IMPACT OF DEMOGRAPHIC VARIABLES ON COGNITIVE BEHAVIORAL BIASES OF AN INVESTORS AND THEIR INVESTMENT DECISIONS

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Abstract

In the recent days behavioral finance play the predominant role for the investment decision making in the field of finance. The paper assesses impact of demographic variables on behavioral biases of an investors in investment decision making. The purpose of the study to examine the influence of demographic variables such as, gender, income, age, education, occupation, investment expertise, investment knowledge on investor behavioral biases especially cognitive biases. The study uses descriptive research with a quantitative approach. On this basis the primary data analysis is conducted to know the impact of behavioral biases. Statistical tests were employed to determine the impact of demographic variables on behavioral biases such as, cognitive dissonance bias, representativeness bias, hindsight bias, conservatism bias, anchoring Bias, availability bias, mental accounting bias and illusion of control Bias. ANOVA and t-test were applied to study the effect of demographic variables on behavioral biases of an investors in investment decision making. The study focuses on the impact of demographic variables influence the behavioral biases of an investors during investment decisions.

Key words: Behavioral Finance, Behavioral biases, Cognitive biases, investment decision

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Introduction:

Investment is an activity to furnish future requirements by utilizing the owned funds. Investment is a kind of sacrificing present and anticipating the return for the future needs by considering funds owned. An investor anticipates to get return or capital gain from the investment. In investment, an investor will be aware of risk and the expected rate of return. At the time of investment many things can influence to investors during decision making, one of which is behavioral finance. During the investment decisions investors are less rational because they precisely involve psychological factors that result in deviations from irrational investor behavior and investment decision bias. Nofsinger (2001) states

Financial behavior, namely studying how investor/human behave in relation to financial decisions and studying psychological variables will impact financial decision making in financial markets. The application of psychology to understand human behavior in finance or investing is the primary function of the behavioral finance. As Statman (1999) quote standard finance people are defined as rational, behavioral finance people are defined as normal. The basic concept of behavioral finance is about how people make decisions both individually and collectivelly. Behavioral finance emerged as a new approach to financial markets in response to the limitations coined in the traditional paradigm. In more precisely, it argues on the financial phenomena

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can be understood by models in which individuals are not fully rational. Demographic variables such as age, gender, education, marital status, income, occupation, investment experience also leads to influence on investment decision making.

Behavioral finance identifies the various psychological aspects leads to people behave irrationally towards suboptimal decision making. In the behavioral finance investors are instrumental to different behavioral anomalies, which becomes the largest obstacle in their attempt to increase wealth. The only way to investors can avoid behavioral anomalies is to understand the importance of emotional and cognitive aspects in trading while in the financial decision making. Greenspan (2001) describes the financial models is not been successful in analysing the process driven in major part of an irrational behavior of market participants. Behavioral finance is a part of finance which studies how investor's behavior in the financial decision making in the capital market is influenced by psychological factors and resulting towards the influence on financial decision making. Shefrin & Statman (2000) examined behavioral finance as a rapidly growing area that deals with the influence of psychology on the behavior of financial decisions in investors.

Baker et al., (2019) conducted a detailed study to understand the effect of financial literacy and demographic variables, such as age, gender, educational level, occupation, marital status & investment experience related to behavioral biases. The results showed different biases have impact on the investment decisions. The findings support that investors not always considers rationally in investment decision making. The important demographics factors like age, occupation and investment experience are associated with investors' behavior. This study emphasised the demographics variables that influence cognitive behavioral biases, namely Cognitive Dissonance Bias, Representativeness Bias, Hindsight Bias, Conservatism Bias, Anchoring Bias, Availability Bias, Mental accounting Bias and Illusion of control Bias. This study produced findings of the impact of demographic variables on the cognitive behavioral biases of investors and their investment decision making.

Cognitive Behavioral Biases:
A cognitive bias is a systematic error in considering the information processing or thinking error occurs at the time of people are processing and interpreting information, which results in faulty decisions or feeling of investment decision making. cognition arises in a investor's line of reasoning when making a decision is faulty by personal beliefs. This kind of bias occurs when drawing conclusions incorrectly, based on ill-conceived heuristics, in order to make bad decisions in investment activities.

Cognitive Dissonance Bias
Festinger (1957) developed the concept of Cognitive Dissonance and suggested that we have an inner drive to hold all our attitudes and behavior in harmony and avoid disharmony (or dissonance). This is known as the principle of cognitive consistency. Cognitive Dissonance explains the persistent efforts rendered by every individual human being, resulting in achieving consistent growth or accumulating success in new domains and setting new benchmarks in the industry.

Representativeness Bias
De Bondt (1993) asserts that the investors keep in mind the recent past returns when forecasting investment in future. Representativeness plays a predominant role in the state of investors' mind. Tversky and Kahneman (1974) describes representativeness heuristic employed in making judgements under uncertainty.

Hindsight Bias
Fischhoff and Beyth (1975) in their research found that the people are victimized by their tendency to maintain "I Knew it would happen." It is imposing events of future things based on recalled probabilities. Hindsight bias is strongly related to the paucity of the perfect memory of human beings. Hindsight bias is strongly related to the paucity of the perfect memory of human beings. It happens because people recall their predictions about the future and claim that they were more accurate than they actually were.

Conservatism Bias
Edwards (1968) in his study compares human behavior with the outputs of Bayes's theorem and the cause for conservatism bias is due to disaggregation of data. In this category of bias, investors consider significant beliefs of the past rather than focus towards the mental ability to accept the beliefs towards complex data assessment on investment.

Anchoring Bias
Tversky and Kahneman (1974) states disproportionate influence causes the anchoring

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effect on decision making while arriving at judgments that are based on the initially presented information. The anchoring effect is also a cognitive bias that is an integral part of biases that accompany information processing. Anchoring overemphasis as human nature that focuses too much on the information received from the initial phase. Anchoring bias results in wrong decisions taken by the investment participants in the stock market.

Availability Bias
Availability bias is based on heuristics of investors which is among the cognitive errors. In this bias investors overweigh easily approachable information. Availability bias explains how investors approach quickly when an event comes to their mind.

Mental accounting Bias
Thaler (1985) describes mental accounting as a cognitive process in which people tend to separate goals, assess and categorize economic outcomes after grouping their assets into mental accounts that are non-interchangeable. It is known as the 'Framing Effect'. This bias makes people separate and categorize their assets assigning one particular function to each category. This intelligence of separating and assigning is generally irrational and often determinantal to their own behavior determination.

Illusion of control Bias
Langer (1975) defined Illusion of Control as "expectancy of an individual achievement probability inappropriately as much higher than the objective probability would warrant." The illusion of control bias plays a significant role in investor's behavioral aspects. Event occurrence is overestimated with the probability of victory from a personal initiative in an activity. In this bias, people thought they influenced the outcomes, but they have not influenced outcomes at all in reality.

Literature review
In recent times, there has been a significant progress work in the area of behavioral finance. The literature on the field of behavioral finance is voluminous, containing survey and analysis through the secondary data. Both approaches have a predominant contributions in this field of finance. This section discusses some of the significant contributions done by the researchers of both approaches. The literature includes the cognitive behavioral biases such as, Cognitive Dissonance Bias, Representativeness Bias,

Hindsight Bias, Conservatism Bias, Anchoring Bias, Availability Bias, Mental accounting Bias and Illusion of control Bias.

Bondt and Thaler (1985) applied experimental psychology in the paper titled *Does the Stock Market Overreact?*. The outcome of this study was contradictory to Bayes'rule. The study indicated that the majority of the people overreacted when they were exposed to unanticipated and dramatic news events. *Shefrin and Statman (1984)* studied the tendency of investors to incline towards cash dividends in accordance with the self-control theory and prospect theory. *Shefrin and Statman (1985)* the central aspect was considering behavioral patterns for a theoretical framework regarding a disposition effect to sell winners too early and hold losers too long. *Shiller (2003)* Contributed towards Anchoring bias in his book called *Irrational Exuberance*. In the study stock market boom was analyzed in a much broader way of understanding the behavioral aspects through investors' irrationality. *Benartzi and Thaler (1995)* conducted study focused on the equity puzzle, which refers to the empirical element that stocks outperformed bonds during the last century by a remarkably larger extent. The study reveals the explanation of the "loss averse" behavioral concept as they are distinctly more sensitive to losses than to gains.

Barber and Odean (2001) analyzed the behavioral biases along with the demographic variables that influence the investor's decision in stock market investment. The theoretical model was an exhibit in accordance with establish the influence of psychological elements of investors. *Dreman et al. (2001)* in their report on the survey of investor sentiment highlights rapidly declining in market. The study considers the investment sentiments of investors in order to examine the behavioral elements that lead to securities price fluctuations. The study revealed that investor sentiment of confidence arises in the long and intermediate stock market performance. *Kent and Nofsinger (2002)* analyzed the psychological and behavioral biases of investors. The study focused on the investors' cognitive biases and emotional errors, which bifurcated the investors' feelings and thinking. They examined the common investment mistakes that mainly lead to the cognitive and emotional errors of the investor. *Fischhoff (1975)* the first researcher who studied hindsight bias and explained how it leads one to memory distortion. His study focused on new information that will

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mislead the previous judgment trait of a person from the actual outcome of a given condition. *Langer (1975)* conducted series of studies to explicate the illusion of control. He defined the concept of illusion of control as an expectancy of a personal success probability inappropriately higher than the objective probability would warrant.

Thaler (1999) states that individuals' financial activities lead to mental accounting as part of the cognitive domain in nature with individuals and households to organize and evaluate. The study was conducted to understand the current state of knowledge regarding how people are involved in mental accounting activities. *Werth et al.(2002)* investigated the hindsight bias and it is focused on a person's tendency towards after learning about the situations actual outcome to distort past judgement through the new set of information. *Fellner (2004)* conducted a study on illusion of control with reference to the issue of poor diversification. The study shows the relevance that illusion of control and excessive extrapolation induce shifts in individual investment portfolio. *Jain (2014)* conducted research on the preferred investment avenues of investors' especially salaried people. The study considered the demographic factors the crucial elements in the investment decisions. The study revealed the influence of demographic factors in the investment preferences by the investors. Level of education and age influenced greatly at the time of investment avenues selection. *Jain and Mandot (2012)* in their research worked on the influence of demographic factors on investment decisions pertaining to India's Rajasthan state. There is a positive correlation between cities, income level, and knowledge of the investors to the risk tolerance level.

Statement of the problem
The financial decision-making has been found to be influenced by emotions, sentiments, psychological factors, and behavioral biases. Research evidence has proved that from individual investors to financial institutions to corporate managers, professional analysts, and portfolio managers are influenced by behavioral biases. The study of the market draws more considerable conclusions on psychological factors; they throw light on the way investors buy or sell stocks and the way they sometimes do not buy or sell at all. In this scenario, the study that has been selected for the research is to know the impact of demographic factors on behavioral biases of

investors and their investment decisions. Basically this study aims to know the effect of demographic variables on cognitive behavioral biases in investment decision making on the investors of Bengaluru region.

Objectives for the study
➢ To study the demographics variables of investors on investment decisions
➢ To understand the effect of demographic variables on cognitive behavioral biases of investors

Scope of the study
The present study considers the two aspects of the variables such as demographic factors and behavioral biases. Demographic variables includes the, age, gender, marital status, educational qualification, occupation, income and experience in investment. With respect to behavioral biases, the study focuses on the selective cognitive behavioral biases such as, Cognitive Dissonance Bias, Representativeness Bias, Hindsight Bias, Conservatism Bias, Anchoring Bias, Availability Bias, Mental accounting Bias and Illusion of control Bias. The respondents are retail investors situated in Bengaluru city for the study.

Data used for the study: Primary data used for the study (Survey based).
Research Design: The study inculcated a survey-based descriptive research design in nature.

Sampling Technique: The stratified snowball sampling method is adopted for the present study

Sample size: Around 450 people approached for participating survey. 430 responses were received, of which few responses were incomplete in some way or other, making the final number of responses to be 393.

Sampling framework: The target respondents are the people from investment segmentation in financial products i.e., the people having financial savings and intend to invest in various financial products. Further, the respondents of the Bengaluru city region were selected for the study.

Questionnaire Design: The present study developed a structured questionnaire to examine the demographic variables effects on behavioral biases of investors.

Scale used for the study: The present study incorporated Nominal, Ordinal, and Interval scales

are used. A nominal scale is used for attributes such as age, gender, marital status, and experience in investment. Ordinal scale and Likert's five-point scale is used for the cognitive behavioral biases.

Statistical test used in the study: Descriptive statistics used to examine the demographic variables for the study. ANOVA & t-test is used to study the effect of demographic variables on behavioral biases of investors in their decision making.

Hypotheses for the present study:
H_0: There is no dependence between demographic variables and cognitive behavioral biases
H_1: There is a dependence between demographic variables and cognitive behavioral biases

Reliability Test

The Cronbach's Alpha Coefficient for Research variables is as follows.

Sl. No	Variables	Cronbach's Alpha Coefficient
1	Anchoring Bias	0.86
2	Availability Bias	0.77
3	Cognitive Dissonance Bias	0.79
4	Conservatism Bias	0.81
5	Hindsight Bias	0.83
6	Illusion of Control Bias	0.82
7	Mental Accounting Bias	0.92
8	Representativeness Bias	0.77

The reliability or internal consistency for each behavioral bias is checked individually. Outcome of the reliability test revealed that is greater than the benchmark value of 0.70, which makes them a preferable scale. Mental accounting bias found highest value of 0.92, followed by anchoring bias and hindsight bias with 0.86 and 0.83 respectively.

Limitations of the study

As with any methodology, the present study is also has limitations. The study is confined to sample of Bengaluru city investors only due to time and resource constraint. Further limitation, as the study limited to Bengaluru city, the results may vary from other cities as well. With respect to biases, the selective biases are considering only cognitive behavioral biases in nature.

Results and Interpretation

The results are depends on the options that investors chose with respect to different situations. These choices subsequently unveil the underlying behavioral biases of respondents. A summary of demographic variables and cognitive behavioral biases corresponding to each item is presented below.

		Frequency	Percentage	Cumulative Percentage
Gender	Male	212	54	54
	Female	181	46	100
Age	Less than 25 Yrs.	53	13	13
	26 to 45 Yrs.	213	55	68
	More than 45 Yrs.	127	32	100
Marital Status	Single	214	54	54
	Married	179	46	100
Educational Qualification	Graduation and Below	134	34	34
	Post-Graduation and above	259	66	100
Occupation	Professional	19	5	5
	Self-employed	28	7	12
	Salaried	346	88	100
Annual Income	Less than 2.5 lakh	12	3	3
	2.5 lakh to 5 lakhs	180	46	49
	5 lakh to 10 lakh	187	47	96
	Above 10 lakh	14	4	100
Experience in Investment	0 to 5 years	152	39	39
	6 to 10 years	181	46	85
	11 to 15 years	60	15	100

It was evident from the above analysis table with reference to Gender, 212 respondents are found to be Male, and 181 respondents are Female. With respect to the age of respondents, it is found that 53 respondents belong to the age group of less than 25 years, 213 respondents are of the age group between 26 to 45 years, and 127 respondents are 45 years and above. With regard to Marital Status, 214 respondents are found to be married, and 179 respondents are single. In educational qualification, it is found that 134 respondents' educational qualification is graduation and below. 259 respondents hold post-graduation and above qualifications. With respect to occupation, 346 respondents are found to be salaried people, 28 respondents are self-employed category, and 19 respondents are professionals like doctor, charted accountant, lawyer etc. In annual income, 12 respondents were found less than 2.5 lakh, 180 respondents found in between 2.5 lakh to 5 lakh income, 187 respondents were found in between 5 lakh to 10 lakh income earned by respondent and 14 respondents are having more than 10 lakh annual income. With respect to experience in investment made by the respondents, it is found that 181 respondents have experienced between 6 to 10 years, 152 respondents have experienced less than or up to 5 years, 60 respondents constitutes the experience from 11 to 15 years.

Impact of demographic variables on cognitive behavioral biases

The dependence between the cognitive behavioral biases and demographic variables of investors is detected with the help of the t-test and ANOVA (F-Test). The study considers the several variables, where the factors like gender, marital status and educational qualifications used t-test values to determine the effect on cognitive behavioral biases. The other demographic factors like age, occupation, annual income and investment experience considers the ANOVA test to known the existence of cognitive behavioral biases of an investors. The present study considers the demographic variables such as, gender, age, marital status, educational qualification, occupation, annual income and investment experience. The study considers the selective cognitive behavioral biases are Cognitive Dissonance Bias, Representativeness Bias, Hindsight Bias, Conservatism Bias, Anchoring Bias, Availability Bias, Mental accounting Bias and Illusion of control Bias. The present study to know the impact of demographic variables on the selected cognitive behavioral biases of an investors. The detailed analysis of this association for each variable is discussed in the below table.

Results of sample t-test

This test gives a more lucid view as to the investors' specific demographic characteristics corresponding to each cognitive biases. It helps in determining the equality between means of two independent groups.

Biases	Gender		Marital Status		Educational Qualification	
	t value	Sig	t value	Sig	t value	Sig
Cognitive Dissonance Bias	-1.52	0.13	-4.74	<.001	-2.66	0.01
Representativeness Bias	-0.73	0.46	-6.36	<.001	-3.61	<.001
Hindsight Bias	-1.33	0.18	-4.72	<.001	-1.79	0.07
Illusion of Control Bias	-0.94	0.35	-6.52	<.001	-3.72	<.001
Anchoring Bias	-0.41	0.68	-6.53	<.001	-1.92	0.06
Mental Accounting Bias	0.77	0.44	-5.88	<.001	-2.87	0.00
Availability Bias	-1.43	0.15	-5.39	<.001	-3.35	<.001
Conservatism Bias	0.20	0.84	-5.53	<.001	-2.15	0.03

Results of sample ANOVA (F Test)

This test gives a more lucid view as to the investors' specific demographic characteristics corresponding to each cognitive biases. It helps in determining the equality between means of more than two independent groups.

Biases	Age		Occupation		Annual Income		Investment Experience	
	F value	Sig	F value	Sig	F value	Sig	F value	Sig
Cognitive Dissonance Bias	1.19	0.305	7.32	<.001	5.12	0.01	14.79	<.001
Representativeness Bias	0.71	0.490	10.04	<.001	1.88	0.15	18.59	<.001
Hindsight Bias	1.81	0.165	9.70	<.001	6.32	0.00	11.06	<.001
Illusion of Control Bias	0.31	0.734	8.96	<.001	2.78	0.06	16.85	<.001
Anchoring Bias	0.05	0.952	3.23	0.04	2.36	0.10	11.35	<.001

Mental Accounting Bias	0.25	0.781	5.19	0.00	2.19	0.11	11.61	< .001
Availability Bias	0.52	0.593	10.38	<.001	2.41	0.09	24.17	< .001
Conservatism Bias	1.06	0.349	1.54	0.22	1.88	0.15	13.30	< .001

Gender: The test results show that the mean values of men and women do not vary significantly in cognitive behavioral biases. The null hypothesis got accepted in respect to all the cognitive behavioral biases. It is seen that men and women do not vary significantly by accepting null hypotheses and rejecting alternative hypotheses with respect to all cognitive behavioral biases.

Marital Status: The test reveals that the respondents with respect to marital status are highly vulnerable as they are prone to all the eight biases. It is seen that this category is rejected the null hypotheses with regard to all the cognitive behavioral biases by accepting the alternative hypotheses. It shows the existence of significant difference between the marital status and cognitive behavioral biases.

Educational Qualification: The test results shows that the mean values of educational qualifications do not vary significantly with hindsight bias, and anchoring bias. The null hypotheses got accepted only with respect to two biases namely. With respect to remaining biases null hypotheses is rejected and alternative hypotheses got accepted. In this category the remaining six cognitive behavioral biases shows there is a significant difference between educational qualification and cognitive behavioral biases.

Age: The test results show that the mean value with age of respondents do not vary significantly in cognitive behavioral biases. The null hypothesis got accepted in respect to all the cognitive behavioral biases. It is seen that age of respondents do not vary significantly by accepting null hypotheses, it means mean values of age do not vary significantly with cognitive dissonance bias, representativeness bias, hindsight bias, conservatism bias, anchoring bias, availability bias, mental accounting bias and illusion of control bias. and rejecting alternative hypotheses with respect to all cognitive behavioral biases.

Occupation: The test reveals that the respondents with respect to occupations are exposed to cognitive behavioral biases. It is seen that this category is rejected the null hypotheses with regard to seven cognitive behavioral biases. Only conservatism bias got accepted the null hypotheses. It is found that existence of significant difference between occupation and cognitive biases namely, cognitive dissonance bias, representativeness bias, hindsight bias, anchoring bias, availability bias, mental accounting bias and illusion of control bias.

Annual Income: The test results shows that the mean values of annual income significantly differ with the cognitive dissonance bias and hindsight bias. The null hypotheses got rejected with respect to cognitive dissonance bias and hindsight bias. With respect to the remaining six biases null hypotheses got accepted, it means mean values of occupation do not vary significantly with representativeness bias, conservatism bias, anchoring bias, availability bias, mental accounting bias and illusion of control bias.

Investment Experience: The test reveals that the respondents with respect to investment experience are highly vulnerable as they are exposed to all the eight biases. It is seen that this category is rejected the null hypotheses with regard to all the cognitive behavioral biases by accepting the alternative hypotheses. It shows the existence of significant difference between the investment experience and cognitive behavioral biases namely, cognitive dissonance bias, representativeness bias, hindsight bias, conservatism bias, anchoring bias, availability bias, mental accounting bias and illusion of control bias.

Conclusion:

The behavioral biases are an integral part of investors' behavior towards the investment decision making. Investors' cognitive behavioral biases determines the investor's success or failure of their investments. The study exhibits the demographic variables has impact on cognitive behavioral biases. This paper examines the effects of the demographic variables influence on cognitive behavioral biases of investors. In line with the hypotheses, the finding indicate the existence of impact of demographic variables on the selected cognitive behavioral biases. Marital status and investment experience demographic variables has impact on all cognitive behavioral biases such as, cognitive dissonance bias, representativeness bias, hindsight bias, conservatism bias, anchoring bias, availability bias, mental accounting bias and illusion of control bias. Educational qualification has impact on the cognitive behavioral biases except

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hindsight and anchoring biases. Occupation demographic variable affects the cognitive dissonance bias, representativeness bias, anchoring bias, availability bias, mental accounting bias, hindsight bias and illusion of control bias. Annual income demographic variable has impact only on cognitive dissonance bias and hindsight bias. The study find the limited evidence that has impact of demographic variables on cognitive behavioral biases.

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