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Psychology of investors: reexamination of the traditional finance

Psychologie des boursicoteurs: une remise en cause de la finance traditionnelle

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Abstract

Traditional finance and behavioral finance are two branches of finance, dealing differently with the decision-making choices of stock brokers, whether on the financial markets or in the company of which they are shareholders. The traditional approach is based on the hypothesis of the efficiency of financial markets and the perfect rationality of the stock market, on the other hand, the behavioral one takes into consideration the impact of cognitive bias and emotional bias on the decision-making process. Rationality and irrationality are two explainable concepts of the decision-making of the drone operators. According to the traditional, stock brokers are "rational" since they allow the price of a share to be linked with its fundamental value and the cancellation of any divergence through arbitration. However, behaviorists describe drone operators as "irrational" because they are humans, driven by emotions and judgment heuristics that interfere with their rational behavior and investment decisions. The purpose of this article is first to clarify the basic foundations of each reasoning, so that we can know whether behavioral finance actually offers remedies for a good understanding of the behaviors of drones.

Key-words: Financial markets; stock markets; rationality; irrationality; behaviors.

Résumé

La finance traditionnelle et la finance comportementale sont deux branches de la finance, traitant différemment les choix de prise de décision des boursicoteurs, que ce soit sur les marchés financiers ou dans l'entreprise dont ils sont actionnaires. L'approche traditionnelle s'appuie sur l'hypothèse de l'efficience des marchés financiers et la rationalité parfaite des investisseurs, par contre, celle comportementale prend en considération l'incidence des biais cognitifs et des biais émotionnels sur le processus décisionnel. La rationalité et l'irrationalité sont deux concepts explicables de la prise de décision des boursicoteurs. Selon les traditionnels, les boursicoteurs sont « rationnels » puisqu'ils permettent de lier le prix d'une action avec sa valeur fondamentale et l'annulation de toute divergence grâce à l'arbitrage. Cependant, les comportementalistes décrivent les boursicoteurs comme « irrationnels », car ils sont des humains, poussés par les émotions et les heuristiques de jugement qui nuisent leur comportement rationnel et leurs décisions d'investissement. Le présent article sert à clarifier tout d'abord les fondements de base de chaque raisonnement, pour que l'on puisse savoir si la finance comportementale offre effectivement des remèdes pour une bonne compréhension des comportements des boursicoteurs.

Mots clefs : Marchés financiers ; boursicoteurs ; rationalité ; irrationalité ; comportements.

Introduction

The financial market is a meeting place between capital applicants and capital providers. The allocation of resources, the creation of liquidity and the transparency of information are the main functions of a financial market in order to facilitate the smooth functioning of their meeting.

This confrontation between surplus and deficit can only be successful if the market is efficient and the investors are perfectly rational. These are the two conditions that have so far created and created a real controversy between theoreticians and practitioners of finance, but also of the psychology of financial markets.

In the eyes of traditional financiers, the investor is a homo œconomicus who rationally orders his preferences in order to maximize his satisfaction and minimize his costs. This assertion has been proven following a range of work ranging from models of modern portfolio theory that rely on the two most popular concepts in finance "risk" and "profitability" (BENJANA, 2021) up to the theory of informational efficiency of financial markets of FAMA, which was largely inspired by REGNAULT, reputed as the founder of scholarship science par excellence. He's the pioneer of random walking theory. In 1863, he presented a theoretical financial model designed to study the variations in the prices of the Paris stock exchange. Later, in 1900, BACHELIER took over the work of REGNAULT to develop his theory on speculation (BENJANA, 2019).

But, can we really believe this vision? What is the real behavior of investors? Behavioral financiers and psychologists such as THALER, KAHENMAN & TVERSKY, SHILLER, responded concretely to this question, explaining the real "irrational" behavior investors at the time of investment decision-making and referring to cognitive and emotional biases that impact their perfect rationality.

It should be noted that the investor can be either an individual investor acting on his own behalf or an institutional investor acting on behalf of others. The ultimate goal of behavioural finance is to assess the irrational behaviours of individual investors in general. However, many other authors have addressed the behavioural vision of companies, referring to institutional investors as shareholders (CHARREAUX 2002, BAKER & WURGLER 2004).

The objective of our article is as follows: how can we explain the influence of certain behavioral biases on the rationality of investors? Do these biases exist by human instinct? And why have traditional financiers ignored them in their analyses?

To answer these questions, this research will focus on two main areas while clarifying the hypotheses of our research. The first will be devoted to a theoretical overview of the traditional vision of investor rationality, whether as a decision-maker on the financial markets or as a shareholder in the company. The second will be in the form of a deep insight into the reasons for the emergence of behavioural finance, its descriptive models and its pillars that have upset all finance.

1. Concept of Rationality according to Traditional Finance

Reason, calculation, coherence, selfishness... If we homogenize them, we find the notion of rationality. "Rationality" has its origin in Latin "Rationalitas" and can be defined as "*a mental state that takes place during a decision, the deliberation that precedes it, the processing of the information that constitutes the matter and the attention paid to each phase of this treatment itself*" (BERTHOUD, 1991).

This mental state has been understood, indeed, since the birth of Greek philosophy and more precisely with the philosopher of reason PLATO, who associated reason with dialectics. Remaining in philosophy, reason took its place on the one hand in the work of DESCARTES on rationalism, in the 17th century, which defines it as "*the power to judge well, and to distinguish the true from the false*" (DESCARTES, 1637), and on the other hand, in the work of ADAM SMITH in the 18th century on "The Invisible Hand" and the individual rationality of economic agents. Without forgetting the passage of the German sociologist WEBER in the 20th century, who suggested that we should speak rather of the "reasons" of the individual action, distinguishing four types of rationality of which the two most famous are: axiological rationality and instrumental rationality.

In economics, rationality is associated with the abstract notion of "homoœconomicus"; a concept whose origin is uncertain, which defines a typical ideal of the human being by encompassing intrinsic and extrinsic traits. Homoœconomicus" is the basis of neoclassical economists since it allows them to facilitate the elaboration of their mathematical models.

To do this, we will list the models that explain on the one hand the perfect rationality of investors as takers of investment decisions in financial markets and on the other hand those that describe the limited rationality of investors, relying on a particular type of "zinzins" as shareholders in the company.

1.1 Perfect rationality of investors

The concept of rationality was placed in the history of financial theory for years, which ended with the creation of a reference theoretical model that brings together the work of a gigantic list of mathematicians and economists. This model focused on the study of the functioning of financial markets and the "rational choices according to the classics" of investors at the time of investment decision-making.

It should be noted that these theories, explained below, do not discriminate between individual and institutional investors; they study the investor as a rational investment decision-maker. To do so, our first hypothesis is formulated as follows:

H1: Investors make their investment decisions rationally.

1.1.1 Portfolio Management Theories

Before discussing portfolio management theories, some basic notions of these theories need to be clarified. According to Knight[1], the first notion "uncertainty" is the probability of occurrence of an unknown event, whereas the second notion "risk" is the probability of occurrence of a known event.

❖ **Theory of Expected Utility (BERNOULLI.D, 1738)**

The problem of decision-making in a risky and uncertain universe, relying on the rationality of individuals in general and investors in particular, has aroused the curiosity of a number of mathematicians and economists thereafter, ranging from BLAISE PASCAL and PIERRE DE FERMAT, two mathematicians who invented the notions of probability and the theory of games. A theory that allows to study risky and uncertain situations "games" where rational individuals "players" interact and make decisions. THEPOT (1998) points out that a game *« is any situation in which several autonomous decision-makers are led to make decisions leading to results. Each decision-maker is assigned a result but this result depends on all the decisions made by all»*

Indeed, after the invention of probabilistic calculus by PASCAL & FERMAT, the Swiss mathematician NICOLAS BERNOULLI stated, in 1713, the famous paradox of Saint Petersburg which is based on the notion of mathematical hope. According to him, in a game of chance, whatever the sums bet by an individual or an investor "the player", the mathematical expectation of the win is infinite. In 1738, DANIEL BERNOULLI tried to replace

[1] Frank Knight (1921), Risk, incertainty and profit.

mathematical hope with the notion of the hoped-for utility. According to D.BERNOULLI, to maximize wealth, one must transform the gains into a function of utility; a growing and concave function that makes it possible to measure the satisfaction of the individual. "*The determination of the value of an object should not be based on its advantages, but only on its utility*" (BERNOULLI.D, 1738).

- **Axiomatic theory of choice (VON NEUMAN & MORGENSTERN, 1944-1947)**

Daniel BERNOULLI highlighted the behaviour of the decision-maker in risky situations by stressing the existence of risk aversion. Subsequently, his criterion was formalized, generalized and axiomatized by VON NEUMANN and MORGENSTERN in 1947 in their book Theory of Game and Economic Behavior. These two theorists pointed to the conditions that must be met for the decision-maker to be rational and maximize his utility function while being within the framework of objective probabilities. (BENJANA, 2021)

- **Modern Portfolio Management Theory (MARKOWITZ, 1952)**

In addition to the theories of decision-making in uncertainty, based on the criterion of hoped-for utility or the axioms of preferences, the American economist MARKOWITZ proposed, based on the hypothesis of the perfect rationality of investors, in his article published in 1952 "The utility of wealth", a quadratic utility function that defines investors' preferences based on their risk attitudes.

In this respect, MARKOWITZ in its modern portfolio theory puts forward the creation of an optimal portfolio. In other words, for a given risk, the investor chooses the portfolio that provides the most profitability and vice versa. A savvy investor is one who optimizes their investments while best allocating their portfolio in order to mitigate their volatility and maximize their gain (BENJANA, 2021).

In doing so, the Markowitz mean-variance model is based on normality. Thus, a normal distribution is characterized by its two parameters: expectation and standard deviation. The expectation measures the expected return while the standard deviation of a security quantifies the risk that has been tainted. In other words, the risk that will be borne by the investor (BENJANA, 2021).

It should also be noted that MARKOWITZ has introduced the concept of portfolio diversification, which makes sense of the famous proverb "Don't put all your eggs in one box."

❖ **Valuation models of financial assets (SHARPE, (1963-1965), ROSS, (1976))**

Despite the success of MARKOWITZ's theory, it has been criticized by many market finance practitioners. According to them, MARKOWITZ did not break down the risk, hence the appearance of financial asset valuation models. Based on investors' rational expectations, they identified two categories of risk: systematic risk and specific risk, and they structured solutions into an equation to answer the following question: how do these risks affect the performance of an asset or portfolio of assets?

The first is the market model introduced by SHARPE in 1963, which is based on the fact that fluctuations in a financial asset are due, on the one hand, to the influence of the market in general (systematic risk) as measured by β and, on the other hand, to specific causes or specific to each asset (specific risk) measured by ε. It is a model that is not based on any theoretical construction, it is a purely empirical formulation. The second model is the Financial Asset Valuation Model (CAPM), the most popular and widely used model, which was developed by SHARPE (1964) and LINTER (1965) based on the idea that the expected profitability of a financial asset depends only on its systemic risk, measured by β and increased by a risk premium.

Unlike the CAPM, the ROSS model (1976) is the third model, based on two main assumptions, the first explains that the profitability of an asset depends on a set of economic factors which can be classified into two categories: systematic factors and specific factors, the second hypothesis concerns the arbitration principle "*Ross uses the arbitrage principle that any investment created without risk and wealth (such as short sales) must have zero profitability*" (FONTAINE, HILLION, 1992).

1.1.2 Capital Market Efficiency Theories

Those who say investors rational expectations on the financial markets, say a hypothesis that has upset conventional finance. This time with the main contributions of REGNAULT (1863), BACHELIER (1900) and FAMA (1970).

❖ **Random walk model (REGNAULT, 1863)**

Towards the end of the 19th century, an agent of exchange in Paris, Jules REGNAULT, observed how stock prices vary over time by assimilating this variation to a game of chance "coin game." "*It is certain that when I flip a coin, each shot is completely independent of the precedents, or at least has no appreciable dependency […]. Similarly, in the stock market, the*

player is always tempted to speculate on what should happen after what has happened […] (REGNAULT, 1863).

Based on this observation, he invented a random market model that explains these stock market fluctuations. However, there remains a theoretical model without concrete demonstration, which left the work of REGNAULT unnoticed.

❖ **Theory of speculation (Bachelier, 1900)**

Thirty-seven years later, the French mathematician BACHELIER, through his thesis entitled "Theory of Speculation (1900)", formalized mathematically the theoretical model of REGNAULT. «*Bachelier states very precisely its objective: to establish "a formula" that expresses the law of probability of price variations that the market admits at a given moment*.» (JOVANOVIC, LE GALL, 2002). However, the unpredictability of future stock prices explained by BACHELIER, through his thesis, gave rise to the theory of the efficiency of financial markets, including the informational efficiency of FAMA which explains information as a factor responsible for stock prices.

❖ **Informational efficiency theory (FAMA, 1970)**

"The price is not always determined solely by the present circumstances; it still includes all the legitimate hopes that may be contained in this situation" (Regnault, 1863). "Speculative theory can be seen as the starting point of modern finance, and the distant root of the concept of informational efficiency in its probabilistic acceptance" (WALTER, 1996)

From these two statements, we will conclude that the two precursors REGNAULT and BACHELIER, through their models, have implicitly introduced the notion of information and the efficiency of financial markets. These two concepts were reformulated in 1970 by FAMA to give us the theory of informational efficiency.

In FAMA's view, an efficient market is a market which fulfils certain conditions, namely: the perfect rationality of investors, the correct incorporation of all the information available in the stock exchange prices and, these prices must always be equal to their intrinsic value. In addition, he distinguished three forms of efficiency according to the variation of the information; the first is the weak form (all past information is available), the second is the semi-strong form (all public information is available) and the last is the strong form (all existing information is available.).

1.2 Bounded rationality of investors

Alongside the financial market, investors also play a key role in corporate governance. This role implicitly explains their limited rationality and behaviours. According to this logic, the purpose of this section is to explain the behaviour of investors, as shareholders or a stakeholder, in the governance of companies. To do this, we will first address the main contractual theories of the firm, which are the explanatory basis of certain behaviors, second, the alternative theories of governance and last, the attitudes of institutional investors towards corporate governance.

Why study, precisely in this section, institutional investors? Because "*institutional investors have largely contributed to the development of corporate governance because it helps to ensure a better efficiency of the executives of the companies in which they have invested*" (Caby et al. (2013)).

In doing so, we propose our second hypothesis:

H2: The limited rationality of institutional investors can impact the governance of companies in which they are shareholders.

1.2.1 Contract theories of the firm

"The nature of the firm" is the article in which COASE, in 1937, asked the following questions: what is the nature of the firm? And why does it exist?

Based on these questions, COASE defined the firm as "*an alternative to the market"* (COASE, 1937), and not simply as a "black box". By extension, the firm entered into a contractual spirit "a node of contracts" with reference to JENSEN & MECKLING (1976) which extended the vision of BERLES & MEANS[2] (1932) on the dismemberment between ownership and control and WILLIAMSON (1985) which extended the transaction costs initiated by COASE (1932).

❖ **<u>Agency theory (JENSEN & MECKLING, 1976)</u>**

In any firm, there is an "agency relationship" that can be defined "*as a contract by which one or more persons (the principal) hires another person (the agent) to perform on his or her behalf any task that involves a delegation of some decision-making authority to the agent*" (JENSEN & MECKLING, 1976). It is a conflict-like relationship, and its main configuration is that between the officer and the shareholders. Indeed, directly or indirectly, this conflicting relationship generates "agency costs" that can impact the value of the firm. JENSEN &

[2] « The modern corporation and private property », Berles & Means (1932)

MECKLING have established control and incentive systems to limit conflicts of interest and asymmetries of information between the manager and the shareholders.

❖ **A transaction costs theory (WILLIAMSON, (1975-1985))**

It is "*a comparative institutional approach that proposes a study of the economic organization in which the transaction is the basic unit of analysis*" (LAVASTRE, 2001). WILLIAMSON has taken up the concept of "transaction costs", initiated by COASE, which are broken down into ex-ante and ex-post costs. The Williamsonniere theory has been based on two behavioral hypotheses that can negatively impact a transaction and generate costs; the first is limited rationality, from the Simonnian theory that replaced the optimal decision with the satisfactory decision because of the existence of constraints, "*Given bounded rationality, all complex contracts are unavoidably incomplete*" (WILLIAMSON, 1990) and the second is opportunism or self-interest "*given opportunism, contract-as-promise unsupported by credible commitments is hopelessly naive*" (WILLIAMSON, 1990).

1.2.2 Alternative Theories of Governance

According to the OECD (2004) corporate governance "*includes all relationships between the company's management and its governance body with shareholders and other stakeholders, with the objective of creating value for the company".*

So, which governance mode or governance system to choose? First, we must choose a governance system that will avoid agency conflicts (JENSEN & MECKLING) and reduce transaction costs (WILLIAMSON). Second, choose a governance mode that will either maximize shareholder value or maximize stakeholder value.

Shareholder theory is a method of governance that is limited to shareholders. It favours the interests of shareholders and maximizes their value. In contrast, stakeholders (in French we retain the translation of stakeholders among several others proposed: interested parties, rights holders...) was used for the first time by Ansoff (1968). But it was from 1984 that this concept was imposed and popularized after the publication of Freeman's book: «Strategic Management: A stakeholder Aproach» (M'BARKI & EL HADRI, 2022). FREEMAN formulated, in 1984, an extended version of the governance "Stakeholder theory", which allows the creation of stakeholder value and the maximization of the interests of all the actors partners to the firm and not only the shareholders.

1.2.3 Passivity and activism of institutional shareholders

The question we need to ask now is: Does the presence of institutional investors improve corporate governance?

Indeed, the increased presence of institutional investors in the shareholding policy of companies, has prompted us, to study the behaviors of the latter in the governance of companies, of which they are shareholders. These investors are savings collectors with the means and skills to guarantee a good management of the portfolio of assets under management, reduce information asymmetries and agency conflicts and improve corporate governance.

The behaviour of institutional investors in corporate governance depends on three main factors: their investment horizon (long-term or short-term), their level of participation in the ownership structures of the firms in the portfolio (SAHUT & OTHMANI GHARBI, 2010) and the relationship between these investors and the company. It is these factors that direct institutional investors behaviour towards either active governance behaviour or passive behaviour.

❖ **Passivity of institutional investors :**

A group of authors, including DRUCKER (1986), BLACK (1990), explained the passivity of institutional investors in corporate governance. These investors prefer a short-term investment horizon and choose not to intervene in the company's strategic decisions. This behaviour "*presupposes a lack of incentive to control and promote the objectives and management of enterprises, and often involves a follow-up of managers in their decisions and actions*" (BLACK, 1990). In this case, institutional investors prefer to stay away, take advantage of changes in share prices and realize significant short-term returns, which clearly explains the fact of being "a stowaway[3]" and follow "the Wall street rule".

❖ **Activism of institutional investors :**

On the other hand, institutional investors opt for a long-term investment, are considered activists. Their active behaviour explains their attachment and strong involvement in corporate governance. « *Institutional investor activism is a complex phenomenon encompassing a multifaceted reality. It manifests itself in various more or less visible modes of intervention, ranging from the supervision of a limited liability company to a relatively high level of control, whose objective is to influence and challenge corporate governance* » (ROUSSEAU and CRÊTE, 1997). Indeed, some authors have asserted that the active presence of institutional

[3] This concept explains the fact of enjoying some advantages without any contribution.

investors allows the company to benefit from executive control, a reduction in agency costs and asymmetries of information and an improvement in the quality of the strategic decisions of the enterprise by their strategy of intervention "voice" (HIRSCHMAN, 1970)

2. Concept of irrationality according to behavioural finance

Like traditional finance theories, can we really affirm that financial markets are efficient and that investors are rational? It is these reflections that have been reactivated among researchers in finance and psychology, a curiosity to know to introduce a new approach entitled «behavioural finance» which has come into play the notion of «irrationality». "*The type of irrationality that poses a conceptual problem is not one's inability to believe or experience what we think is reasonable, but rather an absence from the same person. consistency or non-contradiction in the structure of beliefs, attitudes, emotions, intentions and actions*" (DAVIDSON, 1970)[4]

Investors are human beings, their decisions can be based on their own beliefs and perceptions, on emotions and also on social and cultural factors. These behaviours are the indirect consequences of their irrationality at the time of investment decision-making. Indeed, many crashes, speculative bubbles and anomalies have hindered "rational" finance and challenged this irrational view of investor behavior.

To do this, we will start from the beginning, in other words, we will explain the reasons for the appearance of behavioural finance by focusing on tulipomania (1637), stock market anomalies and the stock market crash (1987). Next, we will list the "founding fathers" of the behavioural approach with their descriptive models of the irrational behaviour of investors.

2.1 The emergence of behavioral finance

Behavioural finance was born at the end of 1970 and was officially recognized in October 2002, following the award of the first Nobel Prize to the psychologist DANIEL KAHENMAN. The question here is what are the reasons for the emergence of research on investor behaviour? And to discuss what is the correlation between these behaviors and the fluctuations of stock prices?

❖ **<u>Tulipomania</u>**

Between 1500-1600, a period that was characterized by the arrival of a new variety of flower "tulip" in the Netherlands. A flower that created the first speculative bubble in history. His

[4] MORETTI A. (2003), Three Approaches to the Irrational: DAVIDSON, MATTE BLANCO AND DA COSTA, Noesis [Online], 5.

appearance on the market quickly aroused the attention and lust of the Dutch. Indeed, tulip is a bulbous plant that takes between 7 and 12 years to reproduce, for this reason, the idea was to settle its purchase through a futures contract "trade in wind". The strong demand and folly of speculators have created an abnormal increase in the prices of tulips, until 1637, where prices collapsed abruptly without leaving any value to this flower. So, is it rational to sell your house to invest in a flower? Tulipomania is a good illustration of the emergence of behavioural finance, as it clearly explains the irrationality and herd behavior [5]of investors.

❖ **Stock market anomalies**

One of the interesting conclusions about the emergence of behavioural finance is the existence of market anomalies. Who says anomaly, says an empirical result that is inconsistent and inexplicable by traditional finance.

The table below focuses on the most well-known anomalies on the various stock markets in the world.

Table N°1: Summary of stock market anomalies

Types of anomalies	Empirical studies	Conclusion
• *Profitability anomalies*		
❖ **Size Effect**	➢ Study of NYSE titles according to their Beta over the period 1936-1975 (BANZ) ➢ Study of securities listed on the NYSE and Chicago stock exchanges (AMEX) over the period 1963-1977 (REINGANUM)	The stock market performance of small companies is abnormally positive compared to large companies.
❖ **PER Effect**	➢ Study of 753 securities listed in the NYSE over the period 1956-1971 (BASU)	Securities with a high PER achieve lower returns than securities with a low PER.

[5] The act of mechanically imitating the attitudes of others.

	➢ Study carried out on the French market (DERBEL, HAMON & JACQUILLAT (1991))	
• *Calendar anomalies*		
❖ **January effect**	➢ Study of securities listed on the NYSE and AMEX (KEIM & ROLL, 1983) ➢ Study on the OTC-NASDAQ over-the-counter market (SANGER, 1989)	Seasonal "beginning of the year" increase in market prices.
❖ **Monday effect**	➢ Study based on the daily history of the Standard & Poor's 500 Over the period 1953-1977 (FRENCH) Study based on the daily stock market returns of the AFFI index over the period 1977-1989 (HAMON & JACQUILLAT)	Monday is the first day of the week, investors are pessimistic which causes a decrease in stock exchanges.
• *Momentum effect*	➢ Study on American equities for the period 1965-1989 (JEGADEESH & TITMAN) ➢ Study of European assets over the period 1980 and 1995 (ROUWENHORST)	Actions that perform positively (respectively underperform) over an earlier period continue to follow this path in the CT.
• *Long-term Reversal Effect*	➢ Study of listed securities on the NYSE for the period 1926-1992 (De BONDT & THALER)	The profitability of the securities tends to reverse on the LT.
• *Excessive volatility*	➢ Standard & Poors 500 (S&P 500) Price Survey of the American Market (SHILLER,	Divergence between the price of a stock and its fundamental value.

	1981) Study of stock prices on the German market after the Second World War (DE LONG & BECHT, 1992)	
• *Disposition effect*	➢ Study of 100,000 stock exchange transactions between 1987 and 1997 (SHEFRIN & STATMAN)	Investors tend to prioritise the winning stock and retain the losing stock.

Source: Authors

❖ **Stock market crash of 1987**

Indeed, from the beginning of 1987, the American stock market was in a phase of euphoria because of the irrational behavior of investors, which generated between 14-Oct-1987 and 16-Oct-1987, a high volatility that led investors to withdraw from the market. The bubble eventually burst on 19 Oct 1987, resulting in a sharp decline in the Dow Jones index by 22.6%. The various explanations of the crash provided by classical theorists were insufficient, as they ignore "investor behaviour". SHILLER is one of the economists, who explained this fall in prices by the irrationality of investors in order to give place to the emergence of behavioural finance.

2.2 Illustrative models of behavioural finance

The appearance of certain irregularities on the stock markets and of certain irrational investor behaviors, has prompted a good community of economists and psychologists to create their own descriptive and explanatory models of the different behaviors observed.

On the basis of the above, our third hypothesis is:

H3: In the presence of behavioural biases, investors become irrational in their investment decision-making.

2.2.1 Models of KAHENMAN D. & TVERSKY A. (1974-1981)

These psychologists were the first to make very influential contributions to irrational decision-making. They divided their work into two axes: heuristics de jugement (1974) and theory of perspectives (1979-1981).

❖ **Heuristics de jugement (1974) :**

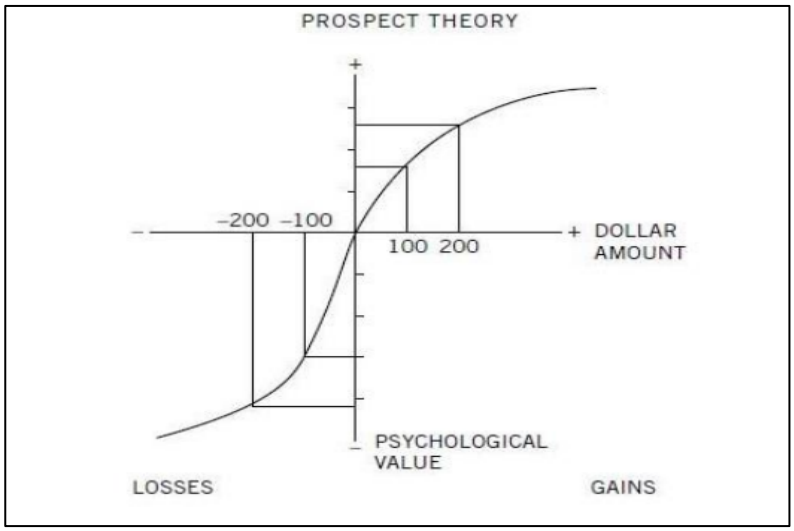
The starting point of this first axis is the concept of "limited rationality" introduced by SIMON (1957). This axis describes the cognitive shortcuts or "rules of thumb" that we use to shorten and simplify our decision-making, which contradicts rational finance. These heuristics are double-edged swords, in other words, they help us find solutions quickly, but they can also lead to cognitive errors or biases. In fact, KAHENMAN & TVERSKY have identified three types of heuristics, namely, heuristics of representativeness, where our decision is based on a comparison of the current situation with another known and representative, heuristics of availability; this time, the individual or investor will not waste his time looking for new information, he will be content only with information accessible to the mind and heuristic anchor where the reasoning is based on a reference from it, we can adjust our decision.

❖ **Theory of perspectives (1979-1981):**

This is the one that challenged the theory of expected utility, showing that individuals do not always behave rationally in decision-making. This alternative theory highlights two cognitive biases, namely:

• Loss aversion: Individuals or investors act rather by emotions and their reactions differ between losses and gains, in other words, for example the loss of 10 MAD can be felt more painful than the gain of 50 MAD. Through experiments and these conclusions, KAHENMAN & TVERSKY have introduced the concept of "loss aversion" which clearly explains that the decision-maker is more averse to losses (convex curve) than to gains (concave curve). **(SEE FIGURE N°1)**

Figure 1: Value function according to the theory of perspectives



Source: KAHENMAN D. (2013), Thinking Fast and Slow, New York: Farrar, Straus and Giroux, 283.

• Framing effect: Based on the famous experiment of «Asian disease», KAHENMAN & TVERSKY introduced a cognitive bias that violates the principle of invariance of the Bernoullian theory. This bias explains that the choice of individuals in general is influenced by the formulation or presentation of the "framing" options, which means that even if the options are equivalent, the way in which these options are presented is different. If the option is presented in negative terms, their behaviour will be risk taker, but if it is presented in positive terms, it will be risk averse. Indeed, the framing effect can hinder the decision of the speculators, because a good framing of a bad information can cause them to underevaluate and therefore to irrational behavior.

2.2.2 Model of SHILLER R. on "Excessive Volatility" (1981)

"The price of a stock must always be equal to its fundamental value "an assertion reflecting the efficiency of financial markets, which has been discredited by SHILLER. Knowing that the fundamental value is the value of the share, taking into account future dividends, stock exchanges are obliged to anticipate them based on the information available on the market, Moreover, the existing fluctuations have no impact on this fundamental value. In SHILLER's view, efficiency cannot always be believed, as dividends are not fully representative of the fundamental value and stock market fluctuations cannot be explained simply by the distortion of available information. In addition, SHILLER has shown that there are cognitive biases (aversion to loss, heuristics of judgements, etc.) and emotional biases (excess of confidence, etc.) that create discrepancies between the price of the stock and its true value. These irrational behaviours negatively impact investors' reactions, resulting in excessive volatility.

2.2.3 Model of THALER R. on "Mental accounting" (1985-1999)

Why would most individuals spend $10 on a theatre ticket if they had just lost it than if they had to replace it? It is from this study carried out by KAHENMAN & TVERSKY in 1981 on theatre tickets, that THALER introduced in his article entitled "Mental Accounting Matters" the concept of "mental accounting" also known as "the two-pocket theory". In simple terms, mental accounting is the set of cognitive operations used by individuals/investors to organize, evaluate and subjectively track their money, This violates the principles of traditional finance and drives them to make irrational spending and investment decisions. The latter treat money differently, relying on three components of psychological accounting, identified by THALER, namely: transactional utility, budget compartmentalization and temporal frequency.

In investment decision-making, mental accounting is frequently explained in the context of portfolio construction. In traditional finance, investors create their portfolios by optimizing the return/risk relationship, on the other hand, many behaviourists including THALER have shown that investors break down their transactions into mental accounts and make their decisions separately without taking into account the portfolio overview. This irrational mental behaviour can lead to undesirable and negative outcomes.

2.2.4 Model of SHLEIFER A. "Limits of arbitrage " (1990-2000)

In the stock market, there are two types of investors; arbitrators and Noises traders[6]. Arbitrators are stock traders who act rationally, while Noises traders irrationally make investment decisions based on cognitive and emotional biases rather than sound financial analysis. According to traditional finance, even if there are Noises traders, market disrupters, rational arbitrators are able to bring the price of the stock towards its fundamental value.

Such a conclusion aroused the curiosity of the economist SHELIEFER to refute it. The latter has shown the limits of this arbitration, stating that it is not always possible to guarantee the conformity of the arbitrators forecasts with the evolution of the market prices, as well as the existence of Noises traders causes the market to react negatively which can influence stock market movements and make it almost impossible for arbitrators to correct the valuation errors of these Noises traders.

2.2.5 Model of SHEFRIN & STATMAN on "Behavioural Portfolio Management" (2000)

In reality, we cannot always believe in modern portfolio theory, because it remains a normative theory that shows how a rational investor builds and diversifies his portfolio of assets by respecting the medium-variance rule. To do this, SHEFRIN & STATMAN have constructed a descriptive theory of investor behaviour entitled "the behavioural theory of portfolio management", based on the Safety-First approach (LE ROY, 1952), the theory of perspectives (Kahenman & Tversky, 1979) and the SP/A theory (Lopes, 1987).

According to SHEFRIN & STATMAN, investors can be risk taker as they can be risk averse. After deforming the objective probabilities, the latter psychologically consider their portfolios as a pyramid with two distinct and uncorrelated layers; a "downside protection" layer and an "upside potential" layer.

[6] An approach first developed by BLACK in 1986

This behavioural portfolio management is more used by institutional investors and reflects the two factors of the risky choice described by LOPES (1987); the first factor presents investors risk averse choose "security" and the risk taker choose "the potential", while the second factor refers to the level of aspiration that can be defined as "the desire to reach a certain level of "reasonable" wealth" (LOPES, 1987).

2.2.6 Corporate Behavioural Finance

There is no denying that behavioural finance was created for one main reason: to explain the market anomalies and irrational behaviour of investors in financial markets, that traditional finance was not able to do so. However, many authors in corporate finance have also decided to integrate this behavioural vision in order to replace traditional assumptions of rationality with behavioral hypotheses that are more based on conclusive conclusions.

• JENSEN (1994): Building on the "Mind Brain Behavior[7]" initiative, JENSEN has introduced a human behaviour model entitled "Pain Avoidance Model" to complement the "Resourceful Evaluative Maximizing Model". He tried to explain why even the most rational individuals can sometimes behave irrationally, as he proposed to add to traditional agency costs, "agency costs with oneself" integrating emotional or psychological pain.

• SHEFRIN (2001): Through its article entitled "Behavioral corporate finance", SHEFRIN claimed that there are two main behavioural costs in the process of creating enterprise value, which cannot be taken into account solely by incentives. The first cost is internal to the company, in other words, that comes from mistakes made by managers due to cognitive and emotional biases, while the second is external that reflects the behavioral errors of investors.

• CHARREAUX G. (2002): He has integrated the cognitive vision into governance as "*the set of mechanisms to increase the potential for value creation through learning and innovation*" (CHARREAUX, 2002)

- BAKER & WURGLER (2004): He addressed two approaches integrating the hypothesis of irrationality, namely; the first is "The market timing and catering approach" which explains the irrationality of investors and its impact on investment and financing policies, while the second approach investigates the irrationality of managers and the influence of certain behavioural biases such as optimism and over-confidence on the creation of company value.

[7] It was introduced in 1993 by Harvard University to study the brain and human behaviour

Conclusion

Whether it is a remedy for the shortcomings of traditional finance, behavioural finance remains a necessity for understanding and clarifying the decision-making of investors in financial markets. The latter succeeded in creating a bridge between traditional finance and psychology in order to explain the anomalies and to begin to understand the true nature of investors' behaviors with all their cognitive and emotional defects. However, one cannot reject the conclusions drawn by traditional financiers even with their limited scope, they remain reference models.

Indeed, although behavioural finance has become a major force in finance, it has not yet been able to find solutions to mitigate the effects of behavioural biases on investor rationality, This leaves us with the following reflections for future research paths: are irrational behaviours controllable and manageable? For example, if an investor is too confident, how can this irrational behaviour impact the stability of financial markets? And do behavioural biases differ between institutional investors and individual investors? If so, what would be the intensity of this nuance?

In short, investing isn't about beating others at their game. It's about controlling yourself at your own game" (BENJAMIN GRAHAM Graham, 1949, The Intelligent Investor)

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