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Interaction between Demographic Factors and Behavioral Bias of Investor's Decision Making

Chetna Makwana
Gujarat Technological University, Gujarat

Corresponding author email id : Chetnaraj30@gmail.com

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Abstract: This paper aims to explore the investor biases and see whether they are related to the demographic factors of the individuals. Investment decision of mutual fund investor is influenced by rational or irrational bias. The purpose of this study is to examine and describes mutual funds individual investor's behavior from behavioral finance perspective. Several researches provide evidence consistent with market prices reflecting representativeness heuristic biased behavior. In this study investors are surveyed to identify the various heuristic and bias viz. representative bias, over confidence bias, framing, SAB and shadow of past effect bias in investment behavior of mutual fund investors. The result of ANOVA provides the enough evidence of presence of behavioral bias in investment decision of mutual funds investors. It is also inferred from the statistical analysis that demographic factors influence the behavior of investors and it is prone to heuristic and bias. Hence, by taking a descriptive view of the how investors make their investment decisions, the patterns of behavioral bias of the individual investors and their association with demographic variables have been explored in the study.

Key words: *Behavioral Bias, Heuristics, Representativeness Bias, Overconfidence Bias & Mutual Funds.*

Introduction:

Investment decision of mutual fund investor is influenced by rational or irrational bias. The purpose of this study is to examine and describes mutual funds individual investor's behavior from behavioral finance perspective. The work combines theoretical insight from the behavioral finance and social psychology literature to investigate the relative importance of the different needs of investors which they may strive to satisfy their financial needs. To explain investors irrationality and their decision-making process, behavior finance draws on the experimental evidence of the cognitive psychology. The biases arises when people form beliefs, preferences and the way in which they make decisions, given their beliefs and preferences. (Barberies and Thaler, 2003).

Literature review:

Behavioral finance literature gets into the very heart of the debate about rationality and irrationality of market participants Behavioral finance literature falls into two primary areas: (i) the identification of 'anomalies' in the efficient market hypothesis that behavioral model may explain (DeBondt and Thaler, 1985) and (ii) identification of individual investor behaviors or biases inconsistent with classical economic theories of rational behavior (Odean,1999). It is imperative to study in detail various empirical evidence of literature on behavioral finance and review the key literary words of Daniel Kahneman and Amos Tversky, the fathers of behavioral financeon this context. Thaler (1991) makes an interesting remark: *"If most individuals tend to err in the same direction, then a theory which assumes that they are rational also makes mistakes in predicting their behavior."*

This section provides a brief review of theoretical and empirical understanding of behavioral finance for identification of various factors that influence investor's investment decision making behavior. It includes the primary features of theories drawn mainly from discipline of cognitive psychology. It includes discussion of research involving; framing effect and heuristics and biases. Two major areas of study (i) judgment of Representativeness and (ii)on the psychology of prediction, in former study, they identified representativeness bias- and in later they argued that representativeness plays key role in intuitive prediction made by individuals. (Kahneman and Tversky, 1972,1973)Individual investor who use the heuristics, depend on framing of the problem, and are prone to biases, which in turn may lead to various anomalies at market level- are subject of research in area of behavioral finance.

Hirshleifer (2001) argues that many or most familiar psychological biases can be viewed as outgrowths of heuristic simplification, self-deception, and emotion-based judgments. Study done by Kent, Hirshleifer and Subramanyan (2001) found the evidence for systematic cognitive errors made by investors and these biases affect prices. The representativeness heuristic is a built-in feature of the brain for producing rapid probability judgments, rather than a consciously adopted procedure. Humans are unaware of substituting judgment of representativeness for judgment of probability. Representativeness heuristic can cause investors to overreact to new information. If the majority of investors are vulnerable to representativeness bias, they might naively extrapolate recent negative earnings change for a company/industry far into future. In this case industry's future profitability is biased downward.

Implication for performance-based management contracts, managers generally prefer performance-based incentive schemes more often than standard theory predicts. This can be attributed to the overconfidence trait. Due to overconfidence, managers prefer riskier projects because they think that they can beat the odds. This provides the evidence against the standard finance theory. According to Camerer and Lovallo (1999), some evidence supports this phenomenon.

According to Serwer, the psychology of investor is referred as "hot hand". To what extent can the remarkable performance of the Legg Mason Value Trust be attributed to its lead manager's skill? Whether this situation is general misconception of chance factor, known as "law of small numbers" an aspect of representativeness heuristics or is the exceptional fund manager track record suggest? (Serwer, 2006). The most important application of this heuristic is in predicting market, picking stocks, choosing mutual funds, selecting money managers, and investing initial public offerings (Shefrin,2000).Moreover, the past earnings of a company, though publicized as representative, may not provide much in the way of guidelines as the small print accompanying such earnings data usually states. Somewhat akin to the "law of small numbers" bias, the representativeness heuristic appears to underlie much reasoning by analogy.

Cognitive psychological literature describes how individuals in narrowly framed situations may mis-specify probability using "automated" or "intuitive" judgmental processes, may be useful in financial market study and nature of decision taken by market participants. Several researches provide evidence consistent with market prices reflecting representativeness heuristic biased behavior. Such as investor choice of mutual funds, whether good stocks are stock of good companies, how growth/ value stock market anomaly might be explained, analyst stock recommendation bias, fund manager selection processes, etc. Therefore, this research study is an attempt to assess the presence of heuristic and biases among mutual funds investors. Hence, by taking a descriptive view of the how investors make their investment decisions, the patterns of behavioral bias of the individual investors and their association with demographic variables have been explored in the study.

Research Methodology

For this descriptive research study data were collected from the 1182 mutual fund investors through the questionnaire stating their opinion on various statements regarding performance of mutual funds for next period to assess presence of representativeness, overconfidence and framing biases in their behavior. Their response is recorded on Likert's five-point scale viz. Good, Above-average, Average, Below-average and Poor. These scales had given codes: Code-5 is given to "Good" and Code-1 to "Poor" and so on.

In this section, analysis was carried out related to representative bias, over confidence bias, framing, SAB and shadow of past effect bias of investment behavior of mutual fund investors. For this, the collected data in the form of statement formed for judgment of performance for the next period as given in statement S.1 to S.9. The objective of this analysis is to get insight into presence of behavioral biases, and its association with various other factors. Following mentioned hypothesis is set to test whether there is a significant difference among 'mean' of variables. Here, the variables are 'heuristic and biases' and 'demographic factors' which was obtained through comparison of respondent's opinion on performance of mutual funds in next period. Following are the observed results for overall analysis:

H_0: Average opinion regarding performance of mutual funds for future period across Demographic factors is alike.

H_1: Average opinion regarding performance of mutual funds for future period across Demographic factors is not alike

Analysis of Representativeness Heuristics and Overconfidence Bias using ANOVA test

In this section analysis of variance (ANOVA) test is performed to check difference in average opinion scores between demographic parameters like age, income, gender and education and behavioral biases in investment decision.

Table-1:Behavioral Finance variable under analysis of investment behavior

Sr. No.	Statements	Bias variable
S.1	CRISIL rated top ten MF scheme like Birla Sun life, HDFC, Reliance Gold etc, its performance in next year will be	Representativeness and extrapolation of past
S.2	Mr. Jain, awarded as excellent Fund Manager, so its next year performance will be	Representativeness and Law of Small No.
S.3	If MF scheme has changed its name & style/objective from "value" to "growth". So, its performance in future will be	Representativeness in Information processing
S.4	If performance of MF Industry has decreased sharply in the last two year, by 53% then performance next year will be	Overconfidence and Framing
S.5	If growth of MF Industry was negative in last 3 years, growth rate in next year will be	Overconfidence and Framing
S.6	Judge your investment skill as compared to others	Overconfidence and SAB
S.7	Estimate the performance of mutual funds industry as compared to last year	Overconfidence & CD
S.8	Result of gold fund and MNC fund in future will be.	Representativeness and Extrapolation of past prices
S.9	Closed ended MF Schemes had not done well in India, but now time is changing, so its performance will be.	Shadow of past or anchoring

1.1 Overall analysis of behavioural biases in performance prediction of mutual fund investors:

Table-2 Descriptive statistics for (investors) respondent's opinion on performance of MFs

Sr. No.	Statements	Descriptive stat. for Total		
		N	Mean	S.D.
S.1	CRISIL rated top ten MF scheme like Birla Sun life, HDFC, Reliance Gold etc, its performance in next year will be	1,182	4.01	0.993
S.2	Mr. Jain, awarded as excellent Fund Manager, so its next year performance will be	1,182	3.83	0.831
S.3	If MF scheme has changed its name & style/objective from "value" to "growth". So, its performance in future will be	1,182	4.02	0.941
S.4	If performance of MFs Industry has decreased sharply in the last two years by 53%,performance next year will be	1,182	3.72	1.068
S.5	If Growth of MF Industry was negative in last 3 years. Growth rate in next year will be	1,182	3.17	1.112
S.6	Judge your investment skill as compared to others	1,182	4.17	1.061
S.7	Estimate the performance of mutual funds industry as compared to last year	1,182	3.17	1.04
S.8	Result of gold fund and MNC fund in future will be.	1,182	3.18	1.123
S.9	Closed ended MF Schemes had not done well in India, but now time is changing, so its performance will be.	1,182	3.04	1.123

Table -2 displays the results for descriptive statistics like number of respondents, mean and standard deviation of opinion scores for male and female respondents. It also provides overall opinion for each statement regardless the gender of respondents.

It can be inferred from the above table, highest mean score- 4.17 is assigned to the statement "Judge your investment skill as compared to others". This result indicates that respondents are having higher level of overconfidence and self-attribution bias about their investment judgment skills. The mean score for statement "If MF scheme has changed its name & style/objective from value to growth" is 4.02. It indicates that respondent's processing of information about the scheme's news, that indicate presumption of respondents for change of value to growth will lead to good performance in the future period. This supports strong evidence of representativeness bias in investment behavior of investors.

The result for statement S.1 provides, mean score of 4.01 is strong evidence of representativeness - extrapolation bias in attitude of respondents. Lowest mean score ,3.04 is assigned to the statement S.9, that indicate the result of 'closed ended funds' future performance. It can be inferred that respondents still believed that closed ended MF schemes had not done well in India that supports the shadow of past bias or bias known as snake bite effect, means investors are not able to change the belief about their past experience. The mean scores, 3.17 is assigned statement S.5, about the results of mutual funds industry's future performance against poor current performance level. This result provides support to framing bias as well as under-reaction phase of overconfidence which is opposite of optimism bias, where investors are judging on how question is framed, whether positive or negative. As data given are about negative performance, they show behavior bias in their attitude which is reflection of framing. The scenario of overall mean remains same for all demographic factors. Results across the demographic factors are presented below:

1.2 Gender of investors and Representativeness bias in investor's behavior

Table – 3ANOVA for Gender and Representativeness bias of investor's behavior.

		Representativeness Bias			
Gender		Extrapolation of past (S.1)	Law of small no. (S.2)	Information processing (S.3)	Extrapolation of past (S.8)
Male	N	1041	1041	1041	1041
	Mean	4.02	3.85	4.02	3.17
	SD	0.993	0.811	0.939	1.127
Female	N	171	171	171	171
	Mean	3.95	3.74	4.01	3.25
	SD	0.993	0.941	0.958	1.101
F value		0.657	2.38	0.011	0.73
Value*		0.418	0.123	0.917	0.393

*Probability values (derived from ANOVA table)

Table –3 shows gender wise comparison of opinion regarding representativeness bias in predicting performance of mutual funds. As it is seen in above table, p-values for all statements are more than 0.05. It can be inferred that representativeness bias (opinion about performance of mutual funds for next period)does not differ significantly in male and female respondents. Therefore, there is no difference in representativeness bias amongst different gender in decision making and judgment about performance of MFs.

1.3 Gender of investors and overconfidence & shadow of past bias in investment behavior:

Table–4 ANOVA for gender of respondents and OC and shadow of past bias in investment.

		Overconfidence				
Gender		Framing (S.4)	Framing (S.5)	SAB (S.6)	CD (S.7)	Shadow of past (S.9)
Male	N	1041	1041	1041	1041	1041
	Mean	3.7	3.18	4.17	3.15	3.05
	SD	1.075	1.102	1.062	1.038	1.11
Female	N	171	171	171	171	171
	Mean	3.86	3.11	4.14	3.25	2.97
	SD	1.014	1.173	1.053	1.052	1.2
F value		3.388	0.751	0.131	1.356	0.718
Value*		0.066	0.386	0.717	0.244	0.397

*Probability values (derived from ANOVA table)

Table –4 indicate the gender wise comparison of over confidence bias; opinion regarding performance of mutual funds. As the p-values for all statements are more than 0.05; this means the null hypothesis cannot rejected. It can be inferred that opinion about performance of mutual funds for next period (behavioral bias) is alike across male and female respondents. It indicates that gender of respondent does not alter the presence of behavioral bias while judging the performance of mutual funds.

1.4 Age group of investors and representativeness bias:

Table –5 ANOVA for age and Representativeness bias of investor's behavior.

Age Group		Representativeness: Extrapolation of past (S.1)	Law of small no. (S.2)	Information processing (S.3)	Extrapolation of past (S.8)
	N	293	293	293	293
20-25	Mean	4.07	3.8	3.99	3.17
	SD	1.058	0.838	1.017	1.128
	N	548	548	548	548
26-35	Mean	3.93	3.8	4.03	3.24
	SD	0.991	0.801	0.932	1.113
	N	230	230	230	230
36-45	Mean	4.04	3.83	3.99	3.08
	SD	0.973	0.889	0.913	1.194
	N	111	111	111	111
46-60	Mean	4.17	4.1	4.14	3.15
	SD	0.83	0.797	0.826	0.993
F value		2.449	4.267	0.779	1.191
Value*		0.062	0.005	0.506	0.312

*Probability values (derived from ANOVA table)

Table –5 shows representativeness bias (the opinion) of respondents across age groups. It varies significantly in one statement: "Mr. Jain, awarded as excellent fund manager, so its next year performance will be good" which indicates 'representativeness-law of small number bias'. The opinion of respondents with all age groups except '46-60' category is statistically differs. Elder respondents mean that Mr. Jain's next year performance will be good whereas other respondents mean that his performance will be above average. As the P-value is less than 0.05 in case of statement number S.2, null hypotheses is rejected. This means there is significant variation across the age group in "representativeness and law of small number bias". There is no significant variation across age group in other cases.

1.5Age of investors and Overconfidence Bias & Shadow of past Bias in Investors Behavior:

Table– 6ANOVA for Age and Overconfidence Bias & Shadow of past bias of investor's behavior.

Age Group		Overconfidence: Framing (30.4)	Framing (30.5)	SAB (30.6)	CD (30.7)	Shadow of past (30.9)
20-25	N	293	293	293	293	293
	Mean	3.63	3.23	4.06	3.24	3.08
	SD	1.086	1.221	1.133	1.091	1.214
26-35	N	548	548	548	548	V
	Mean	3.77	3.15	4.19	3.18	3.01
	SD	1.045	1.049	1.052	1.013	1.089
36-45	N	230	230	230	230	230
	Mean	3.68	3.19	4.16	3.04	2.99
	SD	1.069	1.105	1.059	1.056	1.143
46-60	N	111	111	111	111	111
	Mean	3.79	3.14	4.37	3.17	3.15
	SD	1.121	1.14	0.873	0.99	0.993
F value		1.342	0.386	2.384	1.568	0.789
Value *		0.259	0.763	0.068	0.196	0.5

*Probability values (derived from ANOVA table)

Table –6indicated over confidence bias in the opinion of respondents across age groups. It does not vary across all variables. The mean scores of respondents with different age group is statistically differs (p-value < 0.05). It indicates that, null hypothesis is not rejected for framing, SAB (self-attribution bias), and CD (cognitive dissonance) bias as well as in Shadow of past bias across all age group.

1.6 Income of investors and representativeness bias:

Table – 7 ANOVA for Income and Representativeness bias of investor's behavior

		Representativeness			
Income Group		Extrapolation of past (S.1)	Law of small no. (S.2)	Information processing (S.3)	Extrapolation of past (S.8)
	N	214	214	214	214
<=15000	Mean	3.97	3.95	4.12	3.12
	SD	1.121	0.843	0.88	1.2
	N	495	495	495	495
15001-30000	Mean	4.05	3.77	3.98	3.25
	SD	0.97	0.79	0.988	1.079
	N	314	314	314	314
30001-50000	Mean	3.95	3.79	3.95	3.25
	SD	0.951	0.844	0.959	1.111
	N	117	117	117	117
50001-100000	Mean	4.03	3.88	4.14	3.07
	SD	0.96	0.873	0.808	1.112
	N	42	42	42	42
>100000	Mean	4.17	4.21	4.17	2.55
	SD	0.961	0.898	0.824	1.152
F value		0.829	4.484	2.048	4.596
Values*		0.507	0.001	0.086	0.001

*Probability values (derived from ANOVA table)

As indicated in table–7, the opinion of respondents across income group varies significantly in two statements: "Mr. Jain, awarded as excellent fund manager, so its next year performance will be good" and "Result of gold fund and MNC fund in future will be good". Opinion of respondents with all income groups except 'Rs. >100000' category is statistically differs Respondents with high monthly income mean that Mr. Jain's next year performance will be good whereas other respondents mean that his performance will be above average. According to them, result of Gold and MNC funds in future will be good. The mean scores of respondents with different income groups are statistically differ (p-value < 0.05).Null hypothesis is rejected for representativeness- law of small number and extrapolation of past bias across all income groups of respondents.

1.7 Income of investors and overconfidence bias &shadow of past bias in investors behavior

Table – 8 ANOVA for Income and OC and Shadow of past Bias of investor's behavior

Income Group		Overconfidence Framing (S.4)	Framing (S.5)	SAB (S.6)	CD (S.7)	Shadow of past (S.9)
	N	214	214	214	214	214
<=15000	Mean	3.71	3.06	4.07	3.24	3.07
	SD	1.045	1.222	1.161	1.144	1.235
	N	495	495	495	495	495
15001-30000	Mean	3.73	3.2	4.17	3.18	3.04
	SD	1.088	1.113	1.058	1.042	1.144
	N	314	314	314	314	314
30001-50000	Mean	3.66	3.18	4.17	3.11	3.03
	SD	1.067	1.043	1.025	0.975	1.051
	N	117	117	117	117	117
50001-100000	Mean	3.76	3.2	4.27	3.19	3.03
	SD	1.039	1.061	1.031	0.991	1.07
	N	42	42	42	42	42
>100000	Mean	4	3.36	4.36	3.05	2.98
	SD	1.012	1.165	0.879	1.081	0.975
F value		1.017	0.903	1.125	0.692	0.069
Values*		0.397	0.462	0.343	0.597	0.991

*Probability values (derived from ANOVA table)

Table – 8 states the opinion of respondents across income group does not varying all statements (P value> 0.05).It can be inferred that in case of above all respondents have alike opinion about the performance for the next period.

1.8Education of investors and Representativeness bias:

Table –9 ANOVA for Education and Representativeness bias of investor's behavior

Education Groups		Representativeness Bias Extrapolation of past (S.1)	Law of small no. (S.2)	Information processing (S.3)	Extrapolation of past (S.8)
HSC or less	N	73	73	73	73
	Mean	4.11	3.85	4	3.26
	SD	1.035	0.739	0.943	1.27
Less than Graduate	N	162	162	162	162
	Mean	3.81	3.74	3.88	3.02
	SD	1.07	0.744	1.079	1.226
Graduate	N	492	492	492	492
	Mean	4.1	3.83	4.03	3.16
	SD	0.973	0.846	0.93	1.104
Post Graduate	N	333	333	333	333
	Mean	3.97	3.85	4.08	3.22
	SD	0.929	0.856	0.898	1.064
Professional	N	45	45	45	45
	Mean	3.87	3.82	3.93	3.16
	SD	1.272	0.96	0.889	1.086
Management/FIN	N	77	77	77	77
	Mean	4.04	3.99	4.03	3.44

	SD	0.938	0.803	0.903	1.118
F value		2.507	0.955	1.114	1.66
P Value		0.029	0.444	0.351	0.141

Authors calculation (Probability values derived from ANOVA table)

As indicated in table–9,the opinion of respondents across educational groups varies significantly in one behavioral bias stated in statements: "CRISIL rated top ten MF scheme like Birla Sun life, HDFC, Reliance Gold etc, its performance in next year will be" that is Extrapolation of past-representativeness bias. Opinion of respondents with post-graduation and professional degree is statistically differs from others. Respondents with higher educational qualification depict lower bias. Null hypothesis is rejected in only one bias- Representativeness and extrapolation of past bias. Behavior of investors in all other biases does not vary significantly. Investment behavior across all education groups varies significantly in biases representativeness- extrapolation of past bias.

1.9 Education of investors and Overconfidence Bias & Shadow of past Bias in Investors Behavior

Table – 10 ANOVA for Education and Representativeness bias of investor's behavior Overconfidence

Income Group		Framing (30.4)	OC & F (30.5)	SAB (30.6)	CD (30.7)	Shadow of past (30.9)
	N	73	73	73	73	73
HSC or less	Mean	3.78	3.14	4.1	2.95	3.01
	SD	1.109	1.294	1.293	1.235	1.161
	N	162	162	162	162	162
Less than Graduate	Mean	3.61	3.3	4.13	3.16	2.9
	SD	1.17	1.115	1.081	1.092	1.172
	N	492	492	492	492	492
Graduate	Mean	3.69	3.19	4.15	3.19	3.04
	SD	1.079	1.128	1.06	0.99	1.114
	N	333	333	333	333	333
Post Graduate	Mean	3.77	3.14	4.2	3.17	3.15
	SD	0.996	1.067	1.024	1.046	1.075
	N	45	45	45	45	45
Professional	Mean	3.69	2.98	4.18	3	2.56
	SD	1.083	1.097	1.154	1.168	1.099
	N	77	77	77	77	77
Management/FIN	Mean	3.92	3.08	4.29	3.31	3.16
	SD	1.01	1.023	0.886	0.921	1.182
F value		1.178	0.941	0.364	1.241	3.018
Values*		0.318	0.453	0.873	0.287	0.01

*Probability values (derived from ANOVA table)

Table –10 the opinion of respondents across educational groups varies significantly in two statements: "CRISIL rated top ten MFs scheme like Birla Sun life, HDFC, Reliance Gold etc., its performance in the next year will be poor" and "Closed ended MF Schemes had not done well in India, but now time is changing, so its performance will be poor". Opinion of respondents with post-graduation and professional degree statistically differs from others. Respondents with higher educational qualification mean that CRISIL rated top ten MF scheme like Birla Sun life, HDFC, Reliance Gold etc, its performance in next year will be poor". According to them, and closed ended MF Schemes had not done well in India, but now time is changing, so its performance will be poor. The mean scores of respondents with different education groups are differ significantly (p-value < 0.05).

Through ANOVA analysis it is observed that over confidence bias in the opinion of respondents across age groups do not vary across all variables. As p-value < 0.05 indicated that, null hypothesis could not be rejected for framing, SAB (self-attribution bias), and CD (cognitive dissonance) bias as well as in Shadow of past bias across all age group. The mean scores of respondents with different income groups statistically differs (p-value <0.05), Null hypothesis is rejected for representativeness; law of small number and extrapolation of past bias across all income groups of respondents. It is also observed that, the opinion of respondents across income groups do not vary in all statements (P value>0.05). It can be inferred that in case of framing and SAB, respondents have alike opinion about the performance for the next period.

Conclusion:

This paper aims to explore the investor biases and see whether they are related to the demographic factors of the individuals. Therefore, it can be concluded that this study provides evidence supporting the presence of representativeness, familiarity, overconfidence, SAB, extrapolation of past, and other biases in investors behavior. This suggests that their behavior is heuristic driven and affected by behavioral biases. It can be concluded findings that, investment behavior of mutual fund investors is not fully rational, but they depart from the assumption of rationality. An empirical study on individual investors' preferences and their behavior, in this study provided insight about heuristics and behavioral biases. This result indicates that the investors' behavior in mutual funds is not fully rational, but behavioral biased. This information provides meaningful insight into development, marketing and management of various schemes for AMCs. This suggests some remedy to investors to minimize errors in investment decision through understanding of their own biases and psychological limits. The results showed that overconfidence bias, reliance on expert bias, and self-control bias have a positive and significant association with demographic factors. This study provides further insights on investor behavior and paves the way for various possibilities for future research on biases.

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