Efficient Market Hypothesis: Review of existing research and criticism

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Abstract

Over the past 40 years the importance of Efficient Market Hypothesis (EMH) is well documented and discussed. EMH is useful for analyzing the way equity markets function and consequently for providing appropriate information for investment decision. There is a huge body of research focused on EMH which provides empirical evidence that supports or rejects it. This paper provides a review of much of the published research in this broad area, throughout the said period. Empirical research on various equity markets, such as North American, European, Middle Eastern and North African, as well as Asian, are surveyed. A special attention is paid to the Greek stock market. Furthermore, evidence for the three forms of market efficiency, i.e. weak, semi-strong or strong is reviewed. It ought to be noted that certain tests initially used for empirical research have been recently replaced by newer ones that also measure nonlinear serial dependencies. An ascertainment derived from the reviewed literature is that a definitive conclusion supporting or rejecting EMH cannot be drawn. Further, an examination of various criticisms raised for EMH over the past years is conducted. Finally, a number of conclusions which can be reliably drawn from the evidence of the reviewed articles are discussed.

Keywords: Efficient Market Hypothesis, Market Efficiency, Random Walk, Stock Market

JEL Classifications: G12, G14, G15

1. Introduction

Financial markets are an integral part of modern world, with enormous volume of daily transactions. They are part of modern economic life and influence the level of prosperity of millions of people.

Humans have always had a doubt about what future might bring and they therefore tried to predict it. This effort of course could not exclude the possibility of "easy money" by predicting the future prices of equity markets.

However, efficient markets do not allow investors to earn above-average returns without accepting above-average risks (Malkiel, 2003, p.60). It is, therefore, important to ascertain whether a market is efficient with view to drawing the most appropriate investment strategy path. As a consequence an immense amount of research has been conducted over the past forty years in an effort to assess market efficiency.

This paper is organized as follows: Section 2 gives a description of Random Walk Hypothesis and Efficient Market Hypothesis, and reviews the findings of various articles on EMH, section 3 reviews the main

critiques of EMH, while section 4 summarizes the findings and presents the conclusions made.

2. Random Walk Hypothesis and Efficient Market Hypothesis

2.1. The concepts

There are two main hypotheses relevant to the possibility of being able to make a prediction in stock markets.

- Random Walk Hypothesis – RWH) (Kendall, 1953; Roberts, 1959; Fama, 1965) and
- Efficient Market Hypothesis - EMH) (Samuelson, 1965; Jensen, 1978).

These hypotheses are considered as the cornerstone of modern financial theory, but they are questioned by many and they have generated immense disputes (Thawornwong and Enke, 2004). In any case it has been realized that "the presence (or absence) of a random walk has important implications for investors and trading strategies, fund managers and asset pricing models, capital markets and weak-form market efficiency, and consequently financial and economic development as a whole" (Worthington and Higgs, 2004, p. 59). Therefore it is important to investigate whether stock markets follow or not Random Walk Hypothesis and whether they are efficient.

The first contribution of Random Walk was in the beginning of the century from Bachelier (1900). In his doctoral thesis and in many articles which he has published later, forms the axiom that according to the existing information, expected returns of a trader are null. Kendal (1953) was the one who made a broad research, analyzing 22 weekly stock market indices and 2 series of spot commodity prices. He found that data follow a random walk and act as wandering series, and he concluded that there is no hope for anyone to be able to predict stock market fluctuations. Later, in his complete study, Fama (1965, p.98) mentions "it seems safe to say that this paper has presented strong and voluminous evidence in favour of the random-walk hypothesis". When the sum of the product of each possible price change times the probability of its occurrence is zero, it is called martingale, of which a random walk (50 percent probability up, 50 percent probability down) is a special case. (Siegel, 1998 σελ. 244)

Random Walk in stock prices involves two separate hypotheses (Fama, 1965):

1 Successive changes of prices of stocks are independent. More specifically, the sequence of price changes during time period t is independent of the sequence of price changes during previous time periods. In other words the knowledge of the sequence of price changes leading up to a time period t is of no help in assessing the probability distribution for the price change during time period t. Therefore $\Pr\left(x_t = x \middle| x_{t-1}, x_{t-2}, \ldots\right) = \Pr\left(x_t = x\right)$, where $\Pr\left(x_t = x\right)$ is the unconditional probability that the price change during time t will take the value x, while $\Pr\left(x_t = x \middle| x_{t-1}, x_{t-2}, \ldots\right)$ is the conditional probability that the price change will take the value x on the knowledge that previous price changes took the values x_{t-1}, x_{t-2}, etc.
2 The price changes conform to some probability distribution. The shape of this distribution is very helpful for the investor, since it determines the riskyness of investment, provides information

for the nature of the process generating price changes and it closely related to the type of data to which it is applied.

As the same author (Fama, 1965) points out, from the above two hypotheses, independence of prices is the most important, since it determines whether random walk is valid. The reason is that successive price changes are either independent, in which case the random walk hypothesis is valid, or they are not in which case the hypothesis is not valid.

According to Malkiel (2003), random walk hypothesis states that previous stock prices do not help in predicting future prices, since future prices simply reflect new information which are by definition unpredictable. Stock prices follow a random walk, and therefore their path is unpredictable. According to Seiler and Rom (1997) stock prices fluctuate daily as random white noise, which according to Black (1986) consists of a large number of small actions made by many investors whose actions usually are not based on any information, but simply for their own personal reasons, as to increase their liquidity. Osborne (1959) argues that stock prices are always changing and at the same time they are in a state of a statistical equilibrium, with analogous properties to an ensemble of particles which are moving in a random way, a phenomenon that has been observed by the biologist Robert Brown and therefore it is known as Brownian motion. This is why, random walk hypothesis is also known as Brownian motion (Siriopoulos, 1998).

Efficient Market Hypothesis was first mentioned in the mid 60's. By then, there was only an existing vague perception of a well functioning stock market, but it was Samuelson (1965) who created a theory out of it and proved that in a competitive market, price fluctuations are random. Fama (1970) made a comprehensive overview of the relevant theoretical and empirical literature and was the first who gave the name of Efficient Market, while he presented empirical evidence.

Efficient market hypothesis mentions that at any point in time stock prices fully reflect all available information about individual stocks and about stock market as a whole. Therefore nobody can earn excess returns, i.e. returns higher than market's returns making transactions based on any information, because prices adjust immediately to any information before any individual investor manages to make use of this information (Malkiel, 2003). Jensen (1978, p.98) states that "a market is efficient with respect to information set θ_t, if it is impossible to make economic profits by trading on the basis of information set θ_t". According to Efficient market hypothesis a) previous prices give no indication for future prices, b) prices are embedding fully and immediately all information, and c) prices reflect at every moment either publicly or privately available information (Siriopoulos, 1998).

The term "all available information" is vague and it is not sufficient to clarify the type and availability of the information it is referred to. Therefore according to the definition given to information set θ_t, three different types of efficient market are proposed (Fama, 1970; Shleifer, 2000):

1 The Weak form of the Efficient Market Hypothesis claims that current prices fully reflect the information implicit in the

sequence of past prices. Therefore superior risk adjusted profits can not be earned on the basis of historical prices.

2 The semi-Strong form of the Efficient Market Hypothesis asserts that prices fully reflect all publicly available information. It assumes that prices are almost immediately adjusted in any new information which is publicly available, in a way that no excess return can be made.

3 The Strong form of the Efficient Market Hypothesis asserts that all information known to any participant is fully reflected in prices. Therefore, no individual who has privileged (insider) information has higher expected trading profits than others, because of his monopolistic access to this information.

2.2. Empirical research

It will be helpful to establish whether empirical research supports or rejects Efficient Market Hypothesis in stock markets of various countries.

However, since there are so many differences between the various stock markets, it would be difficult to examine them as a whole. On the other hand, the examination of each case separately, is not helpful either in order to come to a conclusion.

Therefore the review will be made according to various criteria. One of them is the geographical criterion, for example Asian markets will be examined separately from the markets of MENA (Middle East North Africa) and from European markets, etc, while another criterion is the degree of the development of each country's market, for example developed or emerging markets. Finally a review of the research relative to EMH in Greece will be made.

Developed markets

Seiler and Rom (1997), examined the NYSE index from February 17, 1885 to July 2, 1962, using daily returns for a total of 22.474 observations. They have chosen the Box-Jenkins (ARIMA) methodology as the most appropriate for their research and they concluded that for all this period, the price changes were completely random. They also used the same data to investigate whether there is a month or a day of a week that presents any non-uniformly distributed returns. They found that in a monthly basis January, July and August, and in a weekly basis Wednesday, Friday and Saturday present somewhat increased earnings, while Monday presents significant negative returns. They concluded that there seems to be a weak evidence of non-uniform return distribution as early as 1885, but it is not enough to enable models to successfully forecast future returns. Lo and MacKinlay (1988) investigated, in various combinations and subperiods the NYSE-AMEX index, as well as various portfolios with stocks according to their size, for the time period 1962-1985. They strongly rejected the random walk hypothesis for the entire sample period and for all subperiods, mostly because of the behavior of small stocks. They also ascertained that there is a negative serial correlation on individual securities. Finally, they noted that although their findings may be interpreted as a rejection of some economic model of efficient price formation, there may exist other plausible models that are consistent with the empirical findings. Ito and Sugiyama (2009) examined the monthly returns for the S&P500 stock index over a sample period from 1955 to 2006 and they reported that the S&P500 index exhibits a varying degree of efficiency, being most inefficient during the late 1980s.

Conrad and Juttner (1973) studied 54 German stocks with the most frequent daily price changes, from a total of 340 stocks. They noted that almost all of their tests led to the rejection of null hypothesis that there exists an efficient market and that their findings do not support random walk hypothesis and therefore German stock exchange cannot be considered an efficient market for the above time period.

Worthington and Higgs (2004) examined 20 European markets, 16 of which are regarded as developed while the rest as emerging, with daily data between 1988 and 2003. They used a wide range of tests belonging in three different procedures, in order to avoid the case that some spurious outcome to influence the results. According to their conclusions, among the developed markets only Germany, Ireland, Portugal, Sweden and the United Kingdom satisfied the most stringent random walk criteria, with France, Finland, the Netherlands, Norway and Spain meeting at least some of the conditions, while the rest namely Austria, Belgium, Denmark, Greece, Italy and Switzerland did not meet any of the requirements. Among the emerging markets, only Hungary satisfied the above criteria. In another study Borges (2008) used daily data, for the period 1993 to 2007, from the stock market indices of France, Germany, UK, Greece, Portugal and Spain. She noted that if weekly data were used then all countries would have followed the random walk hypothesis, but with daily data this hypothesis was rejected for Greece and Portugal, although the last five years the rejection of random walk was fading out.

Emerging markets

Many studies for Efficient Market Hypothesis were conducted in emerging markets in an effort to examine the effectiveness of this hypothesis in these markets.

In Asia, India was investigated by many researchers. Padhan (2009) studied 33 companies from different categories of Bombay stock exchange. In this study, daily data from April 1990 to February 2007 were used and sufficient evidence that stock prices support random walk hypothesis in the long run was found, although during short periods they might not. It is also stated that stock prices follow random walk process mainly due to firm specific factors, apart from economic and financial factors. Poshakwale (1996) used daily data over a period of 1987 to 1994, in order to provide empirical evidence on weak form efficiency of Bombay stock exchange. The results indicated that this particular stock market of India is not weak form efficient. Gupta and Basu (2007) examined the weak form efficiency in two of the most important Indian stock exchanges, Bombay Stock Exchange (BSE) and National Stock Exchange (NSE). The daily data used were from May 24, 1991 to May 26, 2006 and the results indicated that these markets were not weak form efficient. Mishra et al. (2009) tested the Indian markets with daily data during the period of January 2007 to July 2009, in an effort to analyze the influence of the recent global crisis. They provide empirical evidence of weak form inefficiency during the studied period.

China was tested for the weak-form efficiency, in many articles which however gave contradictory results. Shanghai and Shenzen are the two main stock exchanges and each of these exchanges trades two types of shares, type "A" shares which are available to domestic investors and type "B" shares which are available to foreign investors. Long et al. (1999) employed weekly stock returns and they found that both "A" and "B" shares on the Shanghai exchange follow the random walk hypothesis. Laurence et al. (1997) used daily data which covered the

period March 8, 1993, to October 31, 1996. The results indicate the existence of weak-form efficiency in the market for "A" shares, but not for "B" shares. Lima and Tabak (2004) used daily returns from June 1992 through December 2000 and found similar results. The researchers ascertained that "A" shares were weak form efficient, while "B" shares do not follow random walk hypothesis. Lock (2007), arrived in similar results in a research which used weekly data for the time period between 1992 and 2007. He asserts that "A" shares follow random walk, but "B" shares strongly reject random walk. Mookerjee and Yu (1999) used daily data from the initial trading days of the stock markets of Shanghai and Shenzhen (end of 1990 and beginning of 1991 respectively) up to December 17, 1993. According to the empirical evidence found, they rejected the random walk implications of the efficient market hypothesis. The researchers asserted that theoretically, it is possible for market participants to generate sustained high returns when properly utilizing profitable information, such as past prices and seasonal anomalies. They also added that this fact is reinforced by the highly speculative nature of individual share-owners, for whom rumors rather than fundamentals determine choice of portfolio, giving rise to a group of "all-round winner" speculators in both the Shanghai and Shenzhen markets". The results of the research also pointed to potentially large departures from the EMH. Lee et al. (2001) examined daily data for the period of 1990 to 1997. Their findings rejected the random walk hypothesis. They also found some evidence of long memory, which suggests possibilities for improving price forecasting performance. Chung (2006) used daily returns from February 21, 1992 to December 30, 2006. The researcher ascertained that Chinese stock markets were not weak form efficient, since the four statistical methods he used namely a serial autocorrelation test, a non-parametric runs test, a variance ratio test, and an Augmented Dickey-Fuller unit root test, rejected random walk hypothesis.

Fazal (1997) studied the Karachi Stock Exchange, which is the main equity market of Pakistan, using daily data from January 1, 1989 to December 30, 1993. He rejected the random walk hypothesis, noting a strong serial dependence of returns. He also noted that Pakistani market adjusts slowly to new information. On the contrary, Jun and Uppal (1994), used monthly data for the same country, and found evidence supporting random walk hypothesis.

Abeysekera (2001) examined Sri Lanka and tested the behaviour of stock returns on the Colombo Stock Exchange, with a view to determine its consistency with the weak form of the Efficient Markets Hypothesis. Data employed include daily, weekly and monthly returns of stock indices for the period of January 1991 through November 1996. He used the Sensitive Share Index reported by the Colombo Stock Exchange and a 40-security value weighted index, adjusted for dividends, splits, rights and bonuses. The results of his study indicate that the stocks traded in CSE do not behave in a manner consistent with the weak form of the Efficient Market Hypothesis.

Fuss (2005) examined seven Asian countries, India, Indonesia, Korea, Malaysia, the Philippines, Taiwan and Thailand. He ascertained that none of them followed random walk hypothesis in the pre-liberalization period, while in the post liberalization period the weak-form efficiency hypothesis is adopted for all, except for the smaller stock markets of Indonesia and Thailand. A newer study, conducted by Hoque et al. (2007), concerned eight Asian stock markets i.e. Hong Kong, Indonesia, Malaysia, the Philippines, Singapore, Thailand, Taiwan and Korea. The time period covered by the study was

from April 1990 to February 2004. They found that the stock markets of these countries do not support the random walk hypothesis, with a possible exception of Taiwan and Korea. Kim and Shamsuddin (2008) examined for the period of 1 January 1990 and 29 April 2005, whether a similar group of 9 Asian stock market returns follow a martingale process. They found that that market efficiency varies with the level of equity market development. In general, the developed or advanced emerging markets (Hong Kong, Japan, Korea, Singapore, Taiwan) showed weak-form efficiency, while the secondary emerging markets (Indonesia, Malaysia, Philippines) are found to be inefficient. They have also found evidence that Singaporean and Thai markets have become efficient after the Asian crisis in 1997.

Mlambo and Biekpe (2007) investigated the weak-form efficiency of ten African stock markets using daily data for periods between January 1997 and May 2002. The markets studied were Egypt, Kenya, Zimbabwe, Morocco, Mauritius, Tunisia, Ghana, Namibia, Botswana and the West African Regional Stock Exchange in Cote d'Ivoire. In all the markets studied (except Namibia, Kenya and Zimbabwe), a significant number of stocks rejected the random walk. Enowbi et al. (2009) examined the weak form efficiency of four African stock markets namely Egypt, Morocco, South Africa and Tunisia, using daily data from January 4, 2000 to March 26, 2009. The results indicate that none of the markets followed the random walk hypothesis with the exception of the South African stock market.

Stock markets of MENA i.e. the stock markets of Middle East and North Africa, which include the countries of Bahrain, Egypt, Israel, Palestine, Lebanon, Jordan, Oman, Qatar, Saudi Arabia, United Arabic Emirates, Tunisia and Turkey, offer a good opportunity to investigate a series of emerging markets and to arrive to broader conclusions. Therefore, there have been conducted a series of studies for MENA stock markets. Mecagni and Sourial (1999) studied the behaviour of Eguptian stock exchange. They mentioned that stock returns were characterized by a distribution which is differentiated from the normal and by volatility that tends to change over time and which is serially correlated. They rejected random walk hypothesis, while they identify a number of factors influencing the dissemination of information, including the large number of non-actively traded shares and the limited role of mutual funds. Al-Khazali et al. (2007) studied the behaviour of the indices of eight equity markets in MENA region from the countries of Bahrain, Jordan, Kuwait, Morocco, Oman, Saudi Arabia, Tunisia and Egypt. They used weekly data from October 1994 through December 2003 and they found that no one of them supported random walk hypothesis. They reckoned that this is due to thin and infrequent trading of many stocks participating in the indices. However, when returns of the indices were corrected for the statistical biases, they could not reject the weak form of market efficiency in any of the eight MENA markets. Abdmoulah (2009) studied 11 Arab countries, Saudi Arabia, Kuwait, Tunisia, Dubai, Egypt, Qatar, Jordan, Abu Dhabi, Bahrain, Morocco and Oman, using daily data of their national stock market indices. All Arab stock exchanges were found weak-form inefficient and show high sensitivity to the past shocks. Awad and Daraghma (2009) examined the Palestine stock exchange through many indices. Daily returns from January 01, 1998 to October 30, 2008 were examined for random walks and found that it was weak form inefficient. Omran and Farrar (2006) examined Egypt, Jordan, Morocco, Turkey and Israel using the main indices of the respective stock markets. They used weekly data, from January 1996 to April 2000. The results rejected the Random Walk Hypothesis for all

markets, except for the Israel TA100 stock market index which appears to follow a Random Walk.

A far as Turkey is concerned, Antoniou et al. (1997) used data from the Istanbul stock exchange, for the period 1988 to 1993. They found that till the end of 1990 the market was inefficient, while the opposite was true for the rest of the data period, possibly as a result of a series of considerable liberalization measures. In a broader research, Tas and Dursunoglu (2005) run a series of tests to examine the weak form of market efficiency. According to their research, which was conducted with data of thirty stocks included in the ISE30 index for the period of January 1, 1995 through January 1, 2004, they rejected the weak form of efficient market hypothesis. Yalama and Celik (2008) investigated the existence of semi strong form of efficiency using daily data for the period of January 2, 1990 to June 27, 2008. The researchers ascertained that capital markets, in contrary with money markets, are not efficient. Aga and Kocaman (2008) selected 20 firms which fulfilled the criteria they stated and they created an index. Then, they used monthly data from this index, for a time period between January 1986 and November 2005. According to their study, there is weak form efficiency in the Istanbul stock exchange.

Greece

Greece is considered a developed market according to the ranking of FTSE (n.d.) Retrieved March 11, 2010, from (http://www.ftse.com/Indices/Country Classification/Downloads/ Europe Developed Matrix Sept 09.pdf). However, it is doubtful whether Greek stock exchange can be considered as a developed market, since it has many of the characteristics (shallow market, stocks with thin trading, slow dissemination of information, etc) of the markets of emerging countries. "ASE sometimes works with speculative characteristics as to the movement of stock prices and with erratic and sometimes unjustifiable price swings. The latter give an indication that market prices may not, at all times, rationally reflect all information existing in the market and that possibly other factors may affect security prices" (Samitas and Kenourgios, 2004, p. 6).

Panas (1990) examined the returns of ten companies of Greek stock market that present the highest level of trading activity and ascertained that evidence supports the weak form of the efficient market model. Stengos and Panas (1992) studied the four largest Greek banks covering the period between January 1985 and October 1988 and their findings support the weak and semi strong versions of the efficient market hypothesis. Niarchos and Alexakis (1998) examined Athens Stock Exchange (ASE). They rejected the semi strong form of Efficient Market Hypothesis and they noted that there were other factors, apart from new information, which influenced the price behaviour. In a newer study, Niarchos and Alexakis (2000) used monthly returns of ASE, in an effort to avoid thin trading effect and the effect of non synchronous trading, from January 1985 till December 1995. They rejected the semi strong form of market efficiency and they attributed this to the delayed dissemination of information and to psychological factors. Similar ascertaitions were made from Dritsakis et al., (2003), in their study of ASE with daily data for the period of January 17, 1990 to December 6, 1999. They rejected efficient market hypothesis and they noted that there were significant dependencies between volatility and returns. Samitas and Kenourgios (2004) examined the semi-strong market efficiency of ASE through major corporate events like new stock issuances (with bonus,

rights or both) for the period of 1998-2003. They ascertained that there were non-zero cumulated abnormal returns around the announcement periods and more specifically there was positive impact from the announcements of issuing new stocks with bonus, but negative impact from the announcements of issuing new stocks with rights. Therefore, they rejected the semi-strong form of efficient market hypothesis. Samitas (2004) examined the existence of interdependence between primary and secondary market indices of ASE from January 1998 to December 2003, in order to test the autonomy of secondary market price behaviour, but he ascertained a parallel movement between these two markets. He also measured the effects of the announcements for issuing new stocks by the listed companies. The empirical results led to a rejection of the weak and semi-strong efficient market hypothesis. Laopodis (2004) conducted a research in order to investigate whether Greece's financial market liberalization efforts have had any effects on the efficient operation of its equity market. His findings demonstrated that ASE was weak form efficient, before and after the liberalization period.

Greece joined the Economic and Monetary Union with an official announcement made on June 19, 2000 and became a full member by diminishing drachma and by adopting euro on January 1, 2002. Moreover, Athens Stock Exchange was advanced from the 'emerging markets' status into the 'mature markets' status, after an announcement from Morgan Stanley in May 2001. Therefore, it is legitimate to assume that the period between the years 2000 and 2002 may had important implications for the development of Greek stock market. Filis (2006) investigated the efficiency of ASE, by examining the FTSE/ASE 20 index during the period of 2000-2002. He ascertained that the empirical evidence found supported the view that ASE was a weak form efficient market. Panagiotidis (2003) used the ASE General index and the FTSE/ASE 20 index with data from 1/6/2000 to 31/12/2002, and found that there were strong efficiency gains for the period after the introduction of the common currency. Lately, there have been studies for the Greek Futures market. Pavlou et al. (2007) made a research using daily data from Athens Derivative Exchange (ADEX) for the period of August 2004 till August 2006 and they rejected EMH.

3. Criticism of Efficient market hypothesis and counter arguments

By examining the various studies which have been made during the previous years, specific ascertainments can be made.

Islam and Watanapalachaikul (2005), note that the first studies which were made during the 1960s and early 1970s focused on the extent to which successive changes of prices of the stocks were independent of each other, or whether stock prices followed a random walk, while most findings seemed to support Efficient Market Hypothesis. "I believe there is no other proposition in economics which has more solid empirical evidence supporting it than the Efficient Market Hypothesis. That hypothesis has been tested and, with very few exceptions, found consistent with the data in a wide variety of markets" Jensen (1978) mentions.

However from 1980s and onwards, many research focused on the ability of predicting future prices using either historical prices or fundamentals such as P/E rate, dividends, etc., or even events which might influence stock returns like stocks splits etc. Tomaras (2006) believes that till 1977 most research supported EMH, while afterwards

the studies rejecting EMH are overwhelming those supporting EMH. In a similar way Dupernex (2007, p.167) claims that ”by the mid-1970s there was such strong theoretical and empirical evidence supporting the EMH that it seemed untouchable. However, recently there has been an emergence of counter arguments refuting the EMH.” According to Chenoweth et al. (1996), even if EMH is tested in the economics literature over a 30-year period, there are not definitive findings. The existing controversy becomes clearer-more visible by observing the parallel publishing of two American books with the titles «A random walk down Wall Street» by Malkiel (1999) and «A non-random walk down Wall Street» by Lo and MacKinlay (1999). Dimson and Mussavian (2000) state that EMH became the dominant paradigm in finance during the 1970s, but during 1980s and 1990s witnessed an onslaught.

Peters (1994) asserts that although various investors make simultaneous trades, they evaluate information differently, since their time investment horizon differs. The activity of these investors generates the liquidity of the market, since their perception of fair price varies. However, Efficient Market Hypothesis is not concerned about liquidity. EMH claims that prices are always fair and therefore there should always be enough liquidity, which is taken for granted. That’s why EMH cannot explain crashes and stampedes; when liquidity vanishes, getting a fair price may not be as important as completing the trade at any cost.

Some researchers, such as Lim and Brooks (2009), Lim (2007), Saadi et al. (2006) believe that the reason for so much research supporting EMH is that they simply use statistical tests (like autocorrelation tests, runs test, variance ratio tests, spectral analysis, unit root tests, frequency tests) which are designed to account only for linear predictability. However, these studies ignore the possibility of nonlinear serial dependencies, which could be measured, for example, by the test of Brock-Dechert-Sheinkman-BDS. Johnson et al. (2003), assert that by analyzing data from two distinct markets, they show that these data actually exhibit significant nonlinear (i.e. higher order) temporal correlation.

Various researchers claim that markets are often irrational by analyzing the “crash of 1987”, the “Internet bubble” towards the end of the 20th century and other specific irrationalities. Malkiel (2003, p.60), is referred to these critics of efficiency by stating that “our stock markets are far more efficient and far less predictable than some recent academic papers would have us believe”. He also adds that:

- Markets can be efficient even if they sometimes make errors in valuation, as was certainly true during the 1999 – early 2000 “Internet bubble”
- Markets can be efficient even if many market participants are quite irrational
- Markets can be efficient even if stock prices exhibit greater volatility than can apparently be explained by fundamentals such as earnings and dividends
- Markets are efficient because they don’t allow investors to earn above-average risk adjusted returns.

Campbell et al., (1997, p.80) summarizing the above, assert that fully efficient markets are rather unlikely to actually exist and that "financial asset returns are predictable to some degree. Thirty years ago this would have been tantamount to an outright rejection of

market efficiency. However, modern financial economics teaches us that other, perfectly rational, factors may account for such predictability. The fine structure of securities markets and frictions in the trading process can generate predictability. Time varying expected returns due to changing business conditions can generate predictability. A certain degree of predictability may be necessary to reward investors for bearing certain dynamic risks."

4 Conclusion

There have been several decades since the initiation of efficient market hypothesis and there is an abundance of relevant research. A thorough review was conducted, and it was found that some of the research support and some reject this hypothesis, even for the same region or country. During all these years the scope remained almost the same, but the tests which were initially used for empirical research have changed and were lately replaced by more sophisticated ones. A late tendency seems to be that tests for non-linear predictability are more appropriate.

A definitive conclusion supporting or rejecting Efficient Market Hypothesis cannot be drawn. A clear answer concerning market efficiency that includes all markets cannot be given. There are obvious differentiations from country to country, while the degree of liberalization, the maturity of the market and the specific characteristics are of great importance. A further conclusion that can be derived is that there are many studies which provide evidence of inefficiency in various stock markets. At the same time, there is some evidence that the more developed a markets is, and as the research is focused on the biggest stocks of the market, the more probable is for the market to be considered as efficient. On the other hand, evidence of inefficiency appears in small or emerging markets and in indices including stocks with small capitalization (Hoque et al., 2007; Jennergan and Korsvold, 1974). Drogalas et al. (2007) reinforce the above conclusion by claiming that "most of the researches in the resurgent markets showed that EMH does not exist".

As far as Greek stock market is concerned, it became clear that, although it belongs to the developed markets, at the same time shares many of the characteristics of emerging markets. As a result, it presents a mixed behaviour, which becomes apparent from the diversified research evidence for market efficiency, which was presented above.

Based on the reviewed empirical research implementations, it can be realized that the focus is on testing the all-or-nothing notion of absolute market efficiency. Perhaps future research should not pay too much attention on total support or rejection of EMH, but on determining the degree of efficiency and the specific timeframes for higher or lower efficiency. In other words, to examine weather efficiency is a characteristic that varies continuously over time and across markets (Lo, 2004).

In any case, irrational investors will always exist in stock markets and dissemination of information will never be instant to all participants. Therefore, even if there is some degree of efficiency in stock markets, there might be some pricing irregularities or some predictable patterns and therefore a degree of predictability may exist in the markets, which liberates investors to search for the appropriate predictive method and strategy in deciding an investment.

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