CHECKING INFLUENCE OF COGNITIVE BIASES ON INVESTMENT DECISION MAKING AND MODERATING ROLE OF FINANCIAL LITERACY

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ABSTRACT

In the era of traditional finance, individuals are considered as rational. However, with the emerging new dimension of modern finance, it is accepted that investors suffer from a behavioral gap while making investment decisions. This paper tries to investigate the influence of cognitive biases on this behavioral gap. The paper also attempts to explore the moderating role of financial literacy on the relationship between cognitive biases and investment decision making. The study has collected data from individual investors investing in multiple options like stock market, mutual funds, bank deposits, bullion, and real estate. The data was collected using a well -structured questionnaire designed on a five-point Likert scale. The data collected was investigated using the AMOS (version 20) software with the help of structural equation modeling approach (SEM) and Interaction Software for moderation analysis. The analysis stated significant influence of cognitive biases on the investment decision making as a Zero order model. Also, when Cognitive Bias modeled as a second-order (higher order) factor with investor's decision making, the findings of the data analysis showed a more substantial association. Thus, cognitive bias as a second order is the more favored model in the current study. Additionally, there is a strong moderating effect of the variable known as financial literacy on the association between variables called as cognitive biases and investment decision making.

Keywords: Availability, Anchoring, Cognitive Dissonance, Representative, Mental Accounting, Bias, Decision Making, Cognitive, Financial Literacy

INTRODUCTION

Investment is inevitable for any person. And today, each investor wishes to outperform the market or the standard benchmark while making investment decisions. However, even outperforming the benchmark is in no way an assurance of investment success. Investment success can be defined as a continuous process of meeting investment needs of either generating an income stream for retirement or to secure the capital. Investment success can be achieved when prudent and rational decisions are made by investors which in real life is only a distant dream. While making investment decisions,

intentionally or unintentionally different thoughts or emotions influence an investor's rationality. This has led to the evolution of a new branch of finance known as behavioral finance, which is the study of a combination of cognitive psychology and economics. This branch of finance has answered for anomalies present in the financial market. Presence of bias hinders the prudent investment decision making by the individual investors. Behavioral finance attempts to know and elucidate observed investor and market behaviors.

Deb and Baruah (2022) stated that savings decisions of households are influenced by different factors namely demographic factors, social norms etc. Research conducted by Khan (2020) concluded that many biases like herding bias, disposition effect and mental accounting have a positive impact on investment decisions making of the individual investors while another research conducted by Khan and Tan (2020) stated the influence of family on the behavioral biases and concluded that learning from parents have strongest effect on financial outcomes and biases among the investors of Dhaka. Ogunlusi and Obademi (2019) stated positive impact between behavioral finance and investment decisions. Kumari (2018) conducted one study in Eastern India, explored the influence of three psychological biases on investment decision making, and concluded that all biases have a significant relationship with the decision-making process.

Mak and Ip (2017) narrated through their study in China that psychological, sociological factors along with demographic factors are significant predictors of investment decision. Because of numerous studies in the area of behavior finance, gradually it became clear that people do hold emotions that hinder rational decision making but also they commit flaws in the decision making because of mistakes in the thinking process known as psychological biases. By understanding these biases and its influence on the investors decision making it may be possible to improve the economic outcomes. Thus, this current study is conducted to check the different dimensions of cognitive biases hampering prudent decision-making and its

association with the investment decision making of the individual investors.

REVIEW OF LITERATURE

Representative Bias and Investors Decision Making

Irshad et al. (2016) studied representative bias among Islamabad Stock Exchange investors and stated that investors are influenced by this bias while making investment decision. Investors are using their past performance as a representative of future. Alsawalhah (2022) also studied the bias in reference with active investors in the Amman Stock Exchange, concluded a significant negative relation between bias and investor's decision making using the SEM approach. Adiputra (2021) in his study studied different psychological biases and have quoted a significant role of biases including representative bias on the decision-making process. He also stated how to control and manage these biases. Rasheed et al. (2018) stated that investors at the Pakistan stock exchange (PSX) are influenced by both representativeness and availability bias. Kartini and Nahda (2021) in their work tried to investigate the influence of different psychological bias on the investment decisions among Indonesian investors and have concluded that several bias like bias known with the name of anchoring bias, another bias called as representative bias, another bias known with the name of loss aversion bias while another type of bias called as overconfidence bias, another known as optimism bias, another herding behavior have a crucial influence on the investment decision making process. Javed et al. (2017) concluded through their research that there exists a substantial positive impact of availability bias on the perceived investment performance. Kartini and Nahda (2021) in their work tried to explore the role of different psychological bias on the investment procedure among Indonesian investors and have concluded that representativeness bias has a crucial influence on the process of making investment decision.

H₁: There is a significant association between representative bias and investment decision making.

Availability Bias and Investment Decision Making

Moradi et al. (2013) performed a study to find the linkage between psychological bias and participant's economic behavior and found a significant association between the two. Sachan and Chugan (2020) conducted one research to find the linkage between place of residence and availability bias and thus with investment decision making. The findings concluded that rural folk are more inclined towards availability bias as compared to urban investors. Javed et al. (2017) concluded through their research that there exists a significant positive role of availability bias on the perceived investment performance of an individual. Salman et al. (2021) stated in their research that the relation between the bias known as availability bias and process of investment decision making is somewhat mediated by the variable known as risk tolerance attitude. Shah et al. (2018) in their research work found a substantial negative association between availability bias and investment decisions among the individuals who are active investors and traders on the Pakistan Stock Exchange. Also, availability bias is associated negatively with the variable known as perceived market efficiency. Rasheed et al. (2018) investors trading at the popular Pakistan stock exchange (PSX) are affected by the bias known as availability bias.

H₂: There exists a significant association among availability bias and investment decision making.

Anchoring Bias and the Process of Investment Decision Making

Murithi, (2014) studied the effect of anchoring on investment decision making by individual investors in Kenya. Owusu and Laryea (2022) in their research concluded that investors are very prone to be influenced by the anchoring bias. Further, they also stated that female investors are more frequently influenced by anchor bias as compared to the male investors. Shah et al. (2018) in their research work found a substantial negative relation between the bias called as anchoring bias and the

procedure of investment decisions among the individuals who are active investors and traders on the Pakistan Stock Exchange. Also, anchoring bias is found to be negatively linked with perceived market efficiency. Jetter and Walker, (2017) also found a significant association between bias and investment decision making. They also concluded that anchoring bias is more pronounced in female investors if compared to the male investors. However, children below the teen age are not prone to this bias. Kartini and Nahda, (2021) in their work tried to examine the impact of different psychological bias on the process of making investment decisions among Indonesian investors and have concluded that anchoring bias have a crucial influence on the investment decision-making process. Shah et al. (2018) conducted research in Pakistan and specified that the bias known as heuristic biases holds a negative relationship with the process of investment decision making made by individual investors enthusiastically doing transactions on the Pakistan Stock Exchange. Madaan and Singh, (2019) stated that anchoring have no significant impact on investment decision making.

H₃: There is a significant relationship between the bias called as anchoring bias and investment decision making.

Cognitive Dissonance Bias with Investment Decision Making

Madaan and Singh (2019) also tried to check the influence of behavior biases and found that biases significantly influence the investment decision making of the investors. Hayat and Anwar (2016) disposition effect have a noteworthy positive influence on investment decisions among investors of the country "Pakistan". Fatima (2019) in the research concluded that different factors enhance the cognitive dissonance of the investor, which further influences the decision-making process.

H₄: There is a significant association between cognitive dissonance and investment decision making.

Mental Accounting and Investors Decision Making

Broihanne and Orkut (2018) stated that bias known as mental accounting influence the "Personal Financial Planning" process of an investor which in return reinforces the pattern of inner thinking and evaluation processes that determine the several financial decisions.

H$_5$: There is a significant association between mental accounting and investment decision making.

Behavioral Biases, Financial Literacy, and Process of Investment Decision Making

Prasetyo and Rahadi (2022) explored the influence of financial literacy and behavior biases on the investment decision making. The previously available data is being used for exploring the said relationship among Generation Z investors of Indonesia. The findings of the research work proposed a theoretical outline on the effect of financial literacy and behavior biases among millennials. Kawamura et al. (2021) explored the role of financial literacy in the investment decision making. The study is being performed in Japan to explore the financial behavior and attitudes of the households. The study found a significant and important association between the variables. Sabri et al. (2017) explored the moderating effect of the variable financial literacy on the association between the bias called as overconfidence bias and the process of investment decision making. The data was collected from 183 investors and Baron and Kenny method along with Process Macro was used for checking the moderating effect. The results quoted a significant moderating effect. Rasool and Ullah (2020) conducted one research to explore the relationship between financial literacy and behavioral biases among Lahore investors. The data was collected with the help of standardized questionnaire using multi stage sampling method from 300 investors investing in shares and bonds. The collected data was analyzed using through exploratory factor analysis and found that there exists a negative relationship among financial literacy and biases. As the quantum of financial literacy upsurges, the probability of investors exhibiting different financial biases reduces. Many previous studies have highlighted the fact that participation of women in financial activities is less as compared to males. Also, level of financial awareness is much less as compared to males (Singh et al,. 2022).

H$_6$: There is a moderating role of financial literacy on the association amid cognitive biases and the process of investment decision making.

RESEARCH OBJECTIVES

On the basis of past studies done in the area of cognitive bias and the process of investor decision making, the dimensions of cognitive bias are being defined using a modified scale. If all the dimensions used are valid and appropriate, it will affect the process of decision-making of the investors. To analyze and check the validity of the proposed model, the two models are framed.

Model 1: This model tests the first order confirmatory factor analysis between the different cognitive bias and investor's decision making. If the model fit indices and other critical ratios are significant, effect of different cognitive biases of the investors on the decision making of the individual investor will be measured.

Model 2: Cognitive bias influences the investor's decision making i.e., application of second order Confirmatory Factor analysis. If the model fit indices and other critical ratios is significant, influence of cognitive bias as a second order construct on investor's decision making will be measured. Another aim of the current study is to examine the moderating effect of financial literacy on the relationship amid cognitive biases and investment decision making.

RESEARCH METHODOLOGY

The current study is descriptive and exploratory in nature. The data is collected from the Delhi region from all categories of investors investing in different avenues like stock market, mutual funds,

real estate, fixed deposits, bullion, etc. Adapted and structured questionnaire was circulated through mail and in hard copies to different investors using Convenience sampling method. The questionnaire is distributed to nearly1150 respondents however only 570 responses are considered for the analysis because of missing information. The data collected using survey instrument was studied using structural equation modelling through SPSS software. Also, to explore the moderating effect of financial literacy on the association among different cognitive biases and process of investment decision making Process Macro and Interaction Software is used.

Table 1 highlights the demographic profile of the respondents.

Table 1: Demographic Statistics

Demographic	N	Percentage
Gender		
Male	367	64.4
Female	203	35.6
Education		
Graduation	247	43.3
Post-Graduation	172	30.2
Doctorate	41	7.2
Professional	75	13.2
Others	35	6.1
Age		
20-30 years	119	20.9
30-40 years	222	38.9
40-50 years	131	23
Above 50	98	17.2
Investment Options		
Stock /Mutual Fund	145	25.4
Derivatives/Commodity Market	99	17.4
Bank Deposits	157	27.5
Real Estate	75	13.2
Bullion	72	12.6
Others	22	3.9

Source: Primary Output

Research Instruments

The dependent variable investor's decision making is measured using an adapted scale consists of five statements taken from the study of Scott and Bruce

(1995).The scale comprises of eight statements but only five statements were found to be useful in the data analysis because of their factor loadings .

The different cognitive biases as independent variables are also measured using the adapted questionnaire taken from the previous studies. Several biases like representativeness (06), cognitive dissonance (04), anchoring (04), mental accounting (04), availability (05) are taken from several past studies which includes Torngren and Montgomery (2004), Sarwar and Afaf (2016), Antony and Joseph (2017), and Rasheed et al. (2018). Scale for financial literacy have been taken from the previous studies of Lusardi and Mitchell (2011).

CONFIRMATORY SAMPLE RESULTS

For the determination of the measurement model confirmatory factor analysis (CFA) was performed using the sample size of 570 respondents from the Delhi region. The measurement model is run using the AMOS software. In total, 745 responses were collected and were coded into SPSS version 18 for data filtration and checking for missing frequencies. Out of the total responses of 745, only 570 were found to be complete in each aspect and used for doing the final analysis.

For model 1, fit indices (as depicted in Figure 1) are presented in the following table 2.

Table 2: Model Fit Indices

Fit Index	CMIN/Df	CFI	GFI	TLI	RMSEA
Value	2.303	0.948	0.907	0.941	0.048
		comparative fit index	goodness-of-fit index	Tucker–Lewis index	root mean square error of approximation

Source: Primary Output

The regression weights, SE, CR, p value of each item of each construct is shown in the table No.3 and it has been observed that all constructs are reliable and valid as the individual factor loadings of all items are above the threshold limit of 0.7 (Hair et al., 2006).
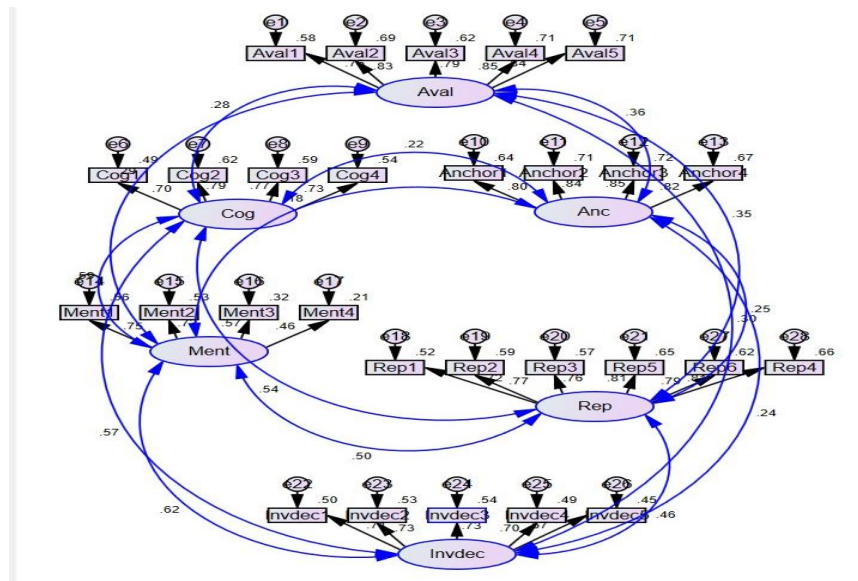
Figure 1: Model 1 (Confirmatory Factor Analysis between Cognitive Bias and Investment Decision Making)

Table 3: Model 1, Regression Weight Measurement

Item	Construct	Estimate	Regression weight	S.E.	C.R.	P
Aval1	Availability Bias	1	.758			
Aval2		1.157	.833	0.056	20.541	***
Aval3		1.018	.789	0.053	19.328	***
Aval4		1.199	.846	0.057	20.882	***
Aval5		1.197	.842	0.058	20.773	***
Cog1	Cognitive Dissonance Bias	1	.703			
Cog2		1.021	.788	0.062	16.415	***
Cog3		0.934	.766	0.058	16.054	***
Cog4		0.88	.735	0.057	15.506	***
Anchor1	Anchoring Bias	1	.798			
Anchor2		1.11	.841	0.051	21.909	***
Anchor3		1.09	.85	0.049	22.202	***
Anchor4		1.046	.821	0.049	21.286	***
Ment1	Mental Accounting Bias	1	.75			
Ment2		0.883	.729	0.061	14.469	***
Ment3		0.653	.57	0.055	11.855	***
Ment4		0.618	.462	0.064	9.709	***
Rep1	Representative Bias	1	.724			
Rep2		1.033	.771	0.058	17.758	***
Rep3		1.023	.755	0.059	17.389	***
Rep4		1.015	.814	0.054	18.748	***
Rep5		1.038	.809	0.056	18.629	***
Rep6		1.051	.787	0.058	18.118	***
InvDec1	Investment Decision Making	1	.709			
Invdec2		0.998	.727	0.065	15.429	***
Invdec3		1.02	.733	0.066	15.543	***
Invdec4		0.911	.702	0.061	14.952	***
Invdec5		0.884	.674	0.061	14.409	***

Source: Primary Output

Construct Validity and Reliability

All constructs have shown convergent and discriminant validity as shown in Table 4 as the CR of all constructs are more than the threshold limit of 0.7 i.e. CR of Availability bias (0.907), representative bias (0.90), anchoring bias (0.896), mental accounting bias (0.726), cognitive dissonance bias (0.834) and Average variance explained AVE more than threshold limit of 0.05 i.e. Availability bias (0.662), representative bias (0.601), anchoring bias (0.683), mental accounting bias (0.507), cognitive dissonance bias (0.558) while the AVE of all constructs are more than MSV i.e. AVE > MSV and AVE > ASV.

Table 4: Model 1, Convergent Validity and Discriminant Validity Measurement

	CR	AVE	MSV	ASV	Representative Bias	Availability Bias	Cognitive Dissonance	Anchor	Mental Accounting Bias	Investment Decision Making
Rep	0.9	0.601	0.293	0.187	0.775					
Availability Bias	0.907	0.662	0.132	0.101	0.345	0.813				
Cog	0.834	0.558	0.346	0.217	0.541	0.284	0.747			
Anchor Bias	0.896	0.683	0.132	0.067	0.248	0.363	0.222	0.826		
Mental Accounting Bias	0.726	0.507	0.378	0.218	0.499	0.29	0.588	0.182	0.638	
Investment Decision Making	0.834	0.502	0.378	0.211	0.461	0.297	0.562	0.244	0.615	0.708

Source: Primary Output

Confirmatory Factor Analysis with Second Order Construct

Another model 2 was framed, which attempts to explain confirmatory factor analysis between Cognitive bias as a second order construct of different cognitive biases and investors decision making as depicted in Figure 2.
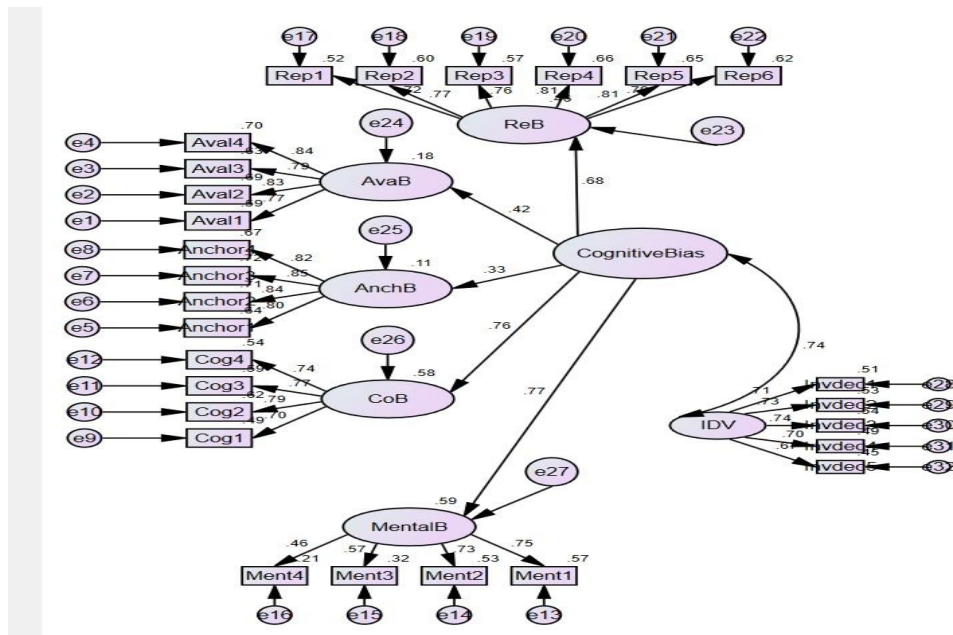
Figure 2: Model 2 CFA between Cognitive Bias as a Second Order construct and Investment Decision Making

For the above model 2, Cognitive bias is conceptualized as a second order composite of different first order constructs like bias known as availability bias, another bias called as mental accounting bias, along with other bias called as representative bias, bias known with the name cognitive dissonance bias and another bias called as anchoring bias. The basic condition to test the model as a second order construct is the presence of multi collinearity among various Zero order constructs. The correlation between Availability & Representative is (0.577), Mental & Cognitive Dissonance is (.693), Availability & Mental is (.541), Availability & Anchor is (.651), Anchor & Mental (.604), Representative bias & Cognitive dissonance (.654), Representative bias & availability (.712). All correlation statistics except one are greater than 0.5, the minimum threshold limit.

The significant test results for goodness of fit indices of Cognitive bias as a second order construct at p-Value < 0.001 are presented in table 5.

Table 5: Model Fit Indices for Cognitive Model as a Second Order Construct

Fit Index	CMIN/Df	CFI	GFI	TLI	RMSEA
Value	2.317	0 .952	0.928	0.952	0.048
		comparative fit index	goodness-of-fit index	Tucker–Lewis index	root mean square error of approximation

Source: Primary Output

Moreover the factor loading of cognitive Constructs are Availability bias (0.446), Mental bias (0.719), Representative bias (0.715), Cognitive dissonance bias (0.755) and Anchor bias (0.342). Thus the composite Reliability of the Cognitive Bias is coming out to be 0.742, above the threshold limit of 0.7 whereas AVE is coming out to be 0.384, although below the threshold limit of 0.05 but if CR > 0.06, AVE less than 0.05 is acceptable as the convergent validity of the construct is still adequate (Fornell and Larcker, 1981) as depicted in Table 6 The CR and AVE of Cognitive Bias fulfil the condition of CR > AVE as 0.742 is greater than

0.384. Thus, from the results, Cognitive Bias can be presented as a second order construct which includes different Zero order constructs like Availability, Cognitive Dissonance, Mental Accounting, Anchoring and Representative bias.

Table 6: CR and AVE of Cognitive bias as a second order construct

Zero Order Construct	Estimate	S.E.	C.R.	Factor Loading	P value
Anchor	1			0.342	***
Cog	1.547	0.257	6.026	0.755	***
Mental	1.402	0.233	6.006	0.719	***
Aval	1.152	0.215	5.358	0.446	***
Rep	1.666	0.276	6.048	0.715	***

Source: Primary Output

In addition, to do a comparative analysis among the two proposed study models (Model 1 and Model 3), Akaike Information Criterion (AIC) (Akaike, 1974), test is performed. As per the previous literature and interpretation of this test, the proposed study model whose AIC statistics score is minimum will be preferred. The AIC value of Model 1 is coming out to be

913.375 while the statistical score of Model 2 is 570.575 as shown in Table7. Thus, AIC test analysis shows that the cognitive bias (Model) as a second-order factor is chosen over all other direct effects.

Table 7: Model Fit Indices

Model	CMIN	GFI	TLI	CFI	RMSEA	AIC
Measurement Model1	2.303	0.907	0.941	0.948	0.048	**913.375**
Measurement Model2	2.459	0.903	0.934	0.940	0.051	**902.093**

Source: Primary Output

Path Analysis

From model 1 and model 2, data was imputed and regression analysis was performed between different independent variables like representative bias, anchoring bias, mental accounting bias, cognitive bias, availability bias, and investment decision making as dependent variables. The regression results are presented in table No. 8. Amongst all cognitive biases, mental accounting explained the maximum variation in investor's decision making as r square is 0.519 with

standardized beta (0.721) with F- statistics as 613.937, and T-value as 24.778 at significance level of 0.05. Afterwards, nearly 42% variation in investor's decision making is explained by cognitive dissonance bias with standardized beta as 0.651, f-statistics as 417.916 and t-value as 20.443. Other bias representative bias, anchoring bias and availability bias individually explained twenty-seven, seven and eleven percent variation in investor's decision making with f-statistics and t-value are as 211.824, 14.554 (representative) 46.997, 6.855 (anchoring bias) and 72.572, 8.519 (availability).

Multiple regression analysis shows all cognitive bias taken together as individual independent variable explains fifty seven percent variation in investor's decision making (57.6) with f-statistics 153.273 at 0.000 p-value. Although the regression results are acceptable and significant but not all cognitive bias turns out to be significant as t-value of bias are representative (1.439) anchoring bias (2.594) mental accounting bias (12.225) availability bias (1.265) and cognitive dissonance bias (6.134). T-value of representative bias and availability bias are not significant.

Table 8: Path Analysis Statistics

IDV	R	R square	F value	T value	Standardized Beta	Sig value	Durbin Watson	Hypothesis
Representative bias	0.521	0.272	211.824	14.554	0.521	***	1.961	Hypothesis accepted
Anchoring bias	0.276	0.076	46.997	6.855	0.276	***	1.849	Hypothesis accepted
Cognitive Dissonance Bias	0.651	0.424	417.916	20.443	0.651	***	1.947	Hypothesis accepted
availability Bias	0.337	0.113	72.572	8.519	0.337	***	1.91	Hypothesis accepted
Mental Accounting bias	0.721	0.519	613.937	24.778	0.721	***	1.98	Hypothesis accepted
Cognitive Bias	681	.463	490.392	22.144	0.681	***	1.931	Hypothesis accepted

Source: Primary Output

MODERATION ANALYSIS

Another aim of the present research work is to examine the moderation role of variable known as financial literacy between the association amongst

cognitive bias and investment decision making. Moderation analysis was performed using Process Macro given by Andrew F. Hayes and interaction software given by Daniel S. Soper.

Table 9: Moderation Statistics

| Independent Variable	Dependent Variable	Moderator	R statistics	R2 statistics	SE	R Square Contribution of the Interaction Term	F value	Sig.	T value	Sig.	Interaction Beta
Cognitive Bias	Investment Decision Making	Financial Literacy	0.738762	0.54577	0.285	0.007292363	226.68	0.000	3.014	0.002	-0.13031

Source: Primary Output

In the above table 9, results of moderation analysis are shown wherein Financial Literacy is taken as a moderating variable for the association amid Cognitive bias and investment decision-making. Results of the above table highlight a

significant negative moderating role of financial literacy on the association amongst cognitive bias and investment decision.

The interaction effect of the variable known as financial literacy for cognitive bias comes out to

be -0.13031 with f and t statistics equal to 226.6882 and 3.014425 respectively with 0.000000001 and 0.00269 as significance values. The change in the r-square because of moderating effect is equal to 0.0072.

The interaction effect is significant as vales of f and t are above the minimum threshold limits. F (226.6882) is greater than 4, p value < 0.05 while t (3.014425) is greater than 2 with p-value less than 0.05. The negative interaction explains that as the level of financial literacy increases, there is less influence of cognitive bias on the investment decision making whereas if financial literacy decreases the effect of cognitive bias on process of the investment decision making increases. The significant moderating effect is shown through interaction plots plotted with interaction software of *Daniel S. Soper in figure 1*. An interaction plot can be defined as a graphical presentation for investigating the interactions or dependencies amongst variables (factors). If the interaction lines or plots equivalent to the distinct factor levels are parallel to each other, that is, there is no differential effect of the levels of the factors over different combinations is revealed, then interaction is not present. However, if the said lines are not parallel to each other, instead unparallel, then there is an existence of interaction effect among the tested variables, Lovie, (2005).
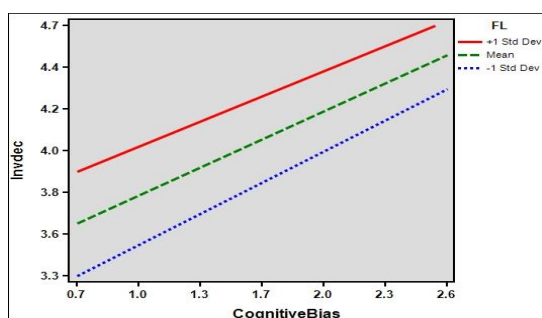
Figure 3: Interaction Graph

In the above figure 3, interaction effect of financial literacy is shown with the help of interaction plots. Interaction plots are indicating a significant negative moderating effect as the interaction plots are not parallel to each other (Lovie, 2005). The plots indicate, as financial

literacy increases the effect of cognitive bias on process of investment decision making reduces while with a decrease in the level of financial literacy, the more the influence of cognitive bias on the investment decision making.

DISCUSSION AND IMPLICATIONS

The current study focuses on the conceptualization of cognitive bias and recognizes five dimensions for the same, which can influence the investor's decision-making. From the previous studies, different bias like anchoring bias, representative bias, cognitive dissonance bias, mental accounting bias and availability bias are significantly influencing the investor's decision-making process. In the study, standardized scales are used to avoid the issue of reliability and validity concerns. The models developed in the study supported the five different biases that lead to cognitive bias to be fit for the statistics, and acknowledged that cognitive bias significantly predicts the investor's decision-making process. Cognitive bias has been considered as a significant determinant of investor's decision-making (Moradi *et al.* 2013; Shah *et al.* 2018; Sachan and Chugan 2020). The analysis of this study demonstrated that cognitive bias, made up of five factors, influences an investor's decision. The result of this study, that is, cognitive bias is significantly associated with investors decision making, is consistent with other past studies (Hayat and Anwar 2016; Shah *et al.* 2018, Madaan and Singh 2019; Kartini and Nahda 2021).

This research work demonstrates that, collectively, all five factors were found to be significant in defining the cognitive bias. Firstly, all the dimensions of cognitive bias modelled collectively through multiple regression with investors decision making process yield an insignificant association of representative bias and availability bias with investors decision making, which supported the second-order model to predict investors decision making. The second-order model showed that 46 % of investors' decision-making process was predicted by

cognitive bias. However, this finding of the study does not obliterate the significance of representative bias and availability bias, instead provides evidence to consider these bias as the most significant dimensions of cognitive bias, which crucially influence the investors decision-making process.

Also, the results of the moderation analysis highlight a significant negative moderating effect of financial literacy on the relationship between cognitive bias and investment decision making. The results are in line with previous studies performed by Özen and Ersoy (2019) in Turkey and Khan (2020) in Pakistan wherein they stated that as the level of financial literacy of individuals increases, there is reduction in the level of the cognitive biases.

In India, very limited research has been conducted to investigate the relationship between different cognitive biases, especially anchoring, representative, cognitive dissonance, representative and mental accounting together on the investors decision making, hence, this study will be filling this gap and will provide new insights and meaningful observations in the area of behavior finance.

Rational decision making is a prerequisite to achieve the financial goals. Thus, an understanding of one's cognitive bias and its influence on the decision-making process would certainly help the potential and actual investors in executing a post-analysis of each investment. This will help investors to diminish the undesirable impact of different psychological biases on their expected utility with the investment. The research findings will also help professional financial planners to better understand their client's behavior and accordingly suggest investment avenues. The results will also help financial planning houses to educate the investors about different bias which are hampering their prudent financial decision making. In addition, policy makers can also explore how the influence of these biases can be reduced with the level of financial literacy.

LIMITATIONS, FUTURE RESEARCH, AND CONCLUDING THOUGHTS

The proposed model of the study regarding cognitive bias and investment decision making provides an important contribution for financial advisors and policy makers in making strategies for minimizing the effect of different bias on the process of decision making by the individual investors with the help of workshops, seminars etc. to make investors aware about different bias and its effect on prudent decision making. It will help the financial experts in understanding the anomalies in the financial markets. A total of five variables were found to be crucial in defining cognitive bias and the results were analyzed using Structural equation modelling, providing affirmation that cognitive bias affects investor's decision making. This study is useful for financial advisors and policy makers of financial institutions to identify an investor's bias and its impact in decision making. At the rescue is the increasing awareness on financial aspects leading to financial literacy and different financial education programs to reduce the influence of bias and promote rational thinking. However, the present work is also not free from inherent limitations. Firstly, to study and investigate the various dimensions of cognitive bias, response size of only 570 investors from Delhi -NCR region was considered instead responses from other cities could also have been included in the sample size. In addition, the methodology used involved the usage of the SEM analysis, which has its own limitations. In addition, the study has considered only five types of cognitive bias although many others could also have been incorporated. The influence of other factors like demographic, could also be investigated. Although a standardized questionnaire was used in the study, there are chances of prejudices. All these limitations have provided a scope for future study.

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