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Research Article

Behavioral Biases in Investment Decision: An Empirical Study Determining the Behaviour of Individual Investors in Stock Market in India

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ABSTRACT

The primary aim of this research is to investigate the field of behavioral finance to ascertain the influence of behavioral biases on investment decision-making within the Indian stock market. This study analyses the impact of representativeness bias, anchoring bias, herding bias, overconfidence bias, and loss aversion bias on individual investors' decision-making. Primary data is collected from individual stock market investors from five major cities in Uttar Pradesh, India. A sample of 330 investors is collected employing convenient and snowballing sampling technique. Structured questionnaire is developed and administered personally to respondents. Likert scale is used to measure the behavioral bias factors, and items to observe these factors are adopted from literature. The influence of behavioral biases on investment decision-making is evaluated using exploratory factor analysis for measurement and multiple linear regression for estimating the research model. One of the main contributions of this research is validation of scale measuring five behavioral biases and investment decision making. The study indicates that biases such as overconfidence, anchoring, representativeness, and loss aversion have a substantial influence on decision-making. Conversely, the findings suggest that herding does not play a significant role in investment decisions within the current Indian context.

Keywords: Behavioral Finance, Behavioral Biases, Investment Behaviour, Investment Decision Making and Behavioral Bias Measurement/Scale.

Introduction:

The stock market investment decision making is considered to be rational in traditional theories where consumers make decisions based on maximizing utility under risk and considering all the available information. Three traditional theories have contributed to this perspective. Expected Utility Theory considers that under risk conditions investors chose the option having maximum utility or they think will provide maximum profit (Bernoulli, 1954 and Pompian, 2011). Markowitz's (1952) Modern Portfolio theory assumes hedging risk with optimal portfolio of securities The subsequent key theory of the Capital Asset Pricing Model evaluates the relationship between an asset's risk and its expected return for the purpose of decision-making (Sharpe, 1964; Lintner, 1965; and Mossin, 1970) and is based in the assumption of market efficiency, which posits that asset prices consistently reflect all available information (Fama, 1970). These theories, despite their early successes, were unable to account for various anomalies in financial markets, such as market overreactions or underreactions, as well as momentum and reversals. This paved the way for behavioral finance where decision making is not purely rational but based on the psychological factors. Tversky and Kahneman (1974) contended that heuristics significantly influence decision-making amid uncertainty, highlighting the biases of availability, representativeness, anchoring, and adjustment. Kahneman and Tversky (1979) in their Prospect Theory proposed that investors value gains and losses differently, giving more value to perceived gains

as compared to perceived losses leading to loss aversion. The question whether the decision making under uncertainty is purely rational or irrational (normal) and there are plenty of researches that have proved the presence of behavioral biases along with the rationality. The role of behavioral biases in investment decision making have been widely discussed around the world, however limited number of researches are done in Indian context. The scare researches in India are limited to the major metro towns. This research aims to address this gap by examining the role of behavioral biases in individual investors and stock market investments in major cities of Uttar Pradesh, India. The primary aim of this study is to assess how identified behavioral biases influence investment decision-making in India. This study will add to evidences in the domain of behavioral finance and will also generate insights for financial market professionals to formulate strategies.

Review of Literature and Hypothesis Development

Ricciardi and Simon (2000) defined "*behavioral finance as a way of understanding psychological processes investors experience in financial markets and explained role of emotional factors in decision making during investment*". Bikas et al. (2013) contend that human rationality in financial markets is limited, acknowledge that behavioral finance is influenced by emotional factors, and discuss the impact of psychological elements on investment decision-making. Nair and Antony (2015) noted that investors in financial markets often exhibit irrational behavior, with emotional and psychological factors significantly influencing their investment decisions. These influences manifest as behavioral biases and heuristics. Kapoor and Prosad (2017) stated that psychological biases affect investors, resulting in irrational investment behavior that can lead to suboptimal decision-making. Tversky and Kahneman (1974) highlighted the biases of availability, representativeness, anchoring, and adjustment, while Kahneman and Tversky (1979) introduced the concept of loss aversion bias. Many of these and other behavioral biases have been analysed and validated in in different context around the world. Some of the researches exploring various bias in Indian context are mentioned below. It is clear from the table that, among the most analysed behavioral biases in the recent times in India context are overconfidence, loss aversion, herding or herd behaviour while among the least analysed behavioral biases are – optimism, representativeness, disposition effect and anchoring. This study focuses on two of the least examined biases—representativeness bias and anchoring bias—along with three of the most frequently analysed biases: overconfidence bias, herding bias (or herd behavior), and loss aversion bias.

Table 1.1: Behavioral Biases in Indian Context

Biases	Studies
Overconfidence, Excessive Optimism (Pessimism), Herd Behaviour and The Disposition Effect.	Prosad, Kapoor, and Sengupta (2015)
Loss Aversion, Regret Aversion, Herd Behaviour, Overconfidence Bias and Cognitive Dissonance.	Gupta and Ahmed (2017)
Overconfidence and Self-Attribution, The Disposition Effect, Anchoring Bias, Representativeness, Mental Accounting, Emotional Biases and Herding.	Baker et al. (2019)
Overconfidence, Anchoring, Disposition Effect, Herding Bias.	Madaan and Singh (2019)
Self-Attribution and Overconfidence besides Investors' Rationality.	Mushinada and Veluri (2019)
Overconfidence, Herding, Disposition Effect, Anchoring, Loss Aversion, Mental Accounting And Representativeness.	Shukla, Rushdi and Katiyar (2020)
Representativeness, Anchoring, Mental Accounting, Loss Framing, Cognitive and others.	Owsley and Laumas (2021)
Herding Bias, Overconfidence Bias, Disposition Effect, And Noise Trading.	Malhotra (2022)
Overconfidence Bias, Herding Bias, Representativeness Bias, Anchoring Bias, And Other Behavioral Stereotypes	Saxena and Chawla (2022)
Big Five Personality Traits and Behavioral Biases - Emotional Biases and Cognitive Heuristics.	Baker, Kapoor and Khare (2023)

Overconfidence Bias: It can be described as the investors' perception or confidence in their ability to analyse the market as being 'above average.' (Benartzi and Thaler, 1995; Barber and Odean, 2000). This bias causes investors to think that the investment success is due their own competence and they trade more frequently ((De Bondt and Thaler, 1995; Barber and Odean, 2001; Statman et al., 2006). Overconfident traders do not manage their risk properly utilise information from various sources (Odean, 1998 a,b) and they may go out limb without getting similar returns (Nevins, 2004). Biases such as optimism and overconfidence significantly affects investment decisions (Seetharaman et al. 2017). Overconfidence behaviour is found to have high positive correlation with investment decision making (Ngacha, 2019) and overconfidence bias is found to have a positive impact on investment decisions during IPO (Kurniawati and Sutrisno, 2019). This study hypothesizes a significant impact of herding bias on investment decision making:

- H1: Overconfidence bias a positive and significant impact on investment decision making.

Herding Bias or Herd Behaviour: Investors show herd behaviour (follow majority) so as to minimise the regret in case of any losses usually under uncertain conditions (Cipriani and Guarino, 2008; Messis and Zapranis, 2014). The result of this bias is people follow others (family, friends, peer group) instead of analysing the available information (Christie and Huang, 1995; Chang et al., 2000). Herding bias is found to be present and affect investment making in some contexts. Ripoldi (2016) identified evidence of herding bias among investors in the Shanghai and Shenzhen markets. Choi (2016) found it more in offline investors that online investors. While some researches fail to find evidences to herding bias in some contexts, Garg et al. (2013) analysed herding in Indian stock market for four years and concluded its absence, Satish and Padmasree (2018) also didn't find any evidences of herding behaviour in any of the three pre-, during or post- financial crisis period, Indars, Savin & Lublóy (2019) also confirmed absence of herding in Moscow Exchange. To explore herding bias in current Indian context, this study hypothesizes a significant impact of herding bias on investment decision making:

- H2: Herding bias has a positive and significant impact on investment decision making.

Loss Aversion Bias: This bias refers to the tendency of investors to take measures to avert losses and view losses as more significant than gains (Tversky and Kahneman, 1991; Benartzi and Thaler, 1995). Additionally, investors often react more intensely to losses than to gains (Benartzi and Thaler, 1995). Investors affected by this bias perceive the discomfort of a loss to be more intense than the joy of an equal gain (Kahneman and Tversky, 1979). Loss aversion bias affect the investor decision making both in risky and riskless situations (Khan, 2017). Investment decisions made by investors are significantly influenced by loss aversion bias (Kumar and Babu, 2018). This study hypothesizes a significant impact of loss aversions bias on investment decision making:

- H3: Loss aversion bias has a positive and significant impact on investment decision making.

Representativeness bias: It is the propensity for people to categorize ideas and occurrences according to prior experiences (Busenitz, 1999). Whenever a thought or event arises, people tend to categorize it into pre-existing classifications. (Ricciardi and Simon, 2000). This bias makes drive investors to give more importance to recent past investment experience (Shefrin, 2008) and less importance to long-term experience or average returns during investment (Ritter, 2003). Representativeness bias has significant negative impact on investment decisions (Shah, Ahmad and Mahmood 2018). Representativeness bias was found to have significantly affect investment decision-making (Adiputra, 2021; Irshad, Badshah and Hakam, 2016).) This study hypothesizes a significant impact of representativeness bias on investment decision making:

- H4: Representativeness bias has a positive and significant impact on investment decision making.

Anchoring Bias: It is a bias that play important role in decision making under uncertainty and causes people to rely on a specific piece of information when making decisions (Tversky and Kahneman, 1974). It can be described as the general tendency of investors to rely too heavily (anchor) on specific information when making decisions in financial markets. (Andersen, 2010). Investment decision-making of individuals is significantly influenced by anchoring biases along with other biases (Chandra, 2008; Le Luong and Thi Thu Ha, 2011; Kimani, 2011; Budhiraja, Raman and Bhardwaj, 2018). This study hypothesizes a significant impact of anchoring bias on investment decision making:

- H5: Anchoring bias has a positive and significant impact on investment decision making.

Research Methodology

The methodology for this research is discussed in the following heads:

Research Design: this research is deductive in nature since it identifies a theory, develops a questionnaire, collects data, analyse it to determine whether the collected data produces the evidences to support the theory. The research design is descriptive, specifically diagnostic since it involves quantitative analysis and hypothesis testing.

Data Collection and Sample: the research design and nature require primary data which is collected through survey employing a structured questionnaire. The respondents are the individual or retail investors who invest in stock market on their own or under non-professional guidance (other individual investors) in equities, mutual funds or other instruments. Convenience sampling technique is applied to collect the data along with snowballing due to absence and non-availability of proper sampling frame in India. The questionnaires were administered personally after identifying that the individual is a stock market investor. At least two known eligible references were taken from the respondents and questionnaires were either handed over personally or through the contact. More than 500 questionnaires were distributed and after continuous follow up 352 responses were received, after data cleaning a sample size of 320 was finalised.

Questionnaire, Measurement and Validation: the questionnaire was developed in two sections the first section recorded the demographic details of the respondents whereas the section two consists of the psychographic scale to measure the behavioral biases. Each of the bias was measured through a Likert type scale with a set of at least three items. Each item was rated on five-point scale with 1-strongly disagree, 2-disagree, 3-neither disagree nor agree, 3-agree and 5-strongly agree. The items to measure behavioral biases

and decision making were adopted from the prior researches. All the adopted items were slightly reworded to change its direction to make it directly relate with the decision making to focus on the significance of relationship. Overconfidence is measured through three items one each adopted from Baker et al. (2019), Prosad, Kapoor and Sengupta (2015), and Jain, Walia and Gupta (2019). The herding bias was measured with four items, two adopted from Baker et al. (2019) and two adopted from Jain, Walia and Gupta (2019). Loss aversion bias is measured through three items one each adopted from Baker et al. (2019), Chandra, Sanningammanavara and Nandini (2017) and Kishor (2022). Representativeness bias is measured through three items one each adopted from Baker et al. (2019), Jain, Walia and Gupta (2019) and Kishor (2022). Anchoring bias is measured through three items one each adopted from Baker et al. (2019), Jain, Walia and Gupta (2019) and Shusha and Touny (2016). Decision making is measured as intentions to make investment decision through three items adopted from Mayfield, Perdue and Wooten (2008). The reliability of the adopted behavioral bias scale was performed in two stages, initially the reliability of the measures was established prior to the data collection through a pilot study on 32 respondents and the secondly the reliability was established post full-fledged data collection. After reliability was established the validation of the developed scale was performed.

Research Methods: Reliability of the adopted behavioral bias scale was established through Cronbach's alpha measure. The adopted behavioral bias scale was validated through exploratory factor analysis (EFA), the unobserved factors or biases were extracted through EFA and the factor scores were obtained to do the further analysis. To determine the impact of behavioral biases on investment decision making multiple linear regression (MLR) was employed with decision making as dependent variable and all the biases as independent variables. Data analysis is performed through SPSS 23.

Data Analysis: the data analysis starts with determining the demographic profile of the sample. The below table presents the profile of the respondents included in sample. It may be noted that all the considered demographic categories are represented in the sample. It may be considered that the sample represent a balanced mix of demographic characteristics of the investors.

Table 1.2 Sample Profile

Sample Profile					
Variable	**Category**	**Percent**	**Variable**	**Category**	**Percent**
Gender	Male	62.1%	**Occupation Status**	Student	28.8%
	Female	37.9%		Private Job	42.4%
Age Group	18-25 years	34.2%		Govt. Job	12.7%
	26-35 years	28.2%		Business	16.1%
	36-45 years	21.2%	**Income Level**	No Income	24.8%
	> 45 years	16.4%		< 2.4 LPA	42.4%
Education Status	Up to Secondary	10.6%		2.40 - 4.0 LPA	19.1%
	UG	44.2%		4.01 - 6.0 LPA	13.6%
	PG	30.9%	**Marital Status**	Married	64.8%
	Others	14.2%		Unmarried	35.2%

Reliability Analysis: the pre- and post- data collection reliability is shown in the below table. The value of Cronbach's Alpha lies between 0 and 1, the acceptable value 0.7 or more. The pre-data collection 19 items were present in the scale. It may be observed from the below above table the all the biases/factors except two factors have alpha more than 0.7, herd behavior and loss aversion alpha is less than 0.7. Hence, scale if item analysis was run and the unreliable item was identified and removed from the scale. After removing 3rd item of herd behavior and 2nd item of loss aversion, desired value of alpha was obtained. Finally, only 17 items were found reliable hence the questionnaire consisted of these 17 items only. The post-data collection reliability is also shown in in the table and it was found that all the constructs were having alpha of more than 0.7 and the full-scale alpha is 0.898. hence the behavioral bias scale is considered reliable. Next the validity of the scale is established through EFA.

Table 1.3: Reliability Analysis

SN	Behavioral Biases	I-1	Pilot Alpha A-1 (N=32)	I-2	Final Pilot Alpha A-2 (N=32)	Post Data Aplha A-3 (N=330)
1	Overconfidence Bias	3	0.914	3	-	0.769
2	Herding Bias	4	0.576*	3	0.734	0.778
3	Loss Aversion Bias	3	0.59*	2	0.872	0.743
4	Representativeness Bias	3	0.796	3	-	0.738
5	Anchoring Bias	3	0.82	3	-	0.828
6	Decision Making Intentions	3	0.761	3	-	0.763
	Overall Items	9	-	9	0.892	0.898
*For alpha less than 0.7, scale if item deleted is run and unreliable item was dropped. I-1: Initial Items numbers; I-2: Final Items numbers after dropping unreliable item/s; A-2: Alpha after dropping unreliable item/s.						

Exploratory Factor Analysis: the EFA was conducted on the 17-item behavioral bias scale found reliable. EFA was conducted entering the 17 items into SPSS employing principal component analysis method and the unobserved behavioral biases were extracted from the priori set of items (items of the factors were pre-decided). Initially the KMO and Bartlet's Test was observed and it was found that KMO value 0.892 which suggests the sample size is adequate for EFA and the Bartlet's Test significance establishes that there is sufficient correlation among the items to conduct the EFA.

Table 1.4: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.892
Bartlett's Test of Sphericity	Approx. Chi-Square	2078.378
	df	136
	Sig.	0.000

The next step in EFA is to observe the total variance explained in the factor model and the factor extraction initially Keiser's (1960) criterion was applied with Direct Oblimin rotation and SPSS extracted 3 factors explaining 53.3% variance. This solution is not accepted as 6 factors (5 behavioral biases and 1 investment intention) were set in priori. To extract required number of factors Joliffe's (1986) criterion of eigen value 0.7 was applied and it was observed that SPSS extracted 6 factors explaining 71.4% of the variance. This solution was found suitable given that the factor structures are accepted.

Table 1.5: Total Variance Explained and Factor Extraction

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	**6.533**	38.431	38.431	6.533	38.431	38.431	3.437
2	**1.980**	11.646	50.077	1.980	11.646	50.077	2.705
3	**1.060**	6.236	56.313	1.060	6.236	56.313	3.984
4	**.914**	5.377	61.690	.914	5.377	61.690	4.374
5	**.863**	5.075	66.765	.863	5.075	66.765	3.863
6	**.794**	4.669	71.434	.794	4.669	71.434	2.365
7	.672	3.951	75.385				
..							
..							
17	.255	1.499	100.000				
Extraction Method: Principal Component Analysis.							
a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.							

To determine the factor structures the pattern matrix with factor loadings was observed as shown in the below table. A cut-off loading of 0.4 was applied as a thumb rule. It was observed that the first to sixth extracted components are overconfidence, herd behaviour, anchoring, representative bias, investment intentions, and loss aversion respectively. All factor loadings were substantial acceptable and substantially large i.e. more than 0.5. This factor structure confirmed the acceptance of the 6-factor solution with 71,4% variance explained.

Hence the scale developed to measure five behavioral biases and investment intention was validated in the current context. Factor scores were obtained employing Anderson-Rubinson method to perform further analysis.

Table 1.6: Pattern Matrix with Factor Loadings

Extracted Components or Factors						
Component No.	1	2	3	4	5	7
Variable No.	Overconfi-dence	Herding	Anchoring	Representa-tiveness	Investment Intentions	Loss Aversion
3	.770					
2	.726					
1	.548					
1		.849				
2		.792				
3		.779				
3			.833			
2			.806			
1			.699			
2				.838		
1				.830		
3				.701		
1					.837	
3					.747	
1					.649	
1						.826
2						.574
Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization.						
a. Rotation converged in 14 iterations.						

Impact of Behavioral Biases on Investment Decision Making: the impact of five behavioral biases on decision making or investment intentions is determined through MLR. Initially the behavioral biases and investment intentions factors were measured and extracted through EFA, the obtained factor scores were entered in SPSS with investment intentions as dependent variable and five biases – representativeness, anchoring, herding, loss aversion and overconfidence as independent variables shown below as the research model.

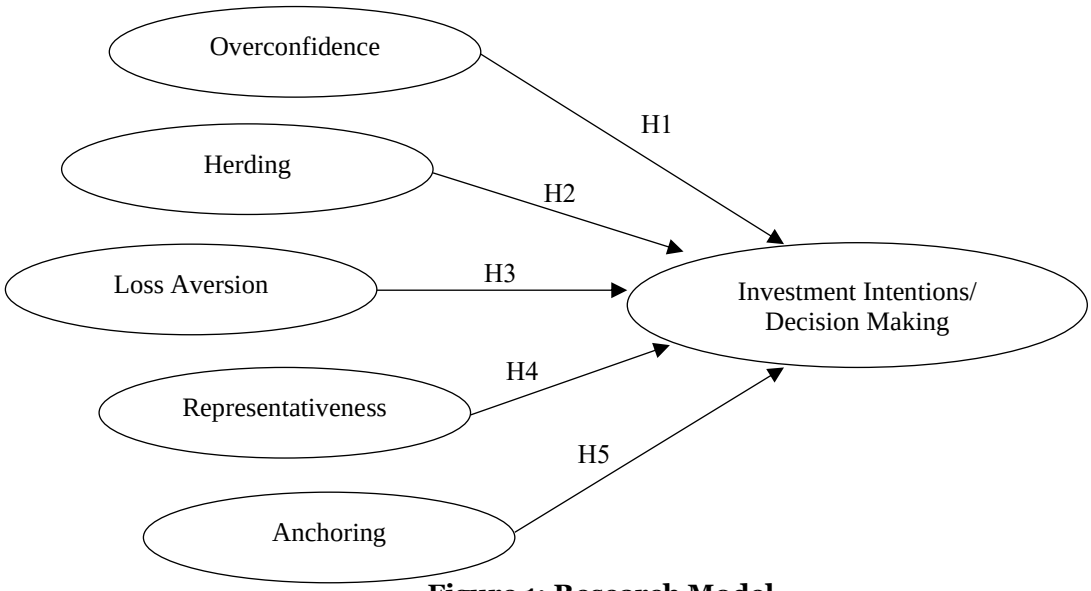

Figure 1: Research Model

The MLR model summary and ANOVA shows that correlation between dependent variables (investment intentions) and independent variables (behavioral biases) is 0.561 and these biases explain 31.5% (R^2) of variance in investment intentions. The adjusted R^2 (if the model is estimated from population) is 30.3% which is not different substantially from R^2. The ANOVA analysis shows that F statistic is significant at 0.000 level, which means the five behavioral biases explain significant amount of variance in investment intentions.
After it is established that the variance explained is significant, the model coefficients can be analysed. It may be observed that out of five biases the impact of four biases is significant. The standardised coefficient of overconfidence (0.276), loss aversion (0.109), representativeness (0.173) and anchoring bias (0.226) are significant at 0.000, 0.05, 0.001, and 0.000 level respectively. Hence hypothesis H1, H3, H4 and H5 are supported through the observed data and it may be concluded that representativeness, anchoring, overconfidence and loss aversion biases have significant impact on investment intentions. The hypothesis H2 is not supported through the observed data and it may be concluded that herding bias doesn't have significant impact on investment intentions.

Table 1.6: MLR Model Summary and ANOVA

Model Summary			**R**	**R Square**	**Adjusted R Square**	**SE of the Estimate**
			0.561	0.315	0.303	0.835
ANOVA		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	91.03	5	18.205	26.116	.000[b]
	Residual	197.97	284	.697		
	Total	289.00	289			
a. Dependent Variable: Investment Intentions.						
b. Predictors: (Constant), Representativeness Anchoring, Herding, Loss Aversion and Overconfidence.						

Therefore, it may be inferred that overconfidence bias, loss aversion bias, representativeness bias and anchoring bias effect decision making of individual investors during stock market investment in current Indian context while herding bias doesn't affect decision making of Indian investors in current context. As far the strength of effects is concerned overconfidence was found to have strongest impact on decision making (β = 0.276), followed by anchoring (β = 0.226), representativeness (β = 0.173), while loss aversion was found to have weakest impact (β = 0.103).

Table 1.5: MLR Model Coefficients

Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	3.865E-04	.049		.008	0.994
	Overconfidence Bias	.276	.059	.276	4.656	.000
	Herding Bias	-.041	.052	-.041	-0.780	.436
	Loss Aversion Bias	.109	.053	.109	2.069	.039
	Representativeness Bias	.173	.056	.173	3.093	.002
	Anchoring Bias	.226	.057	.226	3.966	.000
a. Dependent Variable: Investment Intentions						

Conclusion

The research determined the impact of these behavioral biases on investment decision making. Among five behavioral biases, overconfidence, loss aversion, representativeness and anchoring biases were found to have significant impact on decision making. The findings of this study have important bearings for academia as well as industry. This study contributes to the existing body of literature by proving evidences in favour of the above four biases that have significant impact on decision making of individual stock market investors in India while this study fails to find the evidence in support of significant impact of herding bias.
This study also validated a behavioral bias scale to measure five behavioral biases (overconfidence, herding, loss aversion, representativeness and anchoring) and investment decision making in the current Indian context. The investment professionals shall take note that investors may make errors in investment due to overconfidence and anchoring biases as they significant influence investment decision making. The professionals shall advise investors to avoid these biases and make promotional strategies to make investors

aware of these biases, provide adequate information so that investors can avoid overconfidence and anchoring. Investment professionals may also employ the insight that investors experience loss aversion and representativeness bias hence they may motivate investors with positive and success stories so that investors may overcome these biases. The findings of this study may help professionals and investors to design better portfolios and avoid expensive errors, due to heuristics or behavioral biases. The main limitation of the research is the geographical scope and convenience sampling due to absence of proper sampling frame in India, and also this study analyses only a limited number of behavioral biases. Future researchers shall try to expand the geographical scope of the research, obtain sampling frame from investment companies and include more behavioral bases for analysis. Future researchers may also compare the effect of cognitive and psychological behavioral biases.

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