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Portfolio investor personality traits and portfolio investment decisions: An empirical analysis

Dr. Chabi Gupta[1], Dr. Kshama Agarwal[2]
[1] Galgotias University, Uttar Pradesh, India
[2] Professor, Galgotias University, Uttar Pradesh, India

Abstract
Investor Behaviour often deviates from logic and reason, and investors display many behaviour biases that influence their investment decision-making processes. What are the reasons investors behave as they do? A portfolio investor's behaviour often deviates from logic and reason. Emotional processes, mental mistakes, and individual personality traits complicate tough investment decisions. Thus, investing is more than just analyzing numbers or figures and making decisions to buy and sell various assets and securities. A large part of investing involves individual Behaviour. Ignoring or failing to grasp this concept can have a detrimental influence on portfolio performance of the investors especially in the long run.
Behavioural biases in investing encompass many types. For example, cognitive biases refer to tendencies to think and act in certain ways. A cognitive bias can be viewed as a rule of thumb or heuristic, which can lead to systematic deviations from a standard of rationality or good judgment. Some controversy still exists about whether some of these biases are truly irrational or whether they result in useful attitudes or Behaviour. Other biases are more emotional in nature. Understanding investor behaviour can inform investors about these biases and help them improve their decision-making processes in selecting investment services, products, and strategies. As a result of the financial crisis of 2007-2008, the discipline of psychology began to focus even more on the financial decision-making processes of individuals. Although theory may deem markets to be efficient, investor biases can explain a lot about why assets are often mispriced.
This research work attempts to highlight the effects of the cognitive biases on portfolio investment decisions, and the relationship with portfolio investor's personality traits. The pedagogical assumption underlying this focus is that once the portfolio investors are aware of this mental error, they will notice this in the arguments of others and be able to resist this bias, and that they will avoid making the errors themselves. This will lead to optimal portfolio performance in the long run. This research work concluded that there is direct correlation between extroversion and openness personality trait with hindsight bias and over confidence cognitive bias, between neuroticism personality trait and randomness bias, between escalation of commitment personality trait and the availability bias. Also, there is a reverse correlation between conscientiousness personality trait and the randomness bias, between openness personality trait and the availability cognitive bias.

Keywords: portfolio, financial, personality, conscientiousness

Introduction
The portfolio investor is a human being and to err is just natural. Extreme volatility has plagued financial markets worldwide since the 2008 Global Crisis. Investor sentiment has been one of the key determinants of market movements. In this context, studying the role played by emotions like fear, greed and anticipation, in shaping up investment decisions seemed important. Traditional finance assumes investors always behave rationally and they can process new information quickly and accurately, whereas the evolving field of behavioural finance assumes that investors suffer from cognitive and emotional biases which may lead to irrational and unexplained financial decision making. All too many investors are completely unaware of the mental pitfalls that await them. Even once they are aware of their cognitive biases, it must also be recognized that knowledge does not equal behaviour. Huge amount of information is readily available and it is upon the investor to differentiate and select.
Much of the economic and financial theories presume that individuals act rationally in the process of decision making, by considering all available information. But there is evidence to show repeated patterns of irrationality in the way humans arrive at decisions and choices when faced with uncertainty. Behavioural finance, a study of the market that draws on psychology, throws light on why people buy or sell stocks and why sometimes do not buy or sell at all. The most crucial challenge faced by the investor is in investment decisions. The profit made, or losses incurred by an investor can be attributed mainly to his decision-making abilities. The fact that even the most prominent and well-educated investors were affected by the collapse of the speculative bubble in the 2008 subprime crisis proved that something was fundamentally missing in the traditional models of rational market behaviour. In this study, the aim is to establish the existence of such fundamental issues, driven by various psychological biases, in the investment decision-making process. Behavioural economists firmly believe that psychological factors influence investment decisions. They argue that today's investment decisions demand a better understanding of individual investors' behavioural biases. However, many economists believe

completely in the application of traditional theories in the decision-making process and hence do not consider the concept of irrational behaviour. Behavioural finance therefore studies the influence of psychology on the behaviour of portfolio investors and their consequent reactions in stock market investing. It is an evolving field that studies how psychological factors affect decision making under uncertainty. In this context, it seems relevant to check whether the behavioural factors have an influence on the decision-making process of portfolio investors. A questionnaire will be formulated and distributed among the clients of two brokerage firms in India and their investment decisions and effects of behavioural factors on it will be studied. The focus will be on individual investors as they are more likely to have limited knowledge about application of traditional theories in decision-making and hence are prone to making psychological mistakes. One of the important factors on investors financial decisions are cognitive behavioural errors which affect portfolio investment decisions while buying and selling stock. This research work will study the popular cognitive biases among investors and their connection with personality. Therefore, 200 of the regular investors in National Stock Exchange India were taken randomly as samples and the needed data was gathered through a structured survey questionnaire. The parametric analysis and correlation techniques have been used here.

How people handle portfolio investment decision making

Most financial decisions are made in situations characterized by a high degree of uncertainty and complexity. Often, we have to choose between many alternatives, with many possible uncertain outcomes and probabilities, while many other (previous) decisions situations need to be considered as well. In such situations, the 'homo-economics' or the 'economic man' acts if it performs exhaustive searches over all relevant alternatives, evaluates all consequences by integrating the current decision with other decisions, and then picks the best alternative possible. However, psychological work suggests that people are not able to behave in such a way in many situations. People are limited in their abilities and capabilities to solve especially complex problems (Simon, 1955, 1957, 1959, 1979, Arthur, 1994, and Conlisk, 1996). People are limited in their capacity for processing information since we possess a limited working memory and limited computational capabilities. Moreover, people are limited in their attention capacity and hence ability to perform multiple tasks simultaneously (Kahneman, 1973). For example, a famous psychological finding is the "magical number seven plus or minus two" rule. It states that we can process only seven (plus or minus two) pieces or chunks of information the same time (Miller, 1956). Therefore, the cognitive load required for complex decision problems often exceeds people's cognitive capabilities.

To overcome these problems and manage the problem of interest, people generally rely on a limited number of simplifying rules-of-thumb, or heuristics, which often fail to accommodate the full logic of decisions (Simon, 1955, 1979, Newell and Simon, 1972, Tversky and Kahneman, 1974, Gabaix and Laibson, 2000). For example, when people have to choose among many alternatives, they do not weight of the advantages and disadvantages of all choice options, but they choose among alternatives by sequentially eliminating alternatives that do not possess certain characteristics (Tversky, 1972, Payne, 1976).

A similar heuristic manifests itself in one of the most important financial decisions: the construction of people's investment portfolios. For most individual investors capital market investments form a major part of people's current and future wealth. However, constructing an investment portfolio is also one of the most complex financial problems, requiring a lot of cognitive load. It requires people not only to focus on the individual assets, but also on the interaction and statistical association between them. Baltussen and Post (2007) find that investors cannot perform this task in accordance with economic theory and instead adopt simplifying heuristics in practice.

Rational decision making and personality

Behavioural scientists have got that people are involved with mental errors in their judgments under special conditions, which come to wrong expectations and wrong evaluation of the stock and finally results in irrational decisions (Fuller; 2000). On the other hand we know that perceptual abilities play on important role in man's decisions. Those who have a high perceptual ability and have a highly analysing ability, behave rationality in their decisions. A group of scientists believe those elements and the emotions which are in person's unconscious affect his mind and shape his thoughts. So while it is possible that unconscious issues and their effect be the main reason for decision; the reasons which he uses in his consciousness may be just excuses for his decisions (khoshnoud, 2004). In relation with this subject we concentrate on systematic errors which cover investors' thoughts. Since it is supposed that people act rationally, that is always a contradiction between what they think and what they understand. So their contradiction results in psychological errors and it is joined with the story that most investors think they are the best decision makers. Furthermore, they are looking for some data to confirm this idea which itself results in wrong decisions (Sheleifor; 2000) as their received information is not efficient.

Investing decisions are supposed to be rationally decided. Although we can decide various element bases, but generally thinking, rational decision making is the best way of deciding. Therefore, it is recommended to decide rationally without the emotions and personal feelings interferences, to decide rationally and on real bases (Harrison, 1975). But the problem is that the concept of rational person is not clear enough and the persons decisions may deviate the standard presuppositions (Bolhuis: 2005). There might be a situation which takes away the rational behaviour of the decider (Khoshnoud, 2004).

The relationship between investors' personality traits and the cognitive biases is an element to be considered in this way.

There have been lots of researches on investor's behaviour and the parameter which may affect their benefits; they have concluded that if the dealers could merge their portfolio well, it means that they could sell it to a higher price and buy in a lower price, this can be claimed as a rational behaviour (Masonson; 2007). Economic methodology is a proof in

understanding man's behaviour and his nature, this means the way he treats, not the way he has to and it is somehow related with financial behaviour (Frankfurter; 2004). Basically, a rational economic person is someone who tries to achieve his goals with the minimum expense. (Fridson; 2007). Considering the importance of this model among economists, it was exposed to criticism by other economists like Thorstein Veblen and John Maynard Keynes. They think that no one can be aware of the whole events and maximize his expected desire every time through determining his expectations. They assume "bounded rationality" instead in which all the trials for their decisions depend on the ability to organize the personal information and limitation (Frankfurter; 2004). Simon's limited rationality considers that the person's choices are rational but are limited as man's limited knowledge and perception capacity. Bounded rationality is related with methods in which the final choice is taken by decision. As logic contains a wide range of man's behaviour, even though we consider the whole behaviours as rational and the decisions as intellectual we are still faced with psychological errors which leave the concept of rationality in doubt. (Mcgoun, 1992).

As the decision makers mental perception is an important factor in the process of investment decision making, his personality is also interfering (Fromelt, 2001). Personality characteristic features like intellect and temper, point of view, all importantly contribute to portfolio investment decision making. In their model's ideologists have always tried to avoid the decision maker's personality and individual values while taking portfolio investment decisions. In spite of this, efforts for rationalizing the decision are an active key element in an investor's decision makings. A person's opinion, their risk potential, their experience is very important in their way of deciding (Khoshnoud, 2004).

Financial literature is important for portfolio investors' behaviour in decision making. In addition to sociological factors like age, gender, output, individual personality plays an important role in psychological and behavioural deviations.

Cognitive biases in portfolio investment decisions

To explain the cognitive biases which are the after effects of the psychological status in normal and abnormal situations (Mcgoun; 1992) over confidence bias, availability bias, hindsight bias, escalation of commitment and randomness bias, are being taken as variables for this research work. As the portfolio investors spend most of their funds in investing in stock market, such cognitive errors can be mostly related to their particular way of investing funds. This research work attempts to recognize and therefore reduce these cognitive errors while making portfolio investment decisions. Understanding such mental mistakes as investing cognitive errors and trying best to avoiding these, reduces their long term effect on portfolio investing decisions and potentially improve the investing results (Shefrin ; 2000).

1. Overconfidence cognitive bias: The overconfidence effect is a well-established bias in which a person's subjective confidence in his or her judgements is reliably greater than the objective accuracy of those judgements, especially when confidence is relatively high. Overconfidence is one example of a mis calibration of subjective probabilities. Throughout in the research literature, overconfidence has been defined in three distinct ways: [1] overestimation of one's actual performance; [2] over replacement of one's performance relative to others; and [3] over precision in expressing unwarranted certainty in the accuracy of one's beliefs. Therefore, the portfolio investors who aim for efficiency are more confident about future. This desire motivates them to buy stocks with higher prices and as they lack knowledge, it results in overall price reduction in the stock market and their potential efficiency decreases over a period of time. Generally, pretended confidence causes the investor to buy an expensive stock and sell it in a low price (Zhu; 2003). This increases the amount of dealings and results in bubble price in financial markets (Johnsson *et al.*, 2002).
2. Availability bias: The availability cognitive bias is a mental shortcut that relies on immediate examples that come to a given person's mind when evaluating a specific topic, concept, method or decision. The availability heuristic operates on the notion that if something can be recalled, it must be important, or at least more important than alternative solutions which are not as readily recalled [1]. Subsequently, under the availability heuristic, people tend to heavily weigh their judgments toward more recent information, making new opinions biased toward that latest news. The availability of consequences associated with an action is positively related to perceptions of the magnitude of the consequences of that action. In other words, the easier it is to recall the consequences of something the greater those consequences are often perceived to be. Most notably, people often rely on the content of their recall if its implications are not called into question by the difficulty that they experience in bringing the relevant material to mind.
3. Escalation of commitment: It is a human behaviour pattern in which an individual or group facing increasingly negative outcomes from some decision, action, or investment nevertheless continues the same behaviour rather than alter course. The portfolio investor maintains behaviours that are irrational but align with previous decisions and actions. Escalation of commitment was first described by Barry M. Staw in his 1976 paper, "Knee deep in the big muddy: A study of escalating commitment to a chosen course of action". Researchers, inspired by the work of Staw, conducted studies that tested factors, situations and causes of escalation of commitment. The research introduced other analyses of situations and how people approach problems and make decisions. Some of the earliest work stemmed from events in which this phenomenon had an effect and help explain the phenomenon. Part of this escalation is due to cognitive sunk costs that the person feels a pile of investing have been done on the decision. Justifying the wrong decisions for keeping a positive face on wrong organization and evaluation at beginning of the project and estimating low risk and failure and estimating exceeding success, perception defence and ignoring negative data are of the causes for escalation of commitment (Schoorman and Holahan, 1996).
4. Randomness bias: Randomness bias is the natural

tendency to see patterns in random data. The man's perception is more or less affected by luck and superstitions. But it differs in different cultures for example; believing in superstitions is high in the east. This is related to control centre. People who have got an external control centre believe in luck and superstitions more than those whose control centre is internal. Those who have an internal control centre think that they have control over their fate and world and can shape their future through rational decisions (Ghoilpour, 2007). These people even think that some events happen as the result of luck. It happens a lot in stock market at the time of investment decision making. What causes the result of these superstitions on decision so inefficient is that the person implies those lucks and coincident differently. (Janes and Wells, 2002).

5. Hindsight bias: This cognitive bias, also known as the knew-it-all-along effect or creeping determinism, is the inclination, after an event has occurred, to see the event as having been predictable, despite their having been little or no objective basis for predicting it. It is a multifaceted phenomenon that can affect different stages of designs, processes, contexts, and situations. Hindsight bias may cause memory distortion, where the recollection and reconstruction of content can lead to false theoretical outcomes. It has been suggested that the effect can cause extreme methodological problems while trying to analyse, understand, and interpret results in experimental studies. A basic example of the hindsight bias is when, after viewing the outcome of a potentially unforeseeable event, a person believes he or she "knew it all along". Such examples are present in the writings of historians describing outcomes of battles, physicians recalling clinical trials, and in judicial systems trying to attribute responsibility and predictability of accidents.

Big five personality traits model

The Big Five personality traits is a model based on common language descriptors of personality. When factor analysis (a statistical technique) is applied to personality survey data, some words used to describe aspects of personality are often applied to the same person. For example, someone described as "conscientious" is more likely to be described as "always prepared" rather than "messy". This theory is based therefore on the association between words but not on neuropsychological experiments. This theory uses descriptors of common language and therefore suggests five broad dimensions commonly used to describe the human personality and psyche. The five factors have been defined as openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism, often represented by the acronyms OCEAN or CANOE. Lots of tudies and researches have been done to improve the popularity of the model and it is considered as the base of other models (Nichelson *et al.,* 2005).

The five factors are

1. **Extroversion:** Individuals possessing this personality type are social, practical, appear affectionate, informal, are good conversationalists, and are active and lively. They are habitually outgoing, venturing forth with confidence into the unknown. They prefer outdoor activities, tend to be essentially social - participating in various social and personal activities. They appear full of energy and tend to involve themselves in a variety of pursuits. They are generally good leaders of big and small groups; they apparently live in the present, concentrating on current activity. These individuals adapt easily to a given situation and are particularly influenced by objects and events in the external world.

   Hypothesis 1: There is a significant correlation between being extroverted and investors' cognitive errors in portfolio investment decisions.

2. **Agreeableness:** Agreeableness is a personality trait manifesting itself in individual behavioural characteristics that are perceived as kind, sympathetic, cooperative, warm, and considerate. It is a person's tendency to respect the others; they can easily attract people's reliance (Gholipour, 2007, 209). They are really sincere and honest and deceiving people is hard for them and they have limited their needs and show priority toward other people's needs. These people like to be flexible toward others desires. Agreeableness manners are: trust, straight forwardness, modesty (Farzanepey, 2006).

   Hypothesis 2: There is a significant correlation between agreeableness and the investors' cognitive errors in portfolio investment decisions.

3. **Conscientiousness:** It is the personality trait of being careful, alert or vigilant. Conscientiousness implies a desire to do a task well, and to take obligations to others seriously. Conscientious people tend to be efficient and organized as opposed to easy-going and disorderly. They exhibit a particular tendency to show self-discipline, act dutifully, and mostly aim for achievement; they display planned rather than spontaneous behaviour; and they are generally dependable. It is manifested in characteristic behaviours such as being neat and systematic; also including such elements as carefulness, thoroughness, and deliberation (the tendency to think carefully before acting.) Conscience a tendency for improvement person's risk potential (Nichelson, 2005, 161), Conscientiousness manners are: competence, order, dutifulness, self-discipline, neuroticism, and cautious in deciding (Farzanepey, 2006).

   Hypothesis 3: There is a significant correlation between conscientiousness and the investors' cognitive errors in portfolio investment decisions.

4. **Neuroticism:** It is one of the Big Five higher-order personality traits in the study of psychology. Individuals who score high on neuroticism are more likely than average people to be generally moody and to personally experience such feelings as anxiety, worry, fear, anger, frustration, envy, jealousy, guilt, overall depressed mood, and loneliness. People who are neurotic respond worse to stressors and are more likely to interpret ordinary situations as threatening and minor frustrations as hopelessly difficult. They are often self-conscious and shy, and they may have trouble controlling urges and delaying gratification.

   Hypothesis 4: There is a significant correlation between

neuroticism and the investors' cognitive errors in portfolio investment decisions.

5. **Openness to experience:** It is one of the domains which are used to describe human personality in the Five Factor Model. Openness involves six facets, or dimensions, including active imagination (fantasy), aesthetic sensitivity, attentiveness to inner feelings, preference for variety, and intellectual curiosity. A great deal of psychometric research has demonstrated that these facets or qualities are significantly correlated. Thus, openness can be viewed as a global personality trait consisting of a set of specific traits, habits, and tendencies that cluster together. Openness has moderate positive relationships with creativity, intelligence and knowledge. Openness is related to the psychological trait of absorption, and like absorption has a modest relationship to individual differences in hypnotic susceptibility.

   Hypothesis 5: There is a significant correlation between openness to experience and the investors' cognitive errors in portfolio investment decisions.

Research methodology

This research work has attempted to study the relationship among five personality characteristics with the investors' mental cognitive errors. The standards five parameter characteristics extroversion, agreeableness, conscientiousness, neuroticism and openness) had 45 questions and the investors' cognitive errors (over confidence bias, availability, hindsight, escalation of commitment, randomness) contained 45 questions. To test the validity and reliability of the inquiry the financial and behavioural experts' ideas have been used and any vagueness or ambiguity of the questions asked has been removed or corrected. For determining the reliability of the research Chronbach's Alpha model has been used. Reliability of the characteristic questionnaire was 0.79 and the reliability of the investors' cognitive biases questionnaire was 0.79. For analysis of the data, the method of descriptive and correlation is used and for describing the population research, variants methods of descriptive statistics like amplitude and rate and diagram have been used. For investigating the research hypothesis, exploratory factor analysis and spearman's correlation analysis have been applied. For the analysis of the structured research questionnaires, the transient matrix with the Varimax rotation methods have been used for explaining and recognizing parameters. Mostly, five main characteristic parameters explained 43% of the variants.

Results

The result of the parametric analysis clearly shows that the research variables used in this research work have been measured efficiently using the proper research tools. Spearmen's correlation co efficiency of Extroversion and hindsight bias equals 0.192 and the observed significant on numerical value equals 0.021 which is lower than the standard numerical value (= 0.05). Therefore, there is a significant correlation between extroversion and hindsight bias in measured 0.95 reliability level and considering the positive sign of correlation co efficiency in the followed variables, it can be concluded that these variables are in the same direction and are direct.

Spearman's correction co efficiency between Agreeableness and randomness bias equals – 0.226. The observed numerical value sign was 0.003 which is a significant (sig < 0.01) and it is lower than standard (= 0.01). Therefore, it can be concluded that there is a significant relation between these two variables in the reliability level 0.99. Considering the negative sign of correlation coefficient between these two variables, it can be argued that the direction of these two variables is in the reverse direction.

Spearman's correction co efficiency between Neuroticism and randomness bias has been calculated as 0.278, the observed numerical value (sign) for the two tests equal 0.000 that is (sig < 0.01) and it is lower than the standard numerical value of the standard level (= 0.01), so it can be concluded that the two variables have a significant correlation in the reliability level of 0.99.

Further, the Spearman's correction co efficiency between the Neuroticism and the escalation of commitment bias is 0.179 and it is found to be 0.159 between Neuroticism and availability bias and the observed neuroticism value (sig < 0.01) is lower than the numerical value of the standard level (= 0.05), so it can be concluded that there is a significant correlation between neuroticism and the escalation of commitment bias in the reliability level of 0.95. Considering the positive sign of the co efficiency between these two variables, it can be argued that the direction of these variables is in the same direction and direct.

Spearman's correction co efficiency between the Openness and hindsight bias equals 0.259 and is 0.441 for Openness and over confidence bias and -0.153 for Openness and availability bias. The observed numerical values are 0.010, 0.000 respectively in which (sig < 0.01) and 0.048 in which (sig < 0.05) and they are lower than the standard reliability level (= 0.01) and (= 0.05). Therefore, there is a significant correlation between openness and hindsight cognitive bias and also between openness and over confidence cognitive bias at the relational level of 0.99 and between openness and availability bias at the reliability level of 0.95. Considering the positive sign in openness and over confidence bias and also in openness and hindsight bias, it can be argued that the direction of the two variables is same and direct. Finally, there is a reverse correlation between openness and availability cognitive bias.

Conclusion

The incidence of cognitive bias in both individuals as well as organizations is gaining increasing attention both as a subject for research, but also in contexts more available to the public. An important claim made by Kahneman (2011) in Thinking Fast and Slow, is that a vocabulary for describing different biases has been lacking. Hence, it is not inconceivable that a significant amount of such systematic deviations from rationality goes by unrecorded, which would also apply to corporations. As quoted in the aforementioned book concerning the notion of rationality, "the agent of economic theory is rational, selfish and his tastes do not change". This view of individuals being rational agents is encountering stronger scepticism, as research increasingly claim otherwise.

This research will help portfolio investment decision makers to judge investors attitudes towards risk with a new

perspective, and in a better way, thus leading to profitable investment decision making. This research work is also helpful for investors to become aware about the consequences of their demographic roles and behaviours regarding risky portfolio investments. This research will increase the confidence of individual portfolio investors to prefer risky portfolio investments by making them aware of the need to control the mental constraint factors to achieve higher returns. Emotional and personality factors need to be incorporated in the investment strategies formulated for individual investors.

Considering the above hypotheses, it can be concluded that there is a strong correlation between the personality of the portfolio investor and the cognitive biases. Four of the formulated hypotheses were confirmed and one was rejected. The results agreed with Andersons studies on personality and its effect on investors' behavioural and mental errors. The results from the first hypothesis shows that there is a correlation between extroversion and hindsight cognitive bias which is positive. After being aware of this fact through this research work, the portfolio investor can take portfolio investment decisions accordingly keeping transparency as a priority.

After analysis of the results, the second hypothesis was finally rejected and there was no correlation between the investors' agreeableness personality trait and cognitive biases.

The analysis for the third hypothesis shows that there is a reverse correlation between the agreeableness personality trait and randomness cognitive bias, this can be considered by the portfolio investor while making portfolio investment decisions for the long term. The analysis for the fourth hypothesis shows that there is a straight correlation between the neuroticism personality trait and randomness cognitive bias, and between hindsight bias and availability. Portfolio investors now being aware of this fact, it is expected will overcome the availability mental error. This will increase the performance of their investment portfolio considerably.

The analysis of the results for the fifth hypothesis shows that there is a direct correlation between openness personality trait and hindsight and over confidence cognitive bias and there is a reverse relationship between openness and availability bias. This can be effectively considered by the portfolio investors in the process of investment decision making.

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