

INVESTOR BIASES AND THEIR DISCRIMINATING POWER AMONG THE RISK TAKERS - A CASE STUDY FROM KERALA

Anu Antony*

Abstract *The studies in behavioural finance focused on psychographic and psychological factors which influence investment decisions. The current study is to identify the behavioural biases affecting the investment decision making of an investor. The study was conducted among the salaried group of Kerala who has been invested/investing in the stock market. The study focused on two dimensions (a) the behavioural characteristics of the investors (b) the discriminatory effect of behavioural biases among the risk tolerance level of the investors. Behavioural aspects were done factor analysis and extracted the five biases affecting the investment decisions. Risk tolerance was analysed by evaluating the attitude of the investors towards the risk. Exploratory factor analysis was carried out to identify the various behavioural factors affecting investment decisions. The factors analysed were further tested using discriminant analysis to evaluate the investors on risk tolerance. From the analysis, it was found that regret aversion and herd behaviour have a high influential effect on investor decision making.*

Keywords: *Behavioural Finance, Investment Behaviour, Overconfidence, Representative Bias, Mental Accounting, Regret Aversion, Risk, Risk Tolerance, Discriminant Analysis, Risk Attitude*

INTRODUCTION

In the investment market, we can see many different types of investors with varying levels of financial risk tolerance. Financial risk tolerance is highly correlated with the investment decision of investors in achieving his or her financial goals. In other words, it is inversely related to risk aversion. Identification of risk tolerance is considered an important input for developing an investment plan (Garman & Fogue, 2011). Pompian (2011) has noted that cognitive biases and emotional biases can affect the investment decision. The researchers coined these biases as psychological factors (behavioural biases) influencing the decision making process of the individual investors (Rasheed et al., 2018; Kahneman & Tversky, 1974; Lusardi & Mitchell, 2006). It is termed as irrational behaviour, which is a hindrance for effective decision making.

Various studies have reminisced the irrational behaviour of investors in investment decision making, which is engraved as psychological biases, a key aspect of behavioural finance (Allen & Evans, 2005; Ritter, 2003; Waweru et al., 2008). Within the judgement and decision making domain, a difference has been established between risk and uncertainty (Ricciardi, 2008). The understanding and application of risk, risk assessment, and risk measurement were vital aspects in all financial decisions, because individuals are presented with evaluating whether the returns from an investment

will offer sufficient compensation. The behavioural finance incorporates the idea of risk as investor specific and a multi-dimensional decision making process (Swisher & Kasten, 2005; Ricciardi, 2008).

The present paper endeavours to explore psychological biases of Indian investors with respect to investors in Kerala. Among the behavioural biases, the study focused on the established influence of certain theories, such as the Heuristic theory, Herding, and other theories (market factor) that are believed to influence the investors' investment decisions. Thus, the study addresses two specific research questions, such as:

RQ1: What are the behavioural aspects that determine the investment decision of the investor?

RQ2: Among the behavioural aspects, what are the biases that predominately discriminate the investors on their risk tolerance level?

For this purpose, a survey was conducted among the investors in Kerala. The survey entangles the psychological determinants of investment behaviour and its association on portfolio management. The psychological determinants were cognitive biases (behavioural factors) which are considered to be heuristic, or short-cuts which can lead to systematic errors in judgement. It also covers how psychological aspects influence the financial risk tolerance level of the individual investors.

* Assistant Professor, Rajagiri College of Social Science, Rajagiri Valley Campus, Kakkanad, Kochi, Kerala, India.
Email: anuantony@rajagiri.edu

The remaining session includes literature review; research methodology adopted in the study; empirical results followed by conclusion and implications.

LITERATURE REVIEW

The influence of psychological biases in investor's investment decision is focused on behavioural finance theories (Barber & Odean, 2013). Hoffmann et al. (2015) proposed the role of investor sentiments in investment decision. Ricciardi and Simon (2000) define behavioural finance as an interdisciplinary science derived from psychology, sociology, and finance. Shefrin (2000) explained it as a difference between cognitive and affective (emotional) factors. The cognitive aspects mean the way individuals organise their information, and the emotional aspects deal with the way people feel as they register information. The foundation of behavioural finance was laid down Kahneman and Tversky (1979), who redefined the expected utility function by prospect theory, using the value function. The prospect theory incorporates value function and weighting function of actual probabilities of outcomes. The prospect theory explains the investor behaviour in which people tend to under-weight the probable losses; the weighing function of the prospect theory describes the investor behaviour in terms of regret aversion, loss aversion, and mental accounting (Waweru et al., 2008).

Regret aversion is an emotional phenomenon faced by an individual based on their decisions, especially when they face an unfavourable occurrence. Regret is found to be more for holding losing stocks than selling winning stocks (Shefrin & Statman, 1984; Fogel & Berry, 2006). Mental accounting is referred to as heuristics in which an individual deliberates about the situation and gauges their financial transactions; it allows investors to organise separate compartments for their portfolio (Ritter, 2003).

Tversky and Kahneman were the pioneers who proposed "representation bias" as a heuristic which will affect the decision making of the investors (Kahneman & Tversky, 1979; Tversky & Kahneman, 1974). Representative bias exhibits a cognitive tendency of decision making based on certain opinions or reasoning. It is considered as a behavioural bias because investors may overreact or underreact based on certain probabilities, or assign weights for certain information (DeBondt & Thaler, 1985; Fuller, 1998). Statman (1999) explains that investors have a tendency to take decisions based on certain forecasts or similarities, and tend to judge the market based on historical records. Certain decisions of investors can be influenced by the recommendations of the analyst.

A person's excessive consciousness about self, in terms of knowledge and ability in financial decision making,

is referred to as overconfidence. It mainly manifests as miscalibration (overestimation of one's knowledge), better-than-average effect (personality traits which stress self-views), and illusion of control (unwarranted belief on fate). These three aspects of overconfidence were re-referred to as over-precision, over-placement, and overestimation. The experimental findings of Barber and Odean (2001) reported that overconfidence investors will engage in active trading and incur losses (Glaser & Weber, 2007; Barber & Odean, 2001; Biaisi et al., 2005; Nöth & Weber, 2003; Michailova et al., 2017).

Tripathi and Chattopadhyay (2013) studied behavioural aspects of individual investors in equity mutual funds and found that voluntary risk taking and financial consciousness describe the riskiness of the investment. Kulkarni (2014) conducted a study on the perception of investors using demographic variables. Chandra (2008) explored the influence of behavioural factors and investor's psychology on their decision-making and tried to establish the relationship between investor's attitude towards risk and behavioural decision-making. In this study, they highlighted the influence of greed and fear, cognitive dissonance, heuristics, anchoring, and mental accounting in the decision-making process. Roszkowski and Grable (2005) conducted a survey to determine how effective the financial advisors were in estimating the financial risk tolerance level of their clients. Their study was multifaceted: a) to determine how effective the financial advisors were in estimating the risk tolerance level; b) the judgemental process through multiple regression models using risk tolerance of clients and their socio-economic characteristics.

RESEARCH METHODOLOGY

Data: This is a descriptive study to identify the behavioural factors affecting the investment decision of the investor with respect to the Indian capital market and the risk tolerance of investors. The relevant data is extracted "subjectively", from relevant segments of the population of investors who reside in Kerala (Davar & Gills, 2007; Sahi & Arora, 2011). The target population is those individuals who were residents of Kerala. The state was selected as it is considered to be the highest literate state in India. The sample composition is decided on the basis of snowball sampling (Sahi & Arora, 2011). The criteria for selecting the respondents of the survey are as follows:

- The respondent should be a resident of Kerala and be a working class member who earns a regular income. This represents a cluster with regular incomes at regular intervals.
- The respondent must invest in the stock markets and maintain a portfolio.

Methodology: The study addresses the two research questions. The first research question (RQ1) was analysed using factors analysis. The main advantages of the factor analysis technique is that it removes the redundant variables and helps generate a set of correlated ‘factors’ or ‘latent variables’. The second research question (RQ2) was solved using the discriminant function. The discriminating power between the dependent variables and the independent variable was analysed using linear regression by assigning weights to the various variables. The equation for the discriminant function is represented as:

$$D = \alpha + W_1y_1 + W_2y_2 + W_3y_3 + W_4y_4 + \dots + W_ny_n \quad (1)$$

Where, *D* is the discriminate function of risk tolerance; *W*, the discriminant coefficient for the predictor variable (behavioural factors); *y*, the respondent’s score for that variable; *a*, the constant; and *n*, the number of predictor variables.

This technique analyses if the predictor variables (behavioural biases) can significantly discriminate between various dependent variable categories (risk tolerance).

EMPIRICAL RESULTS

Multivariate Analysis of Behavioural Aspects of Investors

Factor analysis is a multivariate statistics technique and has a vital task in indicating which variables can be classified

together to form a super-ordinate variable. It is a method of data reduction. The main aim of factor analysis is simplification, by identifying basic underlying factors that explain a larger number of related variables in a frugal way. Five behavioural factors, comprising 16 variables, were ascertained. From the 16 variables, predominant factors were analysed using factor analysis. Five-point Likert scale (5 = strongly disagree and 1 = strongly agree) was used for collecting the primary response from the investors who were the respondents. The results derived from principal component analysis, along with KMO and Bartlett’s Test, are given in Table 1.

Table 1: KMO and Bartlett’s Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.758
Bartlett’s Test of Sphericity	Approx. Chi-Square	4303.746
	Df	120
	Sig.	0.000

Source: Primary data.

The Kaiser-Meyer score of 0.758 shows a high level of data adequacy and explains, with a meaningful conclusion, 75.8% of common variance. In addition, the score of Bartlett’s Test of Sphericity is significant (0.000) with a chi-square value of 4303.746. Five factors (Table 2) were extracted with the principal component analysis (PCA) method; the initial factors were extracted with the varimax rotation.

Table 2: Factor Analysis

	Factor Loading	Eigen Value	% of Variance	Cumulative Variance
Factor 1: Representative bias				
Decision based on technical analysis	0.851	3.851	24.070	24.070
During the time of bearish market, I borrow money to invest in the market	0.827			
The current performance of stock is an indicator of future performance	0.77			
Mean: 12.507 Standard Deviation: 2.181 Variance: 4.757				
Factor 2: Overconfidence bias				
Complete knowledge about investment avenues and can realise the movements in the market	0.762	2.241	14.007	38.077
I feel satisfied with my investment decision in the past	0.760			
My investment successes were due to my specific skills and experience	0.757			
Confident about my ability to do better than others in stock picking	0.698			
Mean: 14.726 Standard Deviation: 2.906 Variance: 8.448				
Factor 3: Regret aversion				
I will hold losing stock for too long expecting trend reversal	0.836	1.634	10.21	48.286
I do have a habit of purchasing lottery tickets	0.707			
I will book profits in a winning stock and then feel I could have waited	0.629			
Mean: 11.888 Standard Deviation: 2.251 Variance: 5.070				

	Factor Loading	Eigen Value	% of Variance	Cumulative Variance
Factor 4: Mental accounting				
My investment is based on the time horizon	0.821	1.421	8.878	57.164
I invest only in diversified portfolios	0.721			
I invest for my retirement as savings	0.62			
Mean: 11.300	Standard Deviation: 2.204	Variance: 4.859		
Factor 5: Herd behaviour				
My decision is based on information from public media	0.841	1.113	6.956	64.12
I seek the opinion of my friends and colleagues	0.84			
While going for an investment decision, I will go through the recommendations given by famous analysts	0.828			
Mean: 10.383	Standard Deviation: 2.598	Variance: 6.752		

Source: Primary data.

In fact, all the five components so selected seem to explain 64.12% of the total variance; the remaining variance is described by other variables. The observations in Table 2 provide an insight into the five components that symbolise the heuristics of investors.

The five factors extracted were representative bias, overconfidence, regret aversion, mental accounting, and herd behaviour. These were the short-cuts, otherwise called heuristic simplification, causing several psychological biases. These heuristics allow the brain to disseminate the scenario using available information (Baker & Nofsinger, 2002) and may create incorrect judgements.

- Representative bias means a decision based on a stereotyped situation or information. The factor was extracted with a 24.07 of data variance. It was found that the investors were very significantly influenced, with a mean value of 12.50 and a standard deviation of 2.181. The tendency of the investors exhibits that they give priority to those portfolios with better profitability and ignore those with low returns. The technical analysis with historic price movement and existing performance is considered as an indicator for decision making (Dhar & Kumar, 2001).
- Overconfidence is the predisposition of the investor to rely more on self-abilities and skills. Kahneman and Riepe (1998) classified the overconfident behaviour as a combination of optimism, overestimation of individual knowledge, exaggeration of the ability to control events, and risk underestimation. This factor was extracted by factor analysis and accounts for 14.007% of data variance, with a mean value of 14.72 and a standard deviation of 2.90.
- Regret aversion is a part of the prospect theory, a negative emotion evoked from the outcome of decision. The habit of buying lottery tickets is also a part of regression, where the investor considers

the probability of gain to be much higher than the probability of loss. The mean value of regret aversion is 11.47, with a standard deviation of 2.25. In other words, regret aversion is the emotional instability of investors, in terms of self-blame during bad decision making, by seeing the winning stock which was already sold while evaluating their realised returns (Fogel & Berry, 2006).

- Mental accounting describes the predilection of an individual to place some events/situations into different mental accounts, based on certain traits. The concept of mental accounting is the same as the prospect theory of Kahneman and Tversky (1979), which implies that the individual will decompose their investment problems into local decisions with their cognitive simplicity. This is the reason why investors have different time horizons for investment, with multiple objectives. The mean value of mental accounting is 11.30, with a standard deviation of 2.20.
- Herd behaviour is the most commonly accepted observation of the financial markets worldwide, in a psychological environment. People trust suggestions and recommendations of their friends, relatives, and colleagues while making a decision. The investor's decision is influenced by the recommendations provided by famous specialists. This is the basic reason for stock market fluctuations, caused due to investors' collective assessment; as a result, the true value of the market may be inappropriate. The mean value of herd behaviour is 10.38, with a standard deviation of 2.25.

Investor's Psychology on Risk Tolerance

The investor's risk tolerance represents the maximum amount of psychological risk an investor can afford. This part of the analysis was directed towards estimating the

psychological aspects of the risk tolerance level of the investors. The predictive model between the risk takers and non-risk takers was developed using discriminant function. The dependent variable of the study is the risk segmentation measured based on the attitude of investors towards risk. From the sample, we found that 89.7% of the respondents categorised themselves as risk takers, and the remaining (10.3%) as non-risk takers.

Discriminant analysis was used to model the categorical variables as dependent variables based on their relationship to one or more predictors. The dependent variables for the study were risk takers and non-risk takers. The number functions developed from the discriminant function,

based on the dependent variables, will be $n-1$ discriminant function. The present study has five independent variables extracted from factor analysis, such as representative bias, overconfidence bias, regret aversion, mental accounting, and herd behaviour. And the dependent variable is risk tolerance level based on the risk attitude. The model was generated using linear combinations of its predictor variables.

The group statistics of the independent variables, along with its classification based on risk attitude, are furnished in Table 3. The variation in the mean value of independent variables along with the grouping variables were observed. The variation was found to be high for risk takers compared to non-risk takers.

Table 3: Group Statistics and Wilks' Lambda Values

Group Statistics					Equality of Means	
	Risk Takers (n = 822)		Non-Risk Takers (n = 94)			
Behavioural Factors	Mean	Std. Dev.	Mean	Std. Dev.	Wilks' Lambda	F
Representative Bias	12.5706	2.18772	11.9574	2.05261	0.993	6.707**
Overconfidence Bias	14.7835	2.86851	14.2234	3.19325	0.997	3.139
Regret Aversion	11.9745	2.25329	11.1383	2.10274	0.987	11.77***
Mental Accounting	11.4745	1.92773	11.1596	1.45398	0.997	2.354
Herd Behaviour	7.0985	1.74676	6.4149	1.40972	0.986	13.396***

Source: Primary data.

Note: ***1% significance level, **5 % significance level.

From the test of equality of mean (Table 3), we found a significant difference between the two groups of risk takers and non-risk takers. Equality of mean value, with the help of Wilks' Lambda and F-statistics, helps in re-verifying the significant difference across the risk takers and non-risk takers. All the biases were found to significant, except overconfidence bias and mental accounting.

Table 4: Eigenvalues

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	0.514 ^a	100.0	100.0	0.583

a. First 1 canonical discriminant functions were used in the analysis.

Source: Primary data.

The $n-1$ rule of dependent variable provides one canonical discriminant function with a 100% of variance. The robust analysis is done based on an eigenvalue of 0.514 and with a canonical correlation of 0.583. The correlation value was found to be positive, indicating the positive correlation of dependent variables. Around 40% of discriminating changes among the independent variables were found by squaring the canonical correlation value of 0.339. The significance of the discriminant function was tested by framing the following hypothesis.

H_0 : The behavioural factors do not have the discriminating ability to distinguish a risk taker and a non-risk taker.

Table 5: Wilks' Lambda

Test of Function(s)	Wilks' Lambda	Chi-Square	Df	Sig.
1	0.661	47.855	9	.000

Source: Primary data.

The hypothesis (H_0) was rejected, with a lambda vale of 0.661 at 1% significance level. Thus, the results demonstrate the discriminating power of behavioural factors between the risk takers and non-risk takers.

Table 6: Canonical Discriminant Function Coefficients

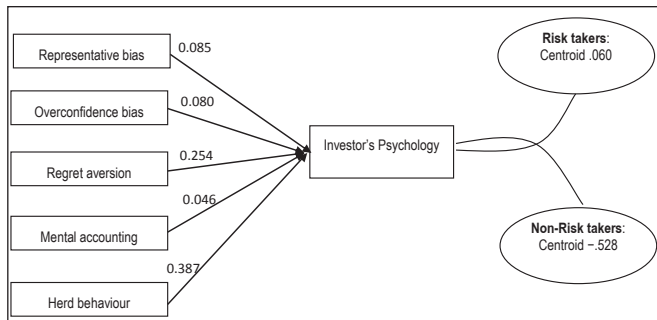
	Function
	1
Representative Bias (REP)	0.085
Overconfidence Bias (OVC)	0.080
Regret Aversion (RAT)	0.254
Mental Accounting (MAT)	0.046
Herd Behaviour (HBT)	0.387
(Constant)	-8.503
Unstandardised coefficients	

Source: Primary data.

The unstandardised scores of independent variables are shown in Table 6. Equation (1) is solved using the canonical discriminant function coefficients and is as follows:

$$\text{Risk Tolerance} = -8.503 + (0.085 \text{ REP}) + (0.080 \text{ OVC}) + (0.254 \text{ RAT}) + (0.0467 \text{ MAT}) + (.387 \text{ HBT})$$

The coefficient values of the predictor variables elucidate the discriminating power of the risk tolerance level of the investors. The accuracy of discriminate function can be analysed further using its centroids, which indicates the average discriminant score between the groups. Using the centroid function, the risk takers and non-risk takers were classified based on their mean values. In the study, we found that risk takers have a mean of 0.060, while non-risk takers have a mean of -0.528. The pictographic representation of the discriminant function based on the canonical discriminant function and the centroid is shown in Fig. 1.



Source: Primary data.

Fig. 1: Investor’s Psychology on Risk Tolerance

The classification results presented in Table 7 provide the strength of the discriminant equation. The result confirms that 64.8% of the selected cases were correctly classified and found to be a good fit for the discriminant function. As a result, it is concluded that the five behavioural factors are almost up to the mark and investors are contented with the factors.

Table 7: Classification Results^a

Original	Risk Attitude		Predicted Group Membership		Total
	Non-Risk Takers	Risk Takers	Non-Risk Takers	Risk Takers	
Count	Non-Risk Takers		58	36	94
	Risk Takers		286	536	822
%	Non-Risk Takers		61.7	38.3	100.0
	Risk Takers		34.8	65.2	100.0

a. 64.8% of original grouped cases correctly classified.

Source: Primary data.

The results of the test are summarised as follows:

- Investors’ approach towards the technical information should be considered while determining optimum portfolio. Investors are found to be more conscious about their returns.
- While determining an optimum portfolio, the knowledge, experience, and skill of the investors should not be considered during the time of risk assessment. Since overconfidence bias has the discriminating power of 0.233, it exerts moderate influence.
- Regret aversion has a strong association with the risk attitude of the investors. Therefore, different segments of investors should design different portfolios. Risk-returns trade-off should be established while determining the optimum portfolio for a segment of investors.
- Investors prefer to have a diversified portfolio. However, the number of avenues in the portfolio is not a criterion for an investor. Mental accounting is found to have the lowest discriminating power among the variables.
- Opinion, recommendations, and technical information shape the risk tolerance level of investors. Each group requires different portfolio patterns, with varying levels of associated risk. Herd behaviour has the highest discriminating power, when compared to other variables.

CONCLUSION

From factor analysis, we found the various behavioural factors/biases affecting investors in their decision making. This reveals the irrational behavioural characteristics of investors, which is an opposing factor towards rational thinking. The factors that were most predominant among the individual investors were expressed in the form of overconfidence, representative bias, herd behaviour, regret aversion, and mental accounting. These are the few cognitive behaviours explained by the psychologist in the domain of behavioural finance. The psychological fact, known as biases or heuristics, and its presence in decision making, provide additional insight on the subject of investor irrationality, and broaden the ideals of rationality (Chira & Thornton, 2008).

Discriminant function was applied to evaluate the investors’ psychology on risk tolerance. The five behavioural factors, such as representative bias, overconfident bias, regret aversion, mental accounting, and herd behaviour, were taken into consideration to find the discriminating ability between the groups of risk takers and non-risk takers. From the equality of group mean, it is found that there is no difference

among the two groups for overconfidence bias and mental accounting. The model has an eigenvalue of 0.514 and canonical correlation of 0.583. Risk tolerance equation was derived from the canonical discriminant function coefficient. The equations help classify the investors based on the midpoint of the centroid.

REFERENCES

- Allen, D. W., & Evans, D. (2005). Bidding and overconfidence in experimental financial markets. *The Journal of Behavioural Finance*, 6(3), 108-120.
- Barber, B. M., & Odean, T. (2013). Chapter 22 – The behavior of individual investors. In G. M. Constantinides, M. Harris and R. M. Stulz (Eds.), *Handbook of the Economics of Finance* (vol. 2, pp. 1533-1570). Elsevier.
- Barber, B., & Odean. (2001). Boys will be boys: Gender, overconfidence and common stock investment. *Quarterly Journal of Economics*, 261-292.
- Biais, B., Hilton, D., Mazurier, K., & Pouget, S. (2005). Judgmental overconfidence, self-monitoring and trading performance in an experimental financial market. *Review of Economic Studies*, 72, 287-312.
- Chandra, A. (2008). *Decision making in the stock market: Incorporating psychology with finance* (pp. 461-483). FFMI 2008 IIT Kharagpur.
- Chira, I., & Thornton, B. (2008). Behavioural bias within the decision making process. *Journal of Business and Economics Research*, 6, 8-11.
- Davar, Y. P., & Gills, S. (2007). Investment decision making: An exploration of the role of gender. *Decision*, 34(1), 95-120.
- DeBondt, W. F., & Thaler, R. (1985). Does the stock market overreact. *Journal of Finance*, 40(3), 793-807.
- Dhar, R., & Kumar, A. (2001). A non-random walk down the main street: Impact of price trends on trading decisions of individual investors. Yale School of Management Working Paper.
- Fogel, O., & Berry, T. (2006). The disposition effect and individual investor decisions: The roles of regret and counterfactual alternatives. *Journal of Behavioural Finance*, 7(2), 107-116.
- Fuller, R. J. (1998). Behavioral finance and the sources of Alpha. *Journal of Pension Plan Investing*, 2(3).
- Garman, E. T., & Fogue, R. (2011). *Personal finance*. Cengage Learning.
- Glaser, M., & Weber, M. (2007). Overconfidence and trading volume. *The Geneva Risk and Insurance Review*, 1-36.
- Hoffmann, A. O., Post, T., & Pennings, J. M. (2015). How investor perceptions drive actual trading and risk-taking behavior. *Journal of Behavioral Finance*, 16(1), 94-103.
- Kahneman, D., & Riepe, M. W. (1998). Aspects of investor psychology. *The Journal of Portfolio Management*, 24(4), 52-65.
- Kahneman, D., & Tversky, A. (1974). Judgement under uncertainty: Heuristics and biases. *Science*, 185, 1124-1131.
- Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47, 263-291.
- Kent Baker, H., & Nofsinger, J. R. (2002). Psychological biases of investors. *Financial Services Review*, 11, 97-116.
- Kulkarni, M. S. (2014). A study of investment behaviour based on demographics. *Journal of Commerce & Accounting Research*, 3(4), 47-54.
- Lusardi, A., & Mitchell, O. (2006). Financial literacy and planning: Implications for retirement wellbeing. Pension Research Working Paper, Pension Research Council. Philadelphia: Wharton School University of the University of Pennsylvania.
- Michailova, J., Mačiulis, A., & Tvaronavičienė, M. (2017). Overconfidence, risk aversion and individual financial decisions in experimental asset markets. *Economic Research-Ekonomska Istraživanja*, 30(1), 1119-1131.
- Nöth, M., & Weber, M. (2003). Information aggregation with random ordering: Cascades and overconfidence. *The Economic Journal*, 113, 116-189.
- Olsen, R. A. (1998). Behavioural finance and its implication for stock price volatility. *Financial Analysts Journal*, 54(2), 11-18.
- Pompian, M. (2011). *Behavioral finance and wealth management: How to build investment strategies that account for investor biases*. N J: Wiley & Sons.
- Rasheed, M., Rafique, A., Zahid, T., & Akhtar, M. (2018). Factors influencing investor's decision making in Pakistan: moderating the role of locus of control. *Review of Behavioral Finance*, 10(1), 70-87.
- Ricciardi, V., & Simon, H. K. (2000). What is behavioural finance. *Business, Education and Technology*, 2(1), 26-34.
- Ricciardi, V. (2008). The psychology of risk: The behavioral finance perspective. In F. J. Fabozzi (Ed.), *Investment Management and Financial Management* (pp. 85-111). Hoboken NJ: John Wiley and Sons.
- Ritter, J. R. (2003). Behavioral finance. *Pacific-Basin Finance Journal*, 429-437.
- Roszkowski, M. J., & Grable, J. (2005). Estimating risk tolerance: The degree of accuracy and the paramorphic representations of the estimates. *Association for Financial Counselling and Planning Education*, 29-47.

- Sahi, S. K., & Arora, A. P. (2011). Individual investor biases: A segmentation analysis. *Qualitative Research in Financial Markets*, 4(1), 6-25.
- Shefrin, H. (2000). *Beyond greed and fear: Understanding behavioural finance and the psychology of investing*. Boston, Massachusetts: Harvard Business School Press.
- Shefrin, H., & Statman, M. (1984). Explaining investors preference for cash dividends. *The Journal of Financial Economics*, 40(3), 253-282.
- Statman, M. (1999). Behavioural finance: Past battle and future engagements. *Financial Analyst*, 18-27.
- Swisher, P., & Kasten, G. W. (2005). Post-modern portfolio theory. *Journal of Financial Planning*, 19(9), 74-85.
- Tripathi, M., & Chattopadhyay, T. (2013). Study of behavioral dimensions of perceived risk of investments of financial experts and laymen in equity mutual funds in India. *Journal of Commerce & Accounting Research*, 2(4), 10-27.
- Tversky, A., & Kahneman, D. (1974). Judgement under uncertainty: Heuristics and biases. *Science*, 185(4157), 1124-1131.
- Waweru, N. M., Munyoki, E., & Uliana, E. (2008). The effects of behavioural factors in investment decision-making: A survey of institutional investors operating at the Nairobi Stock Exchange. *International Journal of Business and Emerging Markets*, 1(1), 24-41.