A Study of Effect of Behavioural Biases on Investment Decisions

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ABSTRACT

The field of finance has evolved over the past few decades based on the assumption that people make rational decisions and that they are unbiased in their predictions about the future. Investors are highly influenced by various behavioral biases which affect their decision making process. The main objective of the study is to determine the cognitive biases and the emotional biases that affect investor decisions and to understand if there is any relationship between behavioral biases and investment decisions. The study is conducted to mainly identify and prioritize those behavioral factors that influence investors decision making process. The study was conducted among the investors of Mumbai city and the observations drawn state that Representativeness bias (r=0.341, sig.= 0.001), Hindsight Bias (r=.226, sig.=0.021) and Regret Aversion Bias (r=.239, sig.=0.016) have statistically significant correlations with the Investors' decisions. These dimensions of behavioral factors influence investor decisions. Self-Attribution Bias though is negatively correlated but does not have statistically significant correlation with the investor decisions when individual regression is conducted. However, collectively considering all independent biases shows that Self-Attribution Bias have a statistically significant influence on the investors' decision. Even after performing individual regression or collective regression of all the variables together, the impact of Representativeness Bias was showing highest impact on the investors' decision. This study would therefore help many stakeholders to understand how investors behave when they make investment decisions and is especially useful to the financial institutions to design financial products that address the psychological needs of the investors.

Key Words: *Behavioural Finance, Investor Decision, Behavioural Biases, Mental Accounting*

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1. INTRODUCTION

1.1 Background of the Study

For a long time, everybody thought that traditional finance theory is accurate because it states that investors think rationally and make informed decisions, based on various estimations or using economic models. The investment theories also suggested that investors are rational and base their decisions on maximizing returns while limiting the risks.

According to Shefrin (2011) behaviour finance is the study of how psychology affects financial decision-making process and financial markets. Since psychology explores human judgment, behaviour and welfare, it can also provide important facts about how human actions differ from traditional economic assumptions.

1.2 Theoretical Review

1.2.1 Behavioural Biases

Pompian (2012) found that in finance and economics, behavioural biases refer to the tendency of decision making that results in irrational financial decisions caused by faulty cognitive reasoning and /or reasoning influenced by emotions.

Faulkner (2002) puts forward that three types of traits represent the most prominent characteristics of behavioural finance and these relate either to regret theory, prospect theory, mental accounting or cognitive dissonance.

1.2.2 Regret Theory

Regret theory (RT) is a model of choice under uncertainty. Developed by Loomes & Sugden (1982), it generalizes the minimax regret approach used in decision theory for minimizing the possible losses while maximizing the potential gain.

1.2.3 Prospect Theory

Prospect theory deals with the idea that people do not always behave rationally. It considers preference as a function of "decision weights" and it assumes that these weights do not always match with probabilities.

1.2.4 Mental Accounting

According to the mental accounting bias, individuals separate their money and investments in separate categories (or different mental accounts) based on certain criteria like source of earning and use of the money. Individuals or investors might use mental accounting as a means of self-control. Since investors have imperfect knowledge about the market, they may divide their money into investments and expenditure pools in order to ensure that they don't over-spend. (Kanan Budhiraja, June-2018)

1.2.5 Cognitive Dissonance

Cognitive dissonance is the mental conflict that people experience when they are presented with evidence that their beliefs or assumptions are wrong; as such, cognitive dissonance might be classified as a sort of pain of regret, regret over mistaken beliefs.

1.3 Determinants of Investment Decisions by Individuals

Engin Demirel et al. (2011) studied the interaction between demographic and financial behavioural factors in investment decisions. The study was carried to find the impact of demographic factors influencing individual investors" behaviour. It showed that gender interacts with five financial behavioural factors i.e. overreaction, herding, cognitive bias, irrational thinking, and overconfidence and the level of individual savings interacts with only four of the financial behavioural factors namely; overreaction, herding, cognitive bias and irrational thinking. The following is a detailed discussion of these factors determining investment decisions and individual behaviours:

1.3.1 Representativeness Bias

Representativeness bias is a belief perseverance bias in which people tend to classify new information based on past experiences and classifications.

They believe their classifications are appropriate and place undue weight on them. Research shows that this bias occurs because people attempting to derive meaning from their experiences tend to classify objects and thoughts into personalized categories. Investors tend to stereotype. (Kanan Budhiraja, June-2018)

1.3.2 Illusion of Control Bias

According to Pompian (2012), illusion of control bias is which people tend to believe that they can control or influence outcomes when, in fact, they cannot. A review by the author indicated that choices, task familiarity, competition and active involvement can all inflate confidence and generate such illusions. This may lead investors to either trade more than is prudent or inadequately diversify portfolios, for instance, because of familiarity due to, for instance, having worked in the company. (Mathew, June 2017)

1.3.3 Hindsight Bias

According to Pompian (2012), hindsight bias occurs when people see past events as having been predictable and reasonable to expect. People tend to remember their own predictions of the future as more accurate than they actually were because they are biased by the knowledge of what has actually happened. Thus people view things that have already happened as being relatively predictable. (ATHUR, 2014)

1.3.4 Cognitive Dissonance Bias

This very influential theory of social psychology was put forward by Leon Festinger (1957). Cognition of persons refers to their ideas, notions, beliefs etc. It is human nature to seek consistency among the cognitions.(Satish K Mittal, December 2016)

1.3.5 Self-Attribution Bias

Self-attribution bias is the tendency of individuals to ascribe their successes to innate aspects such as talent or foresight, while more often blaming failures on outside influences such as bad luck. Therefore, self-attribution investors can, after a period of successful investing, believe that

their success is due to their acumen as investors rather than to factors out of their control. (Mathew, June 2017)

1.3.6 Loss Aversion Bias

Pompian (2012) illustrates that in prospect theory, loss aversion occurs when people tend to strongly prefer avoiding losses as opposed to achieving gains. Prospect theory is a descriptive theory of choice under uncertainty based on the outcome of numerous experimental psychological studies. (Mathew, June 2017)

1.3.7 Regret Aversion Bias

It is the tendency of individuals to regret decisions when the outcome isn't favourable. Pompian (2012) defined regret-aversion bias as an emotional bias in which people tend to avoid making decisions that will result in action out of fear that the decision will turn out poorly. That is, people tend to avoid the pain of regret associated with bad decisions.

1.3.8 Overconfidence Bias

Overconfidence is a state in which people tend to think they are better than they really are (Trivers, 1991). Razek (2011) define overconfidence as an overestimation of the probabilities for a set of events. Agrawal (2012) noted that overconfidence causes people to overestimate their knowledge, undervalue risks and overestimate their ability to control events

1.3.9 Over-Optimism Bias

According to Agrawal (2012), optimism is about expecting a favourable outcome irrespective of the actual effort or skills devoted by individual to bring about the outcome. The authors note that investors" earnings forecast errors are significantly optimistic for buy recommendations and significantly pessimistic for sell recommendations

1.3.10 Halo Effect

It is a bias in which the overall impression of a person influences how you feel and think about his or her character. This especially applies to physical attractiveness influencing how you rate their other qualities.

1.3.11 Self- Serving Bias

This is the tendency to blame external forces when bad things happen and give yourself credit when good things happen. A number of factors have been shown to influence the self-serving bias, including age and gender. Older adults tend to make more internal attributions, that is, credit themselves for their successes. Men are more likely to make external attributions, meaning they tend to blame outside forces for their failures.

1.4 Significance of the Study

This study is an attempt to analyse cognitive and emotional biases by taking behavioural financial factors (cognitive or emotional biases) and their effects on investment decisions by individual investors. The findings of this study will be of help to create awareness to the individual investors on the behavioural biases that they must take cognizance of when making investment decisions. It will assist investment managers to formulate appropriate strategies that will help to minimize the negative impact of such influences.

Stockbrokers and Mutual fund companies would be able to identify both the cognitive and emotional biases that mostly influence investor preferences and investment decisions so that they are able to properly educate investors on how to leverage on the biases. The study will contribute to the general body of knowledge by enriching the existing literature in the field of finance.

1.5 SCOPE OF THE STUDY

The scope of the study is limited to Investors behaviour biases on investment decisions in Mumbai city. The study is based on both Secondary and Primary data sources.

1.6 OBJECTIVE OF THE STUDY

The overall objective of the study is to determine the effect of behavioural biases on investment decisions of individual investors in India- with special reference to Mumbai City. It specifically aims at:

1. To determine the cognitive biases that affect investor decisions
2. To determine the emotional biases that affect investor decisions
3. To understand if there is any relationship between behavioural biases and investment decisions

2. LITERATURE REVIEW

Jaya Mamta Prosad (2014), in the paper on *"Impact of Investors' Behavioural Biases on the Indian Equity Market and Implications on Stock Selection Decisions: An Empirical Analysis"* explores various noteworthy survey base studies in the field of behavioural finance. These are divided into three themes. The first theme deals with factors behind the individual investor behaviour. The second theme analyses the effect of demographics on investor behaviour. The final strand investigates the role of psychological biases on investor behaviour.

Abdulahi Dakane Athur (2014), in the paper on *"Effect of Behavioural Biases on Investment Decisions of Individual Investors in Kenya"* studies Successful stock investing is more than choosing a particular stock; it is also how to go about doing it in Kenya. This is achieved through staying rational, choosing a few stocks that are likely to outperform the market, having fortitude to hold on them during short-term market volatility, keeping track of them and controlling excess optimism and pessimism. However, this has not been observed in practice.

Satish K Mittal & Deepa Shrivastava (2016), in the paper on *"Investment Behaviour & Biases of Investor: An Empirical Research Agenda in Indian Perspective"* in the 5th International Conference on Recent Trends in Engineering, Science & Management develops a conceptual understanding and presenting a framework in the field of behaviour

finance & biases. This paper covers insights on the subject for developing a deeper understating of the behaviour of investor.

Sukanya.R & Thimmarayappa.R (2015), in the paper on *"Impact of Behavioural biases in Portfolio Investment Decision Making Process"* in International Journal of Commerce, Business and Management presents a new approach in the analysis of portfolio investment decisions, namely behavioural finance. This paper examines the role of behavioural biases on investment decision making process.

Amar Kumar Chaudhary (2013), in the paper on *"Impact of Behavioural Finance in Investment Decisions and Strategies – A Fresh Approach"* in International Journal of Management Research & Business Strategy examines the meaning and importance of behavioural finance and its application in investment decisions.

T.V. Raman, Gurendra Nath Bhardwaj and Kanan Budhiraja (June 2018), in the paper on *"Impact of Behavioural Finance in Investment Decision Making"* in International Journal of Civil Engineering and Technology (IJCIET) explains through the research paper how these biases impact investment decision making process and what steps can be taken by individual investors to make rational decisions.

Swati Vishnoi (October 2015), in the paper *"Impact of Behavioural Biases on Investment Decision: With special Reference to Gwalior City"* studies the Behaviour or psychology of investors while making investment decision is known as Behavioural finance.

Filip-Mihai Toma (2015) in Emerging Markets Queries in Finance and Business in the paper on *"Behavioural biases of the investment decisions of Romanian investors on the Bucharest Stock Exchange"* in Emerging Markets Queries in Finance and Business Studies Classical economics and wishes to analyse the investment decisions and behaviour of investors from Bucharest's Stock Exchange, Romania. Using financial transaction data, a wish to study some of the most prominent behavioural biases investors have shown to be prone to.

Mark KY Mak and WH Ip (2017), in the paper on *"An exploratory study of investment behaviour of investors"* in International Journal of Engineering Business Management studies the Chinese and Hong Kong investor behaviour and provides and understanding on how Individual investors are becoming more cautious towards financial investment which makes it difficult for financial service providers to formulate marketing strategies after experiencing several financial crises.

Sreeram Srivaramakrishnan, Mata Srivastava and Anupam Rastogi (July 2017), in the paper on *"Financial literacy, Risk Tolerance and Stock Market Participation"* in an Article in International Journal of Bank Marketing reports the findings of a study which explored how consumer financial literacy, risk avoidance, financial wellbeing, regulatory perception, social influence and hassles of investing influence stock market participation.

Rajesh Mishra (2018), in the paper on *"Financial literacy, Risk Tolerance and Stock Market Participation"* in Asian Economic and Financial Review explores how households' stock market investment decisions are influenced by self-assessed financial literacy, investment awareness, risk propensity and socio-economic characteristics. This study used national survey data of Indian households across the country, a survey conducted by SEBI (Securities and Exchange Board of India) to get a comprehensive view of households' characteristics, behaviour and investment patterns.

A. Charles and R. Kasilingam (May 2016), in the paper on *"Impact of Selected Behavioural Bias Factors on Investment Decisions of Equity Investors"* in ICTACT Journal on Management Studies, explains the impact of behavioural bias factors on investment decision of equity investors. This study also examines the relationship among these behavioural bias factors.

H. Kent Baker and Victor Ricciardi (March 2014), in the paper on *"How Biases Affect Investor Behaviour"* studies Investor behaviour often deviates from logic and reason and investors display many behaviour biases that influence their investment decision-making processes.

Joychen Manuel & George Mathew (June2017), in the journal article on *"Impact of Cognitive Biases in Investment Decisions of Individual Investors in Stock Market"* in International Journal of Engineering Technology, Management and Applied Sciences states that Individuals' decision on investment in stock market is affected by so many factors which are influenced by their day to day affairs. The present study focussing on the extent to which these behavioural and cognitive factors influencing the investors investment decisions.

3. RESEARCH METHODOLOGY

The general objective of the study is to determine the **impact of behavioral biases on investment decisions of investors in India- special reference to Mumbai**.

3.1 Research Design

This research problem employed the use of partly **Descriptive** and partly **Conclusive/ Causal.** This study generalized the findings to investors in India-with special reference to Mumbai city. The study also included quantifiable data and performed statistical techniques.

3.2 Population

For the purpose of this study, the population that was considered were the investors of India. However major focus of the study was on the investors of Mumbai city.

3.4 Sample

The sampling plan describes the sampling unit, sampling frame, sampling procedures and the sample size for the study. The study targeted to have a combination of **Convenience sampling and Random Sampling.** The respondents were targeted by using **snow-ball sampling technique** as the first respondent was requested to recommend a colleague who is an investor and so on, until the desired sample is reached. The study also

included secondary data analysis. For the purpose of the study, the responses of **Eighty-one respondents** were received from the survey.

3.5 Data Collection

The study included **Primary and Secondary sources of data**. Secondary sources included data available in research reports, periodicals, journals while Primary data collected by way of Questionnaire.

3.6 Data Analysis

Descriptive statistics (mean and std. deviation), **Inferential statistic** (testing of hypotheses), **causal statistics** (correlation and multiple regression analysis**)** were used to analyze the data taking help of **SPSS and R-Studio**.

The following Linear Regression Model (lm test) was used as a best fit model to identify the variables showing significant impact on the Investors' decision:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \varepsilon$$

Y – The dependent variable represents the investor decision and is measured by an analysis of the individuals' risk adjusted returns resulting from such decisions.

X1 – Representativeness; X2 – Cognitive Dissonance Bias; X3 – Over-optimism Bias

X4 – Herd Instinct Bias ; X5 – Illusion of Control Bias; X6 – Loss Aversion Bias

X7 – Hindsight Bias ; X8 – Self Attribution Bias ; X9 – Regret Aversion Bias
In the model, the dependent variables were operationalized and measured as shown in appendix-II.

α – is the constant (intercept), and; $\beta_1 x_1$…...Xn - the Predictors ; ε - Is the error term

The β coefficients from the equation above represent the strength and direction of the relationship between the independent and dependent variables.

3.7 Hypotheses Tested

Set of Null and Alternative hypotheses were formulated to test the significance of correlation between the Investor's decision and factor of bias (for each factor). For example:

Ho: There is no statistically significant correlation between Investor's decision and Representativeness Bias

Ha: There is a statistically significant correlation between Investor's decision and Representativeness Bias

Similar Null and Alternate hypotheses have been formulated for **Cognitive Dissonance Bias, Over-optimism Bias, Herd Instinct Bias, Illusion of Control Bias, Loss Aversion Bias, Hindsight Bias, Self-Attribution Bias and Regret Aversion Bias**

4. DATA ANALYSIS AND INTERPRETATION

4.1 Profile of Respondents:

The demographic data collected on respondents was related to the Gender, Age, and Education, to have an idea of the respondents' profile in the sample. No further analysis has been done on this information. The data presented in Table 4.1 to 4.3 are self-explanatory.

Table 4.1: Distribution of Respondents' Gender

Gender of respondents	Distribution	
	Frequency	Percent
Male	43	53.1
Female	38	46.9
Total	81	100

Table 4.2: Distribution of Respondents Age

Age of respondents	Distribution	
	Frequency	Percent
20-29	41	50.62
30-39	7	8.64
40-49	22	27.16
50 & above	11	13.58
Total	81	100

Table 4.3 Respondents' Highest level of Education

Age of respondents	Distribution	
	Frequency	Percent
Graduate	33	40.74
Post- Graduate	43	53.09
Professional Qualification (CA, CS, PhD etc.)	5	6.17
Total	81	100

4.2 Investment Decisions:

In the survey the respondents were asked the questions about their investment preferences, previous investment experience, motivators for investments, objectives of investments, proportion of income invested, duration of investments, expected returns, source of information. The data has been summarised in the following tables

4.2.1 Investment Preferences of Respondents

Out of 81 respondents only 60 respondents have invested their money in different financial instruments. The further analysis is based on the responses of these 60 respondents.

Table 4.4 Respondents Investment Preference

Investment Preferences	Distribution	
	Frequency	Percent
Stock Market	26	43.3
Mutual Funds	1	1.7
Fixed Deposit	27	45.0
Government Securities	4	6.7
Others (LIC, Mutual Funds etc.)	2	3.3
Total	**60**	**100.00**

Most of the investors (45%) preferred to invest in FDs closely followed by Stocks (43.3)

Table 4.5 Previous Investments in the Stock Markets

	Distribution	
Responses	Frequency	Percent
Yes	35	58.3
No	25	41.7
Total	60	100

Majority of investors (58.30) had invested in stock markets previously.

Table 4.6 Who encouraged you to Purchase such Investment (motivators)?

Responses	Distribution	
	Frequency	Percent
Friend	10	16.7
My experience & personal financial knowledge	40	66.7
Financial Advisor	9	15
Father/ Relative/s	1	1.7.0
Total	**60**	**100**

Majority of investors (66.7%) have taken invest decisions based on their own knowledge.

Table 4.7: Respondents' Objective of Investment

Responses	Distribution	
	Frequency	Percent
To achieve capital appreciation	23	38.3
To receive income generation	9	15
To have growth in income	17	28.3
To have stability of principal amount	4	6.7
To have tax shelter	7	11.7
Total	**60**	**100**

Maximum number of investors (38.30%) has invested for capital appreciation followed for growth in income (28.30%).

Table 4.8 Respondents' Proportion of Income Preferred to be invested

Responses	Duration	
	Frequency	Percent
0-10%	28	34.6
11-20%	33	40.7
21-30%	12	14.8
Above 30%	8	9.9
Total	**81**	**100**

Maximum number of investors (40.70%) has invested 10 to 20% of their income closely followed by the investors who have invested upto 10% (34.60%).

Table 4.9: Respondents' Preferred Duration of Investment

Responses	Duration	
	Frequency	Percent
Six Months	6	7.4
One Year	26	32.1
More than One Year	49	60.5
Total	**81**	**100**

Majority of investors (60.50%) have their investment prospective for more than a year.

4.10: Respondents' Expected Return from any Investment

	Distribution	
Responses	**Frequency**	**Percent**
Between 5 & 10%	15	18.5
Between 11 & 15%	38	46.9
Between 16 & 20%	17	21
Above 20%	11	13.6
Total	**81**	**100**

Most of the investors (46.90%) expect a return between 11 and 15%.

Table 4.11: Respondents' Source of Information about Investment Market

	Distribution	
Responses	**Frequency**	**Percent**
Television	12	14.8
Websites from Internet	26	32.1
Reference groups	13	16
Print media (including newspapers)	13	16
Brokers/fund managers	17	21
Total	**81**	**100**

Most of the investors get the information about the market from the websites and internet.

Table -1: Determination of the Effect of Behavioral Biases on Investment Decisions

Influence of Behavioral Biases	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly Disagree (%)
Representativeness Bias	8.64	28.4	29.63	23.46	9.88
Cognitive Dissonance Bias	2.47	19.75	20.99	33.33	23.46
Over-Optimum Bias	3.7	24.69	28.4	25.93	17.28
Herd Instinct Bias	4.94	27.16	29.63	27.16	11.11

Illusion of Control Bias	9.88	25.93	28.4	18.52	17.28
Loss Aversion Bias	3.7	18.52	23.46	29.63	24.69
Hindsight Bias	9.88	29.63	30.86	16.05	13.58
Self-attribution Bias	7.41	17.28	20.99	23.46	30.86
Regret Aversion Bias	17.28	24.69	27.16	22.22	8.64

Impact of Emotional Biases on the Investment Decisions

Table 2: Using Descriptive Statistics on Emotional Biases.

Emotional Biases	N	Mean	Standard Deviation
Herd Instinct Bias	81	2.88	1.088
Loss Aversion Bias	81	2.47	1.163
Regret Aversion Bias	81	3.2	1.219

Table 2 above shows that emotional biases have high impact on investors investment decisions. Among the emotional biases, Regret Aversion Bias is having a high impact on the investors decision making (mean:3.20, std. deviation:1.219) followed by Herd Instinct Bias (mean:2.88, std. deviation:1.088) and the least impact of Loss Aversion Bias (mean:2.47, std. deviation:1.163).

Impact of Cognitive Biases on the Investment Decisions

Table 3: Using Descriptive Statistics on Cognitive Biases

Cognitive Biases	N	Mean	Standard Deviation
Representativeness Bias	81	3.02	1.129
Cognitive Dissonance Bias	81	2.44	1.129
Over-optimism Bias	81	2.72	1.132
Illusion of Control Bias	81	2.93	1.243
Hindsight Bias	81	3.06	1.187
Self-attribution Bias	81	2.47	1.295

Table 3 above shows that cognitive biases have high impact on investors investment decision: Representativeness Bias (mean:3.02, std.

deviation:1.129), Cognitive Dissonance Bias (mean:2.44, std. deviation:1.129), Over-optimism Bias (mean:2.72, std. deviation:1.132), Illusion of Control Bias (mean:2.93, std. deviation:1.243), Hindsight Bias (mean:3.06, std. deviation:1.187), Self-attribution Bias (mean:2.47, std. deviation:1.295). Among the cognitive biases, Representativeness bias and Hindsight biases are having high impact on investors decision making (high mean value and low std. deviation), whereas Cognitive-dissonance having least impact on investors investment decisions.

Correlation between Behavioral Biases and Investment Decisions

Pearson's Correlation		Average Return for the past five (5) years
Average Return for the past five years (**Investment Decisions**)	Pearson Correlation	1
	Sig. (1-tailed)	
Past history influences present investment decisions (**Representativeness Bias**)	Pearson Correlation	0.341**
	Sig. (1-tailed)	**0.001**
Holding to one's investment because selling them would be painful to him since it would incur loss (**Cognitive Dissonance Bias**)	Pearson Correlation	0.086
	Sig. (1-tailed)	0.222
When it comes to trusting people, one can usually rely on his "gut feelings" (**Over- optimism Bias**)	Pearson Correlation	0.172
	Sig. (1-tailed)	0.063
Thinking hard and for a long time about something gives little satisfaction (**Herd Instinct Bias**)	Pearson Correlation	0.123
	Sig. (1-tailed)	0.138
Investor is informed about all the fundamentals of the company that he is confident in making his investments (**Illusion of Control Bias**)	Pearson Correlation	0.164
	Sig. (1-tailed)	0.071
Investor intends to sell his investments immediately it goes back to the acquisition price (**Loss Aversion Bias**)	Pearson Correlation	0.074
	Sig. (1-tailed)	0.256
The previous profits generated from similar investments by the company made it very attractive to one to invest in it (**Hindsight Bias**)	Pearson Correlation	0.226
	Sig. (1-tailed)	**0.021***

The last investment was more of a bad luck than it was his own poor judgment (**Self-Attribution Bias**)	Pearson Correlation	-0.068
	Sig. (1-tailed)	0.273
Holding to his investments because he knows the prices will revert soon (**Regret Aversion Bias**)	Pearson Correlation	0.239
	Sig. (1-tailed)	**0.016***

*Correlation is significant at 0.05 level (1-tailed). **Correlation is significant at 0.01 levels (1-tailed).

In this above table, the relationships between individual investor decisions and behavioral factors are analyzed in terms of correlations based on 81 respondents'. Table shows the significance of Pearson's Correlation coefficients with alpha at 0.05 and 0.01 levels. The investors' decision is positively correlated to all the behavioural factors except "Self Attribution Bias". It is statistically significant for the factors: **Representativeness Bias** (r=0.341; p=0.001, significant at 0.01 level); **Hindsight Bias** (r=0.226, p=0.021, significant at 0.05 level) and **Regret Aversion Bias** (r=0.239, p=0.016, significant at 0.05 level). In these cases the null hypotheses have been rejected and the alternative hypotheses have been accepted indicating that the investors' decisions are significantly influenced by Representativeness Bias, Hindsight Bias and Regret Aversion Bias. The further analysis is carried out using multiple regression equation taking behavioural factors as independent variables and investors' decision as dependent variable.

Regression Analysis Showing Influence of Behavioral Biases on Investors Decisions (Using SPSS)

<u>**Representativeness Bias**</u>

Model Summary

Model R	R	R Square	Adjusted Square Std.	Std. Error of the Estimate
1	0.341[a]	0.117	0.105	0.1026854

Predictors: (Constant), Representativeness Bias. Dependent Variable: Investors' Decision

Table below gives the estimated regression coefficients, standard errors of the estimates, t-values and significant levels.

Coefficients

Model	Un-standardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	1.66	3.281		0.51	0.61
Representativeness Bias	3.28	1.017	0.341	3.23	**0**

The R square shows the total variation of 11.7% in the Investors' Decision can be explained by Representativeness Bias. The regression equation will be: **Y (Investors' Decision) =1.659 (Constant) + 3.284 (Representativeness Bias).** The coefficient for **Representativeness Bias is statistically significant because its p-value (0.002) is smaller than 0.05.**

Cognitive Dissonance Bias

Model Summary

Model R	R	R Square	Adjusted Square Std.	Std. Error of the Estimate
1	0.086[a]	0.007	-0.005	0.1088448

Predictors: (Constant), Cognitive Dissonance Bias; Dependent Variable: Investors' Decision

Table below shows that the estimated regression coefficients, standard errors of the estimates, t-values and significant levels.

Coefficients

Model	Un-standardized Coefficients		Standardized Coefficients	T	Sig.
	B	**Std. Error**	**Beta**		
(Constant)	9.564	2.899		3.299	0.001
Cognitive Dissonance Bias	0.83	1.078	0.086	0.77	0.443

The R square shows the total variation of 0.7% in the Investors' Decision can be explained by Cognitive Dissonance Bias. The regression equation will be: **Y (Investors' Decision) =9.564 (Constant) + 0.830(Cognitive Dissonance Bias).** The coefficient for **Cognitive Dissonance Bias is not statistically significant because its p-value (0.443) is larger than 0.05.**

Over-optimism Bias

Model Summary

Model R	R	R Square	Adjusted Square Std.	Std. Error of the Estimate
1	0.172[a]	0.029	0.017	0.107633

Predictors: (Constant), Over-optimism Bias, Dependent Variable: Investors' Decision

Table below shows that the estimated regression coefficients, standard errors of the estimates, t-values and significant levels.

Coefficients

Model	Un-standardized Coefficients		Standardized Coefficients	T	Sig.
	B	**Std. Error**	**Beta**		
(Constant)	7.123	3.126		2.279	0.025
Over-optimism Bias	1.646	1.063	0.172	1.548	0.126

The R square shows the total variation of 2.9% in the Investors' Decision can be explained by Over-Optimism Bias. The regression equation will be: **Y (Investors' Decision) =7.123 (Constant) + 1.646(Over-optimism Bias)**. The coefficient for **Over-optimism bias is not statistically significant because its p-value (0.126) is larger than 0.05.**

Herd Instinct Bias

Model Summary

Model R	R	R Square	Adjusted Square Std.	Std. Error of the Estimate
1	0.123[a]	0.015	0.003	0.1084280

Predictors: (Constant), Herd Instinct Bias; Dependent Variable: Investors' Decision

Table below shows that the estimated regression coefficients, standard errors of the estimates, t-values and significant levels.

Coefficients

Model	Un-standardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	8.074	3.423		2.359	0.021
Herd Instinct Bias	1.223	1.114	0.123	1.098	0.275

The R square shows the total variation of 2.9% in the Investors' Decision can be explained by Herd Instinct Bias. The regression equation will be**: Y (Investors' Decision) =8.074 (Constant) + 1.223(Herd Instinct Bias).** The coefficient for **Herd Instinct Bias is not statistically significant because its p-value (0.275) is larger than 0.05.**

Illusion of Control Bias

Model Summary

Model R	R	R Square	Adjusted Square Std.	Std. Error of the Estimate
1	0.164[a]	0.027	0.015	0.1077644

Predictors: (Constant), Illusion of Control Bias; Dependent Variable: Investors' Decision

Table below shows that the estimated regression coefficients, standard errors of the estimates, t-values and significant levels.

Coefficients

Model	Un-standardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	7.388	3.079		2.399	0.019
Illusion of Control Bias	1.437	0.969	0.164	1.482	0.142

The R square shows the total variation of 2.7% in the Investors' Decision can be explained by Illusion of Control Bias. The regression equation will be: **Y (Investors' Decision) =7.388 (Constant) + 1.437(Illusion of Control Bias).** The coefficient for **Illusion of Control Bias is not statistically significant because its p-value (0.142) is larger than 0.05.**

Loss Aversion Bias

Model Summary

Model R	R	R Square	Adjusted Square Std.	Std. Error of the Estimate
1	0.074[a]	0.005	-0.007	0.1089552

Predictors: (Constant), Loss Aversion Bias, Dependent Variable: Investors' Decision

Table below shows that the estimated regression coefficients, standard errors of the estimates, t-values and significant levels.

Coefficients

Model	Un-standardized Coefficients		Standardized Coefficients	T	Sig.
	B	**Std. Error**	**Beta**		
(Constant)	9.892	2.856		3.464	0.001
Loss Aversion Bias	0.689	1.048	0.074	0.657	0.513

The R square shows the total variation of 0.5% in the Investors' Decision can be explained by Loss Aversion Bias. The regression equation will be: **Y (Investors' Decision) =9.892 (Constant) + 0.689 (Loss Aversion Bias).** The coefficient for **Loss Aversion Bias is not statistically significant because its p-value (0.513) is larger than 0.05.**

Model Summary

Model R	R	R Square	Adjusted Square Std.	Std. Error of the Estimate
1	0.226[a]	0.051	0.039	0.1064244

Predictors: (Constant), Hindsight Bias, Dependent Variable: Investors' Decision

Table below shows that the estimated regression coefficients, standard errors of the estimates, t-values and significant levels.

Coefficients

Model	Un-standardized Coefficients		Standardized Coefficients	T	Sig.
	B	**Std. Error**	**Beta**		
(Constant)	5.261	3.289		1.599	0.114
Hindsight Bias	2.068	1.003	0.226	2.063	**0.042**

The R square shows the total variation of 5.1% in the Investors' Decision can be explained by Hindsight Bias. The regression equation will be**: Y (Investors' Decision) =5.261 (Constant) + 2.068 (Hindsight Bias).**. The coefficient for **Hindsight Bias is statistically significant because its p-value (0.042) is smaller than 0.05.**

Self-Attribution Bias

Model Summary

Model R	R	R Square	Adjusted Square Std.	Std. Error of the Estimate
1	0.068[a]	0.005	-0.008	0.1089996

Predictors: (Constant), Self-Attribution Bias; Dependent Variable: Investors' Decision

Table below shows that the estimated regression coefficients, standard errors of the estimates, t-values and significant levels.

Coefficients

Model	Un-standardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	13.001	2.62		4.962	0
Self-Attribution Bias	-0.57	0.941	-0.068	-0.606	0.546

The R square shows the total variation of 0.5% in the Investors' Decision can be explained by Self-Attribution Bias. The regression equation will be: **Y (Investors' Decision) =13.001 (Constant) – 0.570 (Self-Attribution).** The coefficient for **Self-Attribution Bias is not statistically significant because its p-value (0.546) is larger than 0.05.**

Regret Aversion Bias

Model Summary

Model R	R	R Square	Adjusted Square Std.	Std. Error of the Estimate
1	0.239[a]	0.057	0.045	0.1060733

Predictors: (Constant), Regret Aversion Bias; Dependent Variable: Investors' Decision

Table below shows that the estimated regression coefficients, standard errors of the estimates, t-values and significant levels.

Coefficients

Model	Un-standardized Coefficients		Standardized Coefficients	T	Sig.
	B	**Std. Error**	**Beta**		
(Constant)	4.771	3.327		1.434	0.155
Regret Aversion Bias	2.133	0.973	0.239	2.192	0.031

The R square shows the total variation of 5.7% in the Investors' Decision can be explained by Regret Aversion Bias. The regression equation will be: **Y (Investors' Decision) =4.771 (Constant) + 2.133 (Regret Aversion Bias).** The coefficient for **Regret Aversion Bias is statistically significant because its p-value (0.031) is smaller than 0.05.**

Regression Model Using R-Studio (Linear Regression Model-lm test)

Call: lm(formula = Returns ~ ., data = std Investors Decision)
Residuals:

Min	1Q	Median	3Q	Max
-0.15978	-0.06280	-0.01486	0.03448	0.31352

Coefficients:

	Estimate Std.	Error	t value	Pr (>|t|)
(Intercept)	0.015054	0.038439	0.392	0.6965
\`Representative Bias \`	0.035773	0.013662	2.618	0.0108 *
'Cognitive Dissonance Bias '	-0.008426	0.011830	-0.712	0.4786
\`Over- optimism Bias \`	0.012317	0.013365	0.922	0.3599
\`Herd Instinct Bias \`	0.005167	0.015163	0.341	0.7343
\`Illusion of Control Bias \`	0.001443	0.011616	0.124	0.9015
\`Loss Aversion Bias \`	-0.010201	0.012448	-0.819	0.4153

'Hindsight Bias `	0.007079	0.014622	0.484	0.6298
`Self-Attribution Bias `	-0.029926	0.011631	-2.573	0.0122 *
`Regret Aversion Bias `	0.014058	0.013806	1.018	0.3120

Significant codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
Residual standard error: 0.1016 on 71 degrees of freedom
Multiple R-squared: 0.2221, Adjusted R-squared: 0.1235
F-statistic: 2.252 on 9 and 71 DF, p-value: 0.02806

From the above Table derived using lm regression, the **adjusted R-square is 0.1235**. This means that there is 12.35% variation in the investor decisions explained by the regression model. **Representativeness Bias and Self-Attribution Bias have a significant impact on the Investors' Decisions while making an investment**. The p-value for them is also less than 0.05. This shows that these biases are statistically significant and the model is a best fit.

The regression equation using lm test works out as follows:

Y= 0.015 + 0.04**X1** - 0.008**X2** + 0.01**X3** + 0.005**X4** + 0.001**X** − 0.01**X6** + 0.007**X7** − 0.03**X8** + 0.01**X9**

The above biases are considered together because each of the bias have an effect on other biases and collectively the statistically significant biases are shown separately. From this we can infer that Representative Bias and Self- Attribution Bias have a significant impact on the Investors' Decisions.

5. FINDINGS OF THE STUDY

General Findings

The questionnaire was administered to seek the response of 81 individual investors in Mumbai city. The sample comprised of 53.1% males and 46.9% females. In terms of the age of respondents, most of them were

between the ages of 20-29 i.e. 50.62% of the respondents. As regards to the qualifications 40.74% of the respondents' attained Graduation level of education whereas 53.09% attended Post- Graduation level of education. Among the respondents' there were around 6.17% respondents' who have attained Professional Qualifications like CA, CS, etc. This translates into a positive relationship between the level of education and investment decisions.

According to the research findings 60.50% of the respondents preferred their duration of investment to be more than one year. 32.10% and 7.40% of them preferred to invest in an investment with one year and six months respectively. This means that individual investors would invest in long term maturity investment as compared to short term. In terms of the return expected, 21% of the respondents would expect a return of between 16 and 20% whereas 46.9% and 13.6% of them expected a return of between 11 and 15% and above 20% respectively.

The research also found out that 32.1% of the respondents' source of information was Websites from the internet, 21% of the respondents relied on brokers/fund managers as their source of information whereas 14.8% and 16% of them relied on television and reference groups respectively. The source of information is a factor considered in determining behavioral biases that influence investment decisions. Even after performing individual regression or collective regression of all the variables together, the impact of Representativeness Bias was showing a highest impact on the investors' decision.

Results of Correlation and Regression Analysis

The study analyzed the relationships between individual investor decisions and behavioral biases. The respondents were asked questions to establish how a certain factor influences their decisions to invest.

The study found that investors' decision is positively correlated to different factors of behavioural bias except Self-Attribution Bias.

Representativeness bias (r=0.341, p.= 0.001), **Hindsight Bias** (r=.226, p.=0.021) and **Regret Aversion Bias** (r=.239, p.=0.016) have **statistically significant correlations** with the Investors' decisions. These dimensions of behavioral factors had influence investor decisions.

CONCLUSION AND RECOMMENDATIONS

The study observed that when the relationship of each bias on the investors decision is considered separately then the impact of Representativeness bias, Hindsight bias and Regret Aversion bias were found statically significant. However, when the regression is run for all the biases together then the study shows that the impact of Representativeness bias and Self-Attribution bias only were found statically significant. This is also considered as a limitation of the study which may require the study to be conducted on a larger sample to get consistent results.

Behavioral finance seeks to find how investor's emotions and psychology affect investment decisions. The study demonstrates how emotions and cognitive errors influence investors in the decision making process. Though only 3 behavioural biases have been found statistically significant for taking investment decisions in this study, other behavioural biases (except self-attribution bias) had also positive correlation which may play important role in investment decision.

The study recommends that the investors should be educated towards different type of biases and their impact on investment decisions. They may take the advice of experts for minimizing behavioural biases which may have different impact on different investors.

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