Psychology of behavioral finance

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Abstract

One of the most critical research programs of today's financial knowledge that is at the top of the rejection of the theory of efficient markets is financial behavior theory. This theory is the result of collaboration between financial sciences and social sciences and makes our knowledge of financial markets deeper. Behavioral finance is a new branch of financial knowledge. Behavioral finance at the macro level challenges classical financial theories, particularly capital efficient market theory. Behavioral finance at the micro level shows that behavior of investors in the real world is incompatible with the fundamental assumption of rationality in classical finance, and cognitive and emotional tendencies or bevels of investors that we called them behavioral biases have an important role in economic decisions making. Behavioral finance of paying attention to the fundamental assumptions of theories in the field of financial economics and capital market like as other branches of the sciences in addition to better understanding and comprehending them, makes our utilization more efficient as a guide in practice. One of the most basic assumptions in valuation of securities and financial products in the stock exchanges is that behavior of investors is rational. This means they seek to maximize their interests, and in addition their response or reaction against the opportunities for taking profit and risk of loss is predictable.

Keywords: arbitrage, behavioral finance, psychology of behavioral finance, assumptions.
1. Introduction

Gustave le Bon wrote his famous book called Community: Investigating mind of community in 1896 that is one of the most famous and most influential social psychology books till now. It can be said a turning point in behavioral finance was occurred. Selden wrote book of psychology of capital market in 1912. His book was based on this belief that changes of price in the market depends to a large extent on the mental attitude of the investment, as well as on the general terms of trade. In 1956, an American psychologist named Leon Festinger introduced a new concept in social psychology science called cognitive dissonance he stated, when the two phenomena that are in contradiction with each other are identified at the same time, a cognitive dissonance will be created. Since the experience dissonance sense of is unpleasant, the person will try to change his beliefs to reduce this sense.

In 1964, Pratt used utility function and the concept of risk aversion and considered risk as a percentage of total assets. Tversky and Kahneman stated the theory of amount of access in 1973. This controversial theory was about that person to assess probability of events based on availability. Availability means that what comes to mind of person firstly. Believing in this theory leads us towards systematic tendencies.

In 1974, two talented psychologists named Amos Tversky and Daniel Kahneman stated three discoveries that are used when we judge in uncertainty conditions: (Roshangar Zadeh, 2009)

- Stating: when people need probabilities for judging about the event or target of A depends on category or process of B the probabilities are evaluated by degree of A that is stater of B. In other words, degree of A describes B.
- Amount of access: when people need to evaluate the frequency of one class or probability of an event, they do something that comes to their mind firstly.
- Fulcrum and adjustment: in numerical prediction, when an appropriate criterion (a reference) is available, people use an initial value (reference) that is adjusted to reach the final answer for estimation. The initial value may be obtained through a false formula or inadequate result of a calculation; in this case adjustments will be ordinarily inadequate and inefficient.

Most of contents listed on the second section have been written in the econometric section in authentic economics science journals by these two psychologists. They also expressed a critique on the expected utility theory (this theory is also called von Neumann and Morgan Stern utility)1. In addition they also expressed a descriptive model of decision making in risk conditions as an alternative model called prospect theory. He stated that the expected utility theory cannot explain why most people simultaneously seek to take risks, and are also looking for reliability.

Kahneman and Tversky found that practically people who are looking for only probable results are less compared with people who are looking for definitive results. They also found that people generally leave investments that are both probable and definitive by considering prospect and foresight. According to prospect theory, investors pay attention to the profit and loss not to the assets. Also weights of decision making are used in this theory instead of probabilities.

1 Bernoulli 1738; von Neumann and Morgenstern 1944; Bernoulli 1954
value of function in this theory is obtained based on deviations from reference points and are usually concave towards profit (indicating risk aversion) and are usually convex for loss (risk seeking) and its gradient for loss is more than of profit (loss aversion). Pay attention to the following Figure.

In general, it can be said that behavioral finance is a combination of classical and financial economics with psychology and decision making sciences that seeks to explain and describe unusual phenomena observed in the financial area (Fuller, 2000).

Behavioral finance had been the most important financial discussion in the last two decades, and attention of economic and financial researchers is increasing in this field. In recent years, a greater number of financial experts have recognized that investors' expectations of the market are not perfectly rational. (Hirshleifer, 2001) It is assumed in traditional Financial Economics pattern that decision makers act perfectly rational, and are always looking for maximizing expected utility. In other words, two main bases of the traditional financial paradigm is perfect rationality of factors and decision making based on maximizing expected utility, while it is stated in behavioral finance that some financial phenomena may be understood by using models in which some factors in economy are not perfectly rational.

In some models of behavioral finance, agents have beliefs that are not completely true and in most cases the cause of such beliefs is mistake in applying Bayes' rule. In some models also agents have true beliefs, but do choices that are not compatible with maximization of expected utility. Behavioral finance discredits standard approach based on the efficient markets hypothesis. (Frankfurter & McGoun, 1996)

2. Problem statement

Efficient market hypothesis (EMH) is the conventional theory for financial markets during the second half of the twentieth century, which states that all public information has been included in assets' prices. Any deviation from this price is quickly used by traders of knowledge who are trying to optimize their efficiency, and as a result it returns to the correct
equilibrium price. Thus, market's prices practically behave in such a way as if all traders with perfect information and logic are looking to maximize their personal interests.

This theory was challenged in several ways in the late twentieth century. First, several events had happened in the markets that question the basic assumptions of this theory. On October 19, 1987, Dow Jones average indicator fell 20% within a day, as much of small stock also suffered severe losses. Its large fluctuations graph in the next days was like what had occurred in famous 1929 crash. Crash in 1987 created a riddle and challenged economists who believed that such fluctuations should not be occurred in an era that information and capital flow is much more efficient than the 1920s.

After a decade, the Japanese market reached a level that was much higher than the realistic estimations and price-to-earnings ratios (P / E) had become triple-digit, and value of stock market of Nippon Telegraph and Telephone had become more than the total value of West Germany market. In early 1990, Nikkei 225 reached level of 40,000, ie almost had doubled during two years and then reached half of this amount within less than a year.

In this regard, the growth of new technology, specifically the Internet sprinkled the seeds of a new generation of advanced companies in United States that some of them became public joint stock even before they reach profitability. As in the bubble of Japanese stock market in the last decade, million dollar market values were created for stocks that even had not gained earnings yet. The bubble continued until 2000 until the value of this stock was reduced to a small percentage of the market value of the predecessors by its bursting. Even some large and profitable technology companies lost 80% of their value in the period of 2000 - 2003.

The existence of such large bubbles and crashes in the absence of significant changes in the valuation questioned the assumption of efficient markets that all public information is considered accurately in prices. Robert J. Shiller in his book titled multiplicity of irrationality argues about price movements more than the rate of change in their value. This argument has been also confirmed in several other studies (including studies of Jeffrey Puntif) that were on investment funds with limited capital. These funds become just like trade stock, with this difference that they have exact valuation and are reported frequently to this value. (Pontiff, 1997)

Behavioral finance is a field that has grown during the past two decades in response to a phenomenon that was described above. Researchers have recorded systematic biases (such as extreme reactions) that occur about both professional and novice investors by using various methods. Behavioral finance researchers generally do not agree with the efficient market hypothesis as a result of these biases. However, in contrary the efficient market theorists believe that this hypothesis can provide accurate predictions of market based on data, while behavioral finance has no more talk about being wrong of efficient market hypothesis.

As mentioned it is assumed that investors form evaluation of coming potential investments based on its expected returns, and its standard deviation as a criterion for evaluation and measurement of risk that is achieved from estimation of the probability distribution of that investment's returns. In addition, it is assumed that investors' estimation toward the actual aforementioned probability distribution has no symmetrical bias. What does it mean? This means that investors have no symmetrical bias toward the actual aforementioned probability
distribution. What does it mean? This means that investors mistake in examination of potential investments against them that there are no compatibility toward their orientation towards one side or the other side.

This traditional view that investors are objective and impartial decision-makers has not been changed in scientific and academic circles for many years. Although many professional investors pose this important issue that investments are severely affected by feelings and emotions means fears and concerns, dreads and hopes and avarices of investors, but scientific academic theories do not consider them in their models.

A recent paper of new intellectual schools has emerged in financial economics. They have based on this basis of their analysis investors do not exhibit a behavior that is fully and perfectly rational in their choices that are associated with risk. Their argument has been based on psychology branches that are known as cognitive psychology. This is a branch that deals to subjects of human capacity in their attitudes and their power of judging.

The use of these psychological dimensions has reached amazing results in economic decisions making in general and in investment in particular. When the environment of decision makers is significantly different, their behavior and attitude become also different, as if they have gotten carried away. These differences are called psychological effects. Two prominent psychologists of the area of research on the psychology of perception means Daniel Kahneman and Tversky have clarified light and shade of these effects with examples.

3. Restriction in arbitrage

In the traditional financial paradigm that is assumed the existing agents act in rational economic, securities’ price is equal to the intrinsic value. The result of accepting efficient markets hypothesis is that real prices are equal to the intrinsic value. In simpler terms, these prices that have been regulated by rational agents are correct based on this hypothesis. Benefit cannot be acquired free of charge in an efficient market. None of the strategies of investments can achieve extra risk-adjusted returns. In other words, the obtained returns are exactly proportional to their risk. According to behavioral finance approach, some features of assets’ prices are interpreted as deviation from intrinsic value. It is stated that the reason for these deviations is the existence of non-rational investors in the economy. One of the criticisms that exist against this view refers to Friedman. That is if a deviation from the intrinsic value is created, rational investors remove it quickly. For example, if the number of non-rational investors is pessimistic about the future of specific share in the market, they start selling it. This causes this share's price reaches below the intrinsic value. EMH advocates state such conditions for rational investment is considered an attractive opportunity, and therefore they purchase this share and borrow a "substitute" share simultaneously with this purchase in order to secure this status of sale. As a result, the demand created for the purchase of this share causes the price to return to intrinsic value. This argument of Friedman's seems to be true but has not been investigated and examined in detail and theoretically. In fact, this argument is based on two claims. First, as soon as a deviation is seen from the intrinsic value, an attractive opportunity is created for investment. Second, rational investors quickly use this opportunity, and thus correct this wrong pricing. Behavioral finance is not opposed to the second part of
this argument: when an attractive opportunity is created for investment, no doubt that it be operated quickly. (Raee and Fallahpour, 2004)

4. Behavioral Finance

Merton defines the behavioral finance as this: base and center of financial theory is studying the behavior of agents in the way of allocation and arrangement of resources in terms of time and place and in an uncertain environment. Hence, "time" and "lack of confidence" are two key factors that influenced the financial behavior.

Olsen says: behavioral finance is looking to comprehend and understand and predict the results obtained from the psychological processes of decision making.

According to Lintner's belief, the paradigm of behavioral finance is: the study of how humans interpret and react toward information in order to make structured decisions.

Thaler says also about behavioral finance: sometimes it is necessary to consider the probability that some of the economic factors do not act entirely rational to find strategies to answer empirical riddles.

Behavioral finance is the study of how people interpret the information for making informed investment decisions. In other words, behavioral finance is looking for the effects of psychological processes on decision making. (Raee and Fallahpour, 2004)

In addition, the financial behavior can be considered as a paradigm according to which financial markets are studied by using models that puts aside two main and limiting assumptions traditional paradigm of expected utility maximization and perfect rationality. Behavioral finance has two main bases. One of them is limitation in arbitrage that says rational investors cannot easily use arbitrage opportunities, because this requires accepting some risks. The second is psychology by which the behavior and judgment of investors, as well as errors made by people when they judge are examined. (Raee and Fallahpour, 2004)

Results indicate that investors do not always behave rationally, predictably and without bevel. Based on the theories of psychology, people tend to keep certain events in their mind as imaginations. These mental imaginations have more effects than the own events on the behavior of individuals in some cases. Many studies have shown irrational behavior of people in investment and monetary subjects. (Grinblatt and Han, 2005)

Most economic theories have been based on this basis that people act rationally when encountering with economic events, and consider all available information in the investment process. This hypothesis is the main basis of efficient market hypothesis. But researchers have questioned this fundamental hypothesis, and have discovered evidences indicating lack of rational behavior in the subject of investment. They seek to understand and explain the effects of human emotions in the process of decision making. Many investors believe that they can always successfully be ahead of the market, but in fact there are many evidences that reject this. This overconfidence causes implementation of high trades and loss of investors' profit. (Shafir and Thaler, 2006)
Behavioral finance knowledge like as classical finance has been based on fundamental concepts and assumptions. Assumptions that are posed in standard or classical finance about investors include:

- Investors are logical;
- They examine all available information and interpret them in a correct manner;
- Their intended returns just depends on the risk of investment;
- They invest according to "modern stock portfolio";
- Although some investors may behave irrationally, but totally irrational behaviors are unimportant.

But assumptions of behavioral finance expresses about investors that:

- They are not logical, they are normal;
- Generally, their decisions based on information are incomplete;
- They commit cognitive errors systematically;
- They invest based on the theory of "behavioral of basket of securities";
- Their expected returns depend on more factors than risk.

Also general assumptions of these two approaches related to financial markets have some differences in classical finance

- All information is quickly reflected.
- Market displays intrinsic value of securities correctly.

While in behavioral finance:

- Issues more than information dominate on prices and way of pricing;
- Intrinsic value of all securities is not determined correctly.

In general, it can be said that classical finance considers human beings rational, logical and profit-driven, and does not pay attention to other human aspects. While behavioral finance claims that by considering emotions and cognitive errors and their effects on the decisions of investors creates models that better describes their behavior.

5. Psychology of behavioral finance

Scientific field of behavioral finance began in 1979 when psychologist Daniel Kahneman and Amos Tversky offered mercantile theory. Mercantile theory has been introduced as a subject to understand the manner of risk effect framework on economic decisions. Tversky and Kahneman have expanded field of behavioral finance in the field of psychology of risk. Their work and behavioral economics was generally to challenge the main assumptions and inherent rationality in the decision making model of classical economics. In this regard, Tversky and Kahneman investigated and studied three main areas: risk attitudes, mental accounting and overconfidence. (Lintner, 1998)

5.1. Risk attitudes

While classicists' economic theory says that investors are risk-averse, behavioral finance believes that investors display the contradictions, and they often have conflicting attitudes about financial risk. Tversky and Kahneman found that investors have an individual radix point about risk, and most of the time when the radix point is achieved they will have more sensitivity to risk.
5.2. Mental accounting

While economic theory claims that money is exchangeable and interchangeable, behavioral finance believes that money is not fully exchangeable for most people. Tyvrsky and Kahneman expanded the idea from individual mental accounting to explain why money is not fully exchangeable for most people. Mental accounting is a quite intuitive form of accounting that contains financial resources to be used by people and they cannot often be transferred and transmitted easily without logical reasons.

Many investors use mental accounting to maintain the investment suggestions. As accounting systems classify and track the flow of money, people also use their brain as a mental accounting system that is similar to an archive shelf. Each investor is the owner of his own shelf and interactions of stock are used in different cases.

5.3. Overconfidence

While economic theory claims that investors are rational decision-makers and have an access to financial information, behavioral finance believes investors tend to overconfidence and biased decisions. Tyvrsky and Kahneman found that investors often are quite optimistic about decisions of investment and the chance of their success in financial matters is more anticipated. Overconfidence increases people's knowledge in investment and reduces investment risks and exaggerates their ability to control events.

Fama published an article titled "capital efficient markets, a review of empirical theory and studies" in 1970. He re-defined his previous view on the efficiency of the capital markets in this article and claimed prices in an efficient market reflect all the things that are understood about an asset in themselves.

Many articles have been done so far in order to accept or reject the validity of the efficient markets hypothesis. The majority of the studies concluded that the efficient markets hypothesis cannot be rejected. During recent decades, financial scientists had attempted to explain and find the causes of the special cases with the help of other sciences such as psychology, social sciences and physics.

Hence interdisciplinary areas have been formed under the titles of financial economics, financial econometric, financial mathematics and decision making theory. One of the studies that was expanded quickly in this field and could to some extent explain the mentioned phenomena was integration of economic theories with prevailing theories of psychology which was posed as "behavioral finance". Of the founders of this area of financial knowledge is famous psychologist, Daniel Kahneman (2001). He received Nobel Prize because of offering models for explaining the behavior of investors under conditions of uncertainty.

Behavioral finance viewpoint or school that has been created from combination of psychology and finance states that psychology plays a role in financial decision making. Since cognitive errors and deviations affect the investment opinions, so they affect finance options. The relationship between finance science and other fields of social sciences, which has been known as financial psychology has caused many researchers to do many investigations about the behaviors of investors in financial markets, and their reaction in different situations.
Today, the idea of perfectly rational behavior of investors who are always looking for maximization of their utility is not sufficient to justify the behavior and reaction of market. There are even some evidences based on which can hardly overcome with education over many behavioral finance patterns that are deeply rooted in the nature of people.

The behavior of investors in the capital market was interpreted based on economic utility theory before behavioral finance being posed in economic and fiscal management, while numerous scientific investigations and researches on the behavior field determined the importance degree of psychological factors. Although behavioral finance theories are new subjects and their history goes back to a decade ago, but the issue of involvement of the psychological and behavioral characteristics of people in purchasing decisions goes back to earlier periods. However, all internal and external factors must be examined finely and rigorously due to capital market developments. This is because we encounter with highly various thoughts, beliefs and mentality of people that knowing and understanding of these mentalities often is very important.

People analyze many factors for investment of money. In other words, investors foster different strategies in their mind for the place to invest their money (black box of buyers) even before gaining money. They finally select an option that is useful to them in any aspect according to their mentality. Many factors influence the intension and decision of people to invest in the Stock Exchange. These factors can be divided into two categories: internal and external factors. Of external factors that can be mentioned are economic, cultural and political conditions and cases such as: amount of advertisements by the stock exchange, issues within the company and so on. Since the effect of these factors has been discussed and examined repeatedly by analysts, the effect of internal factors can allocate a special position to itself.

6. Financial exceptions

Some researches achieved a number of exceptions that question validity of the efficient market hypothesis and the result of previous studies. Some exceptions are based on the relationship between earnings and returns, and some others are based solely on the market. (Raee and Fallahpour, 2004), these facts that are mentioned in most texts as financial exceptions most of time documentary prove that some stocks gain systematically more returns average than others. However the risk of such stocks compared to other stocks has no different.

Exceptions can be categorized by reviewing some relevant texts as follow:

The predictability of returns based on events: average of stock returns caused by the past events can be considered as average of long-term performance of stock in the future, if the same event occurs.

Short-term movements: positive autocorrelation of stock returns in short term for each share either as a company or as the entire market.

Long-term return: negative autocorrelation of short-term stock returns that are separated as excessive reactions from the movement process of stock returns over time.
**High variability of assets' price than intrinsic value related to them:** The intrinsic value of the stock that is obtained by using the logical models is not so different with stock price. In fact the bases used in these models (such as dividend) cannot justify the stock price movements.

**Notifications that are issued later the short-term profits:** These notifications diverts stock price in the path that has been shown by sudden change. But unusual performance of stock is changed in a path opposite to the long-term profits.

1. **The use of behavioral finance in understanding investors' behavior**

Behavioral finance have also had some successes in explaining the behavior of some groups of investors, especially about the way of formation of portfolio and the manner of investors' trades over time.

These studies will become more important in the future due to the expansion of capital markets and increasing reception of this market by people. Some evidences about the behavior of investors and behavioral explanations of it are presented in this part.

**Inadequate diversification:** There are many evidences that show investors diversify their portfolio much less than what normative models recommend. The studies conducted by French and Porterba in this area shows that most investors tend to invest in issued stock of their own country (national stock). This behavior of investors is known as "home bias".

There are evidences that show people hate obscure conditions, means conditions that are not able to determine the distribution of events' probability. In such conditions, investors do not have their required information. On the other hand, people tend to be in conditions and situations that are familiar with them. They feel in such conditions that are in a superior situation for valuation of phenomena than others.

Avoiding ambiguity and tending to familiar conditions simplifies understanding and comprehending inadequate diversifications. Investors prefer national stock market toward foreign stock market, stock of companies that are closer to them in terms of place toward stock of companies that are further away from them, and stock of company that they work in toward stock of other companies because of avoiding ambiguity and tending to familiar conditions. Therefore, investors invest most of their resources in such stock because of attractiveness of stock that seems familiar. As a result, their portfolio will look invariant than prediction of standard models that ignore the level of confidence of investors to the probability distribution. (Barberis & Thaler, 2001)

Diversification using rules of thumb: Benartzi and Thaler, by conducting studies found that people diversify their portfolio by using rules of thumb and simple. In particular, they found evidences based on which seems people use simple strategy of n / 1 for the allocation of funds of their saving to investment options. (Barberis & Thaler, 2001)

**High volume of exchanges:** one of the most explicit predictions of rational investment models is that the exchange rate will be very low in market. But contrary to this prediction, the volume of exchanges is very high in stock markets. In addition, studies conducted on
individuals and institutions show that both groups exchange in market more than prediction of rational models.

Evidence shows that people reduce returns of their investments by doing high exchanges. In other words, if they were doing fewer trades, they were obtaining higher returns. Part of this reduction of returns can be considered because of the existence of trades’ cost, but part of it is also related to poor decisions making in selecting stock. The conducted studies in this field showed that the average of gross returns of purchased stock within one year after the date of purchase had been significantly lower than average of gross returns of sold stock within one year after the date of sale.

The most prominent behavioral explanation has been offered about high volume exchanges is excessive confidence. It means that people think information that they have is accurate and exact enough to attempt to trade based on it, whereas, in practice, their information is too weak to support this action of them. Sometimes the situation becomes also worse and not only investors mistakenly think that they have a lot of information, but also misinterpret the correct information.

Therefore, according to the hypothesis of excessive confidence, people who have excessive confidence do more trades and gain less returns because of trading costs and inappropriate choices. (Barberis & Thaler, 2001)

Conclusion

As discussed, assumptions limiting traditional financial paradigm are put aside in behavioral finance, and tries to modeling according to actual conditions in the financial area. Limited power in computing, complexity of decision making problems and the existence of some systematic errors in judgment cause human beings do not act perfectly rational. Now we have to see what conclusions can be got due to these realities and inevitability of decision making errors.

According to the subjects have been taken place, decisions making and choosing options by investors seems to be a process that six major factors play role in it. They and their relationship between them can be shown in terms of a model in the following page.

Some points must be paid attention about this model. One is that investors take the final decision by the interaction between these factors. However the investor may be completely unaware of the effect of some of them. For example, imagine that the only factor upon which he has made the decision is a valuation technique, while he has done one of the behavioral biases in using that technique. The other is that the weight of each of these factors is different in various conditions and the situations, as the role of political factors or a series of specific information may be more effective than the results of the valuation models in some conditions. Therefore, according to suggested model, it must be tried to consider various factors to forecast prices, investors' behavior, and market behavior. This model indicates the complexity of the behavior of financial markets. According to the current process, financial experts are trying to enter quantitatively further factors into assets' pricing models. (Raee and Fallahpour, 2004)
Neoclassical economic theory considers investors rational people and markets efficient character. But in practice, investors may be sentimental, bigoted and have a tendency to overconfidence error. Market reacts to biases of people, behavior of investors and irregularities. Behavioral finance theory challenges both neoclassical economics assumptions (rational man and efficient market) and explains how and why the psychology of investors affects financial decisions making and market behavior.

Biased tendencies of people to seek, achieve, and confirm the information and emotional and perceptual errors of human beings in the analysis of financial information are of psychological issues that have been paid attention in behavioral finance. Behavioral finance theory that has been formed from a combination of psychology and economics states that perceptual errors have significant effect on judgments related to financial decision making. So, psychological dimensions of the decision should also be considered during making decision and judging about economic issues, particularly investment decisions.
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