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Behavioral Finance as an Answer to the Limitations of Standard Finance

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Abstract: Moving the standard finance theory further away from practice has led to an increased criticism of standard finance. Much evidence in favor of the absence of perfect investor rationality have called for the need of a new approach and a new point of view offered by behavioral finance. Behavioral finance relies on standard finance, supplements its theory and, according to behavioral economists, gradually substitutes it; however, behavioral finance also faces a number of limitations. The aim of this research is to find answers to the question of whether preference should be given to standard or behavioral finance, in terms of finance theory and investment practice. By applying the methods of qualitative economic analysis, it has been concluded that we should strive towards the integrated application of these theoretical frameworks in order to achieve their synergy, exploit the positive and concurrently eliminate the negative aspects. An example of a theoretical approach that reconciles the differences between standard and behavioral finance is *Adaptive Markets Hypothesis (AMH)*, which is given particular attention in the paper and has not been discussed in the literature in the Republic of Serbia thus far.

Keywords: behavioral finance, standard finance, Adaptive Markets Hypothesis

JEL: G00, G12, G14, G40

Introduction

"The goal of every economic theory is to give a simplistic, but realistic, picture of an important phenomenon in practice. If theoretical implications do not fit the actual events, then the theory loses credibility, and attempts emerge to analyze the economic mechanisms from a different angle" (Vučković, 2010, 629). It is the moving away of standard finance theory from practice that has triggered the emergence of behavioral finance, which, by incorporating psychological factors, supplements the teachings of standard finance and points to a repetition of irrationality in the complex world of finance.

Finance theory has come a long way from the general acceptance of the *Efficient Market Hypothesis* (*EMH*), the underlying standard financial theory, to the emergence of behavioral finance and behavioral critique of *EMH*. A large number of market anomalies have called into question the validity of *EMH* and made way for the development of a new approach to finance focusing on studying human behavior and psychology. According to Águila (2009), the growing interest in behavioral finance is the result of the accumulation of empirical anomalies, therefore, the task of behavioral finance is to ensure their better understanding by integrating psychology with finance and economics.

Given the above stated, the subject of the research conducted in this paper is a comparative analysis of behavioral and standard finance theory. The aim of the research is to find the answer to the question of whether behavioral finance has succeeded in replacing the teachings of standard finance in finance theory and investment practice. The objective is to compare the positive and negative sides of behavioral and standard finance by comparing them, but also to offer an explanation of potential optimal solutions which, like the *Adaptive Markets Hypothesis*, are a factor in reconciling standard and behavioral finance.

In accordance with the defined subject and the set goal of the research, the initial hypothesis of the paper reads as follows:

H: Investors, portfolio managers, financial analysts and other market participants equally need knowledge of standard and behavioral finance.

Examination of the validity of the initial hypothesis stated in the paper will be conducted by applying the methods of qualitative economic analysis, which will, through the study of relevant literature, enable the formulation of valid conclusions on the researched topics.

Having in mind the defined subject, determined goal and formulated hypothesis, the paper will present the key differences between behavioral and standard finance, following the introductory considerations. Then, the positive and negative sides of these theoretical frameworks will be analyzed, with an emphasis on the basic challenges they are faced with. Particular attention will be given to market efficiency, which, according to Statman (1999, 18), is at the center of the conflict between standard and behavioral finance. The penultimate section of the paper will explain the *Adaptive Markets Hypothesis* as an example of an optimal solution that reconciles the opposing views of traditional and behavioral economists. Finally, the concluding section of the

paper will summarize the positions regarding the confirmation of the initial hypothesis of the paper and offer conclusions on the directions of future research.

Behavioral Finance Versus Standard Finance

As regards the field of standard finance, the general opinion is that, when deciding under uncertainity, people are guided by reasoning, i.e. the law of probability and maximization of personal interest. However, in addition to reasoning, one cannot deny the importance of intuition (Vučković, 2010, 630) to which proponents of behavioral finance give equal importance.

Reason and intuition are two basic elements of a two-system approach to decision making, where System 1 is identified as intuition, and System 2 as reason, i.e. reasoning. System 1 contains automatic operations, while System 2 contains controlled ones. System 1 operates quickly and effortlessly (an individual's reaction to sudden noise in their environment, driving a car on an empty highway), while System 2 involves mental activities that are slow, effortful and consciously controlled (focusing on a person's voice in a noisy room in which several people are speaking at the same time, parking a car in a narrow space, filling out a survey questionnaire). System 1 and System 2 are in continuous interaction, as System 1 generates inputs to System 2, such as impressions, intuitions, intentions and feelings. After that, System 2 turns these impressions and intuitions into beliefs, and impulses into voluntary actions (Kahneman, 2011).

Most of everyday decisions and actions come from System 1, because people usually do not invest any or only make minor mental effort when making decisions. However, when System 1 encounters unknown or complex situations, System 2 is activated. Thus, when deciding on important issues, issues of particular importance to the decision maker and issues to which System 1 has no solution, System 2 plays a dominant role and makes the final decision. In addition, System 2 is in charge of self-control. Its task is to overcome the impulses coming from System 1 (Kahneman, 2011). In different situations, thanks to System 2, people manage to refrain from violent reactions, which are suggested by System 1, thus, they manage to hide fear, pain and other feelings.

In general, proponents of behavioral finance believe that intuitive reasoning (System 1) deserves as much attention as reasoning (System 2) and criticize the following characteristics of a person, which are considered default in the standard finance (Pompian, 2006):

- *Perfect rationality – a person's behavior is not solely guided by reason and rationality. Many psychologists consider that the human intellect is subordinated to human emotions, which is why the behavior of people is predominantly driven by emotions such as fear, love, hate, pleasure, pain. They even claim that people use their intellect only to achieve or avoid these emotional outcomes.*

- *Being guided solely by self-interest – this assumption implies the absence of philanthropy, selflessness, kindness and humanity that characterize a significant part of the society.*
- *Believing that one is perfectly informed (perfect information) – not a single person possesses all the information and all the required knowledge.*

Proponents of behavioral finance believe that, due to cognitive limitations, there are no perfectly rational market participants. Behavioral finance, instead of a perfectly rational investor, assumes a normal investor, that is, an ordinary person (homo sapiens) who is not always driven solely by self-interest. In addition to economic motives, a normal investor often has non-economic motives. They do not always and exclusively try to maximize their earnings, but are guided by other goals, such as showing selflessness and social responsibility by taking into consideration environmental protection and avoiding the purchase of shares in companies associated with products such as weapons and ammunition, alcoholic beverages and tobacco.

A normal investor does not possess perfect and unlimited knowledge, which is why they often rely on subjective assessment and intuition when making decisions under conditions of uncertainty. According to Todorović (2011, 277), normal investors often decide "spontaneously, without too much thinking, calculation and additional effort, relying on the mental shortcuts - heuristics". Normal investors are characterized by cognitive imperfections and cognitive limitations, therefore, a full understanding of imperfections certainly benefits decision-makers more than a naive belief in the infallibility of their intellect (Slovic, 1972).

Behavioral finance, therefore, puts the imperfection of the human mind at the forefront. Imperfection is manifested when making everyday life decisions, and especially when making complex decisions relating to finance that require the possession of specific knowledge and skills (Ljubojević & Dašić, 2018; Živković et al., 2019). Even the investors such as top financial experts do not possess perfect knowledge and do not make perfectly rational economic decisions. They also make mistakes, not only under the influence of cognitive biases and emotions, but also due to the impossibility of perfectly processing a large amount of information available in complex and uncertain economic conditions. According to De Bondt et al. (2013), in modern times, the volume of obtained information is so immense that investors are forced to focus on only a few most important indicators.

While rapid quality financial decision-making used to be hindered by a lack of information in the past, nowadays rapid decision-making is hindered by a large amount of available information. A normal investor has limited capacities, limited cognitive abilities and skills, and therefore is not able to process a large amount of daily available information, nor to immediately adjust their decisions to newly received information, which is why their decisions are not perfectly rational. According to Kapor (2014), there is an objective information overload in the modern world that disorients people, affects their ability to set priorities and make sound decisions.

In contrast to behavioral finance, standard finance assumes a perfectly rational and perfectly informed investor, *homo economicus*, who is familiar

with complex econometric models and has the knowledge and ability to accurately and precisely process data. Individuals in standard finance are not susceptible to the influence of emotions, preferences and subjective experience, therefore, they make decisions in an objective and professional way. Standard finance, therefore, assumes that people are perfect economic beings who always make the right decisions in their own interest. In addition, standard finance assumes that people do not have a problem with self-control: they stick to their savings plan and never make impulsive purchases, they stick to their diet and easily refuse the dessert, their decisions to stop smoking make them able to easily refuse the offered cigarette, their decisions to stop gambling make them able to easily refuse a friend's invitation to a poker game. Standard finance also assumes that people do not feel remorse: they will feel the same regret when they miss their flight by a minute as when they miss it by one hour (Statman, 1995), or they will feel the same regret when they lose a game during the stoppage time as when they lose a game within the regular time of the game.

In brief, in standard finance people are always rational, while in behavioral finance people are not always rational, but they are always normal (Statman, 1995, 21). One should not mistake normal investors for irrational investors, because normal investors only occasionally show elements of irrationality. Normal investors are not always rational, but they are not always irrational either. Statman (2014) divides normal investors into *normal-knowledgeable* (normal-smart) and *normal-ignorant* (normal-stupid). Normal-knowledgeable investors have learned, although imperfectly and with great effort, to overcome cognitive errors, such as hindsight and overconfidence, and to use strong scientific knowledge to resist strong emotions that lead them to make new wrong decisions. On the other hand, normal-ignorant investors do not trust scientific evidence and do not use scientific knowledge to overcome the obstacles they face.

By summarizing the above presented facts, it is concluded that behavioral finance assumes the *bounded rationality* of market participants, while standard finance starts from the concept of *perfect rationality*. Behavioral finance points to the occurrence and repetition of irrationality, while standard finance assumes the principle of perfectly rational financial decision-making.

Behavioral finance seeks to explain irrationalities existing in the complex world of finance with cognitive biases, such as: 1) overconfidence bias, 2) framing bias or framing, 3) mental accounting bias, 4) representativeness bias, i.e. availability bias or availability heuristics, 5) conservatism bias, i.e. status quo bias or anchoring bias, 6) loss aversion bias, 7) regret avoidance bias, 8) herd behavior, i.e. herd mentality or crowd psychology, 9) confirmation bias or self-confirmation bias, 10) hindsight bias, 11) cognitive dissonance bias and 12) winner's curse.[1]

One of the most famous examples of investor irrationality dates back to the 16th century, when tulips imported from Constantinople into the Netherlands for the first time became a symbol of prestige among the Dutch elite, and very

1 he elaboration of cognitive biases goes beyond the scope of this paper, which is why these imperfections will be the subject of future research by the authors.

soon the most desirable commodity on the market and subject of trade on the Amsterdam Stock Exchange. Seeing the opportunity for profit, which was reflected in the continuous growth of the price of tulips, the average Dutchmen sold everything they had, including their houses, in order to buy tulips and make money by reselling them. However, at the end of 1636, the formed price bubble burst and in just one month, the price of tulips decreased by 90%; many investors suffered huge losses and went bankrupt (Pompian, 2006). The described sequence of events greatly reminds us of the causes of the financial and economic crisis that occurred on the American mortgage market at the end of 2007. The difference is that instead of tulips, Americans, guided by the crowd psychology and excessive self-confidence, traded in real estate.

Accordingly, the majority of economists agree that rational investor behavior is not a permanent characteristic of economic reality. However, the paradigm of rational investor behavior still persists and holds an important place in finance theory. Two basic arguments in favor of defending the assumption of rational investor behavior are (De Bondt & Thaler, 1995):

- *Theories should not be judged based on the validity of their assumptions, but on the basis of the validity of their predictions; theories inevitably involve simplifications*[2]*;*
- *Irrational investors either lose wealth and go bankrupt over time, or their actions get neutralized by the trading of rational, smart and well-informed investors.*

In addition to the aforementioned differences, standard and behavioral finance are not on the same page regarding the manner in which portfolios are constructed, as well as the asset pricing models. Standard finance rests on *Modern Portfolio Theory (MPT)* and standard asset pricing models, while behavioral finance offers an alternative in the form of *Behavioral Portfolio Theory (BPT)* and *Behavioral Asset Pricing Model (BAPM). MPT* is based on the following postulates: a) investors are solely characterized by risk aversion, b) investors consider the portfolio as a whole, they have one defined level of risk tolerance and one goal which is reflected in maximizing the expected return at the given level of risk, c) when constructing a portfolio, investors are solely guided by the expected return and risk relationship, d) an optimal portfolio is a mix of market portfolio and risk-free assets, e) an optimal portfolio is a portfolio maximizing the investor's utilitarian benefits. For each of the aforementioned postulates, *BPT* offers an alternative: a) in addition to risk aversion, investors are also characterized by risk seeking, b) investors consider a portfolio as a layered pyramid, where each mental account (pyramid layer) is characterized by a defined level of risk tolerance and a specific goal that becomes more ambitious by moving from lower to higher layers of the pyramid, c) when building a portfolio, investors are not only guided by the relationship between the expected return and risk, but also by their wishes, needs, emotions and habits, d) an optimal portfolio is a mix of subportfolios each of which is optimal at a certain level of the pyramid, e) an optimal port-

2 Unfortunately, evidence supporting economic theories is often lacking, which is why the financial public may remark that finance consist of theories for which there is no evidence and empirical facts unsupported by theories (De Bondt & Thaler, 1995).

folio is a portfolio maximizing not only the investor's utilitarian benefits, but also their expressive and emotional benefits.

In addition to a clear confrontation of these theories, it is important to point out the idea of their combination, which was implemented by Das et al. (2010). The authors suggest that investors should divide their wealth into different mental accounts (layers) and then optimize these mental accounts as subportfolios of the overall portfolio, according to the rules of the *MPT*. In this way, by combining the elements of *MPT* and *BPT*, Das et al. (2010) founded the *Mental-Accounting (MA) Portfolio Theory* and offered it as an optimal solution that reconciles the opposing views of the traditional and behavioral economists. According to Das et al. (2011), investors, guided by *Mental-Accounting (MA) Portfolio Theory*, manage to achieve the goals defined at each individual layer of the pyramid, while staying on the mean-variance efficient frontier. In this way, investors manage to achieve the maximum possible benefits by combining the knowledge of standard and behavioral finance. The claim that this new portfolio theory reconciles *MPT* and *BPT* is best illustrated by the fact that Harry Markowitz, the founder of *MPT*, and Meir Statman, who founded *BPT* together with Hersh Shefrin, supported the establishment of *MA Portfolio Theory*. The general conclusion is that, despite numerous differences, both *MPT* and *BPT* play an important role in creating and successfully managing a portfolio.

Standard and behavioral finance also differ in terms of asset pricing models. In standard finance, asset pricing models rest upon the following postulates: a) the expected return on assets is a function of risk, which is why differences in expected return are solely the result of differences in the assumed level of risk, b) rational investors, by implementing arbitration, cancel the influence of irrational market participants and make it irrelevant, c) the value of assets is determined on the basis of utilitarian benefits, d) pricing of financial assets is not affected by affects, mental schemes, cognitive errors and misleading emotions, e) risk is an objective category, i.e. a mathematical and statistical concept that is not influenced by affects. For each of the mentioned postulates, *BAPM* offers an alternative: a) differences in the expected return on assets are explained not only by differences in the level of risk, but also by the influence of numerous psychological factors that go or do not go in favor of the choice of a particular asset, b) due to the limitations to the arbitrage, rational investors fail in their attempts to cancel the effect of the irrational market participants, c) the value of assets depends on total benefits: utilitarian, expressive and emotional ones, d) pricing of financial assets is affected by affects, mental schemes, cognitive errors and misleading emotions, e) risk is a psychological concept which includes objective and subjective risk. Despite the fact that *BAPM*, which is based on psychological factors, better fits the real-life circumstances, Barberis (2018) is of the opinion that it is still too early to make a final conclusion and talk about its superiority. In the search for the optimal solution, one should keep in mind the possibility of integrated application of aforementioned models, as well as the emergence of a new asset pricing model that would include the best elements of the described standard and behavioral approach.

Positive and Negative Sides of Behavioral and Standard Finance

Both standard and behavioral finance theory, as all other theories, have their strengths and weaknesses. The key strength of standard finance is its systematic nature, while the main weakness is its reliance on the unrealistic assumptions, such as the assumption of homogeneous expectations and perfect rationality of all market participants. On the other hand, behavioral finance is characterized by the absence of systematicity and uniformity, that is, reliance on models that lack mutual consistency and uniformity. This feature is the most striking weakness of behavioral finance, while the reality of the initial assumptions is their main strength (Shefrin, 2010).

It is not difficult to conclude that the key strength of standard finance is also the essential weakness of behavioral finance, as well as that the key weakness of standard finance is at the same time the essential strength of behavioral finance. Therefore, standard and behavioral finance complement each other in a certain way. Even the most complex econometric models of standard finance, based on restrictive assumptions, oversimplify economic reality, while behavioral finance models more faithfully represent economic reality, however, they lack precision and exactness.

The key challenge relating to standard finance theory is to find an adequate explanation for the numerous market anomalies that have been undermining the validity and credibility of its assumptions for decades, while the basic challenge faced by behavioral finance refers to establishing a systematic and uniform framework, such as that of standard finance.

The frequent occurrence of persistent market anomalies has called into question the validity of standard finance, which is why many theorists have proposed a reconstruction of finance theory on a behavioral basis. Among the anomalies that have shaken the validity of standard finance and at the same time conditioned the emergence and development of behavioral finance, the following stand out (Leković, 2018):

- *P/E effect (price-earnings effect) – by investing in stocks with a low ratio of the stock's current price to its earnings (low P/E ratio) an above-average return is achieved;*
- *Small firm effect or size effect – shares of small-cap companies bring significantly higher risk-adjusted returns, compared to shares of large-cap companies;*
- *Liquidity effect – by investing in less liquid securities, an above-average return is achieved;*
- *Neglected-firm effect – stocks ignored by financial analysts bring higher returns than stocks of followed and observed companies;*
- *January effect – securities returns are significantly higher in the month of January than in any other month of the year;*
- *Monday effect – securities returns on Monday are significantly lower than on any other day of the week;*
- *Day-end effect – securities prices increase in the final thirty minutes of the trading day;*

- *Holiday effect – securities returns realized two working days before a national holiday are significantly above the annual average;*
- *Intra-month effect – the first half of the month is characterized by significantly higher returns compared to the second half of the month;*
- *Turn of the month effect – during the transition from one month to another, significantly higher returns are achieved;*
- *B/M effect (book to market effect) – by investing in shares with a high ratio of book value to market value (high B/M ratio), an above-average return is achieved.*

The growing number of identified market anomalies indicates insufficient confirmation of *EMH* as a key assumption of standard finance, and thus insufficient confirmation of standard finance theory. However, as long as standard finance theorists manage to explain the anomalies, their presence does not result in rejecting *EMH*. What is more, many anomalies had disappeared when the investment public found out about them. However, what calls into question the validity of *EMH* are unexplained anomalies. Also, the threat to standard finance is not reflected in individual, but systemic anomalies, which remain unexplained despite the numerous efforts of standard finance theorists.

EMH argues that when irrational optimists buy stocks, smart (rational) investors sell them, and likewise, when irrational pessimists sell stocks, smart (rational) investors buy them, thus eliminating the influence of irrational traders on the market price (Shiller, 2003, 96). Thus, according to standard finance theory, rational investors are a precondition for efficient financial markets, since they correct the effects of trading conducted by irrational market participants in the arbitration process (Todorović, 2011). However, in practice, rational investors often fail to cancel the influence of irrational investors, which is why the previously described situation represents an idealized picture of reality and a perfect theoretical case. A phenomenon that is much easier to believe in is the limitations to arbitration.

Unlike standard finance that relies on *EMH*, behavioral finance builds on cognitive psychology and limitations to arbitration. Cognitive psychology refers to the way people think and plays an important role in behavioral finance, because numerous studies have shown that people make systemic mistakes in the way they think: they are too confident, they give too much importance to recent experiences, use mental shortcuts, and avoid change (Ritter, 2003). On the other hand, the limitations to arbitration refer to situations where arbitration is not efficient to the extent that it ensures market efficiency.

One of the greatest proofs of the limitations to arbitration and the absence of market efficiency are bubbles that represent long-term movements in the price of an asset above its fundamental value, which are explained by a cognitive anomaly called herd behavior, i.e. herd mentality or crowd psychology. Bubbles point to the insufficient ability of rational arbitrageur to take advantage of arbitration opportunities and return the price of assets to the level of their real value (Todorović, 2011).

According to Ritter (2003), it is very difficult to find a trading strategy that guarantees profit. However, this does not imply that financial markets are

efficient. Misevaluations of financial assets are common, however, it is not easy to achieve above-average returns on this basis for several reasons: it is difficult to find undervalued and overvalued securities, there are transaction costs, information costs and there is a search for undervalued and overvalued securities, as well as small price difference between security price and its intrinsic value, which all make trading unprofitable; in addition, investors also fear that a decline in the price of purchased undervalued securities may occur, i.e. a further increase in the price of sold overvalued securities.

The degree of limitations to arbitrage also depends on the way in which the arbitrageur is funded. An arbitrageur who is forced to borrow financial assets in order to buy an undervalued security is exposed to greater risk, which is why they undertake purchase transactions only in the case of a large undervaluation. The expected price increase must be large enough to cover the interest on the borrowed funds and provide earnings for the risk taken. In case of a small difference between the price and the intrinsic value of the security, there will be no activities of the arbitrageur. Thus, the price of a security will continue to differ from its intrinsic value in a situation where the potential arbitrage profit is too small, so it does not profitable for the arbitrageurs to undertake purchase activities.

In short, the representatives of behavioral finance believe that the markets are not perfectly efficient, however, they admit that it is difficult to "beat" them, that is, to achieve a return higher than the average market return. This goes in favor of the validity of the semi-strong and weak form of *EMH*, while the strong form of *EMH* is thus rejected. Only well-informed, skilled and professional investors are able to beat the market, while the attempts of the average investor are mostly unsuccessful. According to Statman (2014), a non-expert investor tries to beat the market for two reasons: 1) because they have been deceived by cognitive errors and misleading emotions, and 2) because they are trying to achieve the expressive and emotional benefits of surpassing average market results.

The strengths of behavioral finance are, among other things, reflected in the explanation of market anomalies and the causes of market inefficiency. According to *EMH*, the price of assets depends on the received information, while according to behavioral finance, the price of assets depends on the reaction of market participants to the received information (Fakhry, 2016). Based on behavioral finance theory, different participants in the financial market are differently informed and react differently to new information. They often underestimate some information and overestimate other. Thus, according to behavioral finance theory, the way in which market participants perceive new information is more important than the received information, i.e. the reaction of market participants to the received information is more important than the received information itself. Excessive or insufficient reaction will imply market inefficiency, i.e. deviation of the asset price from its fundamental value. According to Águila (2009), the value of an asset may differ from its intrinsic value as a result of the investor's reaction to natural psychological factors, such as fear, hope, optimism and pessimism.

On the other hand, the key advantage of *EMH* compared to standard finance theory is reflected in the fact that this hypothesis can be applied as a useful benchmark for regulators, while behavioral finance theory still cannot be used as a benchmark, due to the lack of a uniform model. Nevertheless, the significance of behavioral finance theory involves its ability to explain deviations from the benchmark (Fakhry, 2016, 458). According to Lo (2005, 22), *EMH* can be seen as an ideal that would exist in the case of absence of market imperfections such as transaction costs, taxes, regulatory constraints, as well as the absence of cognitive constraints and bounded rationality of market participants.

Modern financial theory still does not have a final answer to the question of whether financial markets are efficient. The decision of the Nobel Prize Committee to award 2013 Nobel Prizes to Eugene F. Fama, who is recognized as "the father of *EMH*", and Robert Shiller, the proponent of the claim that markets are often irrational and can be beaten, is confusing to say the least and certainly does not contribute to solving these half-century dilemmas (Statman, 2014).

It is undeniable that behavioral finance has succeeded in supplementing standard finance and improving the investment decision-making process. However, the behavioral finance theory also faces a number of limitations (Curtis, 2004):

- *Experience and education are important – people usually make wrong decisions in areas they are not familiar with, but this does not mean that wrong decisions will continue to occur even after gaining the appropriate knowledge and experience. When investors realize that their decisions were wrong and, more importantly, why such decisions were wrong, they will make better decisions in the future.*
- *If 60% of respondents make the wrong choice or make the wrong financial decision, is it correct for a financial advisor to assume that all his clients will be among these 60%?*
- *The term "statistically significant" does not always mean or say much – there is a subtle but important difference between statistical significance and the likelihood that research results can be applied to an individual. If the sample, in terms of subjects selected to participate in the study, is inadequate, statistical significance tests become meaningless.*
- *Investors react differently in real and fictional situations – in imagined situations, investors make quick decisions, without too much research and thinking, guided not only by reason, but also by mental shortcuts, emotions and intuition. On the other hand, in real-life situations, especially those involving multimillion-dollar stakes, reason is usually put before emotions, thus making behavioral finance lose its significance.*
- *Expectations of the researchers influence the results of the research – the phenomenon of determining the results that the researcher expects to find, or even worse, that they want to find, is a significant obstacle that stands in the way of extensive use of behavioral finance.*

Critics point out that behavioral finance is not a new field of finance, but rather a set of anomalies, as well as that representatives of behavioral finance are

more preoccupied with citing the weak points of standard finance than with providing alternative solutions. It can often be heard that behavioral finance does not have the solid and stable structure that standard finance has, but rather represents a simple collection of stories about investors who are prone to cognitive errors and misleading emotions (Statman, 2014). Critics also point out that behavioral finance lacks exhaustiveness and systemic integrity.

Despite the abovementioned criticisms and limitations, behavioral finance is still much more complex than a simple set of anomalies and a simple collection of stories about the moves of irrational investors. Proponents of behavioral finance reject the claim that behavioral finance pays too much attention to criticizing standard finance, without offering its own alternative solutions. One of the most deserving scientists for the development of behavioral finance, Shiller (2006) as a counter-argument, points out that behavioral finance is playing an increasingly important role in the implementation of public policy, citing the implementation of social security reform in the United States as an example. Behavioral finance draws on the expansion of knowledge from all other social sciences by offering real and tangible alternatives (Shiller, 2006, 7). In addition, compared to standard finance, which is in some way limited by its rigorous analysis, behavioral finance, according to Hirshleifer (2001), provides economic theorists with a greater degree of freedom, resulting in a greater ability to find the best solutions.

According to behavioral economists, the benefits of behavioral finance are multiple, and they are reflected, above all, in a better understanding of the investment decision-making process, which is achieved thanks to the incorporation of the workings of psychological factors. A better understanding of the influence of psychological factors is important, because it enables investors to overcome cognitive errors and resist the influence of misleading emotions. According to Statman Statman (2008, 38), behavioral finance has made a significant contribution to the field of investment by focusing on the cognitive and emotional aspects of the investment decision-making process.

Given all of the above, and primarily the advantages and key limitations of the analyzed theoretical frameworks, the question arises whether preference should be given to standard or behavioral finance in financial theory and investment practice. The answer is that investors, portfolio managers, financial analysts and other market participants equally require knowledge of both theoretical frameworks. Behavioral finance has been developed as an alternative and a great challenge to standard finance theory, but it would be an exaggeration to say that behavioral finance has succeeded in replacing the teachings of standard finance. A more realistic assessment is that behavioral finance, by incorporating psychological factors, has supplemented the teachings of standard finance and brought standard finance theory closer to reality. Assuming that standard finance, for the most part, accurately describes how the market works, behavioral finance indicates the best way to use that knowledge and make a profit (Curtis, 2004, 17).

Standard finance lacked a more realistic view of the complex financial reality, which was obstructed by the application of strict assumptions and exact rules of science. A higher degree of reality was provided by behavioral finance,

which, by integrating the knowledge of psychology, sociology, anthropology and economics, put the individual, i.e. the human factor, in the foreground. The limitations to arbitrage and the occasional irrationality of market participants caused by cognitive imperfections are more in line with reality than the perfect market efficiency and perfect rationality of market participants, which are at the center of standard finance.

To summarize, behavioral finance picks up where standard finance has left off and ensures the completeness of financial theory. Behavioral finance describes how investors actually behave, rather than how they should behave. However, we should not forget the systematicity, uniformity and precise instruments of standard finance, as well as the mutual consistency of its models and other strong points of standard finance theory, which has been the ruling financial paradigm for decades. These strengths of standard finance are precisely the elements that behavioral finance lacks.

With this in mind, De Bondt et al. (2008) point out that a new paradigm is expected to emerge soon which will combine elements of standard and behavioral finance. This new paradigm would reconcile the conflicting teachings of standard and behavioral finance and improve the financial decision-making process. A good example of a theoretical approach that reconciles the differences between standard and behavioral finance is *Adaptive Markets Hypothesis*.

Adaptive Markets Hypothesis – a Factor of Reconciliation Between Standard and Behavioral Finance

By combining knowledge of behavioral finance and postulates of *EMH*, Lo (2004) developed the *Adaptive Markets Hypothesis (AMH)* as an alternative to traditional *EMH*. Since *AMH* integrates the postulates of *EMH* and the knowledge of behavioral finance, *AMH* is practically a modified version of traditional *EMH*.

AMH represents a new theoretical framework which, by applying the following development principles: competition, adaptation and natural selection, reconciles the differences between standard and behavioral finance. Specifically, *AMH* reconciles market efficiency with behavioral alternatives. In contrast to the traditional approach that claims that individuals strive to maximize expected utility and have rational expectations, the developmental approach makes a much more modest claim that at the core of each individual is the desire to survive, and thus the need for constant adaptation to changing environments (Lo, 2004).

AMH builds on the following ideas (Lo, 2005, 31): 1) people are guided by their own interests, 2) people make mistakes, 3) people learn from mistakes and adapt their behavior, 4) competition encourages adaptation and innovation, 5) natural selection shapes market conditions which the creator of *AMH*

figuratively calls "market ecology"[3] and 6) development determines market dynamics. According to Lo (2005), the first idea represents a common starting point for *EMH* and *AMH*, while, in terms of the second and third ideas, the stated hypotheses "differ", because, according to *EMH*, investors do not make mistakes, do not learn from mistakes and do not adapt, since the market environment is static and always in balance. The fourth idea claims that adaptation and innovation do not occur independently of market forces, but under the influence of competition, i.e. the instinct for survival. Competitive struggle results in "natural selection", in the sense that "the strongest survive"; also, "natural selection" shapes the "ecology of the market", in the sense that it affects the number of market participants competing for a limited number of profitable opportunities. Finally, the sixth idea implies that the previously described development processes: competition, adaptation, learning from mistakes, innovation and natural selection, determine and reflect market dynamics.

AMH does not claim that market efficiency is perfect or non-existent, but indicates that market efficiency is a characteristic that varies over time and between markets, with the degree of market efficiency depending primarily on changing market conditions and circumstances. Based on Khuntia and Pattanayak (2018), due to the influence of behavioral biases and the changing market environment, it is unrealistic to expect perfectly efficient, i.e. perfectly inefficient markets. Due to the influence of these factors, efficiency is a changeable category.

Unlike *EMH*, which assumes that the market environment is static and in equilibrium, *AMH* argues that the market environment is dynamic and unbalanced, with changes requiring continuous adjustment of market participants. In other words, while *EMH* implies a static approach, *AMH* implies a developmental and dynamic approach, that is, while according to *EMH* market efficiency is a static category, according to *AMH* market efficiency is a highly dynamic category conditioned by numerous factors.

In contrast to *EMH*, which argues that prices reflect all available information, *AMH* indicates that the extent to which prices reflect available information depends on: 1) changing market conditions, primarily the number of market participants competing for a limited number of profitable opportunities, and 2) the degree of success of market participants in adapting to changing market conditions through learning from errors, competition, adaptation and innovation. A larger number of market participants competing for a limited number of profitable opportunities and a greater success of their adaptation to the changing market conditions implies greater efficiency of the financial market. In contrast, fewer market participants competing for a limited number of profitable opportunities and their lower success in adapting to changing market conditions implies lower financial market efficiency.

Regardless of the greater or lesser adaptability of market participants to changing market conditions, adaption takes time, which is why earning

3 Lo (2004) compares economics with ecology, market participants with plant and animal species and profitable opportunities with the available quantities of food and water. In this respect, economic profit is food for market participants on whose consumption depends their very survival.

opportunities survive and exist for a certain period of time, i.e. they do not automatically disappear as argued by the classic *EMH*. Therefore, *AMH* implies that opportunities for arbitrage and earning occur from time to time, under the influence of changing market circumstances, and exist for a certain period of time. Profit opportunities are present until market participants adjust their trading strategy to changed market circumstances, which suggests that optimal investment strategies also change over time (Tseng, 2006).

Depending on the changing market conditions, investment strategies show greater or lesser profitability, therefore, the financial market is more or less efficient. Just as economic activity goes through both periods of recession and expansion, the investment strategies are also characterized by unprofitable and profitable periods. Due to the change in market circumstances and the number of competitors who apply a certain investment strategy, this investment strategy brings high profit in one period and significant loss in another.

Based on the abovementioned, it is evident that, with the change of "market ecology", a profitability cycle of market participants is superseded by a cycle of unprofitability, i.e. an inefficient cycle of the financial market is replaced by an efficient cycle. *AMH*, therefore, implies a cyclical movement of the degree of market efficiency, which indicates that the financial market is more efficient in one period and less efficient in another. With the growth of market efficiency, the number and the scope of profitable opportunities decrease, and thus, due to the strong competition of market participants, a "natural selection" occurs, as well as a smaller number of profitable opportunities on the market. By reducing the number of market participants, many emerging earning opportunities will go unnoticed and unexploited, which will lead to a decline in market efficiency and an increase in the number and scope of profitable opportunities. This further implies an increase in the number of market participants who seek profitable opportunities, exploit them, and contribute to the new growth of market efficiency.

In this way, a sort of "vicious circle" is created, where periods of decline and periods of growth of the degree of market efficiency come one after another, which irresistibly resembles the superseding of the period of decline and the period of growth in terms of the level of economic activity. Thus, market efficiency is not a static category, as claimed by the classical *EMH*, but a dynamic category whose movement is cyclical, similar to the movement of economic activity. The period of decline and the period of growth of market efficiency can be compared with one economic cycle that begins with a recession, or decline in economic activity, and ends with expansion, or increase in economic activity.

According to Pasca (2015, 158), changes in the degree of efficiency are consistent with the developmental interpretation of the financial market. The market is efficient as long as external factors do not upset the balance. However, when the imbalance occurs, market participants are forced to adapt to new market conditions and, during the adjustment process, they occasionally exhibit behavior that is considered irrational from the aspect of the original market conditions. After the balance is restored, the manifested behavior of market participants becomes rational from the aspect of new market condi-

tions, and the financial market becomes efficient. Thus, irrational behavior in one context can be considered rational in another and vice versa - the rational behavior of market participants in certain market conditions is completely irrational in other market conditions.

Lo, the founder of *AMH*, points out that *EMH* is not wrong, but incomplete, because it ignores human nature (Ackert, 2014, 38). According to Lo (2004), examples of economic irrationality cited by behavioral economists, such as overconfidence, aversion to loss, mental accounting, and other behavioral biases, are nothing more than individuals who adapt to a changing environment through heuristics. Heuristics are not necessarily opposed to rationality, but are rather taken out of context. Decision makers learn from the positive and negative outcomes of their actions and develop heuristics to solve the problems and challenges they face. With the change of economic and market conditions, the original heuristics become inadequate, which is why it is necessary to develop new heuristics through which individuals adapt to the changing environment. Because market conditions are subject to frequent changes, market participants are forced to continuously adjust and adapt (Tseng, 2006, 14).

By summarizing the above, it is concluded that *AMH*, despite its rather abstract and qualitative nature, involves clear implications (Lo, 2004; 2005):

- *Market efficiency does not operate on an "all-or-none" principle. Markets are not necessarily perfectly efficient or perfectly inefficient – the degree of market efficiency varies over time and between markets.*
- *The relationship between return and risk (premium risk) is not constant, but varies over time under the influence of changing market circumstances, the regulatory framework and tax laws. Undertaking high risk is not a guarantee for achieving an equally high return, because its realization also depends on the changes in the environment.*
- *In contrast to traditional EMH, AMH implies the existence of occasional arbitration possibilities. When arbitrage opportunities are exploited, they disappear, but at the same time new opportunities for earnings emerge. Therefore, with the change of market and institutional conditions, primarily of the regulatory framework, some arbitration opportunities disappear and other arise.*
- *The situation is similar regarding investment strategies that tend to both strengthen and weaken, bringing investment gains in one environment, or losses in another environment. One and the same investment strategy results in a gain in a certain market and institutional conditions, as well as a loss in other.*
- *Adaptation (innovation) is the key to success. Unlike EMH, which suggests that a certain level of expected return can be achieved by simply taking a sufficient level of risk, AMH suggests that, due to the fact that the relationship between return and risk varies over time, a better way to achieve the desired level of expected return is to adapt to changing market conditions.*
- *Survival is the only thing that matters. Without denying the relevance of maximizing profits and utility, Lo (2004) points out that survival is an organizational principle that drives market development.*

Despite its clear implications, the founder of *AMH* admits that this hypothesis is still in its infancy and that numerous studies and confirmations of its validity are needed to make it a viable alternative to *EMH* (Lo, 2005, 32). In this respect, research on *AMH* has become an increasingly popular topic in the finance literature. The possibilities of *AMH* have been quickly recognized by both theorists and financial analysts, which is why the validity of this hypothesis has become the subject of numerous studies.

In a study conducted on the *US REIT market*, Zhou and Lee (2013) confirmed the two most important implications of *AMH*: 1) market efficiency does not operate on the "all-or-none" principle and 2) the degree of market efficiency depends on changing market conditions. The authors tested the degree of predictability of future returns based on the movement of past returns, because *EMH* implies the absence of this predictability. They found that predictability of returns varies over time under the influence of market circumstances. They identified the presence of return predictability and the absence of *EMH* validity in certain periods, however, in other periods, the absence of return predictability and the presence of *EMH* validity was detected. In addition, they found that the degree of return predictability decreases over time, indicating an increase in market efficiency. In this way, the authors proved that market efficiency is a dynamic category. Furthermore, they found that the degree of market efficiency depends on a number of factors such as the achieved level of market development, inflation, market volatility and regulatory framework.

A similar testing of *AMH* was conducted by Khuntia and Pattanayak (2018), in the Bitcoin market, who assumed that in an emerging market that is, therefore, exposed to numerous and frequent changes, it would be unrealistic to expect a static market efficiency situation proposed by *EMH*. The study confirms the validity of *AMH*, as it proves that market efficiency is a dynamic category caused by changing market conditions.

Evidence supporting the validity of *AMH* was also found by Neely et al. (2009), Kim et al. (2011), Charles et al. (2012), Noda (2012), Urquhart and Hudson (2013), Kumar, (2018). The mentioned studies found that return predictability varies under the influence of changing market circumstances, which indicates a variable degree and cyclical movement of market efficiency.

Despite the presented evidence confirming the validity of *AMH*, it is still early to make a final opinion on this new theoretical approach. Just as half a century of research on the validity of *EMH* was not sufficient to reach a consensus on the presence or absence of validity of this hypothesis (Leković, 2018), thus fifteen years of research on the validity of *AMH* is a too short a period to draw any final conclusions.

AMH is, in principle, presented as a set of ideas whose time is yet to come and which will take an important place in finance theory in the coming decades. Time will tell whether the optimistic expectations of the founder of this theory will come true, as well as the results of future research that will surely follow, because *AMH* managed to attract the significant attention of the financial public.

Conclusion

Behavioral finance, although drawing on criticism of *EMH* and standard finance, does not repudiate the mentioned theories, but rather points to the absence of their full validity. Many behavioral economists admit that standard finance has undeniable relevance and stress that it is not the intention of advocates of behavioral finance to declare standard finance "dead". What behavioral finance offers can be thought of as, in fact, the salvation of standard finance (Shiller, 2006, 7). Behavioral finance expands the scope, i.e. it supplements standard finance, while standard finance represents the basis of behavioral finance.

Standard and behavioral finance essentially represent two sides of the same coin, i.e. two halves of a whole that is called finance theory. Despite the fact that proponents of behavioral finance are the main critics of standard finance, as well as proponents of standard finance the main critics of behavioral finance, one should strive to reconcile their opposing views and integrate their teachings. Standard finance overemphasizes the importance of econometric models, while behavioral finance overemphasizes the influence of psychological factors, which is why practical solving of financial problems and making correct financial decisions requires the synchronized application of both approaches.

According to Shiller (2006, 4), "The distinctions between standard and behavioral finance have therefore been exaggerated... behavioral finance is more eclectic, more willing to learn from other social sciences and less concerned about elegance of models and more with the evidence that they describe actual human behavior". The behavioral revolution that began in 1980s with the discovery of a large number of market anomalies and the application of psychological theories in economics, represents a return to a more eclectic approach to financial modeling.

Given all abovementioned facts, it is concluded that investors, portfolio managers, financial analysts and other market participants need knowledge of both standard and behavioral finance to make the right financial decisions, which confirms the initial hypothesis of the paper. The Nobel Prizes in Economics awarded to Harry Markowitz in 1990 for his work in the field of standard finance and to Daniel Kahneman in 2002 for his work in the field of behavioral finance are the best proof of the validity of the above stated conclusion, as they unequivocally indicate that the economic public has accepted elements of both standard and behavioral finance as valid and accurate.

The optimal solution to the problem should be sought in establishing a balance between, on the one hand, the application of exact mathematical and statistical models and, on the other hand, the understanding of human nature and the way people think, behave and act. In other words, the optimal solution should be sought in supplementing standard finance with knowledge of behavioral finance, that is, in combining the best elements of standard and behavioral finance. The future of finance, according to Shefrin (2008; 2010), lies in combining realistic assumptions of behavioral finance and rigorous analysis and precise instruments of standard finance. A good example of a

new theoretical approach that reconciles the differences between standard and behavioral finance is *AMH*. This new hypothesis occupies a middle position between the perfect market efficiency advocated by the representatives of standard finance and the absence of market efficiency pointed out by behavioral economists.

Having in mind the dynamic development of contemporary scientific thought, future research may focus on a comparative analysis of behavioral finance and new promising areas of research such as neurofinance that examines the neurological basis of financial decision-making processes. Shefrin (2015) was among the first scientists to suggest investigating the role of hormonal balance and genetic characteristics in the process of financial decision-making, therefore, future research can be also focused on this field of research. The realization of the mentioned research would explain the process of financial decision-making in more detail and make a step towards a better understanding of the researched topics.

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