Do Investors' Exhibit Cognitive Biases: Evidence From Indian Equity Market

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Abstract

The current article examines the influence of cognitive biases on the process of decision making among equity investors of India. The research is being directed by conducting a survey on a sample of 400 investors investing in Indian capital market. This study measures behavioural biases of individual investors' using a structured questionnaire as a research instrument of the study. By means of cross section data analysis, this analysis steadily provides evidence that behavioural biases adversely affect rational decision-making of an investor. This research indicates that a statistically significant relationship exists between behavioural biases among investors and the process of rational decision-making. The findings of the study are imperative to investors investing Indian capital market, brokers, financial consultants and investment advisors; responsible for managing assets and constructing portfolios for investment clients, as they can alter the investment decision by accessing the susceptibility of investors towards cognitive biases, which often lead to erroneous decision.

Keywords: behavioural biases, capital market, investment, decision-making

1. Introduction

Behavioural finance has emerged as a respective discipline which seeks the reasons of stock market anomalies by justifying them with the explanation of various biases that the investor has while taking investment decisions. It also helps in exploring the reasons of why an investor needs tailor-made investment solution depending on his age, income, education, sex, information about security and peer behaviour. Cognitive psychology and the limits to arbitrage are the two structural units of behavioral finance which explains thought process of people and on the condition when markets will be inefficient (Ritter, 2003). Standard financial theories suggest that investor is rational in their approach (Fama 1970) but behavioural finance theory helps in explaining the normal behaviour of investors. Contrary to the classical view and assumptions made under traditional finance theories, behavioural finance assumes that due to the irrational behaviour of investors, advisors and the combined and multiplied effect of the personalities of investors, markets will not always be efficient. The inefficiency of financial market causes the stock prices to deviate from the predictions of traditional market models. Behavioural finance is not limited to asset pricing, portfolio construction and market efficiency (Kahneman et.al 1991). It emphasizes that financial choices are affected by behavioural, psychological and emotional biases of an individual. The prior literature documents that investors are affected by multiple biases and mental filters while making investments in the capital market (Kahneman and Tversky 1979; Bondt et.al, 1994; Lui Yu-Hon et.al 1998; Wicoz, 1999; Barber and Odean, 2000; Dhar and Zhu, 2006; Frazzini, 2006; Chira et.al 2008; Chun and Ming, 2009; Chiang and Zheng 2010; Lao and Singh 2011; Muradoglu et.al 2012; Rekik 2013; Jamal et.al 2014; Prosad et.al 2015; Haron 2016).

The present article is focused on the behavioural biases affecting decision making of investors in Indian capital market. The research is being directed by conducting a survey on a sample of 400 investors investing in Indian capital market. By using cross data analysis, the current study confirmed the hypotheses that behavioural biases affect the rational decision-making process of an investor in the capital market. The findings of this study indicate that herding bias has significant impact on the demand identification, optimism and mental accounting bias has significant relationship with the information search stage of decision making and disposition effect has significant impact on the last stage of evaluating alternatives.

Though studies are conducted on developed capital markets but there are very few evidences available for emerging capital markets like India. Existing studies have theoretically explored the respective biases, but no empirical evidence exists till date whereby statistical significance of these biases have been examined on the investors. Further to the best of author's knowledge there is no previous research where the relationship between behavioural biases and rational decision-making process has been investigated. So, motivated by the stated research gaps, the present study is an attempt to fill the gap by extending the existing literature on behavioural finance by identifying the documented behavioural proclivities that lead investors to make severe investment errors, which jumbles the rational decision-making process. Further the findings of the study provide critical insights and practical applications to the investors, brokers, financial consultants and investment advisors; responsible for managing assets and constructing portfolios for investment clients.

The structure of this article is as follows: - Section 2 contains relevant and systematic literature review; Section 3 describes the research methodology opted in the study and a brief discussion on the variables under study. This section also gives a description of the theoretical model used for the empirical analysis of the study. Section 4 outlines analysis and main findings and Section 5 concludes the study by interpreting the results and highlighting the contribution.

2. Literature Review

Many of existing studies in the wider literature have scrutinized the presence of behavioural biases among investors in different capital markets around the world Odean (1999), Choe, Kho, and Stulz (1999), Barber and Odean 2000, 2001; Grinblatt and Keloharju 2000; Hirshleifer et.al. 2002; Goetzmann and Massa 2002; Richards 2005; Davar and Gill 2007; Lao et.al 2011; Sahi et.al. 2012; Rekik et.al 2013; Statman 2014; Prosad et.al 2015 and Kumar and Goyal 2016). Over a period of time, there has been a remarkable development in the discipline of behavioral finance. A considerable body of literature exists on behavioral finance including analysis of both primary as well as secondary data. Both perspectives have noteworthy contributions in this field.

2.1 Rationality in Decision-Making

A lucidity and cause are trailed by rational decision makers with a view to optimize decision (Nozick, 1994). Two fundamental models of decision making are projected in the behavioural finance literature. One is rational model and the other one is bounded rationality model. A three-stage model for strategic decision-making, is provided by Mintzberg et al. (1976) which comprises identification of problem, gathering alternative ways to solve that problem and eventually selecting the most appropriate alternative to have an optimal solution. The study was extended by Schoenfeld (2011) by recommending a six-stage model of rational decision-making process. In a real world, it becomes very difficult for an individual to make rational choice, due to accessibility of restricted information, paucity of time and psychological constraints. Consequently, the term rationality was substituted with the notion of bounded rationality by Simon (1956, 1982). Many studies explained that neither bounded rationality is irrationality, nor the individuals are irrational; they simply are bounded rational. Normally, it is due to the absence of comprehensive information and facts, that people find shortcuts more convenient and follow the track of simple models resulting in trivial outcomes (Wilcox et.al 1999).

2.2 Literature on Behavioural Biases

Several behavioural biases have been explored by behavioural psychologists and financial academicians associated with investors. These biases are generally the propulsive force trailing the thriving incongruities among individual investors. These incongruities are the cognitive blunders or the predispositions that effect the investment decision-making. Prospect theory introduced by Kahneman and Tversky (1979) states that a particular reference point exists among individuals with respect to which they assign different weights to gains and losses they incur over a period of time when there is a sudden decrease in the magnitude of the marginal values of both. The present study enlightens the relationship between three behavioural biases, namely, optimism, herding mental accounting and disposition effect, and the rational decision-making process.

Optimism (pessimism). There is extremely wide literature on optimism (pessimism) bias. So, it can be broadly classified in four aspects. Hoffmann and Post (2012) highlighted the forces of optimism which is the first aspect of this bias (Bennet *et al.,* 2012). The second aspect explained by Bradshaw *et al.* (2012) deals with optimism of predictors in projecting probable yields and anticipating spot values. The third aspect focuses on the documentation of this respective bias among investors (Toshino and Suto, 2004). The fourth aspect determines the existence and influence of optimism on financial markets (Shefrin and Statman, 2011 and Barone-Adesi *et al.,* 2012; Dhaoui *et al.,* 2014).

Herding. It is defined as the propensity of investors to mimic the reaction of others. There are various studies which examined the possible cause of herding among money managers while taking investment decisions (Chopra *et al.*, 1992; Scharfstein and Stein, 1990). Few researchers provided a base to estimate the herd behaviour in financial markets (Christie and Huang, 1995; Hwang and Salmon, 2001). Previous literature supports the existence of herd bias in developing and developed nations (Chang *et al.*, 2004; Caparrelli *et al.*, 2004; Al-Shboul 2012; Basu *et al.*, 2011)

Mental Accounting. It is the tendency to create separate accounts for the different securities selected to invest in according to the individual reference point (Thaler, 1985). Kahneman and Tversky (1979) suggested that amalgamation of mental accounting with risk seeking in the realm of losses possibly will drive investors to grasp losing investments and sell winning ones (Shefrin and Statman, 1985; Odean, 1998; Weber and Camerer, 1998; Thaler, 1999; Grinblatt and Keloharju, 2001; Shafir et.al 2006)

The disposition effect. Shefrin and Statman (1985) introduced the concept of the disposition effect. Studies in different financial markets as USA (Odean, 1998b), Finalnd (Grinblatt and Keloharju, 2001) and China (Shumway and Wu, 2006). provide the sufficient evidence for the existence of disposition effect bias. Various situations leading to disposition effect are identified by Kumar (2009). Statman *et al.* (2006); Dhar and Zhu, 2006 examined the impact of disposition effect on trading capacity and De *et al.* (2011) linked it between institutional and individual investors.

2.3 Connection Between Behavioural Biases and Rational Decision-Making

According to rational decision theory, it is assumed that a logical trail or order is followed by people while taking decisions, whereas Simon (1956) recommended that individuals ponder some threshold of gratification instead of amplifying a value function which is constructed on the notion of bounded rationality. One of the probable reasons for that could be the lack of information about a particular event. Thereafter the rational decision theory was protracted by Kahneman and Tversky (1979) by presenting the prospect theory which emphasizes on the reference points for gauging the optimal decision. An investigation done by Tversky and Kahneman (1974) revealed that individuals get affected by heuristics, reducing the decision-making time and can be relatively beneficial, however every so often results in grievous and orderly blunder.

Even though, assessing the information by the investors is possible factually, but to overlook the heuristics and cognitive biases tangled at every step of decision-making process is a stringent task (Kumar and Goyal 2016). Therefore, behavioural biases occur in the subconscious of the investors, regardless of following a logical process of decision making.

3. Research Methodology

3.1 Research Objectives

The main aim of the investigation is to assess the impact of behavioural biases on investor decision making. For measuring decision making (dependent variable) of an investor, a three-step model given by Mintzberg et.al (1976) is referred which includes sequential steps of rational decision-making i.e. need identification, seeking essential information and evaluating alternative outcomes; on which the effect of behavioural biases (independent variables) namely optimism, herding, mental accounting and disposition effect is being assessed.

The study is based on the following objectives:

1. To identify the presence of selected cognitive biases among investors of Indian stock market.
2. To build the relationship among behavioural biases and the process of rational decision-making.

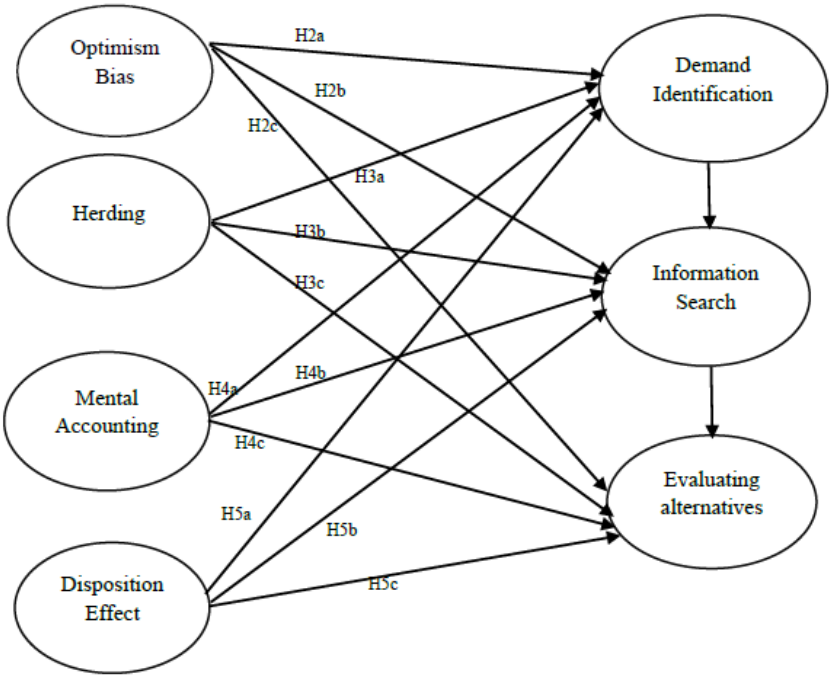

Figure 1. Research model showing behavioural biases and rational decision-making process

3.2 Research Model and Hypotheses Development

The research model hypothesizes seven constructs (optimism bias, herding, mental accounting, disposition effect, demand identification, search information and evaluating alternatives). Figure 1 shows the tested research model of the study.

In order to accomplish the stated objectives, following hypotheses are formulated:

Hypotheses

H1 Behavioural biases are present among investors in the Indian stock market.

H2. A significant relationship exists between optimism bias and rational decision-making process

H2a. Optimism bias has a significant relation with demand identification.

H2b. Optimism bias has a significant relation with information search.

H2c. Optimism bias has a significant relation with evaluating alternatives.

H3. The significant relationship exists between herding and rational decision-making process

H3a. Herding has a significant relation with demand identification.

H3b. Herding has a significant relation with information search.

H3c. Herding has a significant relation with evaluating alternatives.

H4. The significant relationship exists between mental accounting and rational decision-making process

H4a. Mental accounting has a significant relation with demand identification.

H4b. Mental accounting has a significant relation with information search.

H4c. Mental accounting has a significant relation with evaluating alternatives.

H5. The significant relationship exists between disposition effect and rational decision-making process

H5a. Disposition effect has a significant relation with demand identification.

H5b. Disposition effect has a significant relation with information search.

H5c. Disposition effect has a significant relation with evaluating alternatives.

3.3 Questionnaire Design

The questionnaire is primarily focused on behavioural biases affecting investor's rational decision-making process in Indian capital market. The questionnaire mainly includes two sections. Section A contains the questions related to demographic profile of investors. The other section includes the questions for four anticipated behavioural biases, that is optimism bias, herding, mental accounting and disposition effect and the components of rational decision-making process namely demand identification, information search and evaluating alternatives. The present article is focused on 21 variables which are investigated by referring previous studies (Lin, 2011). To measure the variables under study a five-point Likert scale is used for questions in the second section of the questionnaire where 1 denotes "strongly disagree" and 5 denotes "strongly agree" so as to evaluate the strength of connection amongst behavioural biases and rational decision-making process in investment decision making.

3.4 Data Collection and Methods Used

Data has been collected using primary approach whereby survey-based questionnaire is used as a research instrument. To check the reliability and validity of the instrument, pilot test was conducted on 50 respondents. The data of the present study constitutes the population of individual investors of Indian equity market and only an explicit section of the population is pertinent according to the objectives of the study. The study is grounded on cross section data, where the respondents essentially have potential savings with a view to invest multiple investment avenues and have an investment experience in equity market. Further, Mumbai being 37th largest city by GDP and economic and commercial centre of India was selected for study, wherein a normal individual is financially capable to invest in equity market. As any authorized list of investors was not accessible, the investigation trails the approach recommended by earlier investigators (Gupta 1991; Davar and Gill 2007; Sahi and Arora 2012). The present study is based on snowball and chain referral sampling technique which is used when there is difficulty to obtain access to the population under study due to legal, social or moral constraints (Biernacki and Waldorf 1981). To proceed the study few standards were set so as to select the respondents:

- The person should be a resident of the Mumbai region.
- The person should have investment experience in Indian capital market.
- The person annual income should be equal to 3 lakhs or above.

The questionnaires were distributed mainly through e-mails (google docs), direct interaction with investors at investor education programs & also through some brokerage houses. Around 750 investors were approached for the study. Out of which 520 participated and responded. Further after eliminating the incomplete questionnaires, the number of valid responses got reduced to 400 which is sufficient for analysis to get reliable results (Hair et al. 1998).

4. Analysis and Results

4.1 Demographic Profile

Table 1 describes the summary statistics of respondents' demographic profile and shows that majority of the respondents i.e. 64 percent fall in 41-60 age bracket with males' 73 percent and females' 26.9 percent. The respondents are well educated including post-graduate (53.4 per cent) where more than half of them fall in 8-10 lakh annual income bracket (46 percent). Occupation of the sample respondents is of diverse nature including financial experts (56.20 percent), government service or PSU (25.4 percent), working in banks (19.5 percent), private firms (14.82 percent) and remaining belong to some other profession. The sample is mainly comprised of investors who prefer to invest in stocks mutual funds of old companies (56 percent) with 32.7 percent having more than seven years of investment experience in stock market. Lastly majority of respondents' investment (i.e. 41.5 percent) is based on market fluctuations with 31 percent having a trading frequency of 1-3 years.

Table 1. Summary statistics for demographic profile of investors

Summary Statistics	**Coded Values**	**Frequency**	**Percentage (%)**	**Cumulative Percentage**	**Mean**	**Standard Deviation**
Age (in years)					2.73	1.23
20-30	1	60	15	15.00		
31-40	2	82	20	35.40		

41-50	3	125	31	66.60		
51-60	4	123	30.7	97.3		
Above 60	5	10	2.5	99.8		
Gender					1.45	1.16
Male	1	285	73	73		
Female	2	105	26.9	99.9		
Educational Qualification					2.63	1.43
Undergraduate	1	2	0.5	0.5		
Graduate	2	163	40.75	41.25		
Postgraduate	3	225	56.25	97.5		
Doctorate	4	10	2.5	99.95		
Profession					2.84	1.56
PSU/Govt (excluding banks)	1	98	25.4	25.4		
Private (excluding banks)	2	57	14.82	40.22		
Banks (including public & private)	3	75	19.5	59.7		
Financial expert/CA	4	120	31.2	90.9		
Others	5	30	7.8	98.72		
Annual Income (in lakhs)					2.43	1.27
2-4	1	7	1.75	1.75		
4-6	2	47	11.75	13.5		
6-8	3	96	24	37.5		
8-10	4	184	46	83.5		
Above 10	5	52	13	96.5		
Investment Type					2.98	1.23
Stock or mutual funds of new companies	1	107	23.7	23.7		
Stock or mutual funds of old companies	2	224	56	79.7		
Derivatives & commodities market	3	22	5.5	85.2		
High grade corporate bonds	4	34	8.5	93.7		
Others	5	3	0.75	94.4		
Trading experience (in years)					3.77	1.29
<1	1	17	4.25	4.25		
1-3	2	45	11.25	15.5		
3-5	3	96	24	39.5		
5-7	4	108	27	66.5		
>7	5	131	32.7	99.2		

Prerequisite of investment					2.48	1.25
When surplus funds are available	1	136	34.68	34.68		
On friend's advice	2	32	8.16	42.84		
Market fluctuations	3	163	41.56	84.34		
Forecast made by analysts in media	4	61	15.5	99.9		
Frequency of trading					2.97	1.32
Intraday	1	62	15.5	15.5		
0-3 months	2	81	20.25	35.75		
3-12 months	3	107	26.75	62.5		
12-36 months	4	124	31	93.5		
>36 months	5	22	5.5	99		

(N=400)

4.2 Reliability and Validity of Measurement Model

Prior applying the reliability and validity tests, the Kaiser–Meyer–Olkin (KMO) value was calculated which is 0.82 and is considered robust as it ensures sample adequacy (Hair *et.al*., 2010). It is also in conformity with the conventions of exploratory factor analysis (EFA). Table 2 displays the means, standard deviation, reliability and validity statistics. The measure of internal consistency i.e. Cronbach's alpha value is 0.74, 0.85, 0.73 and 0.75, respectively for the optimism, herding, mental accounting and disposition effect (Biases) and 0.76, 0.72 and 0.78, for demand identification, information search and evaluate alternatives (Rational decision-making process), which successfully accomplishes minimum acceptable criteria which is α>0.7 (Sekaran, 2000).

Table 2. Internal quality of endogenous (latent) variables (reliability and convergent validity)

Endogenous Variables	***Item***	***Mean***	***SD***	***Factor Loading***	***Cronbach's alpha***	***Composite Reliability***	***AVE (Average Variance Extracted)***
Optimism (O)	O1	3.96	1.26	0.73	0.74	0.76	0.61
	O2	3.77	1.83	0.81			
	O3	4.06	1.54	0.67			
Herding (HD)	HD1	3.58	1.76	0.65	0.85	0.87	0.59
	HD2	3.49	1.84	0.79			
	HD3	3.22	1.19	0.85			
Mental Accounting (MA)	MA1	3.35	1.26	0.87	0.73	0.76	0.66
	MA2	3.81	1.37	0.80			
	MA3	3.19	1.83	0.86			
Disposition Effect (DE)	DE1	3.62	1.23	0.72	0.75	0.79	0.62
	DE2	3.78	1.78	0.85			
	DE3	3.91	1.82	0.88			
Demand Identification (DI)	DI1	4.24	1.55	0.83	0.76	0.81	0.64
	DI2	4.67	1.94	0.79			
	DI3	4.33	1.72	0.66			

Information Search (IS)	IS1	4.55	1.86	0.77	0.72	0.75	0.68
	IS2	4.26	1.48	0.80			
	IS3	4.49	1.63	0.81			
Evaluating Alterantives (EA)	EA1	4.87	1.34	0.80	0.78	0.84	0.55
	EA2	4.83	1.78	0.88			
	EA3	4.75	1.55	0.77			

Table 3. Discriminant validity of constructs (Fornell and Larcker criterion)

Variables	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Optimism	**0.781**						
Herding	0.22	**0.768**					
Mental Accounting	0.349	0.301	**0.812**				
Disposition Effect	0.268	0.169	0.362	**0.787**			
Demand Identification	0.172	0.235	0.277	0.328	**0.80**		
Information Search	0.232	0.189	0.141	0.282	0.436	**0.824**	
Evaluating Alternatives	0.051	0.085	0.021	0.132	0.376	0.274	**0.741**

The bold values indicate the square root of the Average Variance Extracted (AVE).

4.3 Factor Analysis

To test the reliability, convergent and discriminant validity of all constructs confirmatory factor analysis (CFA) is performed. The present study has taken into consideration seven constructs namely optimism, herding, mental accounting, disposition effect, demand identification, information search and evaluating alternatives. To assess the purported hypotheses that a relationship exists between exogenous and endogenous variables, CFA was applied (Harrington 2008). Hair *et al.* (2010) recommended that each item of the construct should have standardised factor loading of at least 0.5. All items in the present study have more than 0.6 value for standardised factor loading with least value for item HD1 i.e. 0.65 (refer to Table 2). Furthermore, composite reliability is also mentioned in the Table 2, its value should be above 0.6 (Bagozzi and Yi 1988). Composite reliability for each endogenous variable in the study is greater than 0.6, which confirms the construct validity of the proposed model.

Convergent validity is confirmed by AVE values higher than 0.5 for all the latent variables; it is considered as robust since it demonstrates that more than 50% of the disparity in the construct is due to the stated indicators (Bagozzi and Yi, 1988). In the present study, the convergent validity is achieved by all the constructs (refer table 2).

Fornell and Larcker, (1981) recommended that if the values of √AVE of each construct is more than the correlation value of rest of the constructs; the discriminant validity is established. Table 3 indicates that the bivariate correlation of other constructs is less than the values of √AVE of the respective constructs present in the diagonal portion. Table 4 indicates descriptive statistics and correlation matrix of the variables under study.

4.4 Multicollinearity

To apply regression analysis a prior condition is to check the multicollinearity of the independent variables taken under study to get the robust results. In the present study tolerance and VIF values are determined to test the potential issue of multicollinearity among all the independent variables. The minimum acceptable tolerance value i.e. 0.11 is achieved by all independent variables (optimism= 0.712, herding= 0.540, mental accounting = 0.635, disposition effect = 0.672). Similarly, the VIF value has also attained the suggested range that is below 5 (Rogerson, 2001) for

all independent variables (optimism = 1.736, herding = 1.594, mental accounting = 1.796, disposition effect = 1.205. Consequently, no grave issue of multicollinearity exists in the data.

Table 4. Descriptive statistics and correlation matrix

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10
Gender[a]	1.45	1.16	1									
Age[b]	2.73	1.23	0.041	1								
Investment Experience[c]	3.77	1.29	0.123*	−0.296**	1							
Optimism	3.72	1.58	0.081	0.059	−0.041	1						
Herding	3.59	1.62	0.039	−0.043	0.116	0.464**	1					
Mental Accounting	3.65	1.52	0.047	0.043	0.038	0.473**	0.525**	1				
Disposition Effect	3.27	0.98	0.078	0.098	0.006	0.432**	0.405**	0.412**	1			
Demand Identification	4.12	0.91	0.061	0.075	0.006	0.428**	0.475**	0.421**	0.474**	1		
Information search	4.22	0.94	0.025	−0.038	0.055	0.475**	0.454**	0.364**	0.438**	0.467**	1	
Evaluating Alternatives	4.01	0.84	−0.034*	0.181**	−0.052	0.267**	0.321**	0.316**	0.225**	0.435**	0.272**	1

*** sig. at 0.00.

* Represent significance at the 0.05.

** significance at 0.001.

a 1 =male; 2= Female.

b 1=20-30 years; 2= 31-41 years; 3 =41-51 years; 4= 51-60; 5=above 60.

c 1= <1 year ;2= 1-3 years; 3 =3-5 years; 4= 5-7 years; 5= above 7.

4.5 Behavioural Biases

To analyse the existence of behavioural biases among investors, the mean scores of the responses (on Likert scale) were measured. The mean value of all the biases under study is greater than 3 (refer to table 5) which verifies that investors are prone to these behavioural biases while taking investment decision, which strongly supports H1. Optimism bias and disposition effect have the highest mean scores of 4.687 and 4.381 which firstly indicates that majority of equity investors in India believe that they are more likely to experience good outcomes over bad ones and secondly, that they are prone to sell such stocks quite at early stage which has increased in value since purchase, instead the one fallen in value and vice-versa. The results are similar with the earlier studies (Sahi and Arora, 2012; Mishra and Metilda, 2015; Prosad et al., 2015; Kumar and Goyal, 2016).

Table 5. Mean scores of biases

S.No.	Behavioural Biases	Mean Scores
1	Optimism Bias	4.687
2	Herding	3.724
3	Mental Accounting	3.962
4	Disposition effect	4.381

4.6 Results of Structural Equation Modelling

The data of the present study is analysed by using structural equation modelling. It is an advanced tool to analyse the structural relationship between measured and latent variables (Hair et al. 2011). It is extensively applied on management and social sciences research models and is a blend of factor analysis and multiple regression analysis

(Hox 2013). Therefore it is intended to define and explain that how a set of concepts are connected to each other (Dolan, 1999).

Table 6. demonstrates the outcomes of structural equation modelling (SEM) between latent variables by the path coefficients which indicates that *H2b, H3a, H4b* and *H5c* are robustly supported whereas *H2a, H2c, H3b, H3c, H4a, H4c, H5a* and *H3b* are not supported. As decision making is not a vicious circle but a three-stage process, thus the relation of the first stage (demand identification) with the second stage (information search); and the relation of the second stage (information search) with the third stage (evaluating alternatives) is identified in the study. The standardised beta coefficient (measure of regression weights) in the study indicates the statistically significant relation of demand identification with information search (β=0.55, *p*-value<0.05) and information search with the evaluation of alternatives (β=0.52, *p*-value<0.05). It clearly specifies that as the demand rises, there is subsequent rise in the information search among investors by virtue of which they evaluate the most appropriate alternative, and which additionally indicates the sequential linkage amongst diverse stages of the decision-making process. Furthermore, the investigative outcome of the research indicates the relationship amid behavioural biases and decision-making process whereby only herd bias is significantly related to the first stage of the decision-making process (β=0.371, *p*-value<0.05). The information search is significantly related to optimism bias (β=0.465, *p*-value<0.05) and mental accounting bias (β=0.381, *p*-value<0.05). Whereas the disposition effect has significant impact on the evaluating alternatives (β=0.422, *p*-value<0.05).

Table 6. Regression results (path coefficients)

Variables	**Demand Identification**		**Information Search**		**Evaluating Alternatives**	
	β	p-value	β	p-value	β	p-value
Optimism	-0.158	0.120	0.465	0.010	0.352	0.072
Herding	0.371	0.011	-0.586	0.075	-0.047	0.238
Mental accounting	0.112	0.079	0.381	0.032	-0.716	0.185
Disposition Effect	-0.198	0.216	-0.453	0.214	0.422	0.028
Demand Identification	-	-	0.550	0.031	0.53	0.321
Information Search	0.550	0.031	-	-	0.520	0.016
Evaluating Alternatives	0.53	0.321	0.520	0.016	-	-

As decision making is a 3-stage process; hence the relationship of the first stage (DI) with the second (IS); and the second stage (IS) with the third stage (EA) is identified.

5. Discussions and Conclusion

The stock market of India has been through turbulent periods over the past decade. It has undergone a strident downfall during the period from 2008 to 2010, trailed by continuous fluctuations in the succeeding years, till 2015. Keeping in consideration the above stated facts, the persistence of the present research focused on analysing the association between behavioural biases and rational decision-making procedure followed among Indian individual investors. Investors are more susceptible to behavioural biases in India as it is an emergent economy where absence of financial alertness exists among people. Findings of the study reveal that while making an investment, some cognitive aspects influences the behaviour of an investor which affects the rational decision-making process followed by the investors. Empirical evidence of the study highlights a significant relationship among components of rational decision-making process, whereby it can be concluded that while making investment, the very first step of investors is to detect their own demand, by virtue of which they analyse whether investing in financial product will upsurge their affluence or not. Afterwards investors step forward to search the information from numerous modes like print or broadcast media, approvals from their family and friends and from their previous contemplations. Subsequently investors gauge all the existing alternatives and decides to select. Results confirmed the research hypothesis that behavioural biases have a significant relationship with rational decision-making process. Results

inveterate that only herding bias has significant relationship with demand identification. On the other hand, information search which is the second stage of rational decision-making, reflects a strong positive relation with optimism and mental accounting. Based on the framework of the research, the positive relation confirms that investors are prone to herd each other's behaviour when identifying the investment demand and keep on searching information. Optimistic behaviour of investors is based on the accessibility of inadequate information and their previous knowledge, whereby they act irrationally. Many studies in literature have recommended that investors overreact to private information instead of public information (Daniel *et al.*, 1998). Additionally, only disposition effect pointedly establishes the relation with evaluating alternatives which is the last stage of decision-making. Empirical evidences of the study provide enough support to infer that investors count on their past experiences and restricted information and become optimistic during the search for information. Previous studies confirm that investors trade excessively due to optimism (Odean, 1999) and frequently end up having erroneous decision. Furthermore, fallouts indicate that last two stages of the decision-making process have no influence on herding bias. It indicates that there is no direct connection of herding with information search and evaluating alternatives, nevertheless it might be associated to nearly additional facets like market situations etc. Such a consequence is also steady with the inferences of Lin (2011).

5.1 Limitations and Future Directions for Research

This paper is grounded on the cross-sectional analysis of data; therefore, the conclusion can be drawn that there is a probability of transformation in the behaviour of investors with respect to the variable market situations. Future research can be conducted in diverse market situations, considering more emotional biases as well as analysing the interdependence among different cognitive variables.

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