RISK-TAKING AND RISK-AVERSE INDIVIDUALS AND ORGANIZATIONS THROUGH NEUROFINANCE

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ABSTRACT

Financial sciences have begun with the classical theories; passed through the behavioral finance; and reached the neurofinance. At this stage, the medical and psychological sciences are used; moreover, the physical structure of human body and his environmental experiences are applied. In fact, this aspect of finance is tested based on the changes occurring in human’s body affecting decision-making process. It could be mentioned that it completes the behavioral finance. The financial science is associated with the physician and the psychologist. Since it is based on the changes that occur in human’s body, it affects human’s decisions and characteristics, leads to changes in the capital market, and explains investors’ behavioral biases. This new branch of finance discusses modeling financial market processes via investigating physiological processes in human’s brain. Therefore, the cognition of human’s behavior and how he deals with different issues in different conditions are the necessities of neurofinance. The present paper studies the process of financial schools

KEYWORDS: Efficient Market, Rational Human, Behavioral Finance, Neurofinance

Although the behavioral discussions have a long history in the world of investment and financial issues, it has approximately 30 years that they have changed into an independent field of study. The rise of stock price at the end of 1990s of America increased the importance of understanding investors’ non-rational behavior, therefore, terms such as normal human versus rational human emerged\(^1\). The normal human regarding the knowledge of behavioral finance describes human’s real behavior for making economic decisions. After development of the laboratorial economics, the empirical experiences have got considerable so that they could make the development and continuity of studies in the field of the knowledge of behavioral finance inevitable\(^2\).

According to a general categorization, the knowledge of behavioral finance is examined at both micro and macro levels. At the macro level, the financial markets and their characteristics such as behavioral finance confrontation with the classical theories of finance especially the theory of efficient capital market is clarified. At the micro level, the assumption of rationality of neoclassical economics investors via behavioral finance is challenged\(^3\). In the behavioral finance field, the non-rational behavior is not the opposite point of rationality in the classical finance. In fact, the non-rational behavior refers to the behavior which is not completely in accordance with the rational characteristics defined in the classical finance\(^4\).

The investors could widely take advantage of the knowledge of behavioral finance in specific situations. When the behavioral finance develops among the market participants, the investors will get aware of its advantages. As a result, understanding how the investor’s psychological aspects affect the consequences of investment leads to new insights\(^5\). Having a proper relation with the behavioral finance provides a portfolio for managers and consultants. The portfolio is in accordance with each investor’s targets and biases. Here, the evolutionary process of financial schools will be explained.

CLASSICAL SCHOOL

The classical school was introduced by Adam Smith (1723-1790) in 1776 in England based on the philosophy of individualism in economics. Smith was a Scottish scientist who published his book titled “a research into the nature and causes of the nations’ wealth”. The book made him famous as the founder of economics and classical school. His book was the most comprehensive book about the economic organizations. Moreover, it had been the first book written in 18\(^{th}\) century based on a new scientific approach to the economics. In 1871, the emergence of economists such as William Stanley Jevons, Carroll Manger, and Leon Walras the neoclassical school was introduced into

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Neoclassical School

The origin of neoclassical thought refers back to the beginning of 1870s when the school of marginalism has been formed. In fact, neoclassical economics is the developed form of marginalism. Alfred Marshall established the term, however, some declared that Veblen was the first one to apply the term. Alfred Marshall intended to show a kind of link between the term and classical thought. Moreover, Marshal attempted to show that the neoclassical thought resulted from the continuity of classical thought (Dadgar and Namazi, 2011, pp:64-67).

Alfred Marshall combined supply and demand for determining value, therefore, the synthesis was formed and it was called the neoclassical school. Such a synthesis was the renovation of classical-political economics. Moreover, it was considered as the theory of distribution and its value which was almost forgotten as a result of marginalism revolution. Consequently, the neoclassical school was introduced as the continuity of classical school.

Some declare that the neoclassical term is not the continuity of the classical school. For instance, Milan Zafirovski (Milan Zafirovski, 1999) believes that the postclassical economics which has been introduced in 1870s is a non-classical economics rather than a neoclassical economics. This issue is also applied for the theory of value (price) and distribution in the microeconomics. He believes that introducing neoclassical school as the continuity of classical economics is not true. Kepa. M. Ormazabal (Kepa. M. Ormazabal, 2005) declares that the neoclassical economics is not the continuity of classical economics; moreover, there is a great gap between the neoclassical economics and the classical economics. As a result, the introduction of the term"neoclassical economics" is misleading. He declares that the classical concentrates on profit as the basis of capitalism, while the neoclassical economics concentrates on the exchange.

Generally, the neoclassical economics relies on three main assumptions; however, various branches might have different approaches. The assumptions are mentioned as follows:

- People have rational preferences in order to ask for the consequences of their decision-making. They can identify the preferences and associate them with values.
- Individuals maximize utility, while companies maximize the profit.
- Individuals act independently based on their complete and relevant information.

The neoclassical economics presents different theories in relation to different field in order to explain economic phenomena via the mathematical language. The mathematical tools consist of calculus, linear algebra, statistics, and issues such as the theory of games. The knowledge of computer considerably helps economics on order to explain theories which are based on the mathematics in economics.

Knowledge of behavioral finance at micro and macro levels

The behavioral finance models and interprets varying phenomena in a vast range of investors’ behaviors at the individual level and the market level. This issue brings about problems for defining the knowledge of behavioral finance. In order to make a common literature, the terms behavioral finance micro (BFMI) and behavioral finance macro (BFMA) are applied. BFMI examines investors’ biases at the individual level that distinguishes investors from the assumed rational actors of the theory of the classical economics. BFMA detects and describes the uncertainties in the efficient market hypothesis that might be explained by behavioral models.

Role of knowledge of the behavioral finance for investors

The investors could take advantage of the applications of the finance for specific situations. The behavioral finance is a relatively new concept for the investors and the investment consultants. Sometimes, one might be in doubt about its validity or acceptance. Moreover, the consultants are reluctant to ask their customer psychological question in order to understand their biases. When the behavioral finance develops among the market participants, the investors will see its advantages and it will be expected that understanding how the investor’s psychological aspects affect the investment consequences would provide new insights. Having a proper relation with the behavioral finance provides a portfolio for managers and consultants. The portfolio is in accordance with each investor’s targets and biases.

Mental model diagrams in the behavioral finance
The mental model diagrams have been designed in order to categorize individuals based on their certain behaviors, biases, and characteristics. The mental model categorization is related to the capacity of taking risk and individual strategies. An investor's previous experiences could play an important role in decisions made through the process of asset allocation. If the diagrams depict the investors’ biases, the professions of the market will take advantage of them in order to detect signs of behavioral biases before making investment decisions. Barnewall’s study in 1987 and Bailard’s; Biehl’s; and Kaiser’s model in 1986 are two important relevant studies.

**METHODOLOGY**

The library studies are used to have access to the basic theoretical principles needed for the present paper. Since the present paper is in fact a review, it investigates evidence and studies related to the subject matter of the study. Finally, the analysis of the results is done based on the collected evidence and via the help of the experts.

**FINDINGS**

Since the behavioral finance was in contrast with the neoclassical economics and it did not reach an independent paradigm, the analysts, researchers, and investors asked themselves what was the basis of analyses. Other exceptions which could not be explained based on the biases of the behavioral finance led to research studies that introduced medical science into fields of economics, finance, and investment.

This field of study is known as neurofinance and it is developing. For instance, the results of studies done by Hershilfer and Shamui (2002) showed that during 15 years, the investment in stocks in New York during the sunny days was three times more than that of the cloudy days, however, the standard finance and even the behavioral finance could not explain the reason for it. Finally, the results of other research studies revealed that the investment rate depended on different seasons or days of the week, especially the days after non-working days. Anyhow, the previous schools could not explain the reason for it.

They understood that an individual’s internal state is so dependent on his thoughts, observations, interpretations, and events that they could change his internal state. Moreover, the facial gesture, looks, and how the words are expressed will change in accordance with an individual’s internal state. In other words, an individual’s appearance manifests his internal state. Therefore, an individual’s acts, decisions, and even investments at a moment are influenced by his specific internal state at that moment. For instance, if a person is happy, he will be more inclined to invest in something. While, if a person does not feel good, he will avoid participating in business and investment activities.

In this condition, the medical science especially psychology is applied. The psychologists believe that people have different internal states while experiencing different modes of appearance. In fact, different endocrine glands and exocrine glands are secreted for different external factors; therefore, various messages are transferred through the neural network. New discoveries resulted from the combination of psychology and finance. Consequently, knowing different parts of the neural transmission, the effect of different drugs on individuals, and individuals’ different moods for making decisions led to the emergence of a field study known as neurofinance. In fact, neurofinance was a bridge between the knowledge of brain and finance in order to reach a better understanding of individuals’ financial decisions. According to neurofinance, neurology studies the effect of mental states on financial decisions.

The evidence indicates that a distinct brain system is in relation to the processing of emotions. Repressing each of the systems or too much involvement of them would lead to mistakes in decision-making especially mistakes in making financial and economic decisions.

The research studies show that there are two systems in the brain, one is the encouraging system and the other is avoidance (inhibition) system.

The encouraging system: the decision made for obtaining profit activates the encouraging system. The neurons transfer the information to the encouraging system via neural messengers of dopamine. Recently, it was found that dopamine played a role in attention and accuracy, training, stimulations, determining value for the promotion, and so forth. When the level of dopamine in brain increases via electrical stimulation, the individual will experience the intense feeling of joy. Dopamine affects the system of success and it increases individual’s risk-taking. Moreover, the extroverts have more levels of dopamine.
The avoidance system: contrary to the previous system, it is located in different areas of the brain. Serotonin and norepinephrine are the chemical materials of the avoidance system. The activity of these materials causes anxiety; however, the selective inhibitors control the serotonin. The selective inhibitors are known as the antidepressants. The chronic involvement of the avoidance system leads to neurotic characters that are risk-averse. Such people have a gene that activates the serotonin receivers in the cells, therefore, the concentration of serotonin increases in the blood. Neurofinance attempts to understand how the involvement of the systems in the brain increases or decreases. Neurofinance even studies the effects of taking different drugs. The important point is that neurofinance intends to determine the function of the aforementioned systems for people and also to assess level of risk-taking and risk aversion.

The researchers have found that individuals have different emotional states in different times and conditions. Therefore, they will experience internal changes that lead to a specific decision or act. However, the scientists changed the cause and effect and provided an internal state for the individuals in order to make a specific decision or have a specific act. It has been a great progress in the finance because of the fact that actions and reactions are known, and the strategies for making causes and reaching effects have been discovered.

DISCUSSION AND RESULTS

Finance has never been a distinct science, but it has always helped other sciences to reach their goals. It is an interdisciplinary science that takes advantage of accounting, economics, and mathematics. Using different sciences especially mathematics and operational research studies as the important subsets of finance help the development of finance.

The involvement of other sciences especially those related to human- as the most important factor for making decisions and investments-such as psychology, and sociology, a new insight into the finance has been achieved and it paved the way for a new school known as the behavioral finance on order to reach developments in the financial fields.

The emergence of behavioral finance brought about problems for the standard organized structure of finance and it showed that rules of the standard finance were not always reliable. In fact, the behavioral finance revealed mistakes and lack of proper responses.

In other words, it found a new effect for which there was no response. This issue helped scientists get aware of the complexities related to the investor’s brain and neural network in order to reveal financial and economic mysteries.

The behavioral finance had a more realistic view and it changed the idealistic position of the finance into the real position of it. Therefore, it could see decisions from a human’s viewpoint and it successfully recognized the effects, however, it could not understand the causes.

CONCLUSION

The research studies brought about an interdisciplinary field of psychology, finance, and psychiatry that led to revealing how people and organizations turned risk-taking or risk-averse. The field was known as the neurofinance and it explained how causes were formed. Not only it could recognize the effects, but also it defied the causes. Finally, it found strategies and tools in order to make cause. The process of providing causes enabled the finance to simulate the considered effect via individuals that had access to the cause. Today, neurofinance is able to keep the behaviors out of an instinctive state. Today, neurofinance avoids many of the wrong decisions and behavioral mistakes. Finally, the combination of different sciences has proved that neurofinance is an interdisciplinary field and in the future other sciences might help it cause another process in the knowledge.

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