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Research Article**BEHAVIORAL FINANCE: HOW ARE TRADERS' FINANCIAL DECISIONS AND PERFORMANCE IMPACTED BY BEHAVIORAL BIASES UNDER UNCERTAINTY?****Imad TALHARTIT, *Sanae AIT JILLALI and Mounime EL KABBOURI**

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Abstract

Behavioral finance is the application of psychology to finance, dedicated to explaining anomalies in the financial market based on research and analysis of human behavior. This paper aims for studying from a conceptual side the main behavioral biases that impact traders operating in the financial market under uncertain circumstances. The current literature confirms the existence of cognitive and emotional biases, which could be caused by heuristics or framing faults impacting the decision-making process in investment and financing decisions alongside the performance of traders. In this vein, the findings affirm that although it is difficult to change people's emotions and control them completely, moreover the capacity for human introspection is limited, with the understanding of cognitive biases based on the knowledge and beliefs of the trader, the possibility of modifying or changing the individuals' way of reasoning is more or less feasible in order to moderate their behaviors within the market. Behavioral finance admitting a certain degree of inefficiency in the markets, and the existence of factors that influence the behavior of the trader, is calling for a precise set of rules and trading plans (such as money management), besides the mental and psychological control essential to succeed in the financial market. This theoretical informative paper enters into a series of works that challenge investors' rationality assumption and inferences about the efficiency of financial market information.

Keywords: Financial markets, Behavioral finance, Behavioral biases, Investment decisions, Traders' performance.

INTRODUCTION

Behavioral finance is a field of behavioral economics characterized by applying psychology to finance to better understand certain phenomena observed in financial markets. This principle called into question the main concept of classical financial theory, which defends the idea that investment decision-making is rational, and the financial market is efficient; the theory that postulates that asset prices reflect all available information about the price. The founding fathers of behavioral finance are Kahneman and Tversky (1979), they emphasized the irrationality and inefficiency of the market at a certain level and tried to explain the reasons through stakeholder psychology. Thus, behavioral finance can analyze and classify certain behavioral drifts that affect the judgment of investors at different stages of the stock market investment. According to Fama (1991), it successfully simulates investor behavior and reports widespread explanations of deviations in the market from forecasts based on the assumption of its efficiency. Following the work of Scott *et al.* (1972), Peel and Wilson (1996), Danielson and Scott (2006), Carr and Blettner (2010), Ang *et al.* (2010), Sammoudi and Ammar (2017), Baker *et al.* (2018) and several others, focusing on behavioral corporate finance; a branch of the MIBF (Micro Behavioral Finance defined by Pompian (2012) which is interested in the biases of individual investors, alongside Macro Behavioral Finance (MABF) which distinguishes and represents the anomalies of the hypothesis of the markets' efficiency). The MIBF is which regulates the financial decisions of entrepreneurs and managers, which is in most cases influenced by several factors; namely heuristics, cognitive skills, personality traits, social and emotional cognition, and others that we will deal with through this paper.

The behavioral biases, the subject of this analysis, are therefore the discrepancy between the way we reflect and the way we had to do it (Chikh and Grandin, 2016). They can show excessively positive behavior; such as optimism and overconfidence, or other purely negative ones such as regret, loss aversion, and pessimism. Emotional biases can have heuristic or framing causes. Emanating from the same causes, cognitive biases can further be classified according to subtypes either arising from memory errors or related to information processing. There are even biases that can bridge between two to three types, which are multiple in nature, such as overconfidence, herding behavior, mental accounting, anchoring biases, and others. Qafas and El Bijri (2020) consider the knowledge of these biases and the foundations of behavioral finance a necessity, to be able to detect the irrational behavior of financial market players and optimize their decision-making processes, which will lead to effective decision-making. In this sense, with the advent of behavioral finance, the understanding of the markets and their behavior has improved and encourages the use of psychological control methods (cognitive and emotional) with a precise set of rules and trading plans (Such as money management) to moderate the behavior of traders within the market. Knowing that all the emotions of the individual in a decision-making situation come from the research field of behavioral finance and impact the rules of conduct and the performance of players and the financial markets. Financial theory has undergone various mutations over time, making it a field of interest for practitioners and the scientific community. This is a topic of paramount importance, the reason why we made this exploratory conceptual study to prepare the ground for an empirical study in a sense of strategies to avoid behavioral biases and improve stock price forecasts (The case of machine learning algorithms, in particular, genetic algorithms). The objective of this paper, is therefore to provide some answers to the main composed question: What are the principal behavioral

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biases and how do they affect the financial decisions and performance of investors in trading?

The method we have tried to follow to build our conceptual work is combining a set of theoretical and empirical articles and books that provide some answers to our initial question. The informative content of this paper will therefore be presented as follows: We will first start with a definition of psychological biases (cognitive and emotional) as well as their causes (heuristics, framing) and then in a second section we will study the impact of behavioral biases on investors' financial decisions, followed by an explanation of the main behavioral errors that affect traders' performance.

THE MAIN BEHAVIORAL BIASES

As recognized, behavioral finance is dedicated to explaining anomalies in the financial market based on research and analysis of human behavior. In this sense, much psychological research has been carried out in recent years to better understand the decision-making process of investors under uncertainty, as well as the findings obtained highlight the personal expectations of the actors and their decisions which are strongly influenced by their knowledge and beliefs, but also by a crucial factor which is their emotions. Behavioral finance, goes beyond to invalidate the claims of traditional financial methods and demonstrates the existence of psychological biases through numerous studies. These psychological biases according to the neoclassicals, are distancing individuals from "rationality". The theory then holds that individuals are not rational, as long as their decisions are influenced by psychological biases. In this vein, several authors, including Pompian and Wood (2006), assert that the behavior of investors in the financial market is impacted by numerous psychological biases. When talking about these psychological biases, it is essential to distinguish between their two main categories, namely; cognitive biases and affective biases, which will be defined in the table below.

In harmony with the work of Kabbaj (2011), psychological biases are always in motion, they evolve according to the factors of the trader's financial situation or also according to his state of mind. The idea that they are deadpan is therefore erroneous, psychological biases are dynamic by nature. The starting point is that traders tend to react based on previously recorded results, in other words, a winning streak creates a sense of invincibility and a growing spirit of adventure, so that a series of losses often hits traders who prefer to stay behind the market.

This calls into question the character deemed static by neoclassical theorists of psychological biases; by considering the investor as a rational individual experiencing no emotion and able to maximize his hope of gain through the optimal decisions made. In this section we will shed light on the main behavioral biases; cognitive biases then affective biases, each separately, after having an idea of these biases' causes.

→ The causes of behavioral bias:

Following Shefrin (2000), psychological biases could be caused by heuristics or framing faults. On the one hand, according to Kabbaj (2011, p.30) heuristics are: «...cognitive shortcuts taken by individuals to emit a judgment and make a decision». As already mentioned, cognitive biases emphasize specific knowledge and beliefs in the decision-making process and show that investors have the cognitive shortcuts that are often used when making decisions. Individuals generally refer to heuristics, that are, rules and experience data, which can simplify things to speed up analysis and decision-making process. Per Shefrin (2000), heuristic biases arise from the use of heuristic methods and rules of thumb as a basis for examining data that aids in decision-making. Laurent (2019) gives the example in this sense of predictions and judgments on the future performance of securities based on past performance. These heuristics certainly help to make decisions under uncertain circumstances, nevertheless, do not take into account all the problematic factors and can also lead to bad decisions. These rules are used to simplify the representation of perceptual data and to make it possible to judge situations according to what one believes to be true, which is not always rational. This is what some players do when faced with a complicated situation, they make decisions based on their experience, which is not the best or the most rational way to act within the financial market. In this vein, Susskind (2005) states that the phenomena of heuristic simplifications observed by psychology lead to simplifying the decision-making process in order to allow individuals active in the financial markets to make a good decision at the right time. In this sense, we could say that these heuristics, although they lead to biases producing bad decisions, could be beneficial in certain cases that require a fast and reduced process to act or react at the right time, but the risk of the error is still present. On the other hand, framing is simply how individuals determine their choices and options, their decision-making process is sometimes damaged by this specific orientation. It is called framing bias, since it frames the trader and guides his choices with elements either of an affective type resulting from emotions or cognitive, based on his knowledge and previous experiences.

Table 1. Distinction between cognitive and emotional biases

Cognitive biases	Emotional biases
<p>According to Kabbaj (2011, p.28): «Cognitive bias is a decision error (bias): the investor favors immediately available information without carrying out in-depth research»</p> <p>What leads to a bad decision following cognitive biases, is the use of the trader's own knowledge and beliefs as a means for analyzing the information at his disposal. The trader in this case becomes hostage to his own habits.</p> <p>In the same vein, research by Kahneman and Tversky (1979) demonstrates that individuals do not change their usual strategies and base themselves on their knowledge which, even if they are aware of its unreliability, they prefer its simple character in terms of reasoning. In this case, the rigid ideas are the most dominant and are beaten only after extreme losses and which require the change of scenarios by traders.</p>	<p>According once again to Kabbaj (2011), what leads to a bad decision subsequently to the emotional biases as their name suggests, is listening to the emotions emanating from the former operations either of gain or loss, and which influence the decision of the trader and his way of thinking. His reactions are driven by his emotions due to his financial situation.</p> <p>Emotions generally lead to predetermined actions, which can be erroneous given their base that is neither solid, nor always valid, but which per El Bijri and Qafas (2020), can help the investor to make decisions appropriate to his own situation. Thus, following the same authors : «Emotional bias usually occurs spontaneously based on an individual's personal feelings at the time a decision is made.» (p.133)</p> <p>In this sense, Emond (2019) differentiates between cognitive and emotional biases by stating that the latter is based on feelings rather than facts. As well as emotions for him, frequently in times of stress overcome thought.</p>

Cognitive biases

Now we are going to highlight the main psychological biases by first addressing some of the most widespread cognitive biases, which are either the result of information processing problems or memory errors, namely: conservatism biases and cognitive dissonance, availability bias, familiarity bias, framing bias or “framing effect”, representativeness bias, Momentum effect (The Law of Small Numbers), and anchoring bias. Some of these biases can be both cognitive and emotional, which we will detail below.

Conservatism bias and cognitive dissonance: Regarding conservatism bias, it is purely cognitive resulting from memory errors, the main cause of which is framing, while cognitive dissonance is a heuristic cognitive bias that is related to the processing of information. Emond (2019, p.17) defines conservatism bias as: «Clinging to a prior view or forecast at the expense of recognizing new information»

Through these biases; of conservatism and cognitive dissonance, the idea is that the investor overestimates the information confirming his point of view, and minimizes the information inconsistent with his own knowledge that he frequents. Conservative bias allows people to understand why individuals are conservative in their decision-making and how this bias encourages them to value information that supports their opinions. We, therefore, have two scenarios that result from the confrontation between the prerequisites and information kept by the actor resulting from his past, and the new information he has. The first case is when the beliefs of the decision-makers are consistent with the information received, which gives reinforcement to their beliefs. The second case is when the same actor is faced with data inconsistent with his knowledge and his beliefs emanating from his cognitive part that fixes them in his mind as much as an individual, which gives rise to unpleasant tensions; what is called "cognitive dissonance". This conflict between emotion and cognition often stimulates selective perceptual mechanisms: individuals seek to reduce this cognitive dissonance by simply ignoring this information.

Availability bias: This bias is related to the information available to its user, so it is a cognitive bias of heuristic causes. According to Kabbaj (2011), investors limit themselves and settle for readily available information rather than actively seeking all the information needed to make investment decisions. This readily available information is generally irrelevant, the author gives the example of the positive results announced by the company; or when the stock falls sharply, a fact considered as an opportunity to not be missed; a bullish divergence validated on technical indicators such as the Relative Strength Index RSI, or others. «The seasoned trader has understood the importance of waiting for the convergence of several signals before taking a position. The good trader plays above all the probabilities and not the certainties.» (p.29)

Familiarity/Domestic bias: Along the same lines as availability bias, familiarity bias is a cognitive bias of heuristic causes in relation to information processing, it occurs when a person prefers one option over another simply because they know it better. Following different analytical studies, such as the study by Kramer and Weber (2000), Kimball and Shumway (2010), and research by Kahneman and Tversky (1979, 1974) among others, the results showed that between

two bets that offered the same probability of success, individuals would choose the one they knew best, and even in the other direction with a lower probability of success, a number of individuals would still choose the most familiar to them. This pervasive cognitive bias often manifests as State bias. The trader will systematically be interested in situations that he seems to know. Therefore, the vast majority of investors buy stocks that are familiar to them. Research shows that investors tend to favor domestic equities, which contradicts the efficient market hypothesis. In this sense, according to Zhu (2002), the familiarity bias can manifest itself as a kind of overreaction to the results announcements of local titles compared to non-local titles, it is a bias that could also be called domestic. Huberman (2001) argues that this bias is due to discrepancies in terms of information in favor of domestic stocks to the detriment of foreign stocks, so it is a kind of informational asymmetry between the two parties cited. Graham *et al.* (2009) on their part, link this bias to the competence of investors, when it is strong, they are attracted by foreign stocks and invested in them, but when they underestimate their own skills, this is reflected in their behavior so they settle for domestic stocks.

Framing bias or “framing effect”: According to Emond (2019, p.5) framing bias is a: «Tendency of investors to react differently to situations depending on the context in which a choice is presented.» It could represent a set of stereotypes that formulate so-called mental filters that guide individuals and accompany them in their decision-making processes; through understanding and then reacting to events in different situations. In this case and following the work of Kahneman and Tversky, the operators do not have the same decision behavior when faced with the same problem presented in different terms. To several researchers including Emond (2019), this bias is a cognitive framing in relation to information processing.

Representativeness bias and Momentum effect (The law of small numbers): Following a group of researchers, including Tversky and Kahneman (1974), Dhar and Kumar (2001), and Kaestner (2005), individuals link the past to the future through comparisons, likelihood estimation, and extrapolations of events. Representativeness bias is a heuristic cognitive bias related to memory errors. Thereby, it reflects the fact that individuals are used to perceiving trends in the absence of trends, and therefore investors may overestimate the probability that a future event will happen again, especially since they have recently observed this event, known as the dynamic effect. In terms of the law of large numbers, it states that statistical results are only acceptable if the observed sample is large enough. Indeed, many people tend to generalize a case that is normally particular. In other words, they make decisions by referring to the law of small numbers, which shows a complete ignorance of probability theory. Individuals estimate the probability of an uncertain future event based on the event's similarity to a phenomenon observed in the past. Kahneman and Tversky (1979) posit that individuals emanating from their own judgment and perspective, tend to rely on the similarity of observed familiar patterns while neglecting the odds ratio; the relationship between price and the intrinsic value of a stock (Prospect Theory). In this case, market participants will misunderstand the laws of probability, often assigning similar probabilities to different events. They will generalize what is only a particular case, and refer to the "law of small numbers" to apply a large

probability to a series of sequences that are not very relevant, because of its sample which lacks representativeness. Here also comes the Momentum effect which is according to Emond (2019, p.13): «An investment strategy that implies that rising prices tend to continue to move in that direction». Momentum bias is also based on the law of small numbers, suggesting that individuals will rely on the recent past to make predictions. A number of authors have demonstrated that investors are optimistic about bull markets and pessimistic about bear markets. They believe that the recent rise will continue and vice versa if it declines. In this sense, investors completely ignore the law of large numbers and rely on short sequences to make predictions.

Emotional biases

Although emotions are helpful in the decision-making process by simplifying it, they limit investors' ability to analyze and reason effectively. In general, investors experience different emotional states (pride, joy, euphoria, fear...) and emotions that lead to predetermined actions. Emotional biases are also linked to beliefs, they have been the subject of numerous studies and can influence the judgment of investors. «Emotional biases are based on feelings rather than facts. Emotions often dominate thinking in times of stress» Laurent (2019, p.12). In this subsection, we will first try to define and then develop the biases related to individual emotions such as; regret and loss aversion (Prospect theory), overconfidence and self-attribution, biases arising from aggregate behavior (also called mimetic, or herd bias), status quo bias, and anchoring which is among others; both a cognitive and emotional bias. In what follows, we will detail these elements.

Regret and loss aversion (Prospect theory): A head back on the work of Emond (2019, p.17): «Feeling more the pain of losses than the pleasure of gains compared to other types of investors.» is called loss aversion. It is a purely emotional framing bias. On the other hand, the aforementioned prospect theory is based on the assumption that most subjects tend to transgress utility theory and react differently towards similar probability changes. Prospect theory modifies expected utility theory in two ways and leads to predictions related to investors' loss aversion: First, assuming that investor utility is a function of relative benchmark gains and losses, rather than absolute wealth. Second, the standard utility function is concave, whether gains or losses, prospect theory assumes that the utility function is that gains are concave and losses are convex. According to Brabazon (2000), loss aversion is based on the psychological punishment associated with a given loss being greater than a spiritual reward for gaining the same value. In the same vein, Gleitman *et al.* (2000) affirm the impact of loss aversion factors in the process of decision-making by investors who are generally sensitive to it and aim to avoid it all the time. The theory underlines this aversion to losses and considers the investor as an individual with a strong emotional content when his wealth decreases; that is, when he loses, compared to his less emotional behavior at the time of positive operation; that is, when he wins. In this vein, Kahneman and Tversky (1979) are convinced after introducing a new utility function called the value function, that the aversion to losses is twice as important and heavy as the gain. Following this series of ideas, we could add the bias of regret; provoked and linked to the feeling of fear, which Emond (2019, p.18) defines as follows: «Avoid taking decisive measures for fear that with hindsight, the course of action

chosen is not wise.», through this explanation this bias can be classified in the box of emotional biases of framing source.

Status quo bias: The status quo bias is purely emotional from heuristic causes, it is simply the feeling of security that emerges when individuals keep their same investments. As analyzed by Samuelson and Zeckhauser (1988) it is a tendency to defend its previous strategy by maintaining it for the making of the next decisions, this means that it is arbitrarily considered as a reference strategy. The aforementioned authors add that making an investment decision requires time and effort, and a relatively high initial cost of participation, which is why it seems more powerful and optimal for investors to keep the original strategy. Their experiments also show that this gap increases with the range of possibilities. This result is particularly enlightening when applied to investors who are essentially faced with many choices, since discrete choices (which assets?) and choices continuous (what quantities?) combine. Brown and Kagel (2009) argue that status quo bias is significant in individuals who stand the test of time independent of stock returns.

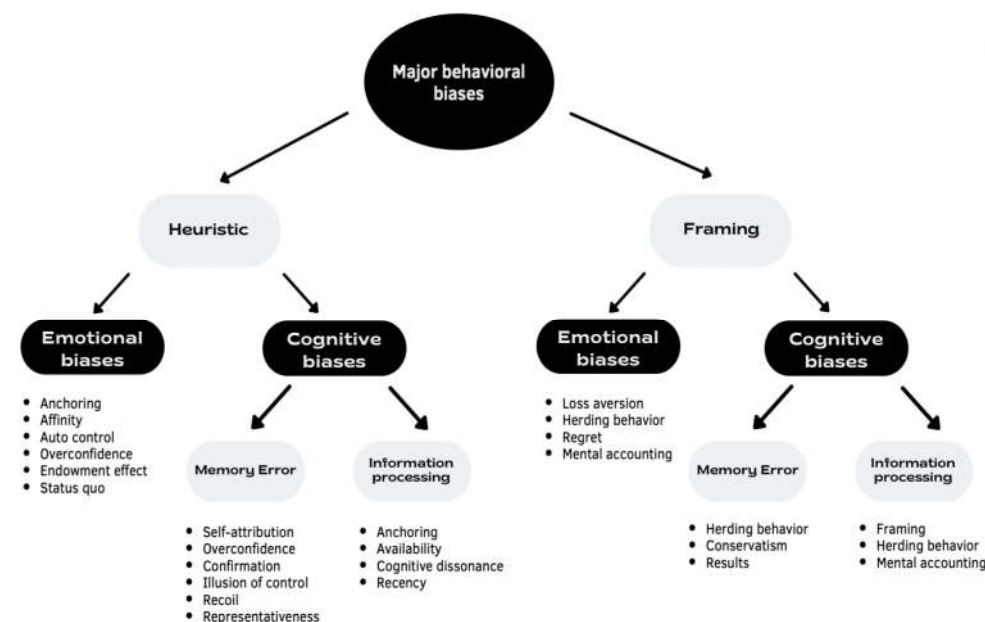
Overconfidence and self-attribution biases: Among the most discussed behavioral biases in the literature; the overconfidence bias and self-attribution bias, both are heuristic cognitive biases related to memory errors, but overconfidence is characterized by such an emotional character, that we preferred to quote them in this subsection dedicated to emotional biases. By definition, overconfidence refers to a situation in which a person believes that their abilities are above average (miscalibration according to Glaser and Weber, 2007). This causes investors to resort to magical thinking and personal attribution (self-attribution). Overconfidence reflects the tendency of humans to overestimate their own abilities, their chances of success, the possibility of obtaining positive results, or the accuracy of knowledge, this overconfidence is generally unjustified which causes the individual to be convinced that his talent is the source of his gain when he records positive results, and his failures are the result of the impact of other external factors, he then attributes his failure in a systematic way to bad luck. Several studies have been carried out in this direction, proving that the majority believe with a 100% probability that an event will happen, when in reality it will only occur in 80% of cases. The opposite case is for an event that they believe in its low chance of occurrence or even lack of chance that it will happen, while it has a 20% probability which can change the situation. According to Puri and Robinson (2007), investors with excessive optimism will be convinced that they, compared to others, have a low opportunity to experience negative events. Distinctly from optimism, overconfidence refers to overestimating one's own personal abilities. Therefore, if investors are overconfident, they cannot listen to others, which impacts prices according to Daniel, Hirshleifer, and Subrahmanyam (1998), and brings out abnormal movements in this direction.

Gregarious behavior (follower, mimetic, or herd bias): This behavior is seen as an explanation of the Momentum effect and the overreaction of securities. It could be a source of cognitive and emotional biases, because it is a behavior that produces spontaneous and emotional decisions related to the psychology of the individual, but which is based in principle on the knowledge and experiences of other investors. Within the financial market, imitation appears as a source of so-called herding behavior which basically determines the prices of

certain main securities and affects the price of risky assets by bringing them back to their fundamental value (De Long *et al.* 1989). Here come the founders of behavioral finance to testify to the veracity of this phenomenon resulting from the limited rationality of investors and their inability to process the information at their disposal. These types of investors will easily follow other more professional investors who demonstrate success in the stock market.

This technique or mimetic reaction can be beneficial in certain cases, but it can even generate phenomena resulting from uncontrollable evolutions at a certain level, when the majority or downright all investors react in the same direction (purchase, sale, speculation) and take identical decisions, we can witness the famous stock market crash of Black Thursday 1929 in New York stock exchange. In this sense, we can cite Hong and Stein (1999) who affirm that this phenomenon of overreaction results from the presence of two types of investors: the first is called a group of News watcher investors who make the effort to analyze the signals market in terms of the fundamental information and data available on the securities to build their forecasts. And the second group rather Momentum which are based on the recent evolution of prices which is influenced by the confrontation of supply and demand (that is to say the decisions of the operators on the market), their forecast based thereby, is therefore seen as an overreaction to information followed by a long-term negative correlation of returns when prices correct the observed overreaction. From an investor attitude or position point of view, there are also two kinds of these following behaviors; first is fallacious mimicry, and the second named intentional mimicry, the difference between them is how decisions are made, is it voluntary or coincidental and based on facts that investors reacted alike. According to Broihanne *et al.* (2004), it is complicated to clearly differentiate the distinct forms of herding behavior, even technical analyzes in practice fail to highlight the distinctions between spurious mimicry and intentional mimicry, knowing that private information is not still accessible and the markets being largely anonymous, this phenomenon for authors is ubiquitous in emerging markets and difficult to manage.

Anchoring bias: The anchoring bias is both cognitive (on the information processing side) and emotional, moreover its causes are rather heuristic. By definition, anchoring is a tool that the human brain uses to solve complex problems. In many cases, humans start estimating from an initial value (baseline) which will be adjusted to produce the final answer to a given question, which can lead to under-reaction or over-reaction by investors in the financial market. The starting point itself is either implied by the way the problem is expressed or the result of a calculation. The adjustments made to arrive at the final answer (from the initial value) are often insufficient. Also, these estimated results may vary depending on the starting point, which therefore may be biased depending on the value initially set as the reference point. According to Pompian and Wood (2006), anchoring bias is linked to the ability of investors to make an investment decision by referring to an irrelevant anchor (or reference) point that accompanies their thinking. Mangot (2004) postulates the existence of a numerical anchoring error because an investor tends to focus on a single numerical anchor such as stock prices, market ratios, etc., and use it as a reference when developing estimates. Anchoring bias creates a strong connection between decisions and the context in which they are made. For instance, to value financial assets, individuals are often influenced by arbitrary data provided to them, and although it is arbitrary, they will stick to that initial measurement. According to the same author, this bias could well be corrected, by first basing it on more rational anchors; for example, taking a legitimate anchor through the collection of sufficient information on the market price, and making static comparisons in terms of comparable values and other dynamics in relation to historical valuations. These steps are among others remedies to this so-called anchoring bias. Instead of dealing with the problem as a whole, individuals focus on one aspect of the problem to find a solution. The market environment affects individual decisions. Anchoring bias is a major flaw for many stakeholders and can only be eliminated by taking a holistic view of the market (Mangot, 2008). In what follows, we present a diagram containing the biases already mentioned and others not mentioned, to synthesize and illustrate the classification of behavioral biases into type and subtype with their causes based on our literature review.



Source: Authors.

Figure 1. Summary of types and subtypes of behavioral biases and their causes

THE IMPACT OF BEHAVIORAL BIASES ON INVESTORS' FINANCIAL DECISIONS

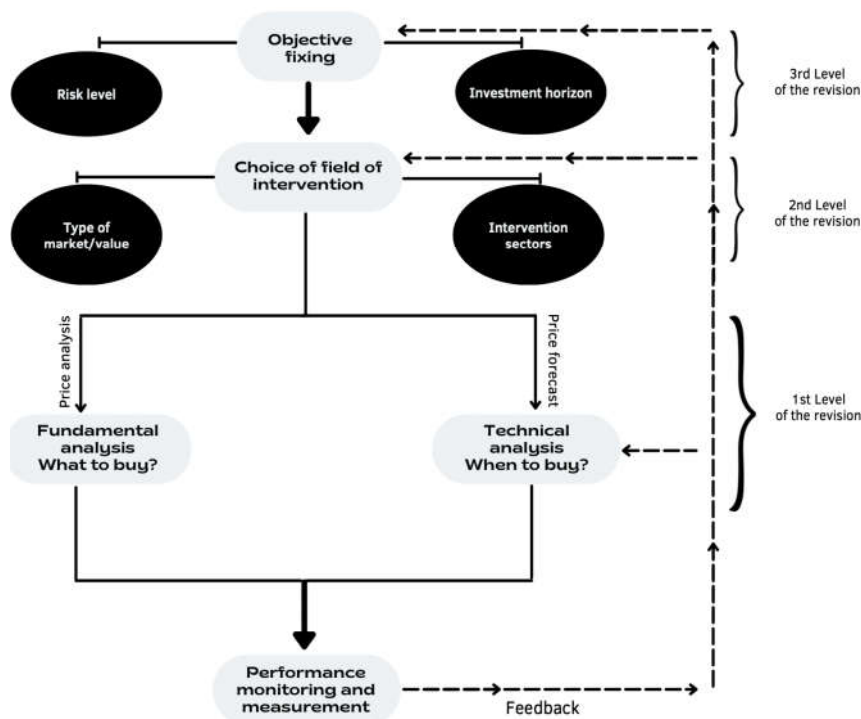
Before starting this section, it is essential to define the so-called investment decision, the latter is therefore a well-calculated financial choice and is considered very crucial because it has a role in the creation of value for the company. As according to Charreaux (2014): «Beyond the financial expression of the conditions for creating value, their economic basis must be clearly perceived». Based on the identification of the conditions necessary for the creation of value, we could arbitrate between different investment opportunities and proposals that must be beneficial in terms of economic rent.

In an even more general way and following Pierre (2018¹): «Investment decisions are decisions related to the choice of projects that the company will have to carry out to ensure its survival and sustainability. They consist of the evaluation of the purchase of equipment, expansion of factories, modification of the production system, etc., in short, of all the decisions that have a significant influence on future cash inflows. In investment decisions, we must assess the relevance of immediately disbursing funds that will only produce revenue in the future».

The use of the financial market and more specifically trading is one of the investment decisions that must be taken carefully and based on specific foundations. A successful investment is the result of an in-depth analysis that must be carried out during this decision-making process and which concerns the intrinsic value of a financial instrument subject to our investment. In this case, each security is analyzed in great depth accompanied by an accounting analysis of the company issuing these securities, what is called fundamental analysis and financial analysis.

Referring to Ennahal (2008), we set out the following diagram, which summarizes all the decision-making stages of an investment in the stock market.

According to the scheme below, any investment in the stock market begins with the setting of clear objectives for this investment. The objectives that an investor must set, are the first pillars of success for his investment in the stock market. These objectives are: First, the determination of the investment horizon and then the setting of the degree of tolerable risk (or risk aversion). In this sense, this idea could be reinforced through the information available in the investor's guide published by the AMMC², the objective of which is to make the circuits understood and adopt good practices for this category of individuals. Among the things to fix: knowing your investor profile, through the definition of investment objectives and the investment horizon as well as risk tolerance which differs from one investor to another. It is, therefore, a key preliminary exercise for the choice of financial instruments, the investor should know and understand each category of financial instruments, their opportunities and their risks in order to make an informed and well-considered investment decision from which he expects an obviously positive return on investment (gain), something that is only possible if he has been able to manage and control his behavior and has succeeded in his decision-making process characterized by uncertain circumstances. By evoking the subject of the management of investors' behavior during the decision-making process, we appeal once again to behavioral finance, the reason why we see the need to address the subject of the impact of behavioral biases on the financial decisions of investors. In the following subsections, we will begin with the main biases including those cognitive in relation to the beliefs and knowledge of the investor and those of emotional type which concerns taking control of his emotions.



Source: Ennahal (2008)

Figure 2. Decision-making process in the context of an investment in the stock market

¹Quote from chapter 4: Long-term financial management, Part 1: Investment decisions in the context of SMEs.

²The Moroccan Capital Market Authority

Cognitive biases and investor decision-making

In an uncertain environment, each investor seeks to adopt an optimal investment strategy, from which he finds himself with a way of thinking that seems easy and advantageous in terms of time and efficiency to achieve his decisional objective of profiting and winning through an investment transaction within the financial market. These orientations prior to the execution of the operation, fall within the scope of the series of behaviors specific to the trader and which are of different types according to several factors, including his personality, age, and experience, are among other elements at the origin of a choice to the detriment of another. From where come the impact of cognitive biases on the actions and choices of traders.

While replying to the question of cognitive biases' impact on traders' choices, we generally can speak about the impact of the factors of beliefs, knowledge, and their relationship with the decision-making process. These elements linked to the convictions specific to each individual, allow him to act effectively in uncertain situations. It is for this reason that traders rely on their knowledge to respond to different market situations. In other words, in a hostile and uncertain environment, the investor generally sticks to what he knows best as a basis for acting and reacting within the financial market. However, this knowledge and beliefs are not necessarily proven, but rather can represent a source of suboptimal and dangerous decisions that lead to undesirable outcomes.

As discussed above, anchoring bias being a cognitive bias, is a tendency to rely excessively on baseline or prior information to make investment choices (Mangot, 2008). Anchor points are the tendency of individuals to base their estimates and decisions on familiar and habitual locations called "anchor points" and to adjust their starting points (called reference points), this type of fixation is called "anchoring according" to the same author. This intervenes as a strategy of decisions made in an uncertain environment by individuals who are afraid of the unknown and change, from which comes the perspective theory of Kahneman and Tversky (1979), which could be used as a means of analysis for making risky decisions. The approach as is based on familiar things and thus from the past, it produces biases that impact the effectiveness of the decisions made, and increase the probability of falling into error. It is for this reason that Mangot (2008) proposes remedy solutions, which we mentioned above in the paragraph dedicated to the anchoring bias, and which invites investors to have a holistic view of the market, and to make more effort in the search for information (both public and private) that accompanies and helps the proper conduct of the decision-making process, and the choice of optimal investment. The following solutions proposed, can even correct the so-called availability bias in which the individual is content with easily accessible information.

Alongside the bias of anchoring, representativeness, and Momentum effect (The law of small numbers), the bias of conservatism and cognitive dissonance, and availability, we can add herd behaviors (follower, mimetic, or gregarious bias), these biases influence the investment decision of individuals in an intense and easily detectable way, since individual investors tend through this behavior to follow others, which creates a mass movement. This eliminates their thought and their personality or these elements become defined by others. In

other words, their investment decisions are practically the investment decision of others.

Emotional biases and investor decision-making

In the other direction, there is no denying that emotions have a remarkable influence and guide investment choices. Speaking of mood, Mangot (2004) states that it plays on the way a person receives and processes, and then interprets information. For him, a calm, even cheerful person, can perform tasks efficiently and better assimilate the data at his disposal. Moreover, the state of the market (bullish, bearish, no trend) has a decisive influence on personal sentiment. On one hand, pessimism and panic can be a result of bearish markets, while on the other hand, when markets are trending bullish, we would have more optimistic and euphoric traders. As well as several studies have shown that market conditions in terms of period and natural states (weekends, good weather, rain, full moon, holidays, etc.) directly influence the actors and therefore the financial market, example of the study by Schwert (2002) and French (1980), Kim and Park (1994) concerning the effect of weekends and holidays on stock performance and market efficiency.

Overconfidence from another side is shown as a bias that leads to underestimating risk, overestimating knowledge, and overreacting to events. In fact, according to Pompian and Wood (2006), individuals think they are smarter and better informed than they actually are. The theme of risk perception had been provoked and used since the 1960s to explain investor behavior. In this context of behavioral finance, investors' perception of risk when trading stocks may vary, whether or not they are actually risky, their perception may be different from reality. The concept of risk perception has a deep foundation in the field of investor behavior and is quite similar to the discipline of behavioral finance.

In accordance with Barberis and Huang (2001), loss aversion refers to the psychological consequences that people may experience as a result of losses or gains. Loss aversion is an intolerable bias in financial decision-making. Most of the time, individuals are risk averse and seek to escape them. Whereas in the financial market, return and risk are in the same direction; when the risk is high, profitability increases, and when the asset is safer, i.e., is less risky, its yield is relatively low. Investors who aim to increase their wealth must therefore take risks (Pompian and Wood, 2006). Wright and Bower (1992) also discussed that emotions can have a major impact on the perception of risk, they claim that being in a good mood makes us optimistic, which drives us to act. Instead, the risk is that bad emotions fuel our critical thinking. What is interesting in this study is the ability to control emotions. The remedy proposed by the researchers is to soothe the effect of emotional biases and to take control of one's emotions. In this case, the loss of control is a source of bad decisions.

On the other hand, by wanting to more or less control our feelings and by fighting our irrationality during decision-making, we cannot deny the intervention of other external factors which can preside over us unconsciously, including valuation anomalies, which emerge from weaknesses of efficient market theory defended by authors; such as Fama (1970), and questioned by others; such as Froot and Dabora (1999), in the sense that market prices in several stock exchanges differ considerably from their apparent core values.

Even with regard to special and natural periods called the calendar effect, certain researchers including Kim and Park (1994) demonstrate correlations between stock markets and between climatic or calendar events (effects of sunshine, days of the different weekdays, holidays, etc.). To say that these external elements are generally uncontrollable and create affective biases among traders, which affects their investment decisions.

BEHAVIORAL BIASES AND TRADING PERFORMANCE

Several failures in trading can be the result of psychological biases linked to the triggering of affection among investors and which in turn has dramatic consequences. According to Kabbaj (2011), the following sequence can summarize the situation:

Psychological bias → Errors → Self-destruction

Not only the emotions, but also the knowledge that an individual gathers during his professional and personal life, have a strong impact on his decisions while operating in the financial market. Although the trader's knowledge allows him to quickly analyze any market situation before making a decision, this will determine his trading performance.

Being successful also means knowing how to manage risk, for Odean (1999) this management is done according to recent gains or losses, insofar as the trader becomes very confident and impulsive after winning streaks, but very cautious and risk-averse after losing streaks. Conversely, after a series of losses, traders become traumatized and reluctant to take a position. Thus, in general, the perception of risk in a given situation will strongly depend on the results recorded during the last operation.

In this section, we will discuss some character and personality traits of traders that still fall within the field of behavioral biases but which this time impact their own trading performance.

Trading frustration

The trader as well as the human being has specific expectations when operating in the financial market, which generally revolves around the success of generating gains and building one's own wealth. These needs are unfortunately not always satisfied since we operate and we decide in the uncertain, that is to say, that the achievement of these objectives is not always guaranteed, which can exacerbate negative emotions and can even make actors suspicious. The fear of loss is an effective frustration that can generate the cognitive dissonance which occurs when individuals interpret market information in a painful way that does not correspond to their situation, they protect themselves from this pain in such a way that they neglect this new information which is inconsistent with his knowledge guaranteeing him peace and certainty in deciding. In this case, the way of thinking hampers a trader's ability to see alternatives to what they might be thinking, which obviously affects their performance in the market as well as a player.

Trader's hidden personality

Human beings by nature are unpredictable, so each person has a hidden character or personality that emerges in specific

situations. According to Kabbaj (2011): « Every individual has a hidden personality. In the financial markets, the rational personality often gives way to another personality, responsible in many cases for the self-destruction of the trader.» Psychological bias can cause traders to go from a state of calm to a state of euphoria or depression. A trader's mistakes as already explained, are generally related to his attitude toward losses, gains, and missed opportunities. Psychological biases alter their perception of information and encourage them to engage in behaviors that are ultimately harmful, leading in particular to "dangerous ADHD³". The solution in this case, referring once again to the work of Kabbaj (2011), is to strive for a more objective behavior. The trader must not only understand the source of his main psychological bias, but also limit the negative effects such as excessive risk-taking in the event of failure or haste. This is to perform and increase his chances of winning. Since the error, and any situation of failure, trigger a mental sign of danger which results in bringing out our other personalities to react against this risk. The reason why controlling our personality can appear difficult as long as the latter is always developing and constantly changing. In this vein having a dual personality, which is normal; since it is proven not to be a fixed element, is of significant implication in the subject of trading (Steenbarger, 2006).

Emotions and self-destruction

Trading can be very stressful, it is an activity that is likely to awaken and provoke certain emotions; as we have seen, fear, regret, self-esteem, and self-confidence, etc. These emotions perfectly illustrate how the market undermines our defenses and pushes us to take reckless risks by not respecting our systems. The only way for a trader to protect himself from the chaos of the market is to have a precise set of rules and trading plans, besides the essential mental and psychological control there are then rules that the trader must follow, such as the "money management" mentioned by researchers including Jesse (2001), this technique takes into consideration several factors that influence our trading operations; including risk.

On the part of self-destruction, it is involuntary when a trader is completely dominated by his emotions and is no longer able to control his decisions. Euphoria, panic, and paralysis can create the conditions for its self-destruction. Self-destruction can also be voluntary. Obviously, many traders want to be successful, but there are also traders who unknowingly refuse to be successful. Traders who truly want to succeed will do whatever it takes to fulfill their ambitions and achieve their stock market goals. Otherwise, those who don't believe in it will give up completely and not do what is necessary. Some traders do not necessarily seek success in the market but complain, in this sense, failure is a form of success.

Self-destruction is possible with regard to the businessman, and for reasons beyond his control. Work, will, and dynamism are necessary assets, but not sufficient to succeed. A person's life is made up of a series of random events that make short-term success completely unpredictable, but that doesn't mean success is impossible. Trying is much better than watching the opportunity slip away. Therefore, it is necessary to make efforts and take matters into your own hands to achieve the desired success. Success depends on many factors, and

³Stands for : Attention Deficit Hyperactivity Disorder.

opportunity has a major impact in the short term. However, in the long term, only skills and performance will prove themselves and contribute to success.

CONCLUSION

At the end of the analysis, behavioral finance makes it possible to question the main principles of classical finance based on assumptions about market coefficients. History shows that classical finance doesn't consider investors' psychological aspects.

Within the framework of our paper, we attempted to provide a representative assessment of the existing literature on the main behavioral biases and their impact on traders' financial decision-making and performance. In this literature, investors exhibit a number of behavioral biases (cognitive and emotional) that influence their investment decision-making process. It has been shown that the extreme volatility of global indices and stock prices due to fear and anticipation makes life difficult for rational investors. Alongside the market sentiment that turns from positive to negative and vice versa in a short time.

Ultimately, as we have seen, investor psychological biases are at the root of stock market mismanagement, affecting investor decision-making and trading performance.

This study points out other important conclusions which bring avenues for future research: First, all the emotions of the individual in a decision-making situation come from the research field of behavioral finance and impact the rules of conduct and the performance of players and the financial markets, also the human capacity for introspection is limited, which varies from person to person. For this reason, studies like ours must be complemented by other more physiological as well as quantitative ones. Second, as in all work environments, investors follow socially accepted standards of conduct, rules, and trading plans (such as money management) trying to control their activity in the financial market. In the final analysis, the question that arises is the following: What are the strategies followed to avoid behavioral biases? and to what extent have machine learning algorithms (particularly genetic algorithms) improved stock price predictions? These queries will be a line of research for future works.

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