CHAPTER-3 RESEARCH METHODOLOGY

This chapter deals with how the present study has been designed and what specific methodology has been used to operationalize and fulfil the objectives of the study.

3.1 PROBLEM STATEMENT

Traditional finance theories and models are based on certain assumptions. These assumptions oversimplify reality and place too much burden on human behaviour. One of these assumptions is the rationality of financial market participants. The standard finance theories assume that financial market participants are rational and they take decisions to maximize their wealth. These rational agents have perfect cognitive abilities and they take decisions after rationally evaluating all the available information. So, standard finance basically assumes that people take perfectly rational economic decisions at all times and they are not influenced by sentiments or emotions.

Many researchers have found evidence that goes against the rationality assumption. In reality, financial decision making has been found to be influenced by emotions, sentiments and behavioural biases. Research evidence has shown that everyone from individual investors, to corporate managers to professional analysts and portfolio managers are influenced by behavioural biases. Their behaviour is influenced by many biases such as overconfidence and disposition Effect, just to name a few. These biases may lead to suboptimal financial decisions. Institutional investors are generally in a better position to protect themselves from subpar investment decisions due to professional knowledge and risk management mechanisms. However, individual investors may not be able to protect themselves from the effects of suboptimal financial decisions caused by behavioural biases.

Researchers around the globe have found substantial evidence on how behavioural biases influence the decision making of individual investors. Barber and Odean (2013) found that American individual investors underperform standard benchmark indices; they’re a victim of disposition effect; are heavily influenced by limited attention and tend to hold undiversified stock portfolios. Magron and Merli (2015) found that French individual investors prefer to repurchase stocks they previously sold for a gain and stocks that have lost value since being sold. In the Indian context,
Chandra and Kumar (2011) found that individual investor behaviour is motivated by a variety of psychological heuristics and biases. They document that the behaviour of Indian individual investors is affected by anchoring, representativeness, mental accounting and overconfidence. Prosad (2014) found that Indian investors are affected by optimism, overconfidence, disposition effect and herd behaviour.

However, it would not be appropriate to say that all the individual investors are affected similarly by behavioural biases. An individual may be affected by some biases while s/he may not be affected by others. Some investors may be biased whereas some investors may not be biased. Moreover, biased and unbiased investors may differ in terms of their demographic characteristics, experience in the stock market, trading frequency, portfolio diversification, annual investment in direct equity, most influencing factor while making buy/sell decisions and return on their equity portfolio. Many researchers have found evidence of such differences. Barber and Odean (2001) reported that men are affected more by overconfidence bias than women. Feng and Seasholes (2005) found that investor sophistication and trading experience together can reduce the effect of behavioural biases like the disposition effect. Korniotis, Kumar, and Page (2012) found that geographical area of residence influences the behaviour of individual investors. Cronqvist and Siegel (2013) found that work experience with finance reduces predispositions to investment biases.

It is in this context that the present study attempts to investigate which behavioural biases influence individual investor behaviour, which bias/biases are most prominent in Indian context, how can the investors be categorized as ‘biased’ or ‘unbiased’, and whether biased and unbiased investors differ significantly in terms of demographic characteristics and other factors such as trading frequency, experience in the stock market, portfolio diversification, and return on equity portfolio.

3.2 RESEARCH QUESTIONS

In financial markets, whenever an investor buys a stock, there is another investor on the other side who sells the same stock. So if one investor performs well, someone else must underperform. The presence of rational investors means that there must be irrational and subpar investors in the market who perform poorly. With some notable exceptions, evidence indicates that individual investors are subpar investors (Barber & Odean, 2013).
As mentioned earlier, researchers in the developed countries have done substantial work to analyze the presence of biases in the behaviour of individual investors. However, research on the effect of behavioural biases on individual investor behaviour in India is still at an early stage. Looking at the current scenario, the stock market participation in India is likely to increase significantly in the next decade. Therefore it is imperative to ensure that individual investors make sound investment decisions when they invest in the stock market.

As discussed in the previous section, it has been documented by the researchers that the effect of biases on investors differs based on the demographic factors and many other factors. However, this matter has not been fully and comprehensively explored in the Indian context. The present study attempts to fill this gap. Eight widely documented biases have been chosen for the study after using Experts’ Opinion method.

Based on the review of literature and the research gaps, following research questions have been identified.

- Do the biases of Anchoring, Availability, Disposition Effect, Herd Behaviour, Mental Accounting, Naïve Reinforcement learning, Overconfidence and Representativeness influence Individual investors?
- Which bias/biases are most prominent in Indian context?
- How can the influence of behavioural biases be measured and how can investors be categorized as biased or unbiased?
- Do biased and unbiased investors differ in terms of demographic characteristics and other characteristics such as experience, diversification and trading frequency?

For the first question, an extensive review of literature was done after which three stock market experts having more than 10 years of stock market experience were interviewed and eight widely used behavioural biases were chosen for the study. For the remaining sub-questions, a survey instrument was designed and finalized after conducting four rounds of pilot survey.
3.3 OBJECTIVES

Based on the gaps and the research questions, the following objectives have been formulated to answer the research questions.

1. To investigate which behavioural biases influence the behaviour of individual investors
   1.1 To identify the most prominent bias/biases in the Indian context
   1.2 To make a demographic profile of investors influenced by each bias
   1.3 To analyze whether there is an association between biasness of the investors with respect to each bias and their demographic characteristics, the most influencing factor while making equity share buy/sell decisions, annual investment in direct equity, trading frequency, experience in the stock market, portfolio diversification, and return on equity portfolio

2. To categorize investors as overall biased or overall unbiased based on their total bias score

3. To analyze whether there is an association between overall biasness of the investors and their demographic characteristics

4. To analyze whether there is an association between overall biasness of the investors and the most influencing factor while making equity share buy/sell decisions, annual investment in direct equity, trading frequency, experience in the stock market, portfolio diversification, and return on equity portfolio

The first objective of the study makes it an exploratory study. While the rest of the objectives make it descriptive in nature.

3.3.1 Operational Definition Of Terms Used In The Study

This section provides the operational definitions of some of the terms used in this study. An operational definition is typically defined as a clear, concise and detailed definition of a measure. Following are some of the operational definitions used in this study.

1. Investor Behaviour

According to Baker and Ricciardi (2014), “The field of investor behaviour attempts to understand and explain investor decisions by combining the topics of psychology and investing on a micro level (i.e., the decision process of individuals and groups) and a macro perspective (i.e., the role of financial markets). Investor behaviour examines the cognitive factors (mental processes) and affective (emotional) issues that
individuals, financial experts, and traders reveal during the financial planning and investment management process” (Baker & Ricciardi, 2014, p.7).

In the present study, the term investor behaviour has been used to refer to the buy-sell-hold decisions of investors with regards to equity shares.

2. Behavioural biases

Behavioural biases have been defined as mental shortcuts or emotional filters which influence the buy-sell-hold decisions of the individual investors with regards to equity shares.

3. Impact

The dictionary meaning of the word impact is a strong effect or influence. In the present study, the term impact has been defined as the manner in which behavioural biases influence or play a role in the equity share buy-sell-hold decisions of individual investors. The impact of behavioural biases has been captured by asking specific hypothetical scenario based questions related to each bias. Hypothetical scenarios related to each bias have been designed after considering the research on how that bias has been found to influence the behaviour of investors.

4. Trading

In this study, the term trading refers to the number of times a respondent buys and/or sells equity shares in a year.

5. Overall Biasness/Biasness

In the present study, overall biasness/biasness of a respondent refers to the number of biases a respondent is influenced by. So, the relationship between overall biasness and annual income means the relationship between the number of biases a respondent is influenced by and their annual income.

6. Overall Biased And Overall Unbiased Investors

‘Overall Biased Investors’ refers to all the respondents who have obtained a bias score which is above the mean bias score and are influenced 5 or more biases. ‘Overall Unbiased Investors’ refers to all the respondents who have obtained a bias score which is below the mean bias score and are influenced by 3 or less biases.
3.4 RESEARCH DESIGN

According to Zikmund, Babin, Carr, and Griffin (2009) “A research design is a master plan that specifies the methods and procedures for collecting and analyzing the needed information. A research design provides a framework or plan of action for the research” (Zikmund et al, 2009, p.66).

The present study was carried out in two phases. In the first phase, Experts’ Opinion method was used to narrow down the list of biases which will be used for the study. In the second phase, a survey was carried out to examine and measure which behaviour biases influence investor behaviour.

3.4.1 First Phase Of The Study

The first phase of the present study falls within the framework of exploratory research design. According to Zikmund, Babin, Carr, and Griffin (2009), “exploratory research is appropriate in ambiguous situations or when new insight is needed. Exploratory research approaches are sometimes needed just to reach the appropriate problem statement and research objectives” (Zikmund et al, 2009, p.134).

In the first phase of the present study, the opinions of three stock market experts were taken to explore the general behaviour of individual investors and to zero in on the biases which will be used for further analysis. Experts’ opinion method was used to gain further clarification on behavioural biases as well.

3.4.2 Second Phase Of The Study

The second phase of the present study falls within the framework of descriptive research design. “The major purpose of descriptive research is to describe characteristics of objects, people, groups, organizations, or environments. In other words, descriptive research tries to “paint a picture” of a given situation by addressing who, what, when, where, and how questions” (Zikmund et al, 2009, p.55).

Descriptive research design has been employed for the second phase of the study. This design is chosen for the study in order to derive a meaningful association between the biasness of the investors and their demographic characteristics and other characteristics such as trading frequency, experience and portfolio diversification.
### 3.5 VARIABLES UNDER STUDY

In order to answer the research questions, it is necessary to break down the research objectives into specific variables under study. The following table displays variables under study for the present study.

#### Table 3.1 – Variables under Study (Behavioural biases)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Construct/ Biases</th>
<th>Definition</th>
<th>Behavioural Indicator</th>
<th>Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Anchoring</td>
<td>Anchoring bias causes people to use an anchor or a reference point or an initial piece of information and subsequently adjust away from that anchor to estimate the value of something or to make decisions about something</td>
<td>A tendency to make buy/sell decisions about a stock based on an initial anchor such as a particular price</td>
<td>(Kaustia, Alho, &amp; Puttonen, 2008) (Hwang, 2004)</td>
</tr>
<tr>
<td>2.</td>
<td>Availability</td>
<td>Availability bias causes people to make decisions or assign probabilities to future events based on how easily something that they have seen or heard or are familiar with can be accessed in their memory.</td>
<td>A tendency of investors to make stock buy or sell decisions based on readily available information such as what they have recently heard/read about that stock</td>
<td>(Jegadeesh &amp; Kim, 2006) (Nofsinger &amp; Varma, 2013)</td>
</tr>
<tr>
<td>3.</td>
<td>Disposition Effect</td>
<td>Disposition Effect refers to the tendency of individuals to sell winning stocks too soon and to hold on to losing stocks for too long</td>
<td>A tendency to hastily sell the stocks whose prices have increased, A tendency to hold on to stocks whose prices have gone down</td>
<td>(Odean, 1998) (Grinblatt &amp; Keloharju, 2001)</td>
</tr>
<tr>
<td>Sr. No.</td>
<td>Construct/ Biases</td>
<td>Definition</td>
<td>Behavioural Indicator</td>
<td>Studies</td>
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<td>4.</td>
<td>Herding</td>
<td>A behaviour in which people imitate the observed actions of others instead of following their own beliefs, common sense or judgment</td>
<td>A tendency to buy a stock simply because many others are buying it. A tendency to sell a stock simply because many others are selling it</td>
<td>(Scharfstein &amp; Stein, 1990), (Christie &amp; Huang, 1995)</td>
</tr>
<tr>
<td>5.</td>
<td>Limited Attention</td>
<td>Limited attention bias causes people to pay attention to only selective alternatives and aspects when they are faced with complicated decisions involving many alternatives and aspects</td>
<td>A tendency to buy stocks that are constantly in the limelight</td>
<td>(Barber &amp; Odean, 2008), (Corwin &amp; Coughenour, 2008)</td>
</tr>
<tr>
<td>6.</td>
<td>Mental Accounting</td>
<td>Mental Accounting causes people to keep separate mental accounts of each item in their investment portfolio. This bias also causes people to evaluate each self created mental account frequently</td>
<td>A tendency to make changes in the investment portfolio based on the performance of a particular stock/stocks A tendency to frequently evaluate the performance of each individual stock in the portfolio rather than evaluating the performance of the entire portfolio</td>
<td>(Thaler, 1999), (Shefrin &amp; Statman, 2000)</td>
</tr>
<tr>
<td>Sr. No.</td>
<td>Construct/ Biases</td>
<td>Definition</td>
<td>Behavioural Indicator</td>
<td>Studies</td>
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<tr>
<td>7.</td>
<td>Naïve Reinforcement Learning</td>
<td>Naïve reinforcement learning is a simple form of learning whereby people repeat actions that previously resulted in pleasure while avoid actions that previously caused pain</td>
<td>A tendency to repurchase stocks previously sold for a gain if prices have come down since the sale. An unwillingness to repurchase stocks previously sold for a loss despite an improvement in future prospect of the stock</td>
<td>(Strahilevitz, Odean, &amp; Barber, 2011)</td>
</tr>
<tr>
<td>8.</td>
<td>Overconfidence</td>
<td>Overconfidence bias causes people to overestimate their knowledge and skills, underestimate risks and exaggerate their ability to control events.</td>
<td>Increase in trading activity due to past success which makes investors feel overconfident. The tendency to believe that one has superior stock picking skills.</td>
<td>(Statman, Thorley, &amp; Vorkink, 2006)</td>
</tr>
<tr>
<td>9.</td>
<td>Representativeness</td>
<td>Representativeness bias causes people to classify objects or new information based on their beliefs and past experiences.</td>
<td>A tendency to classify stocks based on their similarity to other stocks. A tendency to stereotype, for example a tendency to believe if a sector is performing well, all stocks belonging to that sector are also performing well</td>
<td>(De Bondt &amp; Thaler, 1985; 1987)</td>
</tr>
</tbody>
</table>
3.5.1 Biases Included In The Study

After doing extensive review of the literature, three stock market experts having more than ten years of experience were contacted. They were asked questions about certain behavioural tendencies of individual investors and whether they have observed the same tendencies in the behaviour of investors in Surat or not. Based on the experts’ opinions, the following biases were included in the study for further analysis.

**Table 3.2 – Biases included in the study**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Bias</th>
<th>Experts’ Opinion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Anchoring</td>
<td>After having purchased the stock, investors take subsequent decisions about that stock based on the initial purchase price.</td>
</tr>
<tr>
<td>2.</td>
<td>Availability</td>
<td>The experts unanimously agreed that in their experience, investors tend to take purchase and sell decisions based on readily available information.</td>
</tr>
<tr>
<td>3.</td>
<td>Disposition Effect</td>
<td>Majority investors exhibit a tendency to sell stocks whose prices have increased and to hold on to stocks whose prices have gone down.</td>
</tr>
<tr>
<td>4.</td>
<td>Herd Behaviour</td>
<td>The experts were of the opinion that investors do exhibit herd behaviour.</td>
</tr>
<tr>
<td>5.</td>
<td>Mental Accounting</td>
<td>Individual investors tend to keep separate mental accounts of each stock in their portfolio.</td>
</tr>
</tbody>
</table>
6. Naïve Reinforcement Learning
Many investors tend to repurchase stocks previously sold for a gain while they refrain from repurchasing stocks previously sold for a loss.

7. Overconfidence
The experts have observed that individual investors are overconfident about their stock picking skills.

8. Representativeness
Individual investors do tend to exhibit representativeness bias by stereotyping stocks based on their similarities to other stocks.

3.5.2 Biases Excluded From The Study
The following biases were excluded from the study

- **Limited Attention Bias**
Limited attention bias causes investors to buy and sell stocks that are constantly in the limelight. Information about stocks that are constantly in the limelight is readily available. This bias is similar to another bias called availability bias which causes investors to exhibit the behaviour pattern of buying and selling stocks on readily available information. As a result, limited attention bias was excluded from the study.

- **Status Quo Bias**
Status quo bias causes people to stick to the status quo instead of making a change, even when a change is more beneficial. This bias was excluded from the study because those who suffer from this bias do not actively manage their portfolio, hence they do not buy or sell stocks. Moreover, the sample for the study is those investors who actively manage their portfolio. Status Quo bias is not applicable on such investors hence it was not taken.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Bias</th>
<th>Reasons for Exclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Limited Attention Bias</td>
<td>According to the experts, this bias is similar to availability bias</td>
</tr>
<tr>
<td>2.</td>
<td>Status Quo Bias</td>
<td>Not relevant for the sampled investors under study</td>
</tr>
</tbody>
</table>
3.5.3 Demographic Factors Used In The Study

The following demographic factors were identified and included in the study based on the review of literature.

Table 3.4 – Demographic variables used in the study

<table>
<thead>
<tr>
<th>Serial No</th>
<th>Variable</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Gender</td>
<td>(Barber &amp; Odean, 2001), (Khan, Tan, Chong, &amp; Ong, 2017), (Sundén &amp; Surette, 1998), (Mishra &amp; Metilda, 2015)</td>
</tr>
<tr>
<td>2.</td>
<td>Age</td>
<td>(Kumar &amp; Korniotis, 2011)</td>
</tr>
<tr>
<td>3.</td>
<td>Education</td>
<td>(Mishra &amp; Metilda, 2015), (Liivamagi, 2016)</td>
</tr>
<tr>
<td>4.</td>
<td>Occupation</td>
<td>(Dhar &amp; Zhu, 2006)</td>
</tr>
<tr>
<td>5.</td>
<td>Marital Status</td>
<td>(Sundén &amp; Surette, 1998)</td>
</tr>
<tr>
<td>6.</td>
<td>Income</td>
<td>(Khan, Tan, Chong, &amp; Ong, 2017)</td>
</tr>
</tbody>
</table>

3.5.4 Equity Portfolio & Trading Relates Factors Used In The Study

The following equity portfolio & trading related factors were chosen for the study after reviewing the relevant literature.

Table 3.5 – Equity portfolio & trading related variables used in the study

<table>
<thead>
<tr>
<th>Serial No</th>
<th>Variable</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Most influencing factor while purchasing equity shares</td>
<td>(Al-Tamimi, 2006)</td>
</tr>
<tr>
<td>2.</td>
<td>Annual buy/sell frequency (Trading frequency)</td>
<td>(Dhar &amp; Zhu, 2006)</td>
</tr>
<tr>
<td>3.</td>
<td>Experience in the stock market (Number of years active in the stock market/ Trading experience)</td>
<td>(Nicolosi, Peng, &amp; Zhu, 2009), (Khan, Tan, Chong, &amp; Ong, 2017), (Mishra &amp; Metilda, 2015),</td>
</tr>
</tbody>
</table>
Primary data has been collected through a structured questionnaire for the study. As the main objective is to analyze the impact of behavioural biases on investors who make equity share buy and sell decisions on their own, the study is applicable to a specific segment of investors. Therefore the data has been collected “subjectively, but from a relevant segment of population” (Sahi & Arora, 2012). The target respondents for the study are investors who have the financial capability to invest in the stock market and who make buy and sell decisions on their own.

Further, the respondents of Surat city were selected for the study. This region has been selected because Surat is one of the fastest developing cities in the world. Surat is all set to become the most populous city of Gujarat in the next one decade. The population of the city grew 65 percent in 10 years between 2001 and 2011 (The Times of India, 2013). According to a Surat Municipal Corporation (SMC) projection, the population of Surat is expected to become 80 lakh by 2023 (The Times of India, 2013).

The Diamond Research and Mercantile (Dream City) Project in Surat is expected to boost the GDP of the city. Surat is expected become 4th in terms of GDP and will be behind only Kolkata, Delhi and Mumbai by 2020 (The Times of India, 2015). Surat is also one of the top 10 cities in terms of highest per capita income in India (The Times of India, 2015). Surat has a huge business community. So, it seems reasonable to assume that an average individual in this city is financially capable to invest in the stock market.

Due to the unavailability of a comprehensive list of individual investors in Surat, it becomes necessary to narrow down the investor population in this region. So, the

<table>
<thead>
<tr>
<th>Serial No</th>
<th>Variable</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.</td>
<td>Number of scrips in direct equity portfolio (Diversification)</td>
<td>(Goetzmann &amp; Kumar, 2008), (Khan, Tan, Chong, &amp; Ong, 2017)</td>
</tr>
<tr>
<td>5.</td>
<td>Annual return on equity portfolio</td>
<td>(Fischer &amp; Gerhardt, 2007)</td>
</tr>
</tbody>
</table>

### 3.6 SAMPLING PLAN

Primary data has been collected through a structured questionnaire for the study. As the main objective is to analyze the impact of behavioural biases on investors who make equity share buy and sell decisions on their own, the study is applicable to a specific segment of investors. Therefore the data has been collected “subjectively, but from a relevant segment of population” (Sahi & Arora, 2012). The target respondents for the study are investors who have the financial capability to invest in the stock market and who make buy and sell decisions on their own.

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Due to the unavailability of a comprehensive list of individual investors in Surat, it becomes necessary to narrow down the investor population in this region. So, the
sample structure has been decided on the basis of a combination of judgement and snowball sampling (Sahi & Arora, 2012).

3.6.1 Target Population
The objective of the study is to analyze the impact of behavioural biases on individual investor behaviour in Surat. Hence the target population for the study would be all the individual equity investors living in Surat city.

3.6.2 Sampling Unit
The sampling unit for the study is the individual equity investor who is a resident of Surat and who makes equity share buy-sell-hold decisions on his/her own.

3.6.3 Sampling Technique
A combination of judgement and snowball sampling techniques has been used for this study. According to Ove and Snijders (1994), the use of snowball sampling can be justified in the following situations.

1. When the list of participants who belong to the sampling frame is not available.
2. When the initial sample is drawn from different sources

The list of respondents who fall within the sampling frame is not available. There is no public database on the number of individual D-Mat accounts in Surat city. Consequently, probability sampling techniques, wherein each unit of the population has equal probability of being part of the sample, cannot be used for the study. Moreover, as mentioned above, a list of participants who fall within the sampling frame is also not available. So, snowball sampling technique becomes an appropriate sampling technique for this study.

To satisfy the second requirement for using snowball sampling method, efforts have been made to draw the initial set of respondents from different sources. The initial sample was selected based on judgement. So, this is the stage where judgement sampling was used. After selecting the initial respondents from various sources, snowballing was done to collect data from the rest of the respondents. The respondents were asked to give references of those individuals who invest in the stock market and who make buy-sell-hold decisions on their own. The referred respondents were contacted to participate in the survey.
3.6.4 Sampling Selection Criteria

The following criteria have been used to select the respondents for the present study.

i. The respondent should be a resident of Surat city.

ii. The respondent should have an annual income of at least Rs. 2.51 lacs to ensure that s/he is financially capable of investing in the stock market.

iii. The respondent should have a direct equity exposure of at least Rs. 200,000.

iv. The respondent should make buy-sell-hold decisions on his/her own.

The above mentioned sampling selection criteria are based on the assumption that those investors who have a good annual income are likely to increase their exposure in the stock market. Another assumption is that those investors who have a significant exposure in direct equity are likely to periodically update their portfolio by buying/selling stocks. Moreover, in order to capture the presence of behavioural biases, it is important to analyze the behaviour of investors who make buy/sell decisions on their own.

3.6.5 Sample Size

500 people were approached to participate in the survey. The survey was administered on one-to-one basis in person. All 500 respondents agreed to participate in the survey, out of which 3 respondents gave ambiguous responses and they were not considered for the study. Finally, the total number of respondents for the study turned out to be 497.

3.7 SURVEY INSTRUMENT

Descriptive Research was undertaken to investigate the behavioural biases of the respondents with the help of a structured questionnaire. The questionnaire consisted of 28 items that are divided into three sections. The first section consists of 6 items that provide personal information including details about age, gender, education, occupation, annual income, etc. The second section consists of 6 items which provide information about the equity share portfolio and trading related characteristics of the respondents. The rest of the items are scenario based questions which make the respondents relate to hypothetical scenarios followed by a particular response to that
scenario. The scenarios are constructed in such a manner that the response of the respondents to these scenarios reflects their underlying behavioural biases. The scenario based questions are close ended questions for which a five point Likert type scale is used that ranges from strongly disagree to strongly agree. In the scenario based questions, two scenarios pertaining to each bias have been considered. So, two scenario based questions have been asked for each of the eight biases.

The questionnaire was finalized after conducting four rounds of pilot study. After each round, changes were made to the questionnaire. At the end of the fourth round, the questionnaire was shown to two academicians and an industry expert. After their approval, the questionnaire was finalized. To further test the reliability of the measure used in the questionnaire, Cronbach’s alpha was calculated for the scenario based questions.

3.7.1 Pilot Study For The Survey

It is important to carry out pilot studies in order to finalize the survey instrument. Pilot studies are also crucial to mitigate the risk of the whole study being flawed. Total four rounds of pilot study were carried out before finalizing the instrument. After each round, modifications were made in the instrument. After the first round, the length of the questionnaire was reduced as it was observed that respondents are not very comfortable filling up a long questionnaire. After the second round, the scenario based questions for some of the biases were modified to make it easy for the respondents to understand the questions. After the third round, the wordings of some of scenario based questions were modified based on the respondents’ feedback. After the fourth round, details asking the names, phone numbers and e-mail Ids were removed as it was observed that many respondents were hesitant in revealing their identity and gave neutral responses. After conducting four rounds of pilot study, the survey instrument was finalized.

3.7.2 Validity Of The Measure Used In The Instrument

Validity indicates the accuracy of a measure or the extent to which a score truthfully represents a concept. Validity gives the researcher clarity about whether they are measuring what they think they are measuring (Zikmund, Babin, Carr & Griffin, 2009, p.307). The content validity of the scale used in the instrument was checked to ensure that the scale used in the study logically reflects the influence of biases on the
respondents. In order to test the validity, the instrument was shown to two academicians and an industry expert. All of them approved the validity of the measurement used in the instrument. So, the content validity of the instrument was determined based on the opinions of two academicians and an industry expert.

3.7.3 Reliability Of The Measure Used In The Instrument

Reliability is an indicator of the consistency of a measure or the extent to which a scale measures what it is supposed to measure. Internal consistency of the scale is crucial. If the scale lacks internal consistency, it won’t be able to measure what it intends to measure. The most commonly applied test to measure the internal consistency of a scale is Cronbach’s alpha. Cronbach’s alpha was obtained for the scenario based questions. The value of Cronbach’s alpha is 0.819, which indicates that the reliability of the measure is highly satisfactory. Typically, scales with alpha values between 0.80 and 0.95 are considered to have very good reliability (Zikmund, Babin, Carr & Griffin, 2009, p.306).

<table>
<thead>
<tr>
<th>Cronbach's Alpha</th>
<th>Cronbach's Alpha Based on Standardized Items</th>
<th>N of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>.819</td>
<td>.748</td>
<td>16</td>
</tr>
</tbody>
</table>

3.7.4 Description Of Scenarios Used In The Instrument For Each Bias

This part describes the survey instrument in greater detail. Each bias has been tackled individually by developing hypothetical situations based on previous literature.

In order to capture the eight biases, two scenario based questions were asked for each bias. Each scenario was followed by a response. The respondents were asked whether they agree to the response or not by using five point Likert type scale. The questions were jumbled up and question on one bias was followed by question on another bias. Some questions were also negatively worded to avoid the response bias. The expected response to determine the presence of a particular bias was, agree or strongly agree for all the biases except naive reinforcement learning.
• **Anchoring**
Investors exhibit anchoring bias when they make investment decisions based on an initial piece of information. So the investors were given an anchor or the initial piece of information in terms of a price. In order to capture the presence of anchoring bias, the respondents were asked whether they would purchase a stock if it was available for purchase below a certain price as recommended by their favourite stock market expert. In the second question relating to this bias, the respondents were given the lower and upper price for a stock in the past three months and they were asked whether they would purchase the stock if it was available for purchase at a price which is below the lowest range.

• **Availability**
Availability bias comes into play when investors make decisions on readily available information. To capture this bias the respondents were asked whether they would buy a stock about which they have read and heard a lot of good things. In another question, they were asked whether they would buy the two stocks about which their colleagues had been discussing a lot of good things.

• **Disposition Effect**
Disposition effect is the tendency of investors to sell stocks whose prices have increased and to hold on to stocks whose prices have gone down. In order to capture the presence of this bias, investors were asked straightforward questions. In the first question, the respondents were asked whether they would hold on to a stock whose price has come down by 40 percent since they purchased it 3 years ago. In the second question, they were asked whether they would sell a stock whose price has doubled since they purchased it 9 months ago.

• **Herding**
When investors are influenced by Herding, they mimic actions taken by other investors. To examine whether respondents were affected by this bias, they were asked whether they would sell a fundamentally strong stock if the majority of investors were selling it. They were also asked whether they would buy a stock if its price had gone up 30 percent and if everyone else was buying it.
• **Mental Accounting**

Mental accounting bias forces investors to segregate losses and aggregate gains. It also forces them to create separate mental accounts of each and every stock in their investment portfolio. To capture the presence of this bias, investors were asked whether they would track the performance of each and every stock in their investment portfolio rather than tracking the performance of their portfolio as a whole. In the second question, they were asked whether they would sell the two stocks in their portfolio which earned a negative 5 percent return if 10 other stocks in their portfolio had earned an average return of more than 12 percent that same year.

• **Naïve Reinforcement Learning**

Naïve reinforcement learning is a simple form of learning whereby investors repeat past behaviours that resulted in pleasure while they avoid past behaviours which resulted in pain. To capture this bias, respondents were asked whether they would avoid repurchasing a stock which they recently sold for a loss if future prospects of the stock seem bright at the moment. In the second scenario, the respondents were asked whether they would repurchase a stock which they recently sold for a gain if the price of the stock came down since they sold it.

• **Overconfidence**

Investors exhibit overconfidence bias when they feel overconfident in their abilities to pick stock. This bias also gives investors the illusion of having control over the situation. In the first scenario, the respondents were asked whether they would buy more stocks of their choice if the last two stocks chosen by them went on to perform really well. In the second question, the respondents were asked whether they believed that two stocks chosen by them after a thorough analysis will outperform the other stocks which belong to the same sector.

• **Representativeness**

Investors exhibit representativeness bias when they stereotype stocks based on certain, often irrelevant characteristics of the stocks. To capture the presence of this bias, the respondents were asked whether they would purchase the stocks of a company belonging to a certain sector instead of purchasing a similar company belonging to the same sector which they originally wanted to buy but could not buy.
due to its high price. The investors were also asked whether they would purchase a mid cap chemical stock if midcap chemical sector was performing really well.

3.8 METHODOLOGY USED TO CATEGORIZE RESPONDENTS

To measure the impact of behavioural biases on individual investor behaviour, scenario based questions pertaining to each bias were asked. Two different scenario based questions were asked for each bias. Each question described a particular hypothetical scenario followed by a response. Following is an example of the scenario based question.

Scenario – You purchased the share of a company ABC Ltd five months ago. The stock of ABC Ltd has increased in price by 25%
Your response – You will sell the stock of ABC Ltd and book profit

☐ Strongly agree  ☐ Agree  ☐ Can’t say  ☐ Disagree  ☐ Strongly disagree

The respondents had to select one option out of the five options namely, ‘strongly agree’, ‘agree’, ‘can’t say’, ‘disagree’ and ‘strongly disagree’.

Since two scenario based questions were asked for each bias, the response followed by one of the questions was positively worded and the expected answer was ‘agree’ or ‘strongly agree’. This means that if a respondent is influenced by that particular bias, he or she would choose ‘agree’ or ‘strongly agree’. However, for most of the biases, the response followed by the second question was negatively worded and the expected answer for the other question was ‘disagree’ or ‘strongly disagree’. This was done to avoid the response bias/halo effect. Following is an example of the scenario with a negatively worded response.

Scenario – You purchased the share of a company XYZ Ltd five months ago. The stock of XYZ Ltd has reduced in price by 25%
Your response – You will not sell the stock of XYZ Ltd and book profit

☐ Strongly agree  ☐ Agree  ☐ Can’t say  ☐ Disagree  ☐ Strongly disagree

For ease of scoring, it was necessary to treat the scenario with negatively worded response in the same manner as the scenario with positively worded response. So the answers given by the respondents for the scenario with negatively worded responses were converted. For example ‘strongly agree’ and ‘agree’ were converted to ‘strongly disagree’ and ‘disagree’ respectively and vice versa.

After this conversion, the following methodology was used to assign bias score to each respondent for each bias.
3.8.1 Methodology Used To Assign Bias Score For Each Bias

Based on the responses of the respondents to the two scenario based questions, the investors were categorized as ‘biased’ or ‘unbiased’. The respondents categorized as ‘biased’ were assigned a score of 1 for that particular bias and those who were categorized as ‘unbiased’ were assigned a score of 0 for that particular bias. The following table describes the condition for determining whether a respondent is influenced by a particular bias or not.

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Response to Scenario 1</th>
<th>Response to Scenario 2</th>
<th>Categorization</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Agree/Strongly agree</td>
<td>Agree/Strongly agree</td>
<td>Biased</td>
</tr>
<tr>
<td>2</td>
<td>Agree/Strongly agree</td>
<td>Can’t Say</td>
<td>Biased</td>
</tr>
<tr>
<td>3</td>
<td>Can’t Say</td>
<td>Agree/Strongly agree</td>
<td>Biased</td>
</tr>
<tr>
<td>4</td>
<td>Disagree/Strongly Disagree</td>
<td>Disagree/Strongly Disagree</td>
<td>Unbiased</td>
</tr>
<tr>
<td>5</td>
<td>Disagree/Strongly Disagree</td>
<td>Can’t Say</td>
<td>Unbiased</td>
</tr>
<tr>
<td>6</td>
<td>Can’t Say</td>
<td>Disagree/Strongly Disagree</td>
<td>Unbiased</td>
</tr>
<tr>
<td>7</td>
<td>Agree/Strongly agree</td>
<td>Disagree/Strongly Disagree</td>
<td>Neither</td>
</tr>
<tr>
<td>8</td>
<td>Disagree/Strongly Disagree</td>
<td>Agree/Strongly agree</td>
<td>Neither</td>
</tr>
<tr>
<td>9</td>
<td>Can’t Say</td>
<td>Can’t Say</td>
<td>Neither</td>
</tr>
</tbody>
</table>

- **Condition for categorising investors as ‘Biased’**
  The respondents who choose the response ‘agree’ or ‘strongly agree’ in both the questions would be categorized as biased. The respondents who choose ‘agree’ or ‘strongly agree’ in one scenario and ‘can’t say’ in the other scenario or vice versa would also be categorized as biased. So, the respondents would have to choose ‘agree’ or ‘strongly agree’ in at least one of the scenarios in order to be categorized as biased.

- **Condition for categorising investors as ‘Unbiased’**
  The respondents who choose the response ‘disagree’ or ‘strongly disagree’ in both the questions would be categorized as unbiased. The respondents who choose ‘disagree’ or ‘strongly disagree’ in one scenario and ‘can’t say’ in the other scenario or vice versa would also be categorized as unbiased. So, the respondents would have to choose ‘disagree’ or ‘strongly disagree’ in at least one of the scenarios in order to be categorized as unbiased.
• **Condition for categorising investors as ‘Neither Biased Nor Unbiased’**

The respondents who choose the response ‘agree’ or ‘strongly agree’ in one scenario and ‘disagree’ or ‘strongly disagree’ in the other scenario or vice versa would be categorized as neither biased nor unbiased. The respondents who choose ‘can’t say’ in both the questions would also be categorized as neither biased nor unbiased. So, a respondent would be categorized as neither biased nor unbiased if they are indecisive for both the scenarios or give inconsistent responses for both the scenarios.

Data was collected from 500 respondents using a structured questionnaire. Out of the 500 respondents, only 3 respondents gave ambiguous or indecisive responses. These 3 respondents were not considered for further analysis. The respondents who were categorized as ‘biased’ were assigned a biasness score of 1 whereas the respondents who were categorized as ‘unbiased’ were assigned a biasness score of 0.

**3.8.2 Methodology Used To Categorize Respondents As ‘Overall Biased’ Or ‘Overall Unbiased’ Based On Their Total Bias Score**

In order to categorize investors as ‘overall biased’ or ‘overall unbiased’, the bias score of each respondent for each of the eight biases was added up. So, if a particular respondent is found to be influenced by 5 biases, he or she would have a total bias score of 5. The total bias score of each of the respondents was obtained. After that, the mean bias score of all the respondents was obtained by adding up the total bias score of all the respondents and finding its arithmetic mean. Respondents having a total bias score which was above the mean score were categorized as ‘overall biased’ and respondents having a total bias score which was below the mean score were categorized as ‘overall unbiased’. The mean bias score was 4.692. This means that the respondents who were influenced by 5 or more than 5 biases were categorized as ‘overall biased’ while respondents who were influenced by 4 or less than 4 biases were categorized as ‘overall unbiased’. However, in the present study, the respondents who were categorized as ‘overall unbiased’ were found to be influenced by 3 or less than 3 biases.
3.9 LIST OF HYPOTHESES TO BE TESTED

The following null hypotheses have been tested in the present study.

➢ Association Between Biasness Of The Investors Pertaining To Each Individual Bias And Their Demographic As Well As Equity Portfolio & Trading Related Characteristics

H0₁: There is no association between biasness of respondents with respect to Anchoring bias and their demographic characteristics as well as equity portfolio & trading related characteristics

H0₂: There is no association between biasness of respondents with respect to Availability bias and their demographic characteristics as well as equity portfolio & trading related characteristics

H0₃: There is no association between biasness of respondents with respect to Disposition Effect and their demographic characteristics as well as equity portfolio & trading related characteristics

H0₄: There is no association between biasness of respondents with respect to Herd Behaviour and their demographic characteristics as well as equity portfolio & trading related characteristics

H0₅: There is no association between biasness of respondents with respect to Mental Accounting and their demographic characteristics as well as equity portfolio & trading related characteristics

H0₆: There is no association between biasness of respondents with respect to Naive Reinforcement Learning and their demographic characteristics as well as equity portfolio & trading related characteristics

H0₇: There is no association between biasness of respondents with respect to Overconfidence Bias and their demographic characteristics as well as equity portfolio & trading related characteristics

H0₈: There is no association between biasness of respondents with respect to Representativeness Bias and their demographic characteristics as well as equity portfolio & trading related characteristics
Association Between Overall Biasness Of The Respondents And Their Demographic Characteristics As Well As Equity Portfolio & Trading Related Characteristics

H0_9: There is no association between overall biasness of respondents and their gender

H0_10: There is no association between overall biasness of respondents and their age

H0_11: There is no association between overall biasness of respondents and their education

H0_12: There is no association between overall biasness of respondents and their occupation

H0_13: There is no association between overall biasness of respondents and their marital status

H0_14: There is no association between overall biasness of respondents and their Annual Income

H0_15: There is no association between overall biasness of respondents and the factor which influences them the most while making equity share buy/sell decisions

H0_16: There is no association between overall biasness of the respondents and their annual investment in direct equity

H0_17: There is no association between overall biasness of the respondents and their annual buy/sell frequency

H0_18: There is no association between overall biasness of the respondents and their experience in the stock market

H0_19: There is no association between overall biasness of the respondents and their portfolio diversification

H0_20: There is no association between overall biasness of the respondents and the return on their equity portfolio
3.10 STATISTICAL TESTS USED FOR ANALYSIS

This part describes the statistical techniques used to analyze the responses collected with the help of a questionnaire. These tests aim at fulfilling the objectives of the study.

3.10.1. Descriptive Statistics
To describe the demographic and other characteristics of the respondents, frequency tables and bar charts were used. Frequency tables were also used to determine the percentage of respondents influenced by each bias.

3.10.2. Chi-square Test
Chi-square test helps in determining whether a statistically significant association exists between two categorical variables. In the present study, this test has been carried out to check the association between overall biasness of the respondents and their demographic characteristics. This test has also been used to analyze the association between overall biasness of respondents and the factor which influences the most while making equity share buy/sell decisions. Moreover chi-square test has also been used to examine an association between biasness of respondents with respect to each individual bias and their demographic as well as equity portfolio & trading related characteristics.

3.10.3. Independent sample t-test
Independent sample t-test is used to test whether the mean values of two separate groups differ significantly from each other. In the present study, this test has been used to determine whether biased and unbiased respondents significantly differ in terms of their annual investment in direct equity, annual buy/sell (trading) frequency, experience in the stock market, number of scrips in their direct equity portfolio and annual return on their portfolio in financial year 2014-15.

3.10.4. Discriminant Analysis
Discriminant analysis is a multivariate technique which is used for predicting group membership on the basis of two or more independent or predictor variables. Discriminant analysis can be used when the dependent variable is categorical and the predictor or independent variable is scale in nature. To analyse the differentiating characteristics of biased and unbiased investors in detail, discriminant analysis was
carried out. In the present study, the predictor variables are age of the respondents, their annual investment in direct equity, their annual buy/sell (trading) frequency, experience in the stock market, number of scrips in their direct equity portfolio and return on equity portfolio in financial year 2014-15. The dependent variable is the biasness of the respondents, which was decided based upon their biasness score. Based on their biasness score, the respondents were classified as overall biased or overall unbiased. So the main objective behind conducting discriminant analysis was to analyse whether the respondents can be classified as belonging to the overall biased or overall unbiased group based on specific characteristics such as age, experience, and portfolio diversification.

The next chapter gives a detailed explanation of the results of data analysis carried out for the study.