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INVESTMENT BEHAVIOR OF ENGINEERS: AN EMPIRICAL STUDY

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ABSTRACT

The study investigated the behavioral biases of individual investors and their impact on the investment behavior in context of Indian Stock Market. A structured questionnaire were developed and distributed among 196 individual investors who are engineering graduate. The respondents are selected based on convenience sampling. Multi-criteria technique of AHP is used to define the relative contribution of each of the behavioral bias in shaping the investor behavior. Most of the investors over-rate their loss aversion tendency and are found to have fear of loss. Herd behavior among the investors is also observed and they are found to follow the advice of their advisor, relative and friend while buying and selling the in familiar stocks. Results revealed that behavioral biases significantly influence investment behavior that may lead them towards less than optimal investments.

Keywords: Investment Behavior, Behavioral biases, AHP, Loss Aversion, Herding, Mental Accounting.

INTRODUCTION:

Traditional models of finance assume that the investors are totally rational. They take their investment decision to maximize their expected utilities. Efficient Market Hypothesis, proposed by Eugene Fama (1970) suggests that all the markets are fully efficient. In efficient markets investors demonstrate the self-control on their decisions. They react on each and every piece of information and that to rationally. There is no role of emotions feelings and other behavioral factors. But this assumption no longer works as the number of researchers have found the evidence that the emotional and behavioral factors also play an important role in investment decision making. And, that the investors not always react as rational creature when comes to investment as the feeling of loss, winner's pride, mental accounting, framing of investments, herding etc also effect the decision making.

Behavioral Finance is an emerging field which deals with the irrational nature of investors. Efficient Market Hypotheses suggest that all the market information are immediately incorporated in security prices and that security prices are the best estimated and accurate prices all the time. But Behavioral Finance denies this assumption and suggest that there are number of evidence such as January Effect, Weekend effect, Seasonality etc. through which it has proved that markets are not efficient all the time and investors often travel from rationality to irrationality in perhaps a predictable manner. To some extent, our emotions, feelings and perceptions influence the investment decisions and these are known as mental biases. Behavior finance makes an attempt to study the irrational behavior of investors in the market based on the said mental bias. It also explains the factors responsible for such behavior. The established finance seeks to understand stock markets using models in which investors are "rational". Rationality for that purpose means when investors receive new information, they update their viewpoint on any financial action efficiently. This traditional framework is theoretically simple, but **Shiller (2000)** advocates that stock market are strongly governed by the market information, which directly influence the investment behavior of the investor. It can be concluded that individual trading behavior cannot be understood in established traditional finance structure. **Clark (1918)** rightly mentioned that the economist may attempt to ignore psychology, but it is sheer impossibility for him to ignore human nature. Emergence of the concept of Behavioral finance in 1980s was the response to the anomalies detected in the standard finance models which are blamed for the lack of realism in the assumptions on human behavior. It examines financial phenomenon of investment through the dual lenses of finance and of psychology. In behavioral finance, all stock market anomalies are explained by psychological theories. **Lintner (1998)** defines behavioral finance as being "the study of how humans interpret and act on information to make informed investment decisions". **Olsen (1996)** asserts that this field of psychological finance tries to understand the complexity of standard finance through of psychological decision making process of market. It may be argued here that some stock market phenomenon can be better understood using such models in which some investors are not fully rational. Behavioral finance is expected to look into the following possible behavioral patterns in financial markets:

- Reaction of an investor to a price change
- Reaction of an investor to a news
- Extrapolation of past trends into the future
- Focus on some popular stocks and lack of attention to fundamentals
- Seasonal price cycles etc.

On theoretical level, if exploitable pricing anomalies exist in the market, the credibility of the Efficient Market Hypothesis (proposed by Fama, 1970) is diluted. When new information is quickly reflected into the price, market is known to be efficient. According to Efficient Market Hypothesis, the current market price reflects all available information and the current market price in any market could be the true estimate of the value of the security.

The theories of behavioral finance are not denying the established theories rather these are making them more realistic by examining their relaxed behavioral assumptions. Behavioral finance does this by adding the aspect of individual investment patterns in financial markets. Without this contributions the anomalies exist in financial markets cannot be explained.

BACKGROUND OF THE STUDY:

Individual investment pattern is influenced by number of demographic and socioeconomic factors. For example the age of investor plays a key role in the process of decision making. With the sample of more than 75000 US investors, Korniotis and Kumar (2008) in their study concluded that although with the age trading experience and knowledge increases due to positive effect of learning but declines with age due to the adverse effects of cognitive aging. This is usually thought that small investors are more prone to behavioral biases than professionals, who are better trained (Malmendier and Shanthikumar, 2004). Yet some empirical work suggests that professionals exhibit some behavioral biases to a greater extent than non-professionals (Haigh and List, 2005). Family size, marital status, numbers of children impact the asset allocation and stock market participation (Love, 2010). The present study investigates the effect of these factors on the mental biases of engineers. Specially engineers are taken because engineers are supposed to be more inclined towards the rationalistic thoughts and therefore may have more logistic decision making power. They may tend to believe that the world is more deterministic than it is and this gives them more confidence in statistics. Engineers are supposed to be more hostile to the idea that emotions have utility in the workplace, believing instead that this profession must be based on logic, reason, inference, deduction and the hard cold facts of observable reality (Bessler et al., 2010). Except this, engineers now a separate group of professionals in the society. The number of engineering graduates is increasing every year. As per UGC Reports of different years, the ratio of total graduates awarded an engineering degree is now 17% compared to 5% in 2001-02. Engineering is a degree which proves to be most employable without the requirement of higher education or the postgraduate. This is the only decision of the engineers what to opt as a career after getting engineering degree. This research attempts to identify the determinants of investment behavior of individual investors (who possess engineering degree) and their relative importance in investment behavior. The impact of investment behavior on investment decision would also be covered. In our study investor behavior would be studied in terms of nine biases which are anchoring, cognitive dissonance, herding, loss aversion, mental accounting, overconfidence, optimism, regret, self-attribution. We would identify the relative importance of each bias in shaping investment behavior.

LITERATURE REVIEW:

Oslen (1998) suggested behavioral finance is a new dimension of finance theory, which seeks to understand and predict standard financial market implications of psychological decision-making. Behavioral finance is not the replacement of modern finance but it seeks to supplement them by explaining the irrationality and anomalies exist in the financial markets. Behavioral finance exerts that by understanding the psychological mechanism of decision making, the modern and standard finance models may be extended to better understand and reflect the true picture in today's evolving markets.

Since the role of emotions and psychology has been considered relevant in investment, number of economists, psychologists, investment professionals have worked upon on this topic. The literature review is divided in two sections. First section deals with the journey from the rational thoughts to the irrational thoughts with the introduction of Behavioral Finance. Second section deals with the patterns of irrational behaviors and discusses the biases found in rational behavior.

Depart from rationality to irrationality:

According to Eugene Fama (1970) "Efficient market hypothesis states that financial prices incorporate all available information and prices can be regarded as optimal estimates of true investment value at all times". This hypothesis is based on the assumption that investors behave rationally, always try to maximize expected utility and consider all available information (Shiller, 1997). Traditional theories are based on the preposition of Efficient Market Hypothesis. However, common investors tend to be irrational as they are many of times mislead by their moods, emotions and beliefs. According to Simon (1956) people have limited capacity of processing information in solving complex problems. Moreover, "people have limitations in their attention capabilities and they do take into account social considerations (e.g. by deciding not to invest in tobacco companies)", (Kahneman, 1973). Kahneman and Tversky, (1973, 1979) pointed out that, "people fail to update beliefs correctly and have preferences that differ from rational agents". In addition, "rational traders are bounded in their possibilities such that markets will not always correct non-rational behavior", (Barberis and Thaler, 2003). Hence, traditional theories

may give an unreal and deceptive description of financial behavior. Theories based on the prepositions of modern finance do not match with the current global financial scenario.

Behavioral finance introduces the behavioral aspects and focuses on the application of psychological and economic principles for the improvement of individual investment decision-making process. In his book titled "Beyond Greed and Fear", Shefrin (2000) states that people are "imperfect processors" of information and are usually biased, commit mistakes and have perceptual problems.

***Understanding investment patterns and behavioral biases**:*

The study of investment psychology provides confirmation of a variety of psychological effects that help better understand the behavior of investors in context of stock markets. Individual investors appear to invest in a manner that is inconsistent with the standard finance. Specifically, they are undiversified (Benartzi and Thaler (2001); Bhatnagar (2012)), loss averse (Kahneman and Tversky, 1979), overconfident (Gervais and Odean, 2001; Barber and Odean, 2001), prone to over reaction (DeBondt and Thaler, 1985, 1987), and shows mental accounting (Tversky and Kahneman, 1981). Barber and Odean (2000) concluded investors are reluctant to realize the losses and show hurry in selling their profitable stocks. Grinblatt and Keloharju (2000) also confirm the findings of Barber and Odean (2000) and also documented that investors have tendency to stick on a reference. Hirshleifer and Shumway (2003) find that moods of investors at the time of trading, also influenced by cloud cover or number of hours of daylight .According to Kahneman, 1973 "People are limited in their capacity for processing information, since they possess a limited working memory and limited computational capabilities and are limited in their attention capacity and hence ability to perform multiple tasks simultaneously",. Similarly, Miller (1956) states that investor can process only seven piece of information at a time. People generally adopt simplifying rules-of-thumb, or heuristics, to deal with the complexity of investment decisions which may result in behavior that is not fully rational (Gabaix and Laibson, 2000). Similarly, people also have the tendency to follow the judgment and behavior of others while making an investment decision (Asch, 1956) and this herding behavior cause the endogenous fluctuations (bubbles and crashes) in financial markets (Topol, 1991). Shiller (1990) has documented the importance of the role of conversation in diffusion of admired ideas in context of financial markets. Shiller and Pound (1989) surveyed individual investors and observed that most of the investors are influenced by interpersonal communication while investing in a particular stock. Further, many studies, for example, Tversky and Kahneman (1971, 1974), DeBondt and Thaler (1985), Barberis, Shleifer and Vishny (1998), Odean (1998, 1999) find that individuals judge the event on the basis of hoe they have recently occurred and not on the basis of all past statistics also. Also, if people are taking steps to averse losses in the stock market, then it is very important to study regret aversion (Bell, 1982). The phenomena of "mental accounting" (Thaler, 1980, 1999) which explains that the people tend to take decisions in a narrow fashion instead of taking into consideration a broader frame, (Tversky and Kahneman, 1981, and Kahneman and Lovallo, 1993). Mental accounting is a tendency of investors when they put different types of gambles into separate mental accounts by ignoring the likely connection between the accounts and make use of simple "prospect theoretic decisions rules" to each account separately. Such mental accounts are mostly isolated on the basis of content and time (Goldberg, von Nitsch, 2001). North Craft and Neale (1987) have disclosed that when the agents were told to estimate the price of property, where they were pre provided by the proposed list of prices, one group was provided with lower price list as compared to the other group. The influence of Anchoring Bias could be very clearly seen in the results as the group provided with higher price list, estimated the property at a higher price. Cognitive Dissonance is the feeling of discomfort felt by investors, if they come across with some idea, which is against their view point. James Montier (2002), the author of Book "Insights into Irrational Minds and Markets", elaborates the Conservatism Bias, because of which investors tend to cling to the forecasts they have made and they find it difficult to move away from that forecast. Gervais and Odean (2001) discussed Self Attribution Bias in their paper "Learning to be overconfident", in which they have discussed that traders in stock market also show the susceptibility of self-enhancing bias which finally leads to Overconfident Bias.

OBJECTIVE:

Following are the major objectives of the study:

- To study the investment behavior of individual.

- To identify the biases reflect in the investment behavior of engineers.
- To study the relative importance of each biases in shaping investment behavior.

RESEARCH METHODOLOGY:

For the purpose of study, we have used primary data. A structured questionnaire with 29 predefined variables of 9 construct (biases) is used to collect the data. The questionnaire has been circulated to those individuals who invest in equity market and resides in Delhi NCR. Total sample size is 196.
Analytical Hierarchical Process (AHP) proposed by Tomas L. Saaty (2008) is used to identify the relative importance of each bias in shaping investment behavior. Along with AHP, regression analysis is used to study the contribution of each bias in shaping investment behavior.

FINDINGS AND ANALYSIS:

Biases of Individual Investment Behavior:

The literature review helped us to identify 9 biases which influenced the investment behavior. These biases are loss aversion, herding, mental accounting, cognitive dissonance, overconfidence, anchoring, regret aversion, optimism and self-attribution. They are divided into different subfactor. AHP, with the help of pair wise comparison of the investors' responses, defined priorities for the behavioral dimensions in terms of their relative contribution in the formation of investor behavior. AHP determined loss aversion as the most important bias among all followed by mental accounting, herding, cognitive dissonance and over confidence (Figure:1) The most important factor which shows that investors are loss averse is the tendency of the investors to immediately realize their gains to avoid the losses. Also, investors are reluctant to realize the losses. They hold the securities if they are incurring the loss on them. The have fear of loss and that's why they hold their investments in volatile stock market environment. These all factors lead them to be loss averse which shapes their investment behavior. Second most important bias that shapes the investment behavior is herding in term of the tendency of investors to follow the opinion of advisors, friend and relative in both buying and selling the stocks which are not familiar to them. After herding, the bias which comes third in priority is mental accounting which suggests that investors generally use the funds in the stock market that they earn from the stock market only.

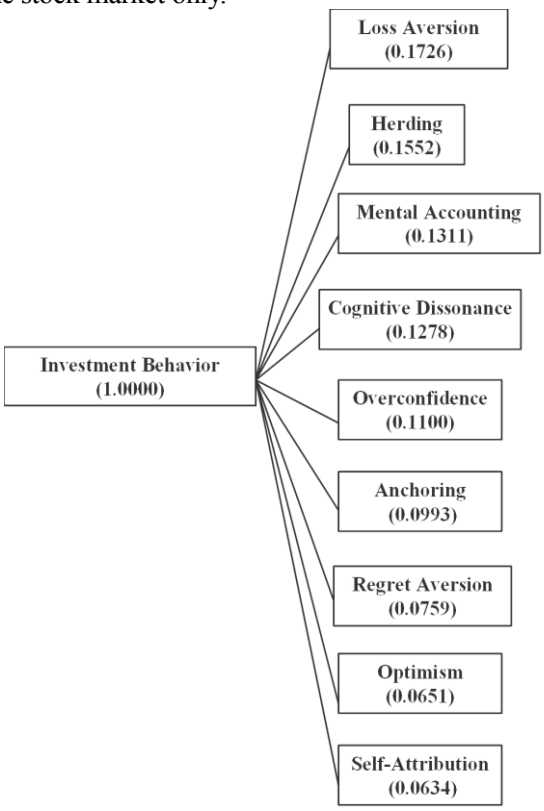

Figure :1 Biases of Individual Investment behavior and their relative weights according to AHP

The cognitive dissonance is at fourth place as suggested by AHP which suggest that investors usually do not remain with their portfolio when they think that they have mistaken in portfolio construction. Overconfidence gets fifth ranking in investment decision making as investor are confident enough in their stock picking abilities. The next bias which contributes in decision making process is anchoring in terms of the investor's tendency to fix the last lowest price to buying price and the last highest price to selling price. The behavioral bias regret aversion is at seventh rank, depicting that investors regret their decisions when the prices of the securities which they bought immediately go down. Optimism is at eighth rank. Findings reveal that investors usually buy the stocks which are rising with the expectation of further price rise. The last bias which is important in shaping investment behavior is self - attribution which is the tendency of investors to attribute themselves for their successes and attribute the bad luck or others for their losses.

IMPACT OF BEHAVIORAL BIASES ON INVESTMENT BEHAVIOR:

Regression analysis helped to identify the impact of behavioral biases on overall investment behavior. It reveals that which bias affects the most the investment behavior. Findings are summarized in Table:1

Table 1: Results of Regression Analysis : Impact of behavioral biases on investment behavior

Independent Variable	Coefficient	Std. Error	t-statistics	sig
Anchoring	0.196	0.156	0.318	0.004*
Cognitive Dissonance	0.218	0.161	3.206	0.001*
Herding	0.283	0.157	0.986	0.008*
Loss Aversion	0.356	0.112	1.508	0.000*
Mental Accounting	0.267	0.16	0.401	0.018*
Overconfidence	0.214	0.157	1.367	0.014*
Optimism	0.168	0.157	2.131	0.003*
Regret Aversion	0.173	0.156	1.775	0.006*
Self - Attribution	0.163	0.153	1.976	0.003*
	R-square	0.298	**F-Statistics**	2.148
	Durbin Watson	1.865	**Probability**	0.015

*significant at 5%

Findings of Regression analysis revealed that investment behavior is significantly affected by all the broad behavioral biases. All the biases, anchoring, cognitive dissonance, herding, loss aversion, mental accounting, overconfidence, optimism, regret aversion and self attribution have significant impact on investment behavior (p value is less than 0.05 for all), that supports the argument made earlier that behavioral biases has an impact on investment behavior. Moreover, R- square value of 29.8 % also suggest that behavioral biases cast high impact on overall investment behavior.

CONCLUSION:

The study investigated the behavioral biases of individual investors and their impact on the overall investment behavior in context of Indian Stock Market. The empirical findings from the analysis propose that individual investors tend to be irrational somehow when considered from a standard finance perspective. Results revealed that investor behavioral traits and biases significantly influence the investment decision making process. The investors are found to have high level of loss aversion and herding, mental accounting, cognitive dissonance and overconfidence while they are not much anchored, regret averse, optimistic and self –attributed. But these biases also have a significant impact on overall investment behavior. The bottom line is that individual investors do not behave in accordance with the tenets of standard finance theory and behavioral biases lead them to take investment decisions that may be less than optimal.

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