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Information Processing, Belief Perseverance, and Emotional Biases: A Study of the Impact of Gender and Investor Sophistication Factors of Secondary Market Equity Investors in Ajmer, Jaipur, Kota, and Udaipur

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Abstract:

The research paper makes an attempt to study the different levels of demographics among the secondary market equity investors with regard to the composite scales of information processing, belief perseverance, and emotional bias. The respondent groups based on gender, city of residence, and level of education were found to be different in information processing cognitive biases, the respondent groups based on investment frequency were found to be different in belief perseverance cognitive biases, and the respondent groups based on the category of occupation and early financial sensitization were found to be different in emotional biases. The variables of age group, income group, and investment experience did not show any significant association with any of the three composite biases.

Keywords: Cognitive, emotional, behavioral bias, endowment effect, status quo, regret aversion, investor sophistication, self-control, over-confidence.

1. Introduction

A new discipline in comparison, the field of 'Behavioral Finance' can be understood as a conceptual blend of the fields of finance, sociology and psychology. Shefrin (2001) defines it as "the study of how psychology affects financial decision-making and financial markets." Alternatively, a participant of the financial market, irrespective of the role, does fall a victim to one's own 'cognitive' (related to mental processes) and 'emotional' biases or predispositions. The field of behavioral finance shows its effect at the two levels, namely micro-level and at the macro-level. The former corresponds to the individual investor behavior in investment while the latter is related to the behavior of the stock market at large. Investor behavior at both the levels is of interest in Behavioral finance.

The Indian scenario of share market investment has been just like a game of snakes and ladders. In spite of many sincere steps undertaken by the responsible organizations, like Securities and Exchange Board of India, still, the corpus of the retail investors is hesitant to keep the equity investment as their primary investment option. Although the trading volume constitutes mainly the institutional investors, yet the amount invested in the Indian equity market by the individual is significant for the investor personally. The market comprises of individual investors of various demographics, socio-cultural background, and market intelligence, making the outcome more complicated. The individual investor seems to be at a disadvantage in certain ways like timely dissemination of information, dependency on the advisor, low level of market knowledge and the like; besides, there are the behavioral biases that are constantly at work. Overall, the individual equity investor is more prone to making investment mistakes due to biases and other factors. The present study focuses on the impact of gender and eight factors identified for investor sophistication on the cognitive and emotional behavioral biases that affect the individual investor's behavior at the micro level.

Toshino & Suto, in 2005, showed the universal presence of the behavioral finance biases, but, there have been studies showing the contradictory results and opinions regarding the different factors affecting investment behavior and investors' tendency to exhibit the various cognitive and emotional biases during investment decision-making. It seems that due to the extreme variability in the socio-economic, politico-legal, and techno-cultural background, the differences are visible in the studies. In the Indian context, not many address the behavioral bias problem, cognitive and emotional, of equity investment in the state of Rajasthan, the largest state area wise and eighth largest population wise.

1.1. Objective of Research

To determine if groups based on gender and eight investor sophistication factors are different with respect to information processing cognitive bias composite score, belief perseverance cognitive bias composite score, and emotional bias composite score.

2. Methodology

The current empirical research study is non-experimental descriptive study using cross sectional sample survey through self-report questionnaire for gaining quantitative results. The present study is mainly based on the primary data gathered from the individual investor respondents in four cities of Ajmer, Jaipur, Kota, and Udaipur, through a self-administered questionnaire. The secondary data was sourced from paper and online versions of various text references, reputed journals, seminar and working papers, online copies of the national survey records and handbook of the Reserve Bank of India, Securities and Exchange Board of India, National Council of Applied Economic Research, online international survey records like Visa, and MasterCard, and World Wide Web for various articles and video tutorials.

The survey was conducted during the three-and-a-half-month period from August, 2014 to Mid of November, 2014. For the present research study, the sample comprises of a finite number of respondents from a large population interest, that is, retail or individual equity investors residing in four cities of Ajmer, Jaipur, Kota, and Udaipur in the state of Rajasthan. The sampling frame constituted all the retail equity investor residents of the four cities.

The instrument was undergone a pre-pilot stage and a subsequent pilot-testing for reliability with a sample of 20 respondents identical in characteristics to the main sample. The 3 composite scales formed from the different combinations of 12 subscales found to have a good internal consistency: Information Processing Cognitive Bias Composite Scale (9 items; $\alpha = .71$), Belief Perseverance Cognitive Bias Composite Scale (9 items; $\alpha = .80$), and Emotional Bias Composite Scale (18 items; $\alpha = .86$).

The sampling technique adopted for the present study is non-probability sampling technique and within its purview, the convenience method is chosen. In total, 600 questionnaires were distributed for the data collection purpose of the current study, 150 per city of residence. Out of the 600 questionnaires administered across the four cities, those considered for the final analysis was 426. The response rate was 71 percent for the present study.

The Table 1 and Table 2 show summary demographics in counts and percentages.

S. No.	Demographic Variable		Ajmer		Jaipur		Kota		Udaipur		Total
			No.	(%)	No.	(%)	No.	(%)	No.	(%)	
1	Number of Valid Respondents		92	(22)	122	(29)	116	(27)	96	(23)	426
2	Gender	Males	58	(20)	89	(31)	83	(29)	58	(20)	288
		Females	34	(25)	33	(24)	33	(24)	38	(28)	138
3	Highest Education	10 th Pass	4	(67)	0	(0)	2	(33)	0	(0)	6
		12 th Pass	6	(32)	2	(11)	7	(37)	4	(21)	19
		Diploma	4	(27)	2	(13)	7	(47)	2	(13)	15
		Graduate	36	(26)	31	(22)	40	(28)	34	(24)	141
		Post Graduate	42	(19)	76	(33)	59	(26)	50	(22)	227
		Any Other	0	(0)	11	(61)	1	(5)	6	(33)	18
4	Marital Status	Never Married	18	(21)	32	(37)	23	(26)	14	(16)	87
		Married	72	(22)	87	(26)	90	(17)	82	(25)	331
		Divorced	0	(0)	1	(50)	1	(50)	0	(0)	2
		Death of Partner	2	(33)	2	(33)	2	(33)	0	(0)	6
5	Children as Dependents	Not Applicable	18	(21)	32	(34)	23	(26)	14	(16)	87
		Yes	68	(23)	75	(25)	86	(29)	70	(23)	299
		No	6	(15)	15	(38)	7	(18)	12	(30)	40
6	Other Dependents	Yes	40	(22)	48	(27)	57	(32)	34	(19)	179
		No	52	(21)	74	(30)	59	(24)	62	(25)	247
7	Category of Occupation	Government Job	36	(28)	46	(36)	31	(24)	16	(12)	129
		Private Job	22	(14)	53	(35)	46	(30)	32	(21)	153
		Business	12	(20)	3	(5)	22	(37)	22	(37)	59
		Self Employed	16	(27)	13	(22)	11	(18)	20	(33)	60
		Retired	6	(24)	7	(28)	6	(24)	6	(24)	25
		Any Other	0	(0)	0	(0)	0	(0)	0	(0)	0
8	Category of Age(in years)	Between 18 - 25	14	(24)	21	(36)	17	(29)	6	(10)	58
		Between 25 – 35	24	(20)	38	(31)	28	(23)	32	(26)	122
		Between 35 – 45	16	(21)	21	(27)	23	(29)	18	(23)	78
		Between 45 – 55	18	(25)	18	(25)	19	(26)	18	(25)	73
		Between 55 – 65	16	(21)	20	(26)	27	(35)	14	(18)	77
		Above 65	4	(22)	4	(22)2		(11)	8	(44)	18

Table 1: Summary Table Part 1 - Respondent Demographics According to the City of Residence

Note. No. means proportion of total respondents in number. % is percentage.

S. No.	Variable		Ajmer		Jaipur		Kota		Udaipur		Total
			No.	(%)	No.	(%)	No.	(%)	No.	(%)	
1	Number of Valid Respondents		92	(22)	122	(29)	116	(27)	96	(23)	426
2	Experience of Investing in Shares (in years)	Less than 1	2	(12)	7	(41)	6	(35)	2	(12)	17
		Less than 5	44	(23)	65	(35)	35	(19)	44	(23)	188
		5 to 10	14	(19)	11	(15)	29	(39)	20	(27)	74
		10 to 15	8	(31)	7	(27)	7	(27)	4	(15)	26
		15 to 20	16	(25)	20	(32)	19	(30)	8	(13)	63
		20 to 25	2	(8)	8	(31)	8	(31)	8	(31)	26
		Above 25	6	(19)	4	(13)	12	(38)	10	(31)	32
3	Frequency of Investing in Shares	Very Frequently	18	(29)	14	(22)	19	(30)	12	(19)	63
		Every Month	8	(15)	14	(26)	16	(30)	16	(30)	54
		Every 2 Months	6	(27)	13	(57)	4	(17)	0	(0)	23
		Every 3 Months	0	(0)	19	(70)	4	(15)	4	(15)	27
		Every 4 Months	6	(25)	12	(50)	4	(17)	2	(8)	24
		Every 6 Months	24	(28)	16	(19)	21	(25)	24	(28)	85
		Yearly Basis	30	(20)	34	(23)	48	(32)	38	(25)	150
4	Category of Income Per Year (in lakh of Rupees)	Below 5	34	(33)	20	(19)	24	(23)	26	(25)	104
		Between 5-10	34	(24)	42	(30)	46	(32)	22	(15)	144
		Between 10-15	12	(13)	32	(36)	23	(26)	22	(25)	89
		Between 15-20	8	(27)	12	(40)	4	(13)	6	(20)	30
		Between 20-25	0	(0)	7	(47)	6	(40)	2	(13)	15
		Above 25	4	(9)	9	(20)	13	(30)	18	(41)	44
5	Total Liabilities payable (in lakh of Rupees)	No Liability	68	(26)	61	(24)	75	(29)	54	(21)	258
		Up to 10	16	(14)	42	(37)	29	(25)	28	(24)	115
		Between 10-20	4	(12)	13	(38)	7	(21)	10	(29)	34
		Between 20-30	4	(22)	5	(28)	5	(28)	4	(28)	18
		Between 30-40	0	(0)	1	(100)	0	(0)	0	(0)	1

Table 2: Summary Table Part 2 - Respondent Demographics According to City of Residence

Note. No. means proportion of total respondents in number. (%) is corresponding percentage of respondents.

In the current study, the unit of analysis is the respondent groups on the basis of various demographic factors like gender, and eight factors of investor sophistication identified namely the city of residence, occupation category, level of education, income group, investment experience, investment frequency, age group, and early financial sensitization. In the present study, the 'Unit of Observation' is the individual retail investor.

The Early financial sensitization scale, an ordinal level composite variable was computed by adding the individual respondent scores for the entire 5 component items. Each of the 5 items was rated on a 3-point ordinal frequency scale with descriptors 'Never', 'Sometimes', and 'Frequently'. The responses to the scale ranged from a minimum of 5 to a maximum of 15 points of differentiation. Further, the Early Financial Sensitization Scale thus computed was re-coded into 3 ordinal categories namely 'Never' with response range from 5 to 7, 'Sometimes' with response range from 8 to 12, and 'Frequently' with response range from 13 to 15.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	37	8.7	8.7	8.7
	Sometimes	324	76.1	76.1	84.7
	Frequently	65	15.3	15.3	100.0
	Total	426	100.0	100.0	
	Mode	2			

Table 3: Early Financial Sensitization Scale Descriptives

Besides, three new composite variables were computed in the present study for further statistical analysis, that is, information processing cognitive bias, belief perseverance cognitive bias, and emotional bias. In the present study, mental accounting, availability, and framing constitute the three information processing cognitive bias; illusion of control, confirmation, and hindsight form the three belief perseverance cognitive bias; and status quo, regret aversion, self-control, overconfidence, endowment, and optimism bias are included as the six constituent emotional biases. Each of the bias was scored on the basis of three diagnostic question items to be rated on a five point Likert agreement scale from 1 as 'strongly disagree' to 5 as 'strongly agree'. The item responses were summed to create a score for a group of items and subsequently recoded to simplify analysis. The information processing cognitive bias and belief perseverance cognitive bias composite scales were created by adding responses across the nine item diagnostic questions for each

scored on a five-point agreement scale. The responses to the scale ranged from a minimum of 9 to a maximum of 45 points of differentiation. The composite scale so computed was re-coded into three ordinal categories namely 'Disagree' with response range from 9 to 22, 'Undecided' with response range from 23 to 31, and 'Agree' with response range from 32 to 45. Similarly, for the emotional bias composite scale the variable was created by adding responses across the eighteen items scored on a five-point agreement scale and the scale ranged from 18 to a maximum of 90 points of differentiation. Composite scale so formed was re-coded into three ordinal categories namely 'Disagree' with response range 18 to 44, 'Undecided' with response range 45 to 62, and 'Agree' with response range 63 to 90. All the three composite variables are treated at an ordinal level of measurement.

Certain demographic variables were re-coded based on the number of responses received per category, for forming manageable categories and subsequent meaningful statistical analysis. The re-coded variables are given in the Table 4.

S. No.	Demographic Variable	New Categories/Levels	Nature
1	Category of age or Age group	<ul style="list-style-type: none"> • Below 35 years • Between 35 to 55 years • Above 55 years 	Ordinal
2	Category of income per year (in Rupees) or Income group	<ul style="list-style-type: none"> • Up to 10 lakh • Above 10 lakhs 	Ordinal
3	Highest education or Level of education	<ul style="list-style-type: none"> • Till Graduate • Above Graduate 	Ordinal
4	Experience of investing in shares or Investment experience	<ul style="list-style-type: none"> • Less Experience (for those with less than a year or 5 years) • More Experience (rest all) 	Ordinal
5	Frequency of investing in shares or Investment frequency	<ul style="list-style-type: none"> • Less Frequently (for those, every 6 months or on a yearly basis) • More Frequently (rest all) 	Ordinal

Table 4: Re-coded Demographic Variables

In regard to the investor sophistication and the constituent factors, the researcher assumes that the sophisticated investor is relatively less prone to the tendency of exhibiting the behavioral biases. The present study has taken into consideration the eight factors constituting the investor sophistication namely, investment experience, age group, investment frequency, income group, city of residence (adapted from the investor sophistication proxies considered by Chen, Kim, Nofsinger, & Rui, 2007), and category of occupation (adapted from Dhar & Zhu, 2002), level of education (adapted from Graham, Harvey, & Huang, 2009). Besides these seven factors, the researcher has also considered the 'early financial sensitization' composite score as the eighth factor of investor sophistication.

3. Analytical Procedure for Research Objective

The present research uses ordinal data. The sample sizes are unequal for the grouping variables across constituent levels. The summed scores of the three composite variables namely information processing cognitive bias, belief perseverance cognitive bias and emotional bias were tested for normality across the levels of the grouping variables namely gender, city of residence, age group, income group, category of occupation, early financial sensitization, level of education, investment experience, and investment frequency through the Shapiro-Wilk test. Since the data was distributed non-normally as the value for one or more of the levels were significant that is $p < .05$. Therefore, the data analysis required non-parametric procedures of Mann-Whitney U test and Kruskal-Wallis H test.

Subsequently, the data was passed through the procedure of non-parametric test for homogeneity of variance or non-parametric Levene's test to find out if the distributions of the samples had the same shape. The results of the test were not significant and therefore we fail to reject the null hypothesis that the distributions of the samples have the same shape. The summary is tabulated in Table 5.

The Mann - Whitney U test was applied for gender, level of education, income group, investment experience, and investment frequency having two levels each. On the other hand, the Kruskal - Wallis H test was applied for city of residence (4 groups), category of occupation (5 groups), early financial sensitization (3 groups), and age group (3 groups).

A level of significance, $\alpha = 0.05$ is considered in each case. The Bonferroni Correction was applied wherever applicable. Parametric counterparts of Mann-Whitney U Test and Kruskal -Wallis H Test that is Independent Samples t-Test and One-way ANOVA were also carried out to yield support to the findings. The effect size for substantive significance was calculated in both the non-parametric and parametric procedures. Post hoc test namely Tukey's HSD and Bonferroni were carried out.

All the inferential statistical tests (the main primary non-parametric tests, and the supporting parametric tests) were carried out at the significance level of 0.05. The analysis of the data collected on different variables through the self-report questionnaire in the present study was analyzed with the help of Microsoft Office EXCEL 2007 and SPSS Statistics 17.0.

S. No.	Grouping Variable	Significance Level (p value) for Each of the Response Variable			Inference (whether the distributions of the samples across the three response variables had same shape; H_0 : The sample distributions have same shape)
		Information Processing Cognitive Bias Composite Score	Belief Perseverance Cognitive Bias Composite Score	Emotional Bias Composite Score	
1	Gender (2 levels)	.190	.149	.508	$p > .05$; H_0 retained
2	City of Residence (4 levels)	.167	.061	.842	$p > .05$; H_0 retained
3	Level of Education (Recoded) (2 levels)	.247	.297	.537	$p > .05$; H_0 retained
4	Category of Occupation (5 levels)	.759	.358	.145	$p > .05$; H_0 retained
5	Age Group (Recoded) (3 levels)	.422	.519	.051	$p > .05$; H_0 retained
6	Income Group (Recoded) (2 levels)	.842	.344	.676	$p > .05$; H_0 retained
7	Early Financial Sensitization Composite Score (3 levels)	.403	.216	.502	$p > .05$; H_0 retained
8	Investment Experience (Recoded) (2 levels)	.105	.222	.345	$p > .05$; H_0 retained
9	Investment Frequency (Recoded) (2 levels)	.139	.342	.648	$p > .05$; H_0 retained

Table 5: Summary - Non-Parametric Test for Homogeneity of Variance for all Grouping Variables across the Response Variable

4. Limitations and Delimitations

- Data was collected through a cross sectional survey and the opinions or the attitudes of the respondents may be dependent on the prevalent conditions at that time.
- Data was collected using a self-report questionnaire; therefore, the unpredictability of the human element in the survey cannot be ruled out.
- Surveys are inflexible because the data collection tool and its administration has to remain unchanged throughout the data collection procedure. The researcher aims to gather multitude of precise and fair data by using the survey method.
- The current study is restricted to only the four cities of Jaipur, Kota, Udaipur and Ajmer in the state of Rajasthan and its scope is limited to only individual retail equity investors.
- Since the current study is a non-experimental research study with no variables manipulated, therefore, the cause and effect relationship may not be established.
- The questions included in the survey instrument are those considered relevant by the researcher.
- The current study focuses only on six cognitive and six emotional behavioral biases.
- Absence of the non-parametric equivalent of parametric Factorial ANOVA in SPSS 17.0 became an inhibitory factor in exploring another dimension to the problem, especially in case of the 'factors of investor sophistication'.
- The sample size was selected keeping all the relevant considerations in mind; still it may be debatable by experts.
- Lastly, the calculations were done at the 95% confidence level.

5. Results and Findings

The overall purpose of the present study is to understand whether there is an impact of the gender and the various sophistication factors of the investors, on the selected cognitive and emotional behavioral biases that may come into effect when a decision is made regarding investment, specifically in the shares.

The Table 6 and Table 7 show the demographic variable distribution of un-coded and re-coded demographic variable distribution while Table 8 gives the summarized findings of the inferential statistics.

S. No.	Demographic Variable	Categories of Variable	Values (Counts)	Total
1	City of Residence	Ajmer	92	426
		Jaipur	122	
		Kota	116	
		Udaipur	96	
2	Gender	Male	288	426
		Female	138	
3	Category of Occupation	Government job	129	426
		Private job	153	
		Business	59	
		Self-employed	60	
		Retired	25	

Table 6: Summary of Un-coded or Original Demographic Variable Distribution

S. No.	Demographic Variable	Re-coded Variable	Values (Counts)	Total
1	Category of Age or Age Group	Up to 35 years	180	426
		Between 35 – 55years	151	
		Above 55 years	95	
2	Category of Income or Income Group(Rs.)	Up to 10 lakhs	248	426
		Above 10 lakhs	178	
3	Level of Education	Till Graduate	181	426
		Above Graduate	245	
4	Investment Experience	Less Experience	205	426
		More Experience	221	
5	Investment Frequency	Less Frequently	235	426
		More Frequently	191	

Table 7: Summary of Re-coded Demographic Variable Distribution

S. No.	Criterion or Grouping Variable	Description of Levels with Sample Size	Response Variable with Test Result and Effect Size		
			Information Processing Cognitive Bias	Belief Perseverance Cognitive Bias	Emotional Bias
1	Gender	Male (288) Female (138)	Significant ($p = .031$, $r = -0.10$)	-	-
2	City of Residence	Ajmer (92) Jaipur (122) Kota (116) Udaipur (96)	Significant ($p < .001$, $r = -0.28$) for both cases	-	-
3	Age Group	Up to 35 years (180) Between 35-55 years (151) Above 55 years (95)	-	-	-
4	Level of Education	Till Graduate (181) Above Graduate (245)	Significant ($p = .022$, $r = -0.11$)	-	-
5	Category of Occupation	Government job (129) Private job (153) Business (60) Self-employed (59) Retired (25)	-	-	Significant ($p = .001$, $r = -0.26$) and ($p = .003$, $r = -0.22$)
6	Income Group	Up to 10 lakh (248) Above 10 lakh (178)	-	-	-
7	Early Financial Sensitization	Never (37) Sometimes (324) Frequently (65)	-	-	Significant ($p = .009$, $r = -0.14$)
8	Investment Experience	Less Experience (205) More Experience (221)	-	-	-
9	Investment Frequency	Less Frequently (235) More Frequently (191)	-	Significant ($p = .002$, $r = -0.15$)	-

Table 8: Summary for Inferential Statistics

Note. 'p' is probability value measured at significance level of 0.05. r is effect size.

The Mann-Whitney and Kruskal-Wallis tests conducted between gender and the 8 factors of investor sophistication, and the composite scales of information processing bias, belief perseverance bias, and emotional bias showed that:

- Males and females are different for information processing cognitive biases, that is males and females have different capabilities to process information regarding investment due to which they fare distinctively in the investment outcomes. Results suggest that there are differences based on gender in relation to the information processing bias.
- Differences are evident in the information processing cognitive bias in investors based on the city of residence and level of education factors of the investor sophistication.
- The investors differ on the aspect of emotional bias across the categories of occupation and the early financial sensitization.
- Lastly, the investors are different on the aspect of the belief perseverance cognitive bias in regard to the investor sophistication factor of investment frequency. The three factors namely income group, investment experience, and age group did not yield any significant results under the analysis. The results for these factors were not in accordance with the expectations.

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