

Decoding Investment Behavior: A Behavioral Finance Approach

by

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Track: Financial Management

Word Count (excluding tables and references): 6900 words

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ABSTRACT

This study aims to consolidate research on key behavioral biases affecting individuals' investment decisions in both financial markets and corporate finance. Through a thorough literature review, the study identifies and categorizes these biases into two primary groups: heuristics and frame-dependent biases. Additionally, it explores other prevalent behavioral biases such as confirmation bias, hindsight bias, endowment bias, and herding. The research also delves into biases specific to corporate finance investment decisions. By highlighting less-explored areas in the existing literature, this study identifies critical gaps and suggests directions for future research. The findings have practical implications, offering valuable insights to help investors and managers mitigate the impact of behavioral biases on investment decisions.

Keywords: Behavioral bias, Heuristics, Prospect Theory, Investment Decisions.

INTRODUCTION

Kengatharan and Kengatharan (2014) stated that investor decision-making is a topic that enhances researchers' understanding of the processes and factors that influence investment decisions. Merton (1985) stated that rationality was the reason for theorizing in traditional finance. Traditional finance is based on several theories and principles, like the arbitrage principles of Miller and Modigliani, Markowitz's modern portfolio theory, the capital asset pricing model (CAPM) of Sharpe, Linter, and Black, and the option pricing model of Black, Scholes, and Merton. These theories support, nurture, and test the old notion of rationality in investment decisions, assuming investors are rational decision-makers. Baker & Ricciardi (2014) raised several questions that remained unanswered like why investor decisions are not based on reasons and logic, why emotional processes cause investors to make decisions that are not justified on the rationality scale, what causes investors to make mental mistakes when making decisions, and how the decision-making process changes from individual to individual.

As per the Efficient Market Hypothesis (EMH), all available information is reflected in the price of the financial assets in an efficient market. It is based on the fact that investors act rationally in financial markets. The Expected Utility Theory (EUT) states that individuals act rationally by judging all available choices depending on their utilities and associated risks and make a rational decision. Tversky & Kahneman (1974), post the 1970s energy crisis, conducted an empirical study. This study's results were inconsistent with the Expected Utility Theory and Efficient Market Hypothesis. In 1979, researchers Kahneman and Tversky brought about the popular notion of prospect theory, which helped in explaining decision-making under the conditions of uncertainty and proved to be an alternative to the Expected Utility Theory. The introduction of prospect theory, which combined the psychological and behavioral elements of financial decision-making, has led to a paradigm shift from traditional finance to new areas of behavioral finance.

Since the 1990s, several empirical studies have criticized the past literature and paved the way for the emergence of behavioral finance. One such study questioned the existence of rational investors and efficient markets by citing market crashes and stock bubbles (Joghee, Alzoubi and Dubey, 2020). Another study stated that decisions were not always rational and logical and could result in cognitive mistakes (Zhang and Chen, 2017). Several other studies indicated the repeated occurrence of irrationality in the process of decision-making in times of uncertainty (Ngoc and Ngoc, 2014; Chen *et al.*, 2007; Bernstein, 1998; Shefrin, 2007; Nofsinger, 2001).

Recently, several studies reviewed the literature on behavioral biases (Paule-Vianez, 2020; Costa, 2017; Kumar and Goyal, 2015). Although they provide valuable inferences, a comprehensive review of all behavioral biases influencing investment decisions in financial markets and corporate finance is still missing. Hence, the present study fills this gap by covering all significant behavioral biases. It aims to highlight significant research gaps in past literature on behavioral biases affecting investment decisions and provide directions for advancing future research.

This paper is structured in the following manner. It first briefs about the research methodology. Next, it discusses the different categories of behavioral biases, namely heuristic-driven biases and frame-dependent biases. Additionally, it also discusses some other commonly seen biases in the context of investment decision-making. Going further, it has a specific section dedicated to the behavioral biases studied in the context of corporate finance investment decisions. After that, it discusses the research gaps and recommendations for future research. Lastly, it ends with a conclusion and limitations for the study.

RESEARCH METHODOLOGY

A comprehensive literature review method is used to review the papers accessible in the public domain, studying behavioral biases and their impact on investment decisions. Keywords such as behavior finance, behavioral biases, heuristics biases, frame-dependent biases, prospect theory, cognitive biases, emotional biases, investor decision-making, and corporate behavioral biases were used to search for papers. Databases such as Emerald, Science Direct, JSTOR, ELSEVIER, Scopus, and Google Scholar were used to find relevant literature on this subject. Papers were identified and selected for this study depending on the following criteria. First, papers published in different journals that are available in the online databases. Second, papers are written in English with full content. Third, different types of papers, such as literature review papers, theoretical papers, analytical papers, case studies, working papers, and conference papers. Fourth, papers with the search keywords in the title or abstract.

After intensive research based on the above criteria, papers were selected for review. This study aims to prepare and review comprehensive papers on behavior biases and their impact on the process of investment decisions.

LITERATURE REVIEW

Behavioral Biases in Investment Decision-Making

Behavioral biases are categorized (Pompian, 2006) into cognitive and emotional biases. Cognitive bias is defined as information processing, statistical, or memory mistakes that may cause an individual to shift away from rationality that is assumed in classical finance. It is divided into two sub-groups: belief preservation biases (to stick to one's original belief even after getting new data that denies it) and information processing biases (refers to mental shortcuts). Belief preservation biases include representativeness, conservatism, confirmation bias, hindsight bias, and the illusion of control. Information processing biases include mental accounting, anchoring, availability, and framing. Emotional biases arise because of attitudes or feelings that may cause the decision to deviate from the rationality assumed in traditional finance. Emotional biases include endowment bias, loss aversion, regret aversion, self-control bias, overconfidence, and status quo bias (Figure 1).

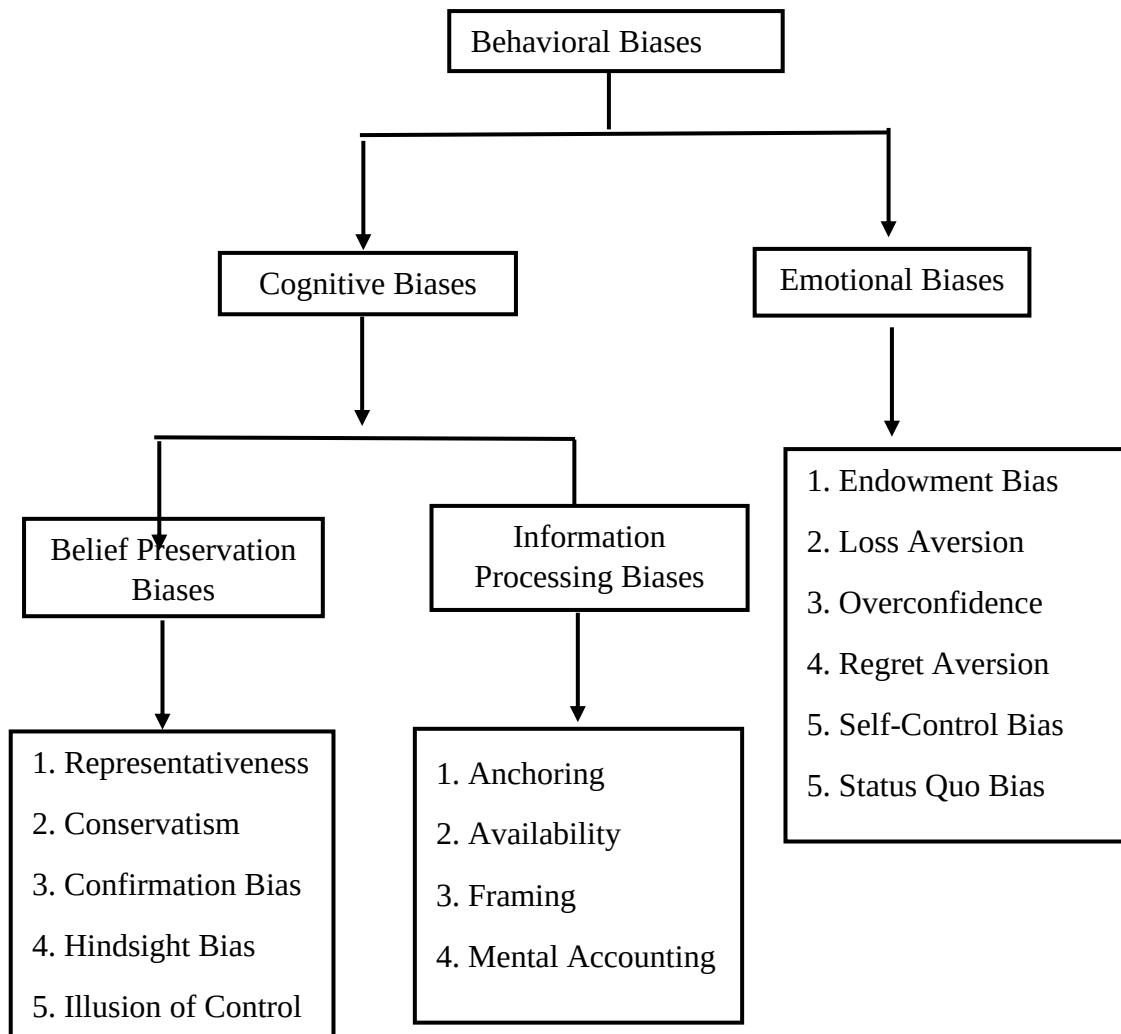


Figure 1: *Classification of Behavioral Biases* (Pompian, 2006)

Behavioral biases in investment decision-making are also categorized by (Shefrin, 2000a) into heuristics-driven and frame-dependent biases. These biases are discussed in detail below (Figure 2).

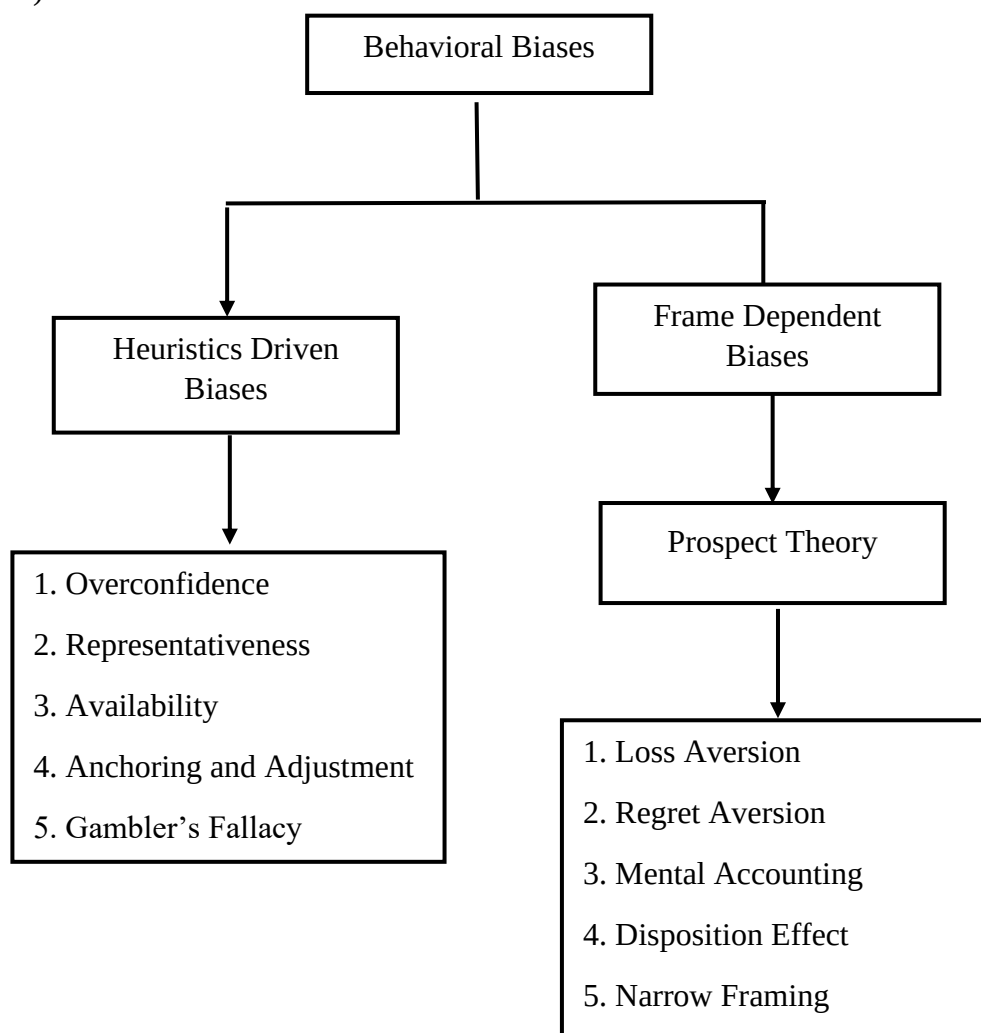


Figure 2: *Classification of Behavioral Biases* (Shefrin, 2000a)

Heuristics-driven biases. The process in which rules of thumb or mental shortcuts are used for making decisions instead of taking decisions rationally by gathering and analyzing information is called ‘heuristics.’ The application of heuristics and their effect on investment decisions is acknowledged in the existing literature of behavioral finance (Bondt and Thaler, 1985; Bernard and Thomas, 1989; Werner F. M. De Bondt and Thaler, 1990). Tversky & Kahneman (1974) were the first to define heuristics and categorize them into anchoring availability and representativeness bias. After that, gambler’s fallacy and overconfidence were included in heuristics (Waweru, Munyoki and Uliana, 2008). The review of literature for heuristic-driven biases is as follows.

Overconfidence. The tendency to overestimate one’s abilities is called overconfidence. It refers to how well people recognize their abilities and the limits of their knowledge (Shefrin, 2007). Fischhoff, Slovic, & Lichtenstein (1977) stated that individuals having this bias override data and models as they convince themselves of knowing better. Overconfidence bias is also defined as a type of excessive self-confidence in which an individual believes that information possessed can be used efficiently because of possessing superior skills (Baker and Nofsinger, 2010). In short, it refers to a situation where individuals consider and believe their abilities to

be superior to other individuals and possess a non-realistic level of self-evaluation (Odean, 1998; Pompian, 2006). It is also stated that in the unknown world of investments, people tend to make overconfident decisions (Fischhoff, Slovic and Lichtenstein, 1977). Shiller (2000) pointed out that overconfident individuals often think they know more than what they do and, hence, believe themselves to be smarter or better than the rest.

Several studies investigated the impact of this bias on investment decisions. It leads to excessive trading by investors (Odean, 1998; Pompian, 2006; Graham, Harvey and Huang, 2005; Toma, 2015; Benos, 1998). Statman & Thorley (2003) pointed out that besides impacting the transactions' frequency, it also affects the traded volume. The greater the overconfidence level, the higher the volume traded. (Pompian, 2006) also found that overconfidence can lead to errors in the decision process that lead to excessive trading. An overconfident individual underestimates risks and overestimates investment returns. Miller & Ross (1975) revealed that in case the return gained is less than expectations, investors would link it to an unlucky situation. In general, these factors bring about a positive influence on investment decisions.

Representativeness. Representative bias is the tendency of an investor to invest depending on the previous performance of the stocks and not dependent on fundamental values that would help generate returns in the future. Abdin, Farooq, Sultana, & Farooq (2017) pointed out that it contradicts the notion of unpredictable share price, as stated by Efficient Market Theory, and uses analysis of past trends to forecast movements in the future. Representativeness is also defined as the tendency to evaluate how likely something is with reference to what it resembles. Kumari & Sar (2017) mentioned one of its elements as the "law of small numbers." It states that a small sample aptly represents the entire population. This is called obtaining inferences from little data. Although it is a decent heuristic, it can result in wrong inferences. It occurs when people make decisions using limited observations from their surrounding environment to gather information and ignore other relevant information (Shefrin, 2000a; Ritter, 2003; Baker and Nofsinger, 2002).

Several studies tried to understand the influence of representativeness bias on investment decisions. Kahneman & Riepe (1998) stated that representativeness bias can result in overreaction while processing information and making decisions. It is supported by the results of (Marsden, Veeraraghavan and Ye, 2008) and (Philip Hans Franses, 2007), who found out that this can lead to over-reaction behavior that was reflected in stock prices. Yoong (2011) pointed out that investors influenced by this bias ignore relevant events that might occur in the future. They, therefore, fail to safeguard themselves from such unexpected situations. The typical stereotypes in the capital market, as explained by (Chen *et al.*, 2007), are that investors interpret the excellent characteristics of a company, like reliable managers, high growth, and product quality, as investment-worthy characteristics. Another error (Frensidy, 2016) mentioned this bias that happens often in the financial market is the belief that past performances are a good indicator for predicting future performances. An investor generally believes that the previous rate of return reflects future expected returns. They, therefore, look for greater returns for the previous winning stocks and utilize this trend as a convention for the movements of stocks in the future (Lakonishok, Shleifer and Vishny, 1994; Ackert and Deaves, 2009).

Availability. Investors tend to depend more on readily available information or information that can be easily recalled rather than the complete information or scenario. This is called the availability bias (Karl Erik Wärneryd: How People Value and Trade Stocks, 2001). Efficient market theory confirms your belief in rational trading. This is reflected in the movements of stock prices after bad or good news is publicly available. The movements tend to be higher than anticipated, portraying investors' dependence on current data (Moradi, Salehi,

and Mojtaba Soleymani Mareshk, 2013). It is also called peoples' frequency of making decisions based on the provided reports, data, and facts without digging deep into it. Tversky & Kahneman (1974) gave the first explanation for availability bias and called this a phenomenon in which decisions are impacted by the ease with which people recall associations and examples.

Several studies tried to understand the influence of availability bias on investment decisions. Wärneryd (2001) proved that the information about well-known firms is readily available and dominates impression. Montier (2002) showed that recent information by brokers or analysts affects investment decisions.

Anchoring and adjustment. Anchoring refers to the tendency to anchor or attach one's thoughts to an initial value, generally referred to while making estimates. Wärneryd (2001) pointed out that in the case of investments, future value forecasts may be influenced by referring to specific benchmarks. Anchoring is often prevalent in situations where people deal with novel concepts. Barberis & Thaler (2003) stated that individuals form their estimates depending on an early and random figure and then adjust it based on the new information. However, this adjustment process is generally inadequate as the emphasis is too much on the original value.

As per Tversky & Kahneman (1974), it occurs when individuals depend a lot on pre-existing data or the first data that they find when making decisions. After that, adjustments are made to such beliefs.

Many people experience this bias. A lot of them remember the purchase prices of shares in their portfolios. Their selling decisions are often dependent on these buying prices as a reference. They would sell off their stocks earlier if the share prices exceeded this reference point. Apart from the purchase price (Frensidy, 2016) also mentioned that the highest price of shares reached during a specific period often becomes the anchor. Therefore, individuals are unwilling to reduce losses as they anchor to such price references.

Gambler's fallacy. Shefrin (2000a) defined it as a phenomenon in which individuals inappropriately forecast a negative recency or sure reversal. Alternatively, the gambler's fallacy, also called the Monte Carlo fallacy, happens when an individual wrongly believes that a specific random event is more likely or less likely to occur based on the outcome of a past event or series of events. This way of thinking is not correct. If a set of events is random and independent of one other, then the outcome of one or more events cannot predict or impact the outcome of the next event.

According to Odean (1998), an investor experiences this bias when making investment decisions in the same way as studied in gambling. Investors determine their investment decisions depending on their observations from past events. Results of the study done by (Hopfensitz, 2009) showed that gambler's fallacy bias affects the decision-making process of investors. In addition, Amin, Shoukat, & Khan (2009) revealed that it can affect investor decisions in Pakistani capital markets. Events from the past are generally seen as a reference by investors to make their investment decisions. During an uptrend, investors having this bias will avoid purchasing shares that have seen price rises in the past, assuming that there will be a price reduction in the future. Conversely, when a downtrend occurs, investors with this bias will buy shares that have seen a price fall in the past, assuming that there will be a price rise in the future (Djojopranoto and Mahadwartha, 2016).

Frame dependent biases. Frame dependence or framing effect refers to the concept wherein the decision taken by an individual is influenced by the way the information is

presented to them. The way questions are formulated negatively or positively can influence an investor's readiness to take risks. People tend to avoid risks when presented with a positive frame and seek risks when presented with a negative frame.

The origin of frame-dependent biases can be traced back to the study of prospect theory. (Shefrin, 2000) took it ahead and mentioned several frame-dependent biases. The important ones are discussed here. This includes loss aversion, regret aversion, mental accounting, disposition effect, and narrow framing.

Prospect theory. In 1979, Kahneman and Tversky brought in this novel concept. It investigates the decisions of individuals under conditions of risk. Kahneman & Tversky (1979) transformed the notion of investment decisions by using psychological elements for analyzing investors' perceptions and decisions regarding the choice of shares, the preference to part with or acquire shares, and so on (Yao and Li, 2013). It supports investors' tendency to look at potential losses and gains of individual deals rather than the total wealth (Olsen, 1997; Gurevich, Kliger and Levy, 2009). It is justified by using three concepts, namely, loss aversion, mental accounting, and regret aversion, in the purview of disposition effect. (Horvath and Sinha, 2017) pointed out that losses and gains are analyzed with regard to specific reference points that are pretty psychological and relative. This relative aspect of investors' decision-making raises questions about the already accepted fact of their risk-averse nature. It is also revealed that in situations of gains, investors show risk aversion, whereas, in situations of losses, they behave in a risk-seeking manner (Kahneman and Tversky, 1979). The Efficient Market Hypothesis states that individuals view losses and gains equally. Benartzi & Thaler (1995) had revealed in their study that this notion had been criticized by the prospect theory, which proposed a ratio of 2.5:1 for such a loss-averse attitude and showed that individuals are more prone to being sad about losing money than being happy about winning the same amount of money. It is supported by using two functions: the Weighing Function and the Framing Effect. The probability weighting function refers to the fact that small probabilities are overweighted, and high and moderate probabilities are underweighted. The framing effect refers to the difference in perception of the same situation when information is presented differently.

Loss aversion. Loss aversion is a crucial aspect of prospect theory. Kahneman & Tversky (1979) introduced this concept. It refers to the tendency in which individuals have stronger preferences to avoid losses than winning the same amount of gains. This is because losses result in more significant regret and impact than gains. It has also been seen that investors are more concerned and cautious about decreases in capital than increases in capital. Empirical evidence has suggested that losses weighed almost twice as heavily as gains for investors,

Several researchers have been conducted to understand the effect of loss aversion bias on investments. Coval & Shumway (2005) studied the impact of this bias in the context of risk-taking among traders. It showed that in intraday trading, losses in the morning resulted in taking more significant risks in the afternoon. Hwang & Satchell (2010) investigated this bias in the financial markets by making use of the asset allocation model for the U.K. pension funds' annual data from the period 1963 to 2003. The study results showed markets to be more loss-averse than what has been presumed in past literature. Going forward, they also showed that this bias changed depending on the market situation. For example, investors became more loss-averse in the bull market than in the bear market, indicating that the pain of losses was bigger when others were relishing gains. It also found that people were more responsive to changes in losses than gains.

Regret aversion. It is used to describe the feeling of regret experienced after deciding on a choice that turns out to be inferior or wrong (Loomes and Sugden, 1982). Kumari & Sar (2017) defined regret as feelings of disappointment that occur by not making the best decision. Regret aversion is a cognitive bias that develops in an investor, which leads them to keep the non-worthy investments for comparatively more extended periods to avoid any errors or losses. Konstantinidis, Katarachia, Borovas, & Voutsas (2012) stated that it is a tendency in which people tend to safeguard themselves from the pain of wrong investment decisions, which results in delays in selling their stocks to avoid realizing their losses.

Several research have been conducted on regret aversion. Qin (2020) stated this bias to be a probable cause for the high equity premium. He developed a model of capital asset pricing after including the influence of this bias. He observed that regret is felt not only for wrong decisions but also for not making any decisions. Qin (2015) stated that this bias is experienced when investors re-enter or exit the market, which might result in herding behavior. Rosenboim, Luski, & Shavit (2008) studied the regret effect in the context of tax reliefs provided by governments to firm managers. It was seen that the regret effect played a role in relation to the cash flow, as higher cash flow was expected to provide low returns.

Mental accounting. Mental accounting is a concept developed by (Thaler, 1999). Thaler (1999) defined mental accounting as the tendency of people to sort out information into different mental accounts. He described it as a set of mental operations that an individual utilizes to assemble, evaluate, and maintain a record of their financial activities. It consists of three parts. The first part captures how the outcomes are viewed and experienced, how decisions are taken and ultimately evaluated. The second part includes the allocation of tasks to different mental accounts. The third and last part captures the frequencies in which these accounts are evaluated and ‘choice bracketed’.

Therefore, this bias helps people separate information into specific accounts. It assesses the performance of individual accounts instead of assessing the performance of the entire portfolio. Even though it can help investors handle complicated information, it distorts asset prices. Barberis & Huang (2001) studied this bias by taking simulated data samples of equilibrium firm-level stock returns. It revealed that this bias affected asset prices.

Disposition effect. The concept of disposition effect was introduced by Shefrin & Statman (1985). It is built on the notions of prospect theory that were proposed by Kahneman and Tversky in 1979. Disposition effect is a phenomenon in which people sell off their winning stocks and hold on to the loss-making stocks. The probable reasons are mental accounting, loss aversion, regret avoidance, and seeking pride.

Several studies tried to understand the impact of disposition effect on investments. In 1985, researchers (Shefrin and Statman, 1985) proposed a conceptual framework to understand how investors sell off their winning stocks and hold on to loss-making stocks. This theoretical framework is also supported by empirical evidence. Odean (1998) documented the presence of this effect by using a sample from the market of about 10,000 discount brokerage accounts of individual investors. He revealed that most investors were reluctant to realize their losses. In 1998, Odean showed that at the end of the financial year, due to tax motivations, people were more willing to sell off their loss-making stocks. Further, empirical evidence for this effect has been generalized in several other research studies (Barberis & Xiong, 2009; Frazzini, 2006; Weber & Camerer, 1998). Grinblatt & Keloharju (2009) found evidence of this effect in the Finnish stock markets by using sample sets of trades and shareholdings of institutional and individual investors between the period from 1994 to 1997. Researchers Shumway & Wu (2006) used a data set of 13,460 Chinese investors and exhibited that most of them showcased

this bias, which led to momentum in the Shanghai stock markets. In 2009, Kumar used multiple behavioral bias proxies and measures of valuation during uncertainty. He revealed that individuals exhibited higher levels of this effect when stocks were harder to value and when the market-level uncertainty was high. The empirical evidence found on this effect showed that this bias influences the volume of stocks traded. Going forward, it also showed that this bias increases under uncertainty and has the power to bring about momentum in stock markets.

Narrow framing. Narrow framing is a cognitive process that simplifies complex decision problems for investors. In this bias, people treat risks separately rather than considering an entire view. Investors consider repeated risks as a single deal (Shefrin, 2000a). Barberis & Huang (2006) elaborated on it in the case of gambling. They stated it to be a phenomenon in which people assess each new gamble separately, isolating it from the other risks.

Several studies have tried to understand the impact of narrow framing on investment decision-making. Presence of this effect in the options market has been documented (Liu, Wang and Zhao, 2009). This study used daily trading volume sample data from the Taiwan Futures Exchange from 2001 to 2004. Results indicated that investors quickly became vulnerable to this effect when trading in a complicated derivatives market. It can result in overestimating risks and make investors myopic in their outlook towards investment.

Other common behavioral biases. Some common behavioral biases affecting investment decision-making are discussed in detail below.

Conservatism. Conservatism bias is a cognitive bias where investors usually stick to the past information they have about investment and give little to no notice to the current data, which leads them to forecast in the absence of new information.

Pompian (2006; 2011) stated that because of conservatism bias, individuals behave inflexibly when provided with new information about a subject in which they have prior knowledge. Investors with conservatism bias take too long to react to the market. Such investors show an underreaction to the new information in the market. Investors possessing conservatism bias have difficulty processing new data, which creates internal conflict, so to avoid this internal conflict, investors generally avoid paying attention to new information and hold on to the previous information, which sometimes results in more significant losses than gains.

According to Montier (2002), investors hold on to a forecast graciously, and once a position has been fixed, it is tough for investors to move away from it. Barberis, Shleifer, & Vishny (1998) found out that investors, at times, show under-reaction to new information in the financial markets, which leads to financial losses.

Confirmation bias. Shefrin (2007) defined it as the tendency in which investors prefer to interpret information that confirms their beliefs and preconceptions and avoid interpreting information that contradicts their beliefs and perceptions. As a result, investors recall data selectively from their memory and use this data for interpretation in a biased way. It can be categorized into three forms: biased memory, biased searching of information, and biased interpretations. All these three forms have a nearly similar impact, that is, looking for evidence that confirms one's original belief. Nickerson (1998) stated that beyond looking for information that confirms pre-existing beliefs or hypotheses, individuals often seek data that will support their beliefs or hypotheses.

In investing, investors search for information that supports their original beliefs and ignore the opposite information. However, this partial information allows investors to view only a small part of the entire situation in markets and can lead to incorrect decisions. It can lead individuals to avoid evidence that showcases their strategies to lose money, inducing them to become overconfident in the process.

Self-attribution bias. Self-attribution is a cognitive bias. Self-attribution is defined as the tendency of individuals to credit themselves when something good occurs and blame external circumstances if something terrible happens. Simply, it refers to the propensity of individuals to credit successes to personal skills and failures to uncontrollable circumstances (Feather and Simon, 1971; Miller and Ross, 1975; Zuckerman, 1979). According to Bradley (1978), investors give credit to themselves for an event of success, and they believe that it is their inborn talent and vision of the future and blame their failures on external situations.

According to Pompian (2006), it can be categorized into self-enhancing bias, which is the propensity of individuals to take full credit for their success, and self-protecting bias, which refers to the tendency of individuals to deny the fact that they are accountable for their failure also.

Success results in overconfidence, which leads to self-attribution bias (Shefrin and Statman, 1985; Daniel, Hirshleifer and Subrahmanyam, 1998; Gervais and Odean, 2001). In other words, the greater the investors' success, the greater the overconfidence they will show, and the greater the chances of them tending towards self-attribution bias. Also, investors who show self-attribution bias can become overconfident when they get the desired positive outcomes, leading them towards higher risk and greater losses.

Hindsight bias. It is a form of cognitive error. It makes an individual believe that the occurrence of certain events after the events have happened were anticipated to happen as indicated by the historical data. It occurs when past events look more eminent than they truly are, causing an investor to believe these events were foreseeable, even though there was no logical basis for forecasting them. Guzmán, Campdesuñer, Sánchez-Rodríguez, García Vidal, & Martínez-Vivar (2018) called this belief in predictability to be seen as an ability to make investment decisions.

Investors feel pressured to perfectly time their selling or buying of stocks to maximize returns. If they incur a loss, they regret not acting earlier. With such regret comes the thought that they viewed this outcome coming all along. Also, investors with hindsight bias believe this outcome to be one of the many possibilities that they might have anticipated. Whichever of the outcomes pans out, the investor believes they visualized it coming. This leads to poor investment decisions in the future by the investors.

The illusion of control. It refers to the tendency wherein one overestimates his ability to control an event. According to Pompian (2017), investors who suffer from this bias think they can control investment outcomes, even though, in reality, they cannot.

In finance, it may lead to underestimating risks and having greater difficulty adjusting to the adverse events by investors. Chira, Adams, & Thornton (2008) stated that this bias negatively affects future decisions. Such bias impacts the role of luck, the relative importance of skill, and the incentives an individual gets to control the investment environment in financial markets. Aggressive investors possessing it believe that the best method to manage their portfolio of investments is to constantly adjust it. For example, traders who take greater risks believe they have greater control over the results of their portfolio investments than they actually do, as they think that they are pulling the trigger in every decision.

Endowment bias. Endowment bias is a tendency in which people attach more value to the things they own simply because they own them.

Pompian (2011) stated that this bias causes individuals to hold onto securities that they have inherited, irrespective of whether it is financially wise to do so. It can result in individuals holding onto the securities that they have bought, which is usually the outcome of a decision deficit. Endowment bias can lead to investors holding on to securities they have purchased or inherited as they do not wish to incur transaction costs that come with selling such securities. It can also lead to investors keeping the securities they have purchased or inherited since they are familiar with the behavioral characteristics of such investments.

Self-control bias. Self-control bias refers to the tendency to consume today at the expense of saving for tomorrow. It is a form of emotional bias in which people do not act in their best long-term interests as they lack self-control. Generally, people favor better living standards in the present period rather than saving money for retirement.

It can cause several mistakes while investing, thus affecting investor decisions and profits and creating bubbles in the financial markets. People suffering from this bias generally spend in the present and sacrifice their retirement. They do not usually invest in stocks. Retirement can arrive so early that those individuals fail to provide enough. Usually, people take an inappropriate level of risk in their portfolio to make up for the lost time. Individuals who do not intend to retire are unlikely to put their money in financial assets. Pompian (2011) stated that self-control bias can lead individuals to ignore basic finance principles.

Status quo bias. Conservative investors often prefer to keep their investments the same; that is, they maintain the status quo. Such investors tell themselves that “things have always been this way” and thus feel safe keeping things the same. Bostrom & Ord (2006) pointed out that individuals with status quo bias, when provided with a range of alternatives, tend to select the option that sustains the status quo rather than the set of options that might result in change. Schade & Koellinger (2007) stated that people with this bias tend to stay where they originally were, even when provided with better alternatives. Ackert & Deaves (2009) stated that it occurs due to the search for comfort or as individuals resist changes and fear the remorse of such changes that might come if they take the relevant steps to change the status quo.

In investing, this can result in concentrated stock positions or the tendency to stay invested in assets that might no longer be appropriate in the investment portfolio.

Familiarity bias. The concept of this bias was introduced by Graham in 1955. Familiarity bias refers to the tendency in which people prefer to invest in stocks that they are familiar with. Many individuals would like to put their money in a known company as they believe that the firms they are unfamiliar with are riskier. However, the market does not award individuals with risk premium for familiarity or loyalty. Cao, Han, Hirshleifer, & Zhang (2011) mentioned about the “unfamiliarity premium” being reflected in equilibrium stock prices.

Home bias. Levis, Yaz Gulnur Muradoglu, & Vasileva (2016) and Ke, Ng, & Wang (2009) have categorized home-country bias as a type of familiarity bias. Home bias, also called home country bias, is the tendency of individuals to prefer putting their money in domestic stocks as compared to putting their money in foreign stocks.

Keloharju, Knüpfer, & Linnainmaa (2012) and Ke et al. (2009) stated that home bias is crucial in assigning securities to a familiar milieu. Pool, Stoffman, & Yonker (2012) stated that portfolio managers prefer to assign funds to the companies belonging to their home states.

Herding Effect. The herding effect is defined as a situation in which rational individuals start behaving irrationally by copying the judgments of other people while making decisions. Some significant studies like (Wermers, 1999) and (Grinblatt, Titman and Wermers, 1995) tried to understand herding in investment decisions. There could be several causes for showcasing herd behavior amongst different forms of investors. The individual investors showcase herding as they follow the decision of noise traders or a bigger group. Analysts showcase herding of their past decisions or experiences or copy others to safeguard their compensation or reputational concern. Individual investors are more inclined toward adopting herd behavior than institutional investors (Lee *et al.*, 2004). Herd instinct on a larger scale can lead to asset bubbles or market crashes through panic buying and selling.

Table 1: List of Behavioral biases along with their descriptions and investment implications

Behavioral Biases	Descriptions	Investment Implications
Overconfidence	Overconfidence refers to how well people understand their abilities and the limits of their knowledge (Shefrin, 2007). It is a tendency in which people overestimate their ability.	Overconfidence bias leads to excessive trading by investors (Benos, 1998; Odean, 1998; Graham, Harvey and Huang, 2005; Pompian, 2006; Toma, 2015). Apart from influencing the frequency of trades, it also affects the volume traded.
Representativeness	Representativeness is defined as someone's tendency to make decisions based on prior experiences or knowledge or certain stereotypes. It occurs when people make decisions by using limited observations from their surrounding environment and ignore other information (Shefrin, 2000b; Baker and Nofsinger, 2002; Ritter, 2003).	Representativeness bias can lead investors to overreact while processing information and making decisions (Kahneman and Riepe, 1998). Representativeness can lead someone to a wrong conclusion. Frensidy (2016) mentioned another error of this bias that often happens in the financial market: past performances are often assumed to be the best indicator for forecasting future performances. Alternatively, investors generally believe past return rates to represent expected returns to be earned in the future.
Availability	An individual's tendency to rely more on easily available information or information that can be easily recalled rather than the complete information or scenario is termed availability bias (Wärneryd, 2001).	The information related to well-known companies is easily available and can dominate impressions (Wärneryd, 2001). Recent information by brokers or analysts influences investment decisions (Montier, 2002).
Anchoring and Adjustment	Anchoring refers to the tendency to attach or 'anchor' one's thoughts to an initial value, often referred to while making estimates. In the case of	Investors usually continue to remember the buying price of shares in their portfolio. The selling decision is often based on the buying price as the reference

	investments, forecasts of future value may be influenced by reference to some benchmark (Karl Erik Wärneryd: How People Value and Trade Stocks, 2001).	point. Frensidy (2016) pointed out that the highest price of shares achieved during a specific period often becomes the reference. Hence, many individuals are unwilling to reduce losses as they refer to these references.
Gambler's Fallacy	It is a phenomenon in which investors inappropriately predict a sure reversal or negative recency (Shefrin, 2000a).	During an uptrend, individuals avoid buying shares that have experienced price increases in the past as they believe that there will be a price reduction in the future period. Conversely, when a downtrend happens, investors buy shares that have experienced a price decline in the past, assuming that there will be a price rise in the future period (Djojopranoto and Mahadwartha, 2016).
Loss Aversion	Loss aversion refers to the tendency in which an individual prefers to avoid losses than to win the same amount of gains (Kahneman and Tversky, 1979).	Hwang & Satchell (2010) investigated it in the markets and found markets to be more loss-averse than what has been believed in past literature. Further, they also found that individuals are more responsive to changes in losses than to changes in gains.
Regret Aversion	(Loomes and Sugden, 1982) described it as feelings of regret that are felt after deciding on a choice that turns out to be either an inferior or a wrong choice.	(Qin, 2020) stated it to be a probable cause for such high equity premiums and developed a model of capital asset pricing after including the influence of this bias. It observed that regret is felt not only for wrong actions but also for not taking any actions.
Mental Accounting	Thaler (1999) defined it as the tendency of individuals to sort out information into specific mental accounts.	Barberis & Huang (2001) found out that the investors' system of mental accounting affected asset prices. Although it can help investors handle complicated information, it can lead to distortion of asset prices.
Disposition Effect	It is defined as the tendency of individuals to sell off their winning stocks and to hold on to the loss-making stocks (Shefrin and Statman, 1985)	Odean (1998) documented the presence of this effect. He revealed that most investors were reluctant to realize their losses.

Narrow Framing	It is the tendency of individuals to treat repeated risks as a single deal (Shefrin, 2000b).	The presence of this effect is documented in the options market (Liu, Wang and Zhao, 2009). They indicated that individuals easily became susceptible to this effect when trading in the complicated derivative market. Narrow framing bias can lead investors to overestimate risks and make them myopic in their outlook toward investment.
Conservatism	Conservatism bias is a cognitive bias where investors usually stick to the past information they have about an investment and give little to no notice to the current information.	Pompian (2006; 2011) stated that investors behave inflexibly when provided with new information about a subject in which they have prior knowledge. Investors with conservatism bias take too long to react to the market. Such investors show under reaction to the new information in the market, which leads to losses (Barberis, Shleifer and Vishny, 1998). According to Montier (2002), investors hold on to a forecast graciously, and once a position has been fixed, it is tough for investors to move away from it.
Confirmation Bias	Shefrin (2007) stated confirmation bias as the tendency in which investors prefer to interpret information in a way that confirms their preconceptions and beliefs and avoid interpreting information that contradicts their beliefs.	Nickerson (1998) stated the existence of confirmation bias in his research. In investing, confirmation bias can lead investors to ignore evidence that showcases their strategies might lose money, resulting in them to behave too overconfidently.
Self-Attribution Bias	Self-attribution bias refers to the propensity of investors to credit successes to personal skills and failures to uncontrollable circumstances (Feather and Simon, 1971; Miller and Ross, 1975; Zuckerman, 1979).	Investors who show self-attribution bias can become overconfident if they get the desired positive outcomes, which can lead them to greater risk and greater losses.
Hindsight Bias	It is a cognitive error in which an individual believes that the occurrence of an event after the event has happened was expected to happen based on historical data.	Investors often feel pressured to perfectly time the buying or selling of stocks to maximize their returns. When they incur a loss, they regret not acting earlier. With such regret comes the thought that they saw it coming all along. This might lead to poor investment

		decisions in the future by the investors.
Illusion of Control	It refers to the tendency of individuals to overestimate their abilities to control events.	Investors suffering from this bias think they can control investment outcomes even though they cannot (Pompian, 2017). Illusion of control bias negatively affects future decisions (Chira, Adams and Thornton, 2008). It may lead to underestimating risks and having greater difficulty adjusting to the adverse events by investors.
Endowment Bias	Endowment bias is a tendency in which people ascribe more value to the items that they own simply because they own them.	Pompian (2011) stated that this bias causes investors to hold onto securities that they have inherited, irrespective of whether it is financially wise to do so. It can lead to retaining securities that investors have inherited or bought as they do not wish to bear the transaction costs associated with selling such securities.
Self-Control Bias	It refers to the tendency to consume today at the expense of saving for tomorrow.	It can lead to many mistakes while investing, thus affecting investor decisions and profits and creating bubbles in the market. Pompian (2011) stated that it can also lead investors to ignore basic finance principles.
Status Quo Bias	Conservative investors often prefer to keep their investments the same; that is, they maintain the status quo. Such investors tell themselves that “things have always been this way” and thus feel safe keeping things the same.	In investing, it can result in concentrated stock positions or the tendency to stay invested in assets that might no longer be appropriate in the investment portfolio. Schade & Koellinger (2007) stated that people tend to stay where they originally were, even if provided with better choices.
Familiarity Bias	Familiarity bias refers to the tendency of people to prefer things with which they are familiar (Graham, 1955).	Investors prefer to put their money in a known company, as they believe the companies not known to them are riskier. In their study, Cao et al. (2011) mentioned that the “unfamiliarity premium” is reflected in equilibrium prices of stocks.
Home Bias	It is also called home-country bias. Investors tend to favor	Keloharju et al. (2012) and Ke et al. (2009) stated that it plays a

	putting their money in domestic stocks rather than putting their money in foreign stocks.	crucial role in assigning assets to the familiar milieu. Pool et al. (2012) stated that portfolio managers prefer to assign their money to companies belonging to their home states.
Herding Effect	It is defined as a situation in which rational people start behaving irrationally by imitating the judgments of other people while making decisions.	Some significant studies (Wermers, 1999; Grinblatt, Titman and Wermers, 1995) tried to understand the herd behavior in investment decision-making. Herd instinct on a larger scale can lead to asset bubbles or market crashes through panic buying and selling.

Special focus on behavioral biases in corporate finance investment decisions.

Corporate finance explains financial agreements and investment behaviors that emerge from the interaction between agents and investors. Hence, a full explanation of the investment and financing patterns requires understanding the preferences and beliefs of these agents. Most research here assumes rationality. Agents are expected to have unbiased predictions of future incidents and use this to make decisions that serve their interests best. It means managers can consider capital markets efficient, with stock prices reflecting all the available information. Similarly, investors can believe that managers would function in their self-interests, responding to the incentives created by the compensation contracts, markets for corporate control, and other such governance mechanisms.

The way managers make their investment decisions can influence the corporation's growth. Behavioral biases can also influence managers' decisions. Malmendier & Tate (2002) studied the overconfidence bias amongst CEOs by using data from the Forbes 500 companies. They revealed that most CEOs suffered from overconfidence bias, which, in turn, affected their corporate investment decisions. They showed that overconfidence had high explanatory power for the sensitivity of investments to cash flows. According to this study, the sensitivity of investments to cash flows is greater for more optimistic CEOs.

Mergers and acquisitions. Past studies have shown that agents in firms suffer from behavioral biases. Many of them are overconfident and optimistic about the decisions that they make. Shefrin (2007) found out that firms in which agents qualified as excessively overconfident and optimistic were 65% more likely to have completed an acquisition than those whose agents did not qualify. He showed that overconfident executives pressed on with the acquisition, even if the market reaction was adverse. Typically, mergers occur between a target firm and an acquiring firm to achieve synergies. Therefore, when the synergy is positive, an acquiring firm should acquire the target firm. However, Christofferson, McNish, & Sias (2004) found out that there were 70% of cases in which agents intended to acquire corporations functioning in dissimilar industries as they were overconfident about the synergy to be gained from such diversifying mergers. Shefrin (2007) pointed out these poor assumptions and too much optimism amongst agents as the reasons why they overestimate such synergies.

Shefrin (2007) showed that heuristics influenced agents when they made a merger and acquisition decision. He pointed out that some agents based their acquisition decisions on

intuitive judgments and tried to get specific deals no matter what. Such agents fail to take formal valuations or weaken numbers that support their decisions.

Capital budgeting. Capital budgeting refers to the process of making investment decisions in the long-term assets. In capital budgeting, managers use several methods to decide whether to undertake an investment opportunity. Standard techniques are Payback Period, Net Present Value (NPV), Internal rate of return (IRR), and Profitability Index. Regardless of whichever technique managers use, the selected investment opportunity should create value for the shareholders.

The NPV method is a common method that is being used in capital budgeting. In this method, managers evaluate the expected value that they will get from an investment. Usually, they accept projects that yield positive cash flows and reject those that give negative cash flows. However, this process is greatly influenced by the expectations of future cash flows. The expectations of future cash flows are a very subjective process as they come from the agent's prediction. Behavioral biases are inevitable while making such predictions. Overconfidence bias can affect this process. Studies have shown that individuals possessing this bias overestimate their abilities and information (Fischhoff, Slovic and Lichtenstein, 1977; Alpert and Raiffa, 1982). Another research showed that agents have overconfidence deeply ingrained in their practices and beliefs (Russo and Schoemaker, 1992). They also explored cognitive reasons that result in overconfidence bias. The most crucial factor pointed out was the difficulty people face in imagining how events could unfold. It is referred to as the availability bias. They stated that because managers failed to visualize relevant pathways in the complicated web of future events, they became too confident about the predictions based on the fewer pathways they considered. The second reason pointed out was the anchoring bias, where people anchor their thoughts to a point. The third factor identified was confirmation bias, in which managers search for information that supports their beliefs. Unfortunately, when the conditions are uncertain, and the decision is more complex, it is easier to find one side support.

Several reasons have been pointed out why managers become overconfident during the process of capital budgeting. In his study, Gervais, Heaton, & Odean (2011) pointed out three reasons. Firstly, he stated that capital budgeting is a complicated process, and the conditions involved in this process are uncertain. Secondly, he stated that capital budgeting decisions may not be suitable for learning. Lastly, he stated that unsuccessful agents were less likely to hold on to their jobs and get promoted, and those who succeed may get overconfident due to the self-attribution bias.

DISCUSSION OF RESEARCH GAPS AND RECOMMENDATIONS FOR FUTURE RESEARCH

This comprehensive literature review helped identify research gaps in the area of behavioral biases that influence investment decisions and provides recommendations for future research. These are as discussed below (Table 2).

First, limited research is done in the developing nations. Since behavioral finance is emerging, most studies have been done in developed nations, primarily in the US. The possible reason for this could be that the financial markets are still emerging in developing nations. In the last decade, scholars in developing nations have also tried to conduct research in this area. It is shown that post-globalization, developing nations have greater growth potential, and individuals and institutional investors are more inclined towards investing in the stock market, which provides a broader scope for further research. Therefore, future studies can focus on emerging markets.

Second, most of the studies are empirical and use secondary data. Only a few studies have used primary data in their research. Therefore, primary data-driven empirical studies that analyze investors' behavior during the process of investment decisions should be focused. Wärneryd (2001) pointed out that the current studies have focused on explaining biases and heuristics on an ad hoc basis and after-the-fact explanations. To better understand investor behavior, a good approach could be to focus on individual decisions by conducting detailed interviews, controlled experiments, and observations.

Third, there is a lack of studies that consider cultural, individual, and institutional differences to analyze the diversity in human behavior. In addition, research can also be done by merging different investor types, such as institutional (hedge funds, mutual funds, investment advisors, pension funds, etc.) and individual investors, to understand the differences in their behavior and the impact of biases in their financial decisions.

Fourth, the current conceptual perspectives used to understand biases in behavioral finance research include the theory of planned behavior (Ajzen, 1991), risk-as-feelings theory (Loewenstein *et al.*, 2001), and the theory of bounded rationality (Simon, 1957). The theories above try to explain behavior from the conceptual lens of sociology and psychology. Still, Ricciardi & Baker (2014) pointed out that there is still no clear understanding of biases. Fuller (1998) pointed out that there is no clear taxonomy of biases. Thus, it is essential to study the neural base of irrational behaviors' origination, effects, and causes, as all behaviors and decisions are initiated in the human brain.

Fifth, the beliefs and perspectives about the character of such biases are still unclear. Questions like whether biases are bad or good for fund management companies, investors, and markets are still inconclusive. Few studies claim that biases and heuristics can lead to successful decisions, while others believe this can result in disasters. Apart from this, whether biases are temporary or permanent and whether they can have long-term or short-term influences on stock prices and the behavior of markets is still openly debated. With this regard, some scholars like (Shefrin, 2000b) have argued that these biases can cause prices to move away from their actual values for a longer time period. Some other researchers believe the effect to be short-term and state that it need not be included in the conceptualizing and modeling works of finance.

Sixth, fintech has transformed the world of finance. Specifically, financial decisions have significantly changed since the launch of Robo-advisory services. Researchers have shown that using Robo-advisory tools helped overcome the impact of biases (D'Acunto, Prabhala and Rossi, 2019; Bhatia, Chandani and Chhateja, 2020). Despite this, there is a lack of research that studies the impact of Robo-advisory services in mitigating the impact of biases in financial decisions.

Seventh, existing research has investigated the effect of biases on investors' decisions using traditional statistical tools like covariance-based structural equation modeling (CB-SEM), partial least square structural equation modeling (PLS-SEM), and multiple regression. Singh & Srivastava (2017) pointed out that for the past few years, researchers have been using machine learning tools like recurrent neural networks (RNN) and artificial neural networks (ANN) to forecast the effect of biases in investors' decisions. Machine learning tools are better than conventional statistical techniques since their implementation needs fewer axioms. Hence, going forward, research can be done to understand the effect of biases on investors' decisions by using machine learning models and comparing their accuracy with traditional models.

Table 2: Research Gaps and Future Research Directions

Category	Research Gaps and Future Research Directions
Focus on Developing Countries	Most empirical studies have been done in developed countries, primarily in the US. Future studies can focus on emerging markets.
Focus on Primary Data	The area is dominated by empirical research using secondary data. Only a few studies have used primary data in their research. Thus, focus is to be given to primary data-driven empirical studies. (Karl Erik Wärneryd: How People Value and Trade Stocks, 2001) stated that the current research has focused on explaining biases and heuristics on an ad hoc basis and after-the-fact explanations. He also stated that the best approach could be to focus on individual decisions by conducting detailed interviews, controlled experiments, and observations.
Focus on the heterogeneity of investor behavior.	There is a lack of studies that consider cultural, individual, and institutional differences to recognize the diversity of human behavior. Focus should be given on this. Also, research can be done by merging different investor types, such as institutional investors (hedge funds, mutual funds, investment advisors, pension funds, etc.) and individuals, to understand differences in their behavior and the impact of biases in their investment decisions.
Limited Theory	Theoretical perspectives used to understand behavioral biases include the (Ajzen, 1991) theory of planned behavior, (Loewenstein <i>et al.</i> , 2001) risk-as-feelings theory, and the theory of bounded rationality (Simon, 1957). (Ricciardi and Baker, 2014) pointed out that there is still no clear understanding of biases. (Fuller, 1998) pointed out that there is no clear taxonomy of biases. Thus, it is essential to understand the neural basis of irrational behaviors' origination, effects, and causes, as all behaviors and decisions are initiated in the human brain.
Unclear Perspectives and Beliefs	The beliefs and perspectives about the character of biases are still unclear. Questions like whether biases are bad or good for the fund management companies, investors, and the markets are still inconclusive. Also, whether biases are temporary or permanent and whether they can have long or short-term impacts on the stock prices and behavior of markets is still openly debated.
Robo-Advisory Services	There is a lack of research studies investigating the impact of Robo-advisory tools in overcoming biases. Future studies should focus on this.
Machine learning Models	Previous studies have used traditional statistical tools like covariance-based structural equation modeling (CB-SEM), partial least square structural equation modeling (PLS-SEM), and multiple regression. Future research can focus on machine learning tools like recurrent neural networks (RNN) and artificial neural networks (ANN).

CONCLUSION AND LIMITATIONS

This study is a comprehensive review of literature that examined the effect of behavioral biases on financial and corporate investment decisions. It reviewed some essential and common biases investors and managers face while making investment decisions. Several past studies have documented the impact of behavioral biases on investment decisions. Identifying these biases in an early stage of investment is essential, which would help make better investment decisions and lead to a better portfolio of investments. This paper structurally reviewed, organized, and synthesized the existing literature studying the impact of biases on

investment decisions. It contributes to the behavioral finance literature by highlighting the research gaps existing in the literature and offering future research directions.

Although it is a comprehensive study, it suffers from a few limitations. There are chances that this study might have failed to account for some past papers that studied the impact of behavioral biases on investment decision-making. Also, the search for articles was conducted by using the Emerald, JSTOR, ELSEVIER, Scopus, Science Direct, and Google Scholar databases. Several other databases can also be included to offer additional insights.

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