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## Review paper on impact of behavioral biases in financial decision- making

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### Abstract

Traditional finance is constructed on four principles which are portfolio principles of Markowitz, the arbitrage principles of Miller and Modigliani, the capital asset pricing model of Sharpe, Lintner and Black and the option-pricing model of Black, Scholes, and Merton. These principles conclude that the market is efficient and competent. Patrons of traditional finance recommend that individual behavior frequently reflect rationality. EMH of Samuelson also explains that people behave rationally, maximize their expected utility and process all available information. EMH states that stock prices reflect all the available information. It is impossible to “beat the market” consistently on a risk adjusted basis since market price should only react to available information. Proponents of traditional finance state that the market and investors who access the market are rational. But in reality investors cannot act rationally all time. They are frequently influenced by psychological factors like state of mind, emotions, trading theories, values and interpretation of information, which mislead them to act as irrational investors, (Kahneman and Tversky). Daniel Kahneman and Amos Tversky were known as the fathers of behavioural finance. Though, many literary works are carried out by them in behavioural finance. Proponent were advocate that investors behavior influence by psychological bias. From the above findings, it concludes that Most of the standard finance theories give more importance to fundamental factors instead of give importance to decision making process of individuals. Therefore, there is necessitating developing modern finance to study these irregularities. The main aim of this paper is to study how psychological factors influence the investment behavior of individuals through review of literature from secondary sources like Journals, Magazines, Books etc. The study also has tried to discover the relationship between the behavioral biases and the investment decisions of the individual investors of stock market. The result of the study will help investors to improve their decision making process through identifying the most important behavioural finance factor.

**Keywords:** Behavioural finance; Prospect theory; Psychological factors; Heuristics theory; Capital assets pricing model; Efficient market hypothesis

### 1. Introduction

*“The fact that people will be full of greed, fear or folly is predictable. The sequence is not predictable.” ~ Warren Buffett*

“Finance is defined as the study of how scarce resources are allocated by humans, and how these resources are managed, acquired and invested over time”. Traditional finance is constructed on four principles which are portfolio principles of Markowitz, the arbitrage principles of Miller and Modigliani, the capital asset pricing model of Sharpe, Lintner and Black and the option-pricing model of Black, Scholes, and Merton. These principles conclude that the market is efficient and competent. Patrons of traditional finance recommend that individual behavior frequently reflect rationality. EMH of Samuelson also explains that people behave rationally, maximize their expected utility and process all available information. EMH states that stock prices reflect all the available information. It is impossible to “beat the market”

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consistently on a risk adjusted basis since market price should only react to available information. Proponents of traditional finance state that the market and investors who access the market are rational. But in reality investors cannot act rationally all time. They are frequently influenced by psychological factors like state of mind, emotions, trading theories, values and interpretation of information, which mislead them to act as irrational investors, (Kahneman and Tversky).

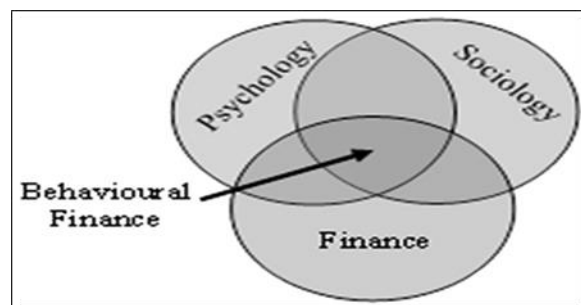
The major problem of the traditional model was not realizing the effect of human behavior in the investment decision. However, these traditional finance theory renovated the study of finance, many questions were left unanswered such as why do markets over or under perform?, Why investors become irrational when they are bared to risk? and why investors invest in stock market?. The unanswered questions created a research gap. The experts in the field of finance and economists were finding it difficult to identify the reasons for irrational behavior of market and individuals. At the same time the researchers in psychology started working on identifying the reasons for irrational behavior and found that people behave in odd ways when money is involved. This smooth the way for the commencing of Behavioral Finance.

Behavioural Finance is new branch of finance. It is the study of the influence of psychology on the behavior of human beings in their financial decision-making. It helps us in studying its consequent effects on the financial markets. It highlights the reality that human beings are not always rational, have limits to their self-control, and are influenced by their own biases. It is the study of how investors systematically make errors in judgment, or “mental mistakes”. From the academic perspective, investor’s behavior is not only related to finance, but also influenced by a combination of psychological, sociological and financial variables making “behavioral finance” truly interdisciplinary (Figure 1). The what, why, and how of finance and investing, viewed from a human and a social perspective is the scope of behavioral finance.

The works of Kahneman and Tversky especially during 1970’s played a momentous role in the evolution of behavioral finance theory. MacKay, Edward Meade, George Selden, William Hamilton, Edwin Lefebvre and many such researchers with their publications laid the ground work for the behavioral finance in early 1980. In 1990’s the concepts of Behavioral finance started to become visible in the finance journals. Later, many researchers like Shiller, Tversky, Baker, Barberis, Odean, De Bondt, Thaler, Hirshleifer etc. believed that the critical review of psychology and other social sciences shed light on the behavior of stock markets and tried to explain the stock market anomalies.

The complete literature of behavioral finance is broadly classified into two segments heuristic theory and prospect theory.

The main aim of the paper is to systematically review the literature relating to behavioral finance, and try to highlight the gaps in the existing studies of behavioral finance.



**Figure 1** Behavioural finance

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## 2. Literature Review on Behavioural Biases

Behavioural finance is the study of psychology and sociology on the behavior of the financial practitioners and the succeeding effect on the capital market.

Traditional finance attempts to explain the process of financial decision-making on the basis of rationality of markets and its players. However, investors act irrationally, because unintentionally decisions are influenced by state of mind, emotions, trading theories, values and interpretation of information. Psychological biases do impact the actual process of investment decision-making. “Behavioral finance” has precise for better understanding and to explain how emotions

and cognitive errors influence investors during the decision-making process. Kahneman and Tversky (1979)[4], Shefrin and Statman (1994), Shiller (1995), Shleifer (2000) are among the leading researchers who have employed the theories of psychology and other social sciences to focus on the efficiency of financial markets as well as explain the root cause of many stock market anomalies such as bubbles, depression, scams and market crashes.

**Bernoulli was the first to introduce the concept of systematic bias in decision making based on a “psychophysical” model.**

Bernoulli proposed a “utility function” to explain people’s preference behavior. Bernoulli assumed that people tried to maximize their utility, and not their expected value. Bernoulli’s function proposed that utility was not purely a linear function of wealth, but rather a biased, concave, evaluation of outcome. The concave shape of the function introduced the perception of decreasing marginal utility, whereby changes far- there away from the starting point have less impact than those which are closer to it

### **Fathers of Behavioural Finance and their contribution to Behavioural Finance**

Daniel Kahneman and Amos Tversky were known as the fathers of behavioural finance. Though, many literary works are carried out by them in behavioural finance, Kahneman and Tversky also focused on different lines of research based on the normative theory. Their first contribution in behavioural finance titled “Belief in the law of small numbers” published in 1971 reported – ‘People have erroneous intuitions about the law of chance’. Followed by that in 1972 the paper concentrated on “Subjective probability: A judgment of representativeness”. In 1974, it covered the way for “Judgment under uncertainty: Heuristics and Biases” discussed on “Better understanding of the heuristics will lead judgment and could improve decisions in times of uncertainty.

Psychologists have found that human beings do not behave as rationally as economists believe. The occurring of stock market abnormality and empirical researches conducted by Babajide & Adetiloye (2012) and Bashir et al. (2013) revealed that investors are not always as rational as they are represents to be. These abnormalities can be explained by a new emerging area of finance called behavioral finance. Behavioral finance considers how various psychological traits affect on individuals or groups act as investors, analysts and portfolio managers. It attempt to understand how emotions and cognitive errors influence behaviours of individual investors (Kengatharan 2014). It also seeks to clarify why and how investors can act beyond the boundary of rationality in ways that resist to what they are supposed to..

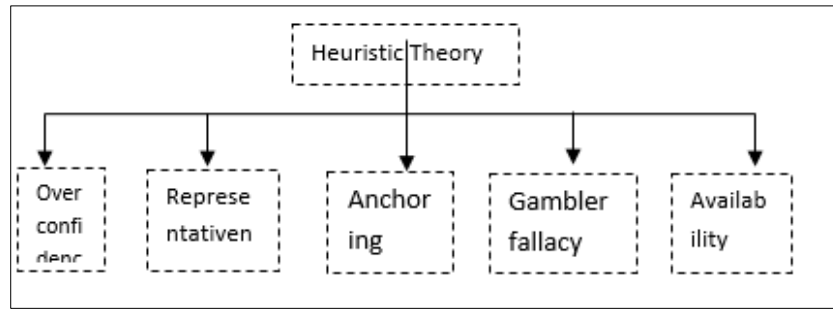
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### **3. The heuristic theory**

“Heuristics are simple efficient rules of the thumb which have been anticipated to explain how people make decisions, come to judgments and solve problems, usually when facing complex problems or incomplete information. These rules work well under most situation, but in certain cases lead to systematic cognitive biases” – Daniel Kahneman (Parikh, 2011).Tversky and Kahneman identified the influence of human heuristics on the decision making process. Tversky defined heuristic as a strategy, which can be applied to a variety of problems that usually but not always give a correct solution. People often use heuristics (or shortcuts) that reduce composite problem solving to more simple judgmental operations (Tverskyand Kahneman, 1981).

Heuristic decision theory is the process by which the investors find things out for themselves, usually by trial and error, lead to the development of rules of thumb. In other words, it refers to rules of thumb, which humans use to made decisions in complex, uncertain environments (Brabazon, 2000). Man is not able to process all the information that one is presented with on a daily basis. While collecting experience through the process of doing something, those experiences gives a notion of how something works. This process produces rules of thumb that can then be used when similar circumstances are encountered. This phenomenon is called the use of heuristics. This is mainly relevant in modern trading, when the number of sources and the density of information have increased extensively.

Heuristics also simplifies the decision making process by identifying a defined set of criteria to evaluate (Bikas.E et al. 2013).According to Kengatharan (2014), the availability bias was first introduced by Kahneman & Tversky in year 1974 to be included into the heuristics theory and later on Waweru et al. (2008) listed the overconfidence factor into the heuristic theory..



**Figure 2** Behavioural biases - Heuristic decision theory

### 3.1. Overconfidence

People are poorly calibrated in estimating probabilities and usually overestimate the precision of their knowledge and ability to do well and about good things happening in future than bad. This theory summarizes how people form beliefs under uncertainty. The overconfidence bias which is related to the self-attribution bias is the tendency of an individual to attribute his success to his own talent and ability while blaming 'bad luck' for his failure, making himself overestimating his talent.

Confidence is a fundamental element of accomplishment in an extensive variety of domains extending from professional performance and emotional wellness to sports, business and battle, while overconfidence alludes to a one-sided method for taking a gander at a circumstance. As indicated by Shefrin (2000), overconfidence "relates to how well individuals comprehend their own particular capacities and the points of confinement of their knowledge." Psychologists opined that a large portion of the financial specialists have a tendency to think little of danger and overestimate their capacity to conjecture the occasions with pomposity. A pompous speculator enjoys an excess of unsafe exchanges and they for the most part don't do astute enhancements

Illusion of control is the propensity for individuals to overestimate their capacity to control events that they have no impact over Langer (1975), Self-attribution bias is crediting fruitful results to claim aptitude yet accusing unsuccessful results for misfortune, Miller and Ross (1975) and Kunda (1987), Irrational agents, being pompous, can wind up bearing a greater amount of the risk and can henceforth acquire more noteworthy expected returns over the long run DeLong et al. (1990), Investors have a tendency to overestimate their capacity, unreasonably idealistic about future events, excessively positive on self-assessments Odean (1998), Overconfidence suggests that investors overestimate their capacity to foresee market events, and as a result they regularly go out on a limb without getting similar returns Nevins (2004), overconfidence to have positive significant impact on investors' decision making Qureshi et al. (2012) and Bashir et al. (2013), The study concludes that overconfidence exists in investors while taking investment decisions. It was evident that investors were overconfident about their knowledge, ability to pick stocks, holding of stocks, optimism, control over portfolio, and other factors. The investors take credit for their successes, assume to have full control over their portfolio, trade frequently, and are quite optimistic about Indian stock market Trehan, B., & Sinha, A. K. 2011, the objective of the study to bring out the thoughts on overconfidence in Thirukkural. Overconfidence thoughts are available in Thirukkural and they also indicate the relationship between overconfidence bias and performance Subramaniam, V. A (2019).

### 3.2. Representativeness

Representativeness heuristic: Representativeness is "the degree to which an event is similar in essential characteristics to its parent population and reflects the salient features of the process by which it is generated" Representative Heuristic is a cognitive action in which an individual categorizes a situation based on a pattern of previous experiences or beliefs about the scenario.

Representativeness heuristic is a judgment based on stereotypes (Shefrin, 2000). Representativeness is high when an observation fits the pattern (Goldberg and Nitzsch, 2001). Representativeness heuristic affects the investor's decision when evaluating stocks (Barberis et al., 1998; Bloomfield and Hales, 2002; Frieder, 2004; 2008; Kaestner, 2006; Alwathainani, 2012). Boussaidi (2013) tried to explain the investor overreaction by the representativeness heuristic. Guo (2013) examined through an analytical model of a competitive securities market to examine the survival of representativeness heuristic traders in competition with rational traders. Guo (2013) showed that without the presence of noise traders, heuristic traders will be driven out of the market by rational traders due to their representativeness heuristic.

### 3.3. Anchoring

People who make judgments under uncertainty use this heuristic by starting with a certain reference point (anchor) and then adjust it insufficient to reach a final conclusion.

The anchoring effect is described as the heuristics implemented when making judgments under uncertainty (Tversky and Kahneman, 1974). Reference point is the stock value that investors contrast with the present stock cost Benartzi and Thaler (1995), Persons are usually influenced by the historical price movements of stocks, implying that past movements serve as anchors for their expectations Törngren and Montgomery (2004), There exists an anchoring bias which mirrors the propensity to concentrate on a value and received it as a kind of a perspective moment that wants to make estimation Mangot (2008), There is a strong positive association among previous day price and present day price Chang et al. (2011), Amid choice making, anchoring happens when people utilize an introductory bit of data to make resulting judgments. When a stay is situated, different judgments are made by conforming far from that anchor, and there is an inclination toward deciphering other data around the anchor. In numerical prediction, when a relevant value is available, people make estimates by starting from an initial value that is adjusted to yield the final answer. In either case, adjustments are typically insufficient (Rekik and Boujelbene, 2014), If previous day closing value is superior than the opening value i.e., the previous day was a ascendant moving day, then the forecast for the next day is for ascendant actions and result in superior investments that day Duclos (2015).

Frequently, financial specialist's utilization to offer significance to mentally decided "anchors" and factually irregular facts which is unnecessary as this inclination drives irrational investment decisions. Information in number may not reflect real force of its nature and inherent value.

### 3.4. Gambler fallacy

Gambler's fallacy is the behaviour of investors who predict future events based on information from the past. Investors believe that if something happens more often than usual in some time, it will occur less frequently in the future, or if something happens less frequently than usual in some time, then it will occur more frequently in the future. Thought to interpret these opportunities allows an investor to act irrationally.

Thus, investors will determine their investment decisions based on observations of events from the past. From the results of research conducted by Hopfensitz (2009), there is a bias in the behaviour of gambler's fallacy in investors in making the decision process. In addition, research conducted by Amin, et al., (2009), also found that the behaviour of gambler's fallacy bias can affect investors' decision-making processes in the Pakistani capital market. Events from the past are often a reference for investors to determine their investment decisions. When an investor gets a return several times in the previous period, the investor tends to reduce the level of investment in the future. During an uptrend, investors with a gambler's fallacy bias will tend to avoid buying shares that have previously experienced price increases with the assumption that in the future periods there will be a greater price decline. Conversely, when a downtrend occurs, investors with a gambler's fallacy bias will tend to buy shares that previously experienced a price decline assuming that in the future periods there will be a greater price increase (Djojopranoto and Mahadwartha, 2016).

### 3.5. Availability

This heuristic is used to evaluate the frequency or likelihood of an event on the basis of how quickly instances or associations come to mind. When things related to each other are easily brought to mind, this fact leads to an overestimation of the frequency or likelihood of this event.

The availability bias happens when the individual acts upon recent information that is obtained easily. They have a strong tendency to focus their attention on a particular fact rather than the overall situation, only because this particular fact is more present or easily recalled in their minds (Nofsingera & Varmab 2013). Qureshi et al. (2012) found availability bias to have positive significant impact on investors' decision making. Luong & Thu Ha (2011) found availability bias to have moderate impact on investors' decision making while Nofsingera and Varmab (2013) found availability bias to have strong impact on investors' repurchase decision in United States..

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## 4. The prospect theory

According to prospect theory a group of illusions may impact decision-making process of individuals (Kahneman and Tversky, 1979). It deals with how individuals manage risk and uncertainty. In other words, it explains the apparent regularity in human behaviors when assessing risk under uncertainty. According to Kahneman and Tversky (1979)

individuals place much more weight on the outcomes that are perceived more certain than that are considered mere probable, a feature known as the “certainty effect.”

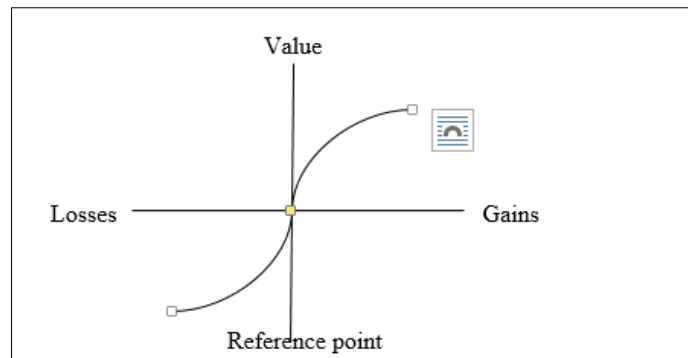
Bernoulli’s model was the beginning of utility theory. As such, it combined a mixture of descriptive and normative elements. The description seemed sensible, and the normative implications merely represented the idea that caution constituted the better part of prudence. To the extent that Bernoulli assumed that people are typically risk averse, he explained this behavior in terms of people’s attitudes toward the value of the payoff, rather than in terms of the phenomenon of risk-taking behavior itself. People’s attitudes toward risk were posited as a by-product of their attitude toward value.

Two centuries later, von Neumann and Morgenstern revolutionized Bernoulli’s expected utility theory by advancing the notion of “revealed preferences

In developing an axiomatic theory of utility, von Neumann and Morgenstern turned Bernoulli’s suppositions upside down and used preferences to derive utility. In Bernoulli’s model, utility was used to define preference, because people were assumed to prefer the option that presented the highest utility. In the von Neumann and Morgenstern model, utility describes preferences; knowing the utility of an option informs an observer of a player’s preferences.

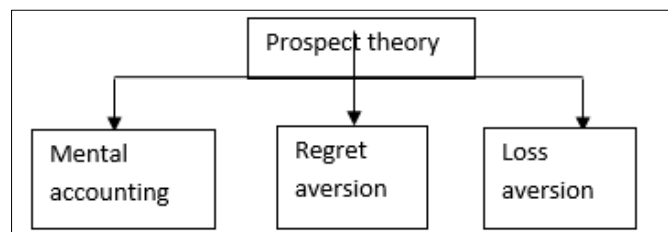
Tversky and Kahneman have demonstrated in numerous highly controlled experiments that most people systematically violate all of the basic axioms of subjective expected utility theory in their actual decision-making behavior at least some of the time. These findings run contrary to the normative implications inherent within classical subjective expected utility theories. In response to their findings, Tversky and Kahneman provided an alternative, empirically supported, theory of choice, one that accurately describes how people actually go about making their decisions. This model is called prospect theory.

Under the prospect theory, an investor’s decision-making process will be influenced by four different behavior biases based on the uncertainty and risk as depicted in Figure 3. These are dealt with in detail herein.



Source: Kahneman and Tversky (1979)

**Figure 3** A hypothetical value function



**Figure 4** Behavioural biases-the prospect theory

#### 4.1. Mental accounting

Mental Accounting; a concept first named by Richard Thaler (1985)[26]. in an attempt to describe the way in which a person subjectively frames a transaction in their mind the utility they receive or expect. People weigh the money value

on the basis of the source from which that income has been generated. This is also a bias in investment decisions. Although having the same value, investors place different weights on an income earned as interest and income from lottery, Mental accounting depicts the inclination of individuals to place specific occasions into distinctive mental accounts in light of external characteristics Shiller (1998), Mental accounts are basically disconnected on the premise of substance. However, they can be disengaged as for time too Goldberg and Nitsch (2001), Individuals create mental computations for dealing any type of monetary operation. This was proved from experiment Matsumoto et al. (2012).

#### **4.2. Regret aversion**

It arises from the investors' desire to avoid pain of regret arising from a poor investment decision. This aversion encourages investors to hold poorly performing shares as avoiding their sale also avoids the recognition of the associated loss and bad investment decision. Regret aversion creates a tax inefficient investment strategy because investors can reduce their taxable income by realizing capital losses.

Regret theory is about people's emotional reaction to having made an error of judgment. Investors may avoid selling stocks that have gone down in order to avoid the regret of having made a bad investment and the embarrassment of reporting the loss. They may also find it easier to follow the crowd and buy a popular stock: if it subsequently goes down, it can be rationalized as every-one else owned it.

Regret was most often taken as a negative feeling in an investigation of verbal articulation of emotions Shimanoff (1984), Participants tend to choose the regret-minimizing gamble in both gains and losses and in both relatively high risk and relatively low risk pairs of gambles Zeelenberg et al. (1996), Investors may sell victor stocks and hold on to loser stocks in light of the fact that they anticipate that their loser stocks will beat their victor stocks later on Thaler (2005), Past victor stocks have abundant selling pressures and past loser stocks are not disregarded as fast as they ought to be, bringing on under-response to market knowledge Zeelenberg and Pieters (2007), Characterized regret aversion bias as a passionate predisposition in which individuals have a tendency to abstain from settling on choices that will bring about activity out of trepidation that the choice will turn out ineffectively Pompian (2012).

#### **4.3. Loss aversion**

It means that investor is risk seeker when faced with respect of loss, but becomes risk averse when faced with the prospects of enjoying gains. Khaneman has said that investors are "Loss aversion". This 'Loss Aversion' means that people are willing to take more risks to avoid loss than to realize gain.

Aversion means the feeling of dislike or disinclination and loss aversion means disliking or feeling uncomfortable about a loss. This psychological feeling was first proposed by Kahneman and Tversky (1979) in their famous prospect theory. Tversky (1991) further used this concept in his study about making decisions under certainty Loss aversion is an important psychological concept which receives increasing attention in economic analysis. The investor is a risk-seeker when faced with the prospect of losses, but is risk-averse when faced with the prospects of enjoying gains. This phenomenon is called loss aversion. Ulrich Schmidta, and Horst Zankb discussed the loss aversion theory with risk aversion and he accepted the Kahneman and Tversky views, Individuals assign more noteworthiness to losses than they designate to gains Olsen (2000), It is not so much that individuals dislike instability - yet rather, they detest losing Kahneman and Tversky (2001), Proprietary traders on the Chicago board of trade undertake more risks late in the day to cover their losses before all else of the day Coval and Shumway (2005), Individuals are loss-averse around reference focuses given by their desires in an aggressive circumstance with genuine efforts Gill and Prowse (2012)[33], Respondents showed weaker risk aversion in selection among assorted prospects than in selection between gains. Likewise, in an ample set of circumstances, decisions among mixed prospects show a choice pattern that is more reliable with risk neutrality than with risk aversion Ert and Erev (2013).

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### **5. Conclusion**

Behavioral finance tries to explain and reform people's perception about psychological processes and the emotional factors that impact the investment decisions. It enlarge the traditional finance theories that govern the domain of academics, which assumed speculators behave intelligently and proficiently, thus missing the thoughtlessness of human behavior. The multidisciplinary nature of investment behavior has attracted many expert and professionals. modern research in prospect theory (mental accounting, loss aversion and regret aversion) and heuristic decision process (overconfidence, representativeness, anchoring, gambler fallacy and availability) would help in structured guidelines and rule of thumb investment choices for individuals by tracing notice to potential mental errors, probably managing to enhanced investment returns. Irrational behavior proved not only in security markets but also in property, bullion, and commodities markets.

Thus behavioral finance has important citation for both intellectuals and practitioners. It provides the preliminary work for developing theories for a sound understanding of the psychological processes involved in financial decision-making. In fact the behavioral finance research is rapidly roll out to other markets inspecting multiple variables involved in decision-making. The productiveness and forecasting power of investors' conduct is expected to refine through the quick developments in behavioral finance in the years to come. Behavioral biases have been and will continue to impact human judgment in financial decision-making. As it is still progressing, both theoretical analysis and pragmatic testing are needed.

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## Compliance with ethical standards

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The authors have no conflicts of interest to declare. All co-authors have seen and agree with the contents of the manuscript and there is no financial interest to report. We certify that the submission is original work and is not under review at any other publication.

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