A Critical Survey on Efficient Market Hypothesis (EMH), Adaptive Market Hypothesis (AMH) and Fractal Markets Hypothesis (FMH) Considering Their Implication on Stock Markets Behavior

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Abstract

The fundamental objective of our research study is to provide a critical analysis on Efficient Market Hypothesis (EMH), Adaptive Market Hypothesis (AMH) and Fractal Markets Hypothesis (FMH) considering their impact on stock markets behavior. Efficient Market Hypothesis is one of the pillars of modern finance and it is built on the paradigm that any publicly information can be considered as available for all financial investors, stock market participants or other actors in financial markets, and consequently asset prices always integrate and reflect all relevant information. Adaptive Market Hypothesis is based is a more recent theory whose theoretical architecture includes evolutionary principles. On the other hand, the Fractal Market Hypothesis is focused on the concept of the stock market liquidity, considering the fact that Efficient Market Hypothesis completely ignores this major aspect. Moreover, a liquid stock market represents a stable market which has significant implications at the investment level. Past financial evidence has shown that short-term price changes exhibit the obvious tendency to be more volatile compared to long-term price trends.

Key words: Efficient Market Hypothesis (EMH), Adaptive Market Hypothesis (AMH), Fractal Markets Hypothesis (FMH), stock market, Random Walk Hypothesis (RWH), chaos theory
J.E.L. classification: D53, E44, G1, G4

1. Introduction

This research paper aims to investigate most relevant aspects regarding Efficient Market Hypothesis (EMH), Adaptive Market Hypothesis (AMH) and Fractal Markets Hypothesis (FMH) considering their effects on stock markets behavior. Efficient Markets Hypothesis is not a falsifiable theory since frames the behavior of stock market asset prices under certain conditions, including the concept of informational efficiency. Stock market efficiency includes three main categories, such as: strong form efficiency, semi strong form efficiency and weak form efficiency. According to Malkiel (2003) an efficient market involves certain limitations that affect investment behavior given that it does "*not allow investors to earn above-average returns without accepting above-average risks*".

In literature, the paradigm of efficient market hypothesis is assimilated in close connection with the random walk theory. As a pioneering theoretical approach, Kendall (1953) argued that "*stock price fluctuations are independent of each other and have the same probability distribution*". Technically, every further asset price changes actually means just random departures from previous prices. In other words, Fama (1965) highlighted important aspects of random walk theory and argued that: "*the future path of the price level of a security is no more predictable than the path of a series*

of cumulated random numbers". Furthermore, Fama (1970) discussed the matter of efficient capital markets and suggested that the perfect scenario targets a capital market "*in which prices provide accurate signals for resource allocation".*

On the other hand, Adaptive Market Hypothesis (AMH) tends to perceive Efficient Market Hypothesis (EMH) as a theorized utopia that is impossible to apply in economic practice. In case of Adaptive Market Hypothesis (AMH), it is important to discuss about optimal dynamic allocation, but also relative efficiency. Moreover, Fractal Market Hypothesis represents another alternative to the concepts promoted by Efficient Market Hypothesis. Konstantinidis et al. (2012) have developed a critical empirical research (by comparison) between the main principles of Efficient Market Hypothesis and Behavioural Finance Theory, and argued that: "*investing rationality and efficient market processes over time contradict investors' psychology, biased behavioral rules and market bubbles*".

Extreme events such as the global financial crisis (GFC) significantly affects the development of the financial sector. For instance, the recent COVID-19 pandemic caused severe lockdown in most countries of the world, whether they were developed, emerging or underdeveloped, so affected the performance of all the sectors of the economy, including financial system (Batool et al., 2020). However, Spulbar et al. (2020) consider that global financial liberalization generates a lower impact on emerging economies compared to the case of developed economies. Consequently, it is very important to have a theoretical foundation that provides efficient solutions, especially in times of financial turmoil.

2. Literature review

Eugene Fama is a Nobel laureate in Economic Sciences, with significant contributions in the field of financial markets. In literature, Fama is also considered the father of Efficient Market Hypothesis which represents the quintessence of modern finance theory. According to Fama (1965): *"The main conclusion will be that the data seem to present consistent and strong support for the random-walk model. This implies, of course, that chart reading, though perhaps an interesting pastime, is of no real value to the stock market investor.*" Fama (1970) also stated as "*definitional statement*" that: "*A market in which prices always fully reflect available information is called efficient*", but this condition "*has no empirically testable implications*".

In another train of thoughts, Fama (1976) suggested that: "*An efficient capital market is a market that is efficient in processing information considering the fact that in the case of an efficient market, prices 'fully reflect' available information"*. In order to support the validity of market efficiency hypothesis, Fama (1998) argued that: "*anomalies are chance results, while apparent overreaction to information is about as common as underreaction*". In addition, Malkiel (2003) examined the linkage between the important conditions of predictability and efficiency in order to provide a viable explanation for possible investment opportunities and promoted the principles of Efficient Markets Hypothesis even in the light of the following issues: "*if many market participants are quite irrational*" and "*if stock prices exhibit greater volatility than can apparently be explained by fundamentals*".

Samuelson (1965) has made a significant contribution to disseminating the concept of market efficiency and argued that financial asset prices swing using a random pattern since future information is unpredictable and the changing price of financial assets also follows a random dynamics. Moreover, Sewell (2011) investigated relevant aspects regarding Efficient Market Hypothesis and concluded that "*the definitional 'fully' is an exacting requirement, suggesting that no real market could ever be efficient, implying that the EMH is almost certainly false*".

Fractal Market Hypothesis represents a very complex theoretical structure. Peters (1994) suggested that: "*in fractal time, randomness and determinism, chaos and order coexist*", but also revealed that " *It has been difficult to reconcile randomness and order, chance and necessity, or free will and determinism*".

3. Research methodology

The research methodology of this research paper includes a theoretical approach built on qualitative analysis. Brown (2020) analyzed in an exhaustive manner the implications of Efficient Market Hypothesis and concluded that it is very necessary as a price to be characterized by an adequate level of noise or inefficiency in order to enable the compensation of information production. For instance, Noda (2016) investigated the existence of Adaptive Market Hypothesis in case of Japanese stock market using a time-varying model, and identified that the degree of efficiency for selected stock markets changes over time, while empirical findings confirm Adaptive Market Hypothesis for the higher qualification stock markets. Fractal Market Hypothesis provides a different perspective compared to Efficient Market Hypothesis. It is based on chaos theory.

Lo (2005) provided a very interesting approach to Adaptive Market Hypothesis, considering the influence of evolutionary principles, such as it involves the fact that "*the degree of market efficiency is related to environmental factors characterizing market ecologies such as the number of competitors in the market, the magnitude of profit opportunities available, and the adaptability of the market participants.*" As a representative approach applied for testing the Adaptive Market Hypothesis, Lim and Brooks (2011) suggested certain criteria regarding market efficiency, which should be varying through time, and on the other hand should be dependent on particular market conditions such as: financial crises, market crashes, stock bubbles and others.

4. Findings

Malkiel (2003) pointed out the fact that news is implicitly unpredictable by its very nature so as a consequence the price changes determined in this way have to be unpredictable, but also random, or in other words, "*prices fully reflect all known information*". According to Fama (1965) "*in an efficient market, on the average, competition will cause the full effects of new information on intrinsic values to be reflected instantaneously in actual prices*". In a previous research study, Malkiel (1973) argued that if „*a blindfolded chimpanzee throwing darts at the Wall Street Journal could select a portfolio that would do as well as the experts*" focusing on the idea that efficient markets do not allow financial investors to earn (gain) above-average risk-adjusted stock returns.

Spulbar and Birau (2018) investigated weak-form efficiency for a cluster of emerging capital markets, such as: Romania, India, Poland and Hungary considering the argument that stock market security prices always incorporate and reflect all relevant information. The empirical findings demonstrated that efficient market hypothesis has been rejected even in the case of weak-form efficiency for the sample period January 2000 to July 2018.

Trung and Quang (2019) examined the implications of Adaptive Market Hypothesis based on a case study for the Vietnamese Stock Market using certain autocorrelation tests such as: AVR test, AP test, GS test, but also a time-varying autoregressive framework. The empirical findings revealed that the behavior of Vietnamese stock market complies with Adaptive Market Hypothesis, while the market inefficiency has been considerable during previous financial crises, such as the period 2006–2007, but also 2011.

Lo and MacKinlay (1988) have conducted a solid empirical study in order to identify the reasons why stock market asset prices do not actually follow a random walk pattern and pointed out that: *"… the common misconception that the Random Walk Hypothesis is equivalent to the Efficient Markets Hypothesis…*" considering the economic implications of the empirical findings. However, Jegadeesh and Titman (1993) performed certain empirical studies applying momentum effect strategies which can determine the existence of abnormal stock returns. Spulbar et al. (2019) argued that considering the financial modeling effect of efficient markets hypothesis results that if we consider normal distribution, the skewness is naturally null.

5. Conclusions

This research paper provides a very well structured and documented comparative conceptual overview. It is concluded that Efficient Market Hypothesis (EMH), Adaptive Market Hypothesis (AMH) and Fractal Markets Hypothesis (FMH) represent essential paradigms in modern financial

theory, with significant implication on understanding stock markets behaviour. Kemp and Reid (1971) examined the empirical evidence on random walk hypothesis which claims that the changes in financial share prices are independent, so that it generates a random walk in price levels and argued that the dynamics of share price is "*conspicuously non-random*". Fractal Market Hypothesis considers that financial investors will not react immediately to the information they receive, while their reaction will also be distinct. Fractal Market Hypothesis is focused on the idea of stock market liquidity, despite the fact that Efficient Market Hypothesis does not even mention this extremely important concept, especially in the context of globalization and financial liberalization. Synthetizing, a liquid stock market is considered to be a stable market and this is very important in the financial investment environment.

Lo (2004) proposed an innovative perspective using the concept of Adaptive Markets Hypothesis (AMH) as an evolutionary framework, but also cognitive neurosciences insight in understanding economic linkages. Wilson (1975) defined the new concept of sociobiology a the "*systematic study of the biological basis of all forms of social behavior*", that is, including the behavior of financial markets. Thereby, Lo (2004) highlights a number of psychological traits of human behavior, such as: altruism, fairness, kin selection, language, mate selection, religion, morality, ethics, and abstract though and suggest that this complete reconciliation of Efficient Markets Hypothesis based on its behavioral selection choices implicitly generates an innovative synthesis called Adaptive Markets Hypothesis.

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