applied SEM to analyse the relationship between personality traits and behavioural biases among individual investors. Our results reveal that four personality traits are significantly associated with the different behavioural biases among stock investors in India. More broadly, our findings substantiate that the neuroticism trait has a significant relationship with most of the behavioural biases (i.e., the disposition effect; anchoring; representativeness bias; emotional and herding bias). According to our results, having an extrovert personality trait has a significantly positive relationship with all the behavioural biases. The possible reasons underlying this relationship are that investors are assertive, energetic, optimism, talkative and outgoing. These characteristics can make investors prone to overconfidence and other biases that lead to mental mistakes. The OP trait has a statistically significant link with only mental accounting bias. Similarly, the AG trait has no significant relationship with any of the behavioural biases.

The CON trait is positively related to overconfidence and self-attribution bias, anchoring bias, representativeness, mental accounting and emotional bias, whereas it has no significant relationship with disposition effect and herding.

Table 6.38 Summary of Relationships between Personality Traits and Behavioural Biases

This table presents the summary of relationship between Big Five personality traits and behavioural biases. Where OS = overconfidence and self-attribution bias, DE = the disposition effect, ANCH = anchoring bias, REP = representativeness bias, MA = mental accounting bias, EM = emotional bias, HERD = herding bias, NEU = neuroticism, EV = extraversion, OP = openness to experience, AG = agreeableness and CON = conscientiousness

Exogenous Variables	Endogenous Variables						
	OS	DE	ANCH	REP	MA	EM	HERD
NEU	NS	+	+	+	NS	+	+
EV	+	+	+	+	+	+	+
OP	NS	NS	NS	NS	+	NS	NS
AG	NS	NS	NS	NS	NS	NS	NS
CON	+	NS	+	+	+	+	NS

NS= non-significant, + = positive relation

6.9 CONCLUSION

This chapter describes the data analysis and research findings of the research objectives of this study. Examination of the level of financing literacy and prominent behavioural biases helps in developing an in-depth understanding of the financing behaviour of individual investors. The chapter elucidates the influence of socio-demographic variables on financial literacy and behavioural biases. Moreover, this chapter also examines the relationship between personality traits and behavioural biases.

CHAPTER 7

CONCLUSIONS AND SUGGESTIONS

7.1 INTRODUCTION

This study highlights the investment behaviour and financial literacy of individual investors in India. Further, this research examines the effect of financial literacy and socio-demographic variables including gender, age, marital status, education, income, occupation and investment experience on prominent behavioural biases. This study also determines the association between personality traits and behavioural biases of individual investors. This chapter draws the conclusions and suggestions for the study. It reviews the findings of the study and its contribution to the literature. It also highlights the managerial implications for financial planners and advisors in India. The final section discusses the limitations of the study and offers suggestions for future research.

7.2 KEY FINDINGS

The main aim of this study was to understand the psychology of individual investors who make investment-related decisions in India. Behavioural biases and financial literacy are under-researched among individual investors in India. Therefore, research conducted exclusively on the investment behaviour of individual investors is essentially required to develop an understanding about the behavioural biases of Indian investors. This section discusses the key findings of the preliminary study and the main study in the context of specific aims and objectives of the present study.

7.2.1 Findings of the Preliminary Study

The preliminary study was conducted on 20 financial advisors and analysts by using in-depth semi-structured interviews. This study makes an exploratory attempt to identify the behavioural factors influencing Indian investors while making investment decisions. Due to lack of awareness about investment products, most investors are dependent on financial advisors for their investments. The findings of this study revealed that investors are susceptible to different errors and biases. These mental mistakes may result in suboptimal decisions. Based on the findings of this study, totally 13 themes emerged. Table 7.1 shows the major themes and behavioural biases related to these findings.

Table 7.1 Key Findings of the Preliminary Study

S. No.	Findings/Themes	Behavioural Biases
1.	<i>Tendency to believe they are better than others</i>	Overconfidence bias (OS)
2.	<i>Tendency to hold loss making assets</i>	Disposition Effect (DE)
3.	<i>Prefer to invest in familiar securities</i>	Familiarity bias (FAM)
4.	<i>Tendency to make investment by looking at the framing of the outcome</i>	Framing effect (FE)
5.	<i>Tendency to rely on reference point</i>	Anchoring bias (ANCH)
6.	<i>Tendency to invest based on information easily available</i>	Availability bias (AVL)
7.	<i>Rely on their own skills</i>	Self- Attribution bias (SA)
8.	a) <i>Tendency to buy rising stocks with the expectation that this rise will continue.</i> b) <i>Follows past trend of stocks</i>	Representativeness (REP)
9.	<i>Tendency to divide their money in to different accounts/ assets</i>	Mental Accounting (MA)
10.	<i>Tendency to believe that past events were predictable</i>	Hindsight bias (HS)
11.	<i>Tendency to feel regret for past decisions</i>	Regret Aversion (RA)
12.	<i>Tendency to have more sensitivity towards losses than gain</i>	Loss Aversion (LA)
13.	<i>Tendency to rely on other sources of information</i>	Herding bias/Media bias (HERD)

Therefore, this study develops a fundamental base to explore the prominent behavioural biases among individual investors and it paves the way for conducting the main study. Further, the findings obtained from the preliminary study were used for the development of the research instrument for the main study. The next section explains the findings of the main study in the perspective of the stated research objectives.

7.2.2 Findings of the Main Study

This section presents the research findings of the study based on research objectives. The first research objective assesses the level of financial literacy among individual investors.

7.2.2.1 Financial Literacy of Individual Investors- The level of financial literacy among individual investors is as follows:

1. The results revealed that, on average, the respondents answered 56.08 percent of questions correctly. The median percentage of correct answers is 58.33 percent. This implies that individual investors have a low level of financial literacy.
2. Individual investors have a fair knowledge of questions related to basic financial literacy, which includes compound interest, diversification of portfolio and risk and return.
3. Individual investors were least knowledgeable about the question related to earning per share and P/E ratio, closing price of the index, knowledge about the Market efficiency and technical analysis, relationship between interest rate and bond prices and meaning of Beta. This implies that investment knowledge of individual investors is poor.

7.2.2.2 Behavioural Biases of Individual Investors- This study also analysed the prominent behavioural biases among individual investors in India. The major findings related to the susceptibility to behavioural biases are as follows:

1. Mental accounting, representativeness, overconfidence and self-attribution, disposition effect, anchoring, emotional bias and herding bias were prominent biases encountered among individual investors.
2. Most respondents are not prone to familiarity, availability and hindsight biases.
3. Our findings revealed that framing effect is less prevalent in individual investors.
4. Our findings also support the view that individual investors do not always act rationally. Instead, they are often guided by their emotions, heuristics and other biases that affect their investment decision making.

7.2.2.3 Effect of Financial Literacy and Socio-Demographic Variables on Behavioural Biases- The next objective of the current study relates to analysis of the effect of financial literacy and socio-demographic variables on behavioural biases. The main findings of this research objective are as follows:

1. Overconfidence bias is negatively associated with gender and positively associated with the occupation and investment experience of respondents. This

implies that males and respondents with high investment experience are more confident than are females and less experienced investors, respectively.

2. Disposition effect is negatively related to financial literacy, education and occupation, but positively related to gender and experience. This indicates that financially literate and highly educated investors are less prone to disposition effect compared to less educated investors. Moreover, self-employed individuals are less affected by the disposition effect than are private sector employees. However, females and less experienced respondents are more inclined towards disposition effect than their reference category.
3. Anchoring bias is negatively related to age and positively related to occupation. This indicates that middle aged investors (31-45 years old) are less prone to having anchoring bias than are young investors. Moreover, retired investors and those who are housewives are more prone to having anchoring bias than are private sector employees.
4. Representativeness is negatively associated with age and education, but positively related to occupation and experience. This implies that investors who are >60 years are less prone to representativeness compared to young investors (i.e., 18-30 years). Similarly, graduates and postgraduates are less inclined to having representativeness bias than those with education up to schooling. However, greater investment experience is associated with greater representativeness bias relative to less experienced investors.
5. Mental accounting is positively related to financial literacy, age, marital status, occupation, income level and investment experience, but negatively associated with gender and education. This shows that females and investors having a doctorate degree are less inclined to exhibiting mental accounting bias relative to the reference category. The graduate and post-graduate categories in education, retired, and other categories of occupation, investors who have more experience are less prone to mental accounting bias than are those in the reference category.
6. Emotional bias has no significant relationship with any of the predictor variables. Herding bias is negatively related to financial literacy, age and occupation. This implies that financially literate and older investors are less influenced by herding behaviour relative to the less literate and young investors, respectively.

7. Framing effect is negatively related to financial literacy and positively related to marital status, income and experience. This implies that respondents who are more financial literate are less likely to be influenced by framing effect compared to financial illiterate respondents. Moreover, respondents earning a low income and less experienced investors are more inclined towards framing effect as compared to others.

7.2.2.4 Effect of Socio-demographic Variables on Financial Literacy- This study also examines the effect of socio-demographic factors on the level of financial literacy. The results obtained from this objective are as follows:

1. Financial literacy is negatively related to gender, education, income level and investment experience. This implies that females have more financial awareness compared to their counterparts in India.
2. Investors having >10 years of experience are more financially literate compared to less experienced investors.
3. Respondents having a higher degree such as doctorate are more financially literate compared to investors who are having a graduate degree or school certificate.
4. Investors who are earning less income are less financially literate compared to other investors who are earning more.
5. In the present study, effect of age, marital status and occupation of individual investors on financial literacy were found to be statistically insignificant.

7.2.2.5 Relationship between Personality Traits and Behavioural Biases- The final objective of this study is related to examining the relationship between personality traits and behavioural biases. The main findings of this objective are summarized below:

1. Neuroticism trait has a significant positive relationship with most of the behavioural biases (i.e., the disposition effect; anchoring; representativeness; emotional and herding bias). This implies that investors who scored high on neuroticism are more inclined towards the above biases.
2. Extrovert personality trait has a significantly positive relationship with all the behavioural biases. The possible reasons underlying this relationship are that investors are confident, energetic, optimism, talkative and outgoing. These

characteristics can make investors prone to overconfidence and other biases that lead to mental mistakes.

3. Openness trait has a statistically significant association with only mental accounting bias.
4. Agreeableness trait has no significant relationship with any of the behavioural biases.
5. Conscientiousness trait is positively related to overconfidence and self-attribution bias, anchoring bias, representatives, mental accounting and emotional bias, but it has no significant relationship with disposition effect and herding.

7.3 CONTRIBUTION OF THE STUDY

The present study provides a deeper understanding of financing literacy and predisposition to behavioural biases of individual investors in India. This study depicts the prominent biases among individual investors. The present study also draws attention by analysing the effect of financial literacy, socio-demographic factors and personality traits on behavioural biases. Thus, it makes a significant contribution to the already existing body of knowledge. This section sheds light on the significance of the study. The present study makes the following contributions:

7.3.1 Theoretical Contribution

1. The present study contributes to the literature on behavioural finance. It examines the financial literacy and prominent behavioural biases of individual investors in India. Thus, it adds to the theoretical knowledge by providing new empirical evidence about the investment behaviour of Indian investors.
2. This study is probably the first attempt to unravel the relationship between financial literacy and behavioural biases, especially in India. Thus, it contributes to this literature by trying to fill this gap.
3. The present study also contributes to the behavioural finance literature by bridging the gap of the limited research on the personality traits and behavioural biases of individual investors in India. Overall, the study contributes to the present body of knowledge by providing first-hand evidence on investment behaviour and financial literacy of individual investors in the Indian context.

7.3.2 Practical Contribution

1. This study analyses the investment behaviour and their determinants of individual investors in India. The findings of this study will enable individual investors to get a better understanding of behavioural biases and financial knowledge that may influence their investment decisions and results in suboptimal returns.
2. This study also highlights the fact that financial knowledge among individual investors is poor. This finding may help financial educators in promoting financial awareness programs for individuals.
3. Financial advisors can potentially become more effective by understanding their clients' investment decision making, which in turn can result in providing customized financial services based on their clients' predisposition.
4. This study also analyses the relationship between personality traits and behavioural biases of individual investors. Understanding investor personality differences and biases can help policy makers formulate better policies involving investors. Further, the findings can assist financial counsellors and planners understand investor personality traits and enable them to better address client financial needs.

7.3.3 Methodological Contribution

The present study also creates a methodological contribution to the literature by using the mixed method approach to investigate the behavioural biases of individual investors in India. In-depth semi-structured interviews and survey were conducted in an attempt to identify and analyse the investment behaviour of individual investors. The interviews help in providing information regarding behavioural factors influencing investment decisions of investors. Further, primary data obtained from the survey were used to identify the prominent biases and influence of financial literacy, socio-demographics and personality traits on behavioural biases. Thus, the present study applied qualitative and quantitative methods for collecting information about investment behaviour of individual investors in India.

7.4 SUGGESTIONS

This section mainly deals with suggestions for individual investors and financial advisors and planners based on our research findings.

7.4.1 Individual Investors

Individual investors should be aware of these behavioural factors that may influence their investment decisions. Investors should be well aware of the available investment products that may help in their financial well-being.

1. Individual investors should be alert as to how behavioural biases influence their investment decisions so that they can minimize their effect while making investment-related decisions.
2. Individual investors need to pay more attention for upgrading their financial and investment knowledge. This will assist them to overcome adverse investment returns due to psychological/emotional error.
3. The investors should also be able to understand the market and economic indicators of different industries and firms since they affect the performance of shares on the stock exchange.
4. Investors should not be overconfident about their investment skills and knowledge.
5. Investors should be aware about their risk tolerance before making any investment. They should diversify their portfolio by investing in different assets.
6. Individual investors should not stick to a reference point for making investment decisions.

7.4.2 Financial Advisors and Planners

The findings of the present study are also constructive to financial planners and advisors in improving the financial well-being of their clients.

1. Financial advisors can potentially become more effective by understanding their clients' investment behaviour, which in turn can result in providing customized financial services based on their clients' predisposition.

2. Financial advisors and planners should plan financial and investment awareness programmes to educate and create awareness among potential and existing investors.
3. Financial advisors and planners may create a systematic plan of investment that may help their clients' financial well-being even in downturn markets.
4. Financial advisors and planners may assist clients with neuroticism characteristics by educating them to use stop-loss orders to reduce excessive losses while taking advantage of tax loss harvesting, which is the practice of selling a security that has experienced a loss.
5. Financial advisors and planners can help clients with the openness trait to view their portfolio of diversified investments as a whole, and not as consisting of separate parts. As previously noted, such investors tend to have mental accounting bias.
6. Financial advisors and planners should advise conscientious clients to focus on long-term investment. Otherwise, they are likely to let emotional biases and overconfidence to lead to excessive trading and higher transaction costs, which reduces returns.

7.5 LIMITATIONS AND DIRECTION FOR FUTURE RESEARCH

The present study focuses on analysing the financial literacy and prominent biases of individual investors in India. This study also highlights some important findings related to the effect of financial literacy, socio-demographic characteristics and personality traits on behavioural biases. However, few limitations are associated with the present study which provides the direction for future research. The limitations of this study are as follows:

1. The present study was undertaken in the urban area of India to which generalization of empirical findings to the whole of India needs to be done cautiously. Thus, future studies must be undertaken in suburban areas of India so that the findings can be generalized.
2. This study analysed the propensity to exhibit overconfidence and self-attribution bias, disposition effect, anchoring bias, representativeness, mental accounting, familiarity, availability, hind-sight, emotional bias, herding and framing effect.

Thus, future studies must incorporate additional bias and evaluate the effect of these biases on investment decisions.

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ANNEXURE -I: RESEARCH QUESTIONNAIRE

Malaviya National Institute of Technology, Jaipur

JLN Marg, Jaipur- 302017

Department of Management Studies

Questionnaire Cover Letter

Survey on “Financial Literacy and Behavioural Biases: A Study of Indian Investors”

Dear Sir/Madam,

I, at Department of Management Studies, Malaviya National Institute of Technology (MNIT) Jaipur am conducting a research on ***“Financial Literacy and Behavioural Biases: A Study of Indian Investors”***. The prime objective of the study is to identify the psychological biases among individual investors investing in Indian stock market. The study will also assess the level of financial literacy and the effect of financial literacy on investment behaviour.

I will be grateful if you spare your valuable time and provide us your views on this research study. It may take some time but it is extremely important for my research work. I assure you that it is purely an academic exercise and the information supplied by you would be kept strictly confidential. Completed questionnaire may be sent through email at: goyalnisha20@gmail.com

Thanking for your participation and helping us in carrying out this research.

Sincerely,
Nisha Goyal
Research Scholar

Financial Literacy and Behavioural Biases: A Study of Indian Investors

Section A: Respondent Profile

Please fill one square from each category that best describes you. (a- h)

- a. Current Location** -----
- b. Gender**
- Male
 Female
- c. Age Group (years)**
- 18-30
 31-45
 46- 60
 More than 60
- d. Marital status**
- Married
 Unmarried
- e. Educational qualification**
- Up to schooling
 Graduate
 Post graduate
 Doctorate
- f. Occupation**
- Private Sector Employee
 Public Sector Employee
 Self-employed
 Retired
 Other, Specify

.....
- g. Annual Income**
- Less than 3 lakhs
 3-6 lakhs
 >6-10 lakhs
 >10 lakhs
- h. Investment Experience in stock market**
- Less than 2 years
 2-5 years
 >5-10 years
 >10 years

Section B: Financial Literacy

Please insert a check mark (✓) in the appropriate column to indicate whether you agree or disagree or don't know with each of the following statements:

S. No.	Statements	Agree	Disagree	Don't know
1.	Buying a single company stock usually provides a safer return than a stock mutual fund.			
2.	When an investor diversifies his investments, the risk of losing money decreases.			
3.	If an investment earns 10% per year, your money will be doubled after seven years.			
4.	With compound interest you earn interest on your interest as well as on your principal.			

S. No.	Statements	Agree	Disagree	Don't know
5.	If market efficiency is considered weak (security prices don't adjust to reflect new relevant information), technical analysis would have little or no value.			
6.	If interest rate rises, the bond prices fall.			
7.	Common stocks always provide higher returns than bonds or money market investments.			
8.	If earning per share increases, the PE ratio is expected to increase as well.			
9.	Beta measures how responsive or sensitive a stock is to market movements.			
10.	ROA and ROE are the most important measures of a company's overall performance.			
11.	The closing price of Sensex/Nifty represents price of last deal.			
12.	The standard settlement time for shares deal executed in BSE/NSE is T+2.			

Section C: Behavioural Factors Affecting Investment Decision

Please insert a check mark (✓) in the appropriate column to indicate your behaviour while making investment decision by using the following five-point scale:

S. No	Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1.	I am an experienced investor.					
2.	I feel that on average my investment performs better than the stock market.					
3.	When I purchase a winning investment, I feel that my actions and knowledge affected the result.					
4.	I feel more confident in my own investment opinions over opinions of financial analysts.					
5.	I don't have any quick responses to good or bad news and tend to sell profitable stocks too early and sell losing stocks too late.					
6.	I am often reluctant (unwilling) to realize losses.					
7.	I sell profitable stocks because I am afraid that the stock price would fall					

S. No	Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	again.					
8.	I compare the current stock price with their recent 52-week high and low price to justify my stock purchase.					
9.	I am unlikely to buy a stock that was more expensive than last year.					
10.	When I decide to sell a stock, I keep its purchase price in mind.					
11.	In a falling market, I hold a losing stock till its price returns to its purchase level.					
12.	My past profitable investments were mainly due to my specific investment skills.					
13.	I believe that my skills and knowledge of stock market can help me to outperform the market.					
14.	You rely on your previous experiences in the market for your next investment.					
15.	The last investment was more of a bad luck than it was my own poor judgment.					
16.	I forecast the changes in stock prices in the future based on the recent stock prices					
17.	I rely on past performance to buy stock because I believe that good performance will continue.					
18.	You tried to avoid investing in companies with history of poor earnings.					
19.	My investment in stock A does not effects my investment decision in stock B.					
20.	My decision to buy gold or a house does not affect my investment in stock market.					
21.	I tend to treat each element of my investment portfolio separately.					
22.	I just look at the company names					

S. No	Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	before investing.					
23.	I prefer to invest in those shares where my father has invested.					
24.	I am in X industry, so I only invest in companies of this industry.					
25.	I prefer to buy stocks on the days when the value of the Nifty- 50 Index increases.					
26.	I prefer to sell stocks on the days when the value of the Nifty- 50 Index decreases.					
27.	I prefer to buy local stocks than international stocks because the information of local stocks is more available.					
28.	You were able to predict the collapse of Sensex in the wake of 2007 global financial crisis.					
29.	You would be convinced, if In 2006-07 someone had told you that a financial crisis is about to happen in a years.					
30.	You believe, you have gained more if your advisor had waited for a longer period.					
31.	I will not increase my investment when the market performance is poor					
32.	You are more concerned about a large loss in your stock than missing a substantial gain/profit.					
33.	You feel nervous when large paper losses (price drops) have in your invested stocks.					
34.	When it comes to investment, no loss of capital (invested money) is more important than returns/profits.					
35.	I feel more sorrow about holding losing stocks too long than about selling winning stocks too soon.					
36.	I often feel regret for selling a winning stock too early.					

S. No	Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
37.	I rarely consult others before making stock purchases or sales.					
38.	Other investors' decisions of buying and selling stocks have impact on my investment decisions.					
39.	I usually react quickly to the changes of other investors' decisions and follow their reactions to the stock market.					
40.	I consult others (family, friends or colleagues) before making stock purchased.					
41.	I follow social blogs/ forums before making stock purchase/sale.					

Please select the option that better represents you.

Q. 42 Suppose that you have Rs 12,000 invested in Company A stock. A downturn in the economy is occurring. You have two investment strategies that your broker has recommended to preserve your capital. (Two strategies have the same associated commissions and fees):

First decision: choose between

- Rs 8,000 of your investment are saved.
- 2/3 chance that the entire Rs. 12,000 investment will be saved and a 1/3 chance that none of the Rs. 12,000 will be saved.

Second decision: choose between

- Rs 4,000 of your investment are lost.
- 2/3 chance that none of the Rs. 12,000 investment will be lost, and a 1/3 chance that all Rs. 12,000 will be lost.

Section D: Personality traits

From each of the following statements, please indicate where you see yourself as someone who...

S. No	Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1.	I often feel inferior to others.					
2.	When I'm under a great deal of stress, sometimes I feel like I'm going to pieces.					

S. No	Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
3.	I often feel tense and jittery.					
4.	Sometimes I feel completely worthless.					
5.	Too often, when things go wrong, I get discouraged and feel like giving up.					
6.	I really enjoy talking to people.					
7.	I often feel as if I'm bursting with energy.					
8.	I am a cheerful, high-spirited person.					
9.	I am a very active person.					
10.	I am intrigued (attract) by the patterns I find in art and nature.					
11.	I often try new and foreign foods.					
12.	I have little interest in speculating on the nature of the universe or the human condition					
13.	I have a lot of intellectual curiosity.					
14.	I often enjoy playing with theories or abstract ideas.					
15.	I often get into arguments with my family and co-workers.					
16.	Some people think I'm selfish and egotistical.					
17.	Some people think of me as cold and calculating.					
18.	I keep my belongings neat and clean.					
19.	I'm pretty good about pacing myself so as to get things done on time.					
20.	I waste a lot of time before settling down to work.					
21.	Sometimes I'm not as dependable or reliable as I should be.					
22.	I never seem to be able to get organized.					

Thank you for your cooperation

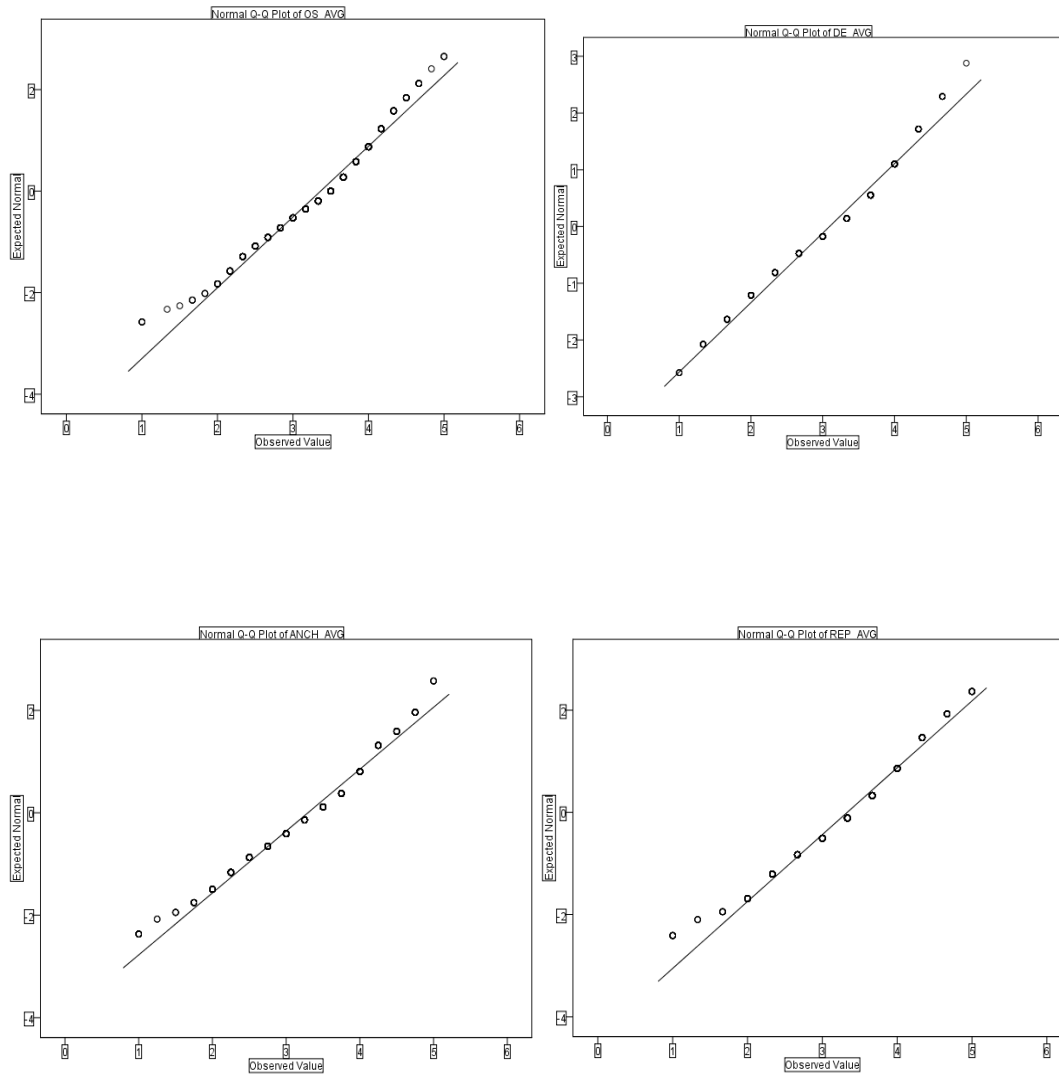
ANNEXURE -II: SUMMARY OF THE RESPONDENTS

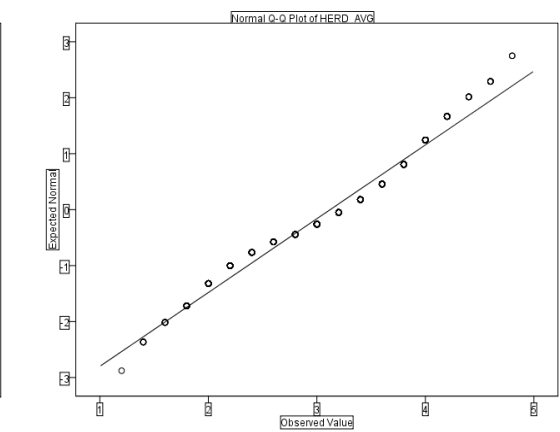
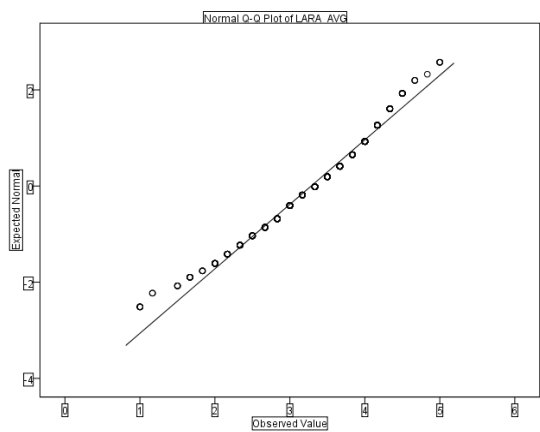
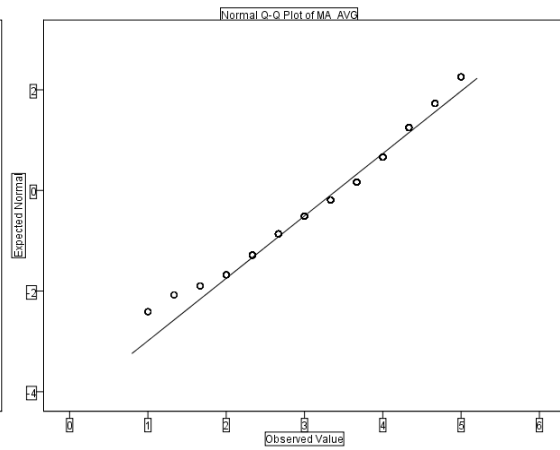
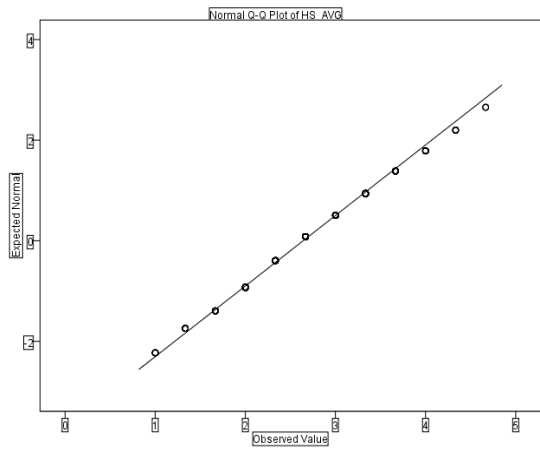
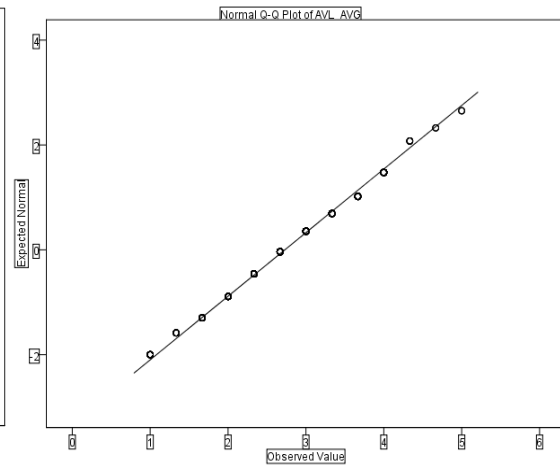
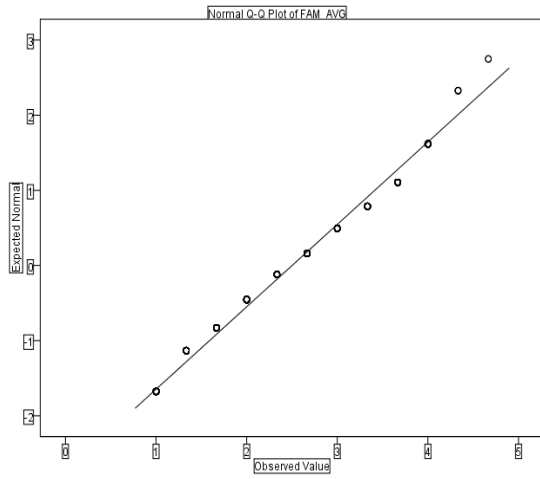
This table presents the total no of responses obtained from different cities and their respective response rate.

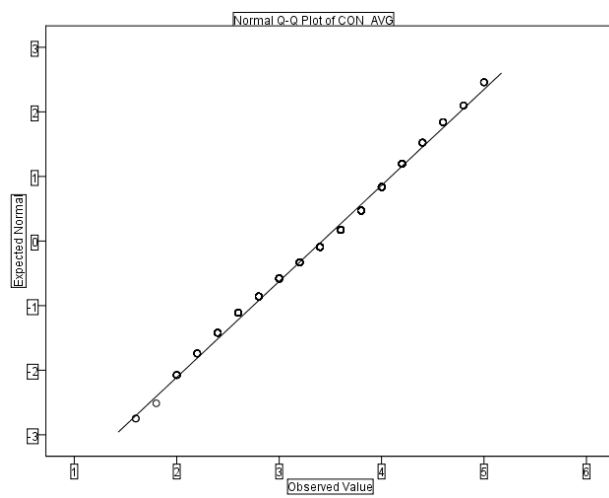
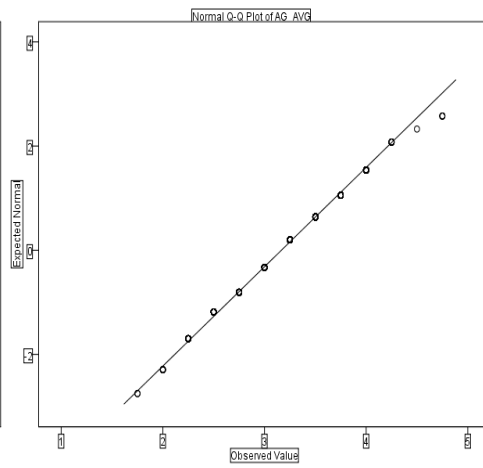
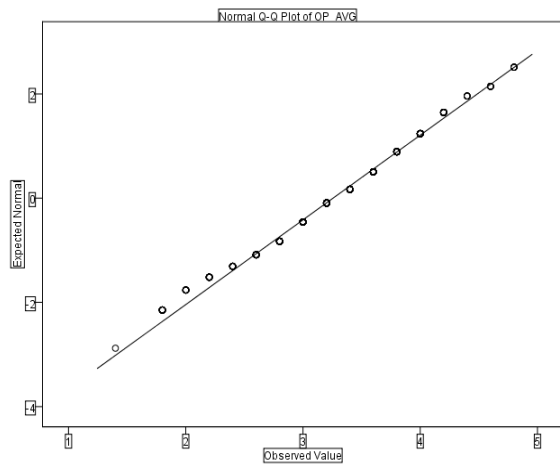
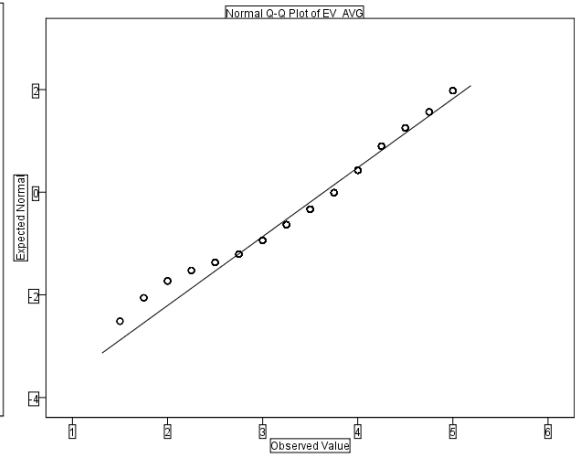
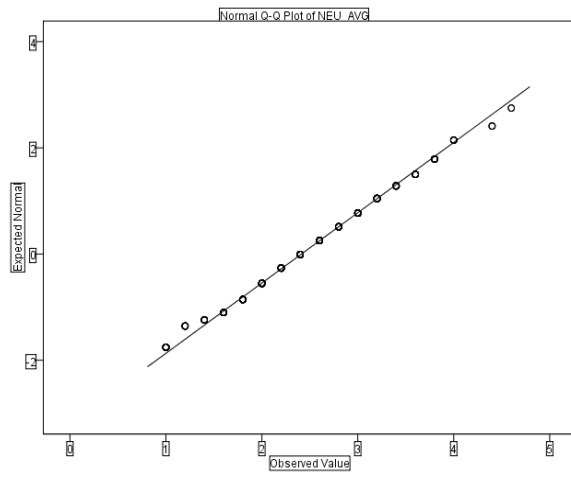
S. No.	City	No. of Accounts	Response Obtained	Response Rate
1.	Ahmedabad	256	67	26%
2.	Bangalore	229	65	28%
3.	Chennai	155	41	26%
4.	Cochin	80	29	36%
5.	Delhi	261	75	29%
6.	Hyderabad	204	32	16%
7.	Jaipur	218	87	40%
8.	Kolkata	172	26	15%
9.	Mumbai	303	48	16%
10.	Pune	122	31	25%

ANNEXURE -III: Q-Q PLOTS

Following figures show the normal Q-Q plots for all the variables measured on a 5 point Likert type scale

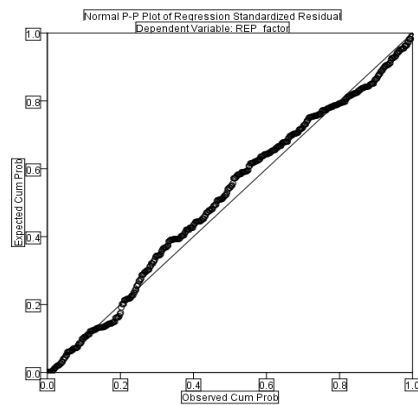
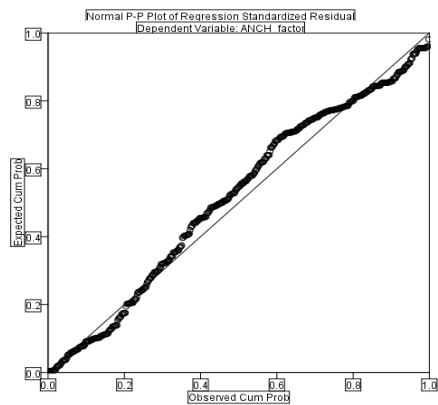
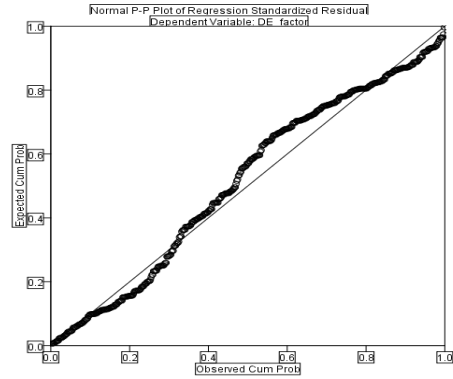
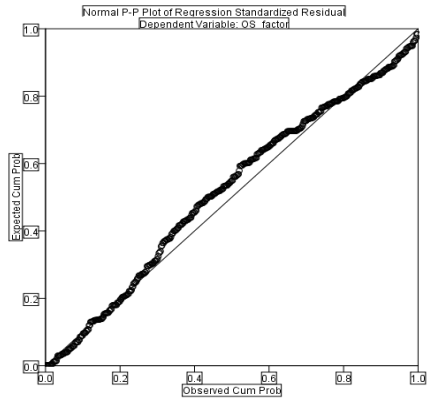


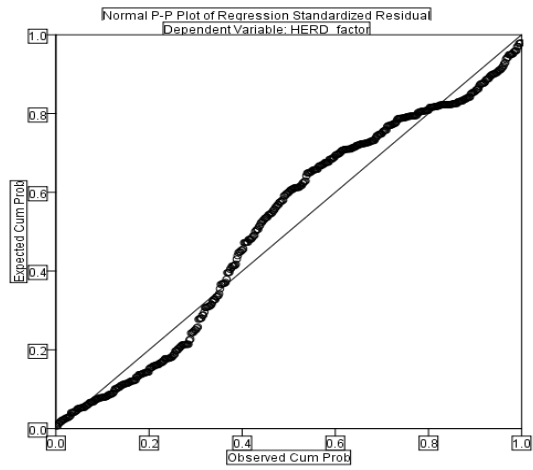
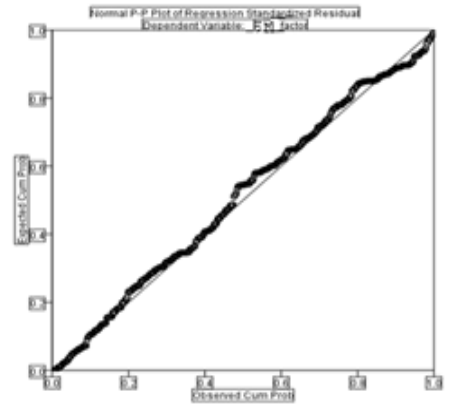
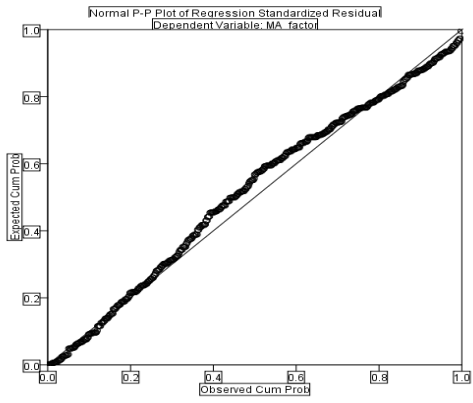




ANNEXURE -IV:P-P PLOTS FOR RESIDUALS

Following figures show the P-P plots for residuals for dependent variables measured on a 5 point Likert type scale.





ANNEXURE –V: RELIABILITY OF THE RESEARCH INSTRUMENT

This table examines the reliability of the variables by calculating Cronbach’s alpha, inter item correlation and corrected item total correlation. Note that S.D. = standard deviation, OS = overconfidence and self-attribution bias, DE = the disposition effect, ANCH = anchoring bias, REP = representativeness bias, MA = mental accounting bias, FAM = familiarity bias, AVL = availability bias, HS = hindsight bias, EM = emotional bias, and HERD = herding bias, NEU = neuroticism, EV = extraversion, OP = openness to experience, AG = agreeableness, and CON = conscientiousness.

Construct	Item	Statement	Mean	S.D	Cronbach's Alpha	Inter Item Correlation	Corrected Item-Total Correlation
Overconfidence and Self attribution Item 6	OS1	I am an experienced investor.	3.20	0.950	0.818	0.56-0.39	0.648
	OS2	I feel that on average my investment performs better than the stock market.	3.32	1.005			0.548
	OS3	When I purchase a winning investment, I feel that my actions and knowledge affected the result.	3.45	0.961			0.575
	OS4	I feel more confident in my own investment opinions over opinions of financial analysts.]	3.40	1.037			0.565
	OS5	My past profitable investments were mainly due to my specific investment skills.	3.41	0.968			0.562
	OS6	I believe that my skills and knowledge of stock market can help me to outperform the market.	3.40	1.027			0.592
Disposition Effect Item 3	DE1	I don't have any quick responses to good or bad news and tend to sell profitable stocks too early and sell losing stocks too late.	3.17	0.997	0.792	0.58-0.54	0.634
	DE2	I am often reluctant to realize losses.	3.08	0.927			0.622
	DE3	I sell profitable stocks because I am afraid that the stock price would fall again.	3.13	1.095			0.653
Anchoring Item 4	ANC H1	I compare the current stock price with their recent 52-week high and low price to justify my stock purchase.	3.39	1.040	0.818	0.63-0.46	0.615
	ANC H2	I am unlikely to buy a stock that was more expensive than last year.	3.07	1.001			0.604
	ANC H3	When I decide to sell a stock, I keep its purchase	3.63	1.131			0.695

Construct	Item	Statement	Mean	S.D	Cronbach's Alpha	Inter Item Correlation	Corrected Item-Total Correlation
		price in mind.					
	ANC H4	In a falling market, I hold a losing stock till its price returns to its purchase level.	3.24	1.128			0.646
Representativeness Item 3	REP1	I forecast the changes in stock prices in the future based on the recent stock prices	3.22	0.904	0.733	0.52-0.42	0.544
	REP2	I rely on past performance to buy stock because I believe that good performance will continue.	3.36	0.990			0.602
	REP3	You tried to avoid investing in companies with history of poor earning	3.51	1.071			0.530
Mental Accounting Item 3	MA1	My investment in stock A does not effects my investment decision in stock B.	3.52	0.968	0.786	0.58-0.53	0.603
	MA2	My decision to buy gold or a house does not affect my investment in stock market.	3.29	1.063			0.637
	MA3	I tend to treat each element of my investment portfolio separately.	3.47	0.963			0.642
Familiarity Item 3	FAM 1	I just look at the company names before investing.	2.57	1.087	0.863	0.74-0.64	0.693
	FAM 2	I prefer to invest in those shares where my father has invested.	2.28	1.022			0.770
	FAM 3	I am in X industry, so I only invest in companies of this industry.	2.35	1.085			0.758
Availability Item 3	AVL1	I prefer to buy stocks on the days when the value of the Nifty- 50 Index increases.	2.61	1.063	0.786	0.75-0.41	0.735
	AVL2	I prefer to sell stocks on the days when the value of the Nifty- 50 Index decreases.	2.53	1.011			0.678
	AVL3	I prefer to buy local stocks than international stocks because the information of local stocks is more available.]	2.91	1.055			0.482
Hindsight Bias Item 3	HS1	You were able to predict the collapse of Sensex in the wake of 2007 global financial crisis.	2.44	0.975	0.719	0.53-0.40	0.553
	HS2	You would be convinced, if In 2006-07 someone had	2.60	0.926			0.584

Construct	Item	Statement	Mean	S.D	Cronbach's Alpha	Inter Item Correlation	Corrected Item-Total Correlation
		told you that a financial crisis is about to happen in a years'.					
	HS3	You believe, you have gained more if your advisor had waited for a longer period.	2.87	0.922			0.483
Emotional Bias Items 6	EM1	I will not increase my investment when the market performance is poor	3.03	1.064	0.812	0.53-0.31	0.500
	EM2	You are more concerned about a large loss in your stock than missing a substantial gain/profit.	3.40	1.004			0.618
	EM3	You feel nervous when large paper losses (price drops) have in your invested stocks.	3.31	0.993			0.586
	EM4	When it comes to investment, no loss of capital (invested money) is more important than returns/profits.	3.31	1.062			0.575
	EM5	I feel more sorrow about holding losing stocks too long than about selling winning stocks too soon.	3.27	1.049			0.599
	EM6	I often feel regret for selling a winning stock too early.	3.38	1.057			0.559
Herding Item 5	HER D1	I rarely consult others before making stock purchases or sales.	3.18	0.885	0.889	0.73-0.48	0.722
	HER D2	Other investors' decisions of buying and selling stocks have impact on my investment decisions.	3.15	0.982			0.789
	HER D3	I usually react quickly to the changes of other investors' decisions and follow their reactions to the stock market.	3.10	1.024			0.750
	HER D4	I consult others (family, friends or colleagues) before making stock purchased.	3.20	1.091			0.796
	HER D5	I follow social blogs/forums before making stock purchase/sale.	3.22	0.900			0.605
Neuroticism Items=5	NEU1	I often feel inferior to others.	2.26	0.997	0.857	0.66-0.45	0.649
	NEU2	When I'm under a great deal of stress, sometimes I feel like I'm going to	2.48	1.013			0.718

Construct	Item	Statement	Mean	S.D	Cronbach's Alpha	Inter Item Correlation	Corrected Item-Total Correlation
		pieces.					
	NEU3	I often feel tense and jittery.	2.49	0.987			0.701
	NEU4	Sometimes I feel completely worthless.	2.35	0.954			0.646
	NEU5	Too often, when things go wrong, I get discouraged and feel like giving up.	2.45	1.026			0.646
Extraversion Items=4	EV1	I really enjoy talking to people.	3.70	0.945	0.864	0.77-0.55	0.693
	EV2	I often feel as if I'm bursting with energy.	3.48	0.811			0.629
	EV3	I am a cheerful, high-spirited person.	3.77	0.926			0.780
	EV4	I am a very active person.	3.72	0.881			0.760
Openness to experience Items=4	OP2	I often try new and foreign foods.	3.33	1.026	0.822	0.66-0.43	0.655
	OP3	I have little interest in speculating on the nature of the universe or the human condition.	3.12	0.729			0.532
	OP4	I have a lot of intellectual curiosity.	3.43	0.919			0.715
	OP5	I often enjoy playing with theories or abstract ideas.	3.34	0.945			0.705
Agreeableness Items=3	AG1	I often get into arguments with my family and co-workers.	3.10	0.994	0.785	0.57-0.54	0.636
	AG2	Some people think I'm selfish and egotistical.	3.18	1.009			0.628
	AG3	Some people think of me as cold and calculating.	2.99	0.872			0.615
Conscientiousness Items=5	CON1	I keep my belongings neat and clean.	3.60	0.966	0.857	0.68-0.44	0.623
	CON2	I'm pretty good about pacing myself so as to get things done on time.	3.65	0.904			0.707
	CON3	I waste a lot of time before settling down to work.	3.38	0.963			0.713
	CON4	Sometimes I'm not as dependable or reliable as I should be.	3.36	0.923			0.595
	CON5	I never seem to be able to get organized.	3.46	0.982			0.726

ANNEXURE –VI: STRUCTURAL MODEL

Figure A.1 Structural Model (Unstandardized Estimates)

This figure shows the relation between the Big Five personality traits (NEU = neuroticism, EV = extraversion, OP = openness to experience, AG = agreeableness, and CON = conscientiousness) and different behavioural biases (OS = overconfidence and self-attribution bias, DE = the disposition effect, ANCH = anchoring bias, REP = representativeness bias, MA = mental accounting bias, EM = emotional bias, HERD = herding bias) and the unstandardized path coefficients.

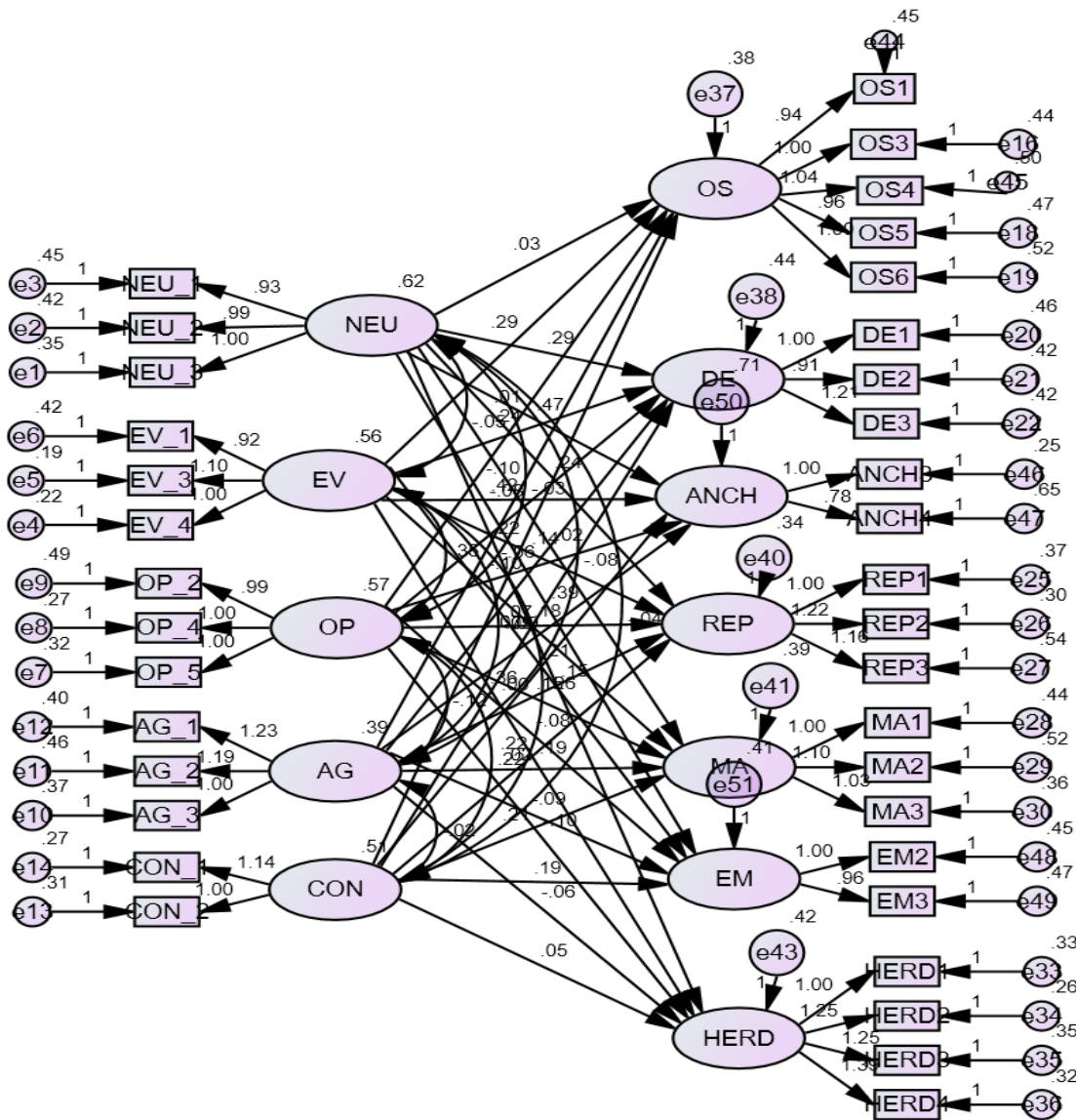


Figure A.2 Structural Model (Standardized Estimates)

This figure shows the relation between the Big Five personality traits (NEU = neuroticism, EV = extraversion, OP = openness to experience, AG = agreeableness, and CON = conscientiousness) and different behavioural biases (OS = overconfidence and self-attribution bias, DE = the disposition effect, ANCH = anchoring bias, REP = representativeness bias, MA = mental accounting bias, EM = emotional bias, HERD = herding bias) and the standardized path coefficients.

