TESTING THE WEAK FORM EFFICIENCY OF KSE 100 INDEX

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ABSTRACT

This research is an attempt to test the market efficiency of KSE 100 index under the principle of efficient market hypothesis and tests its weak form, in a time frame of 10 years (2000-2010) on the basis of monthly & daily data. The research is significant because most of the earlier researches have either tested the market efficiency of few countries and then carried out a comparison of those markets or tested the same market on the basis of yearly or monthly data but this research will provide new insights about the efficiency of the market on monthly basis. If the stock market is efficient than it means that in such a market the stock prices reflect all available information and no one can use this information to make abnormal profits by predicting the future prices on the basis of the past available information. In other words no one can trick the market and earn abnormal returns consistently and if anytime it(abnormal returns) does comes than it is only because of the luck. The reality that market is efficient is important for the overall economy of the country because the stock market facilitates the distribution of scarce resources from those who saves money to those who need money, through price changes. In Pakistan the security markets are significant because they truly reflect the economic position of the country because it has representation of all the sectors of the economy. Keeping this in mind testing the market efficiency in Pakistan is very significant as it reflects true image of the economy.

Key Words: Market efficiency, event theory, random walk theory

INTRODUCTION

The word efficiency means a market where all the information about the security is embedded in the current price of the security. The stock exchange's efficiency is one of the most debated issues in the field of finance. Many researches have been conducted all around the world to check the efficiency of the stock market in many different environments and have produced different results. The researchers have used different approaches to determine the efficiency of the market and have proposed various theories on its bases. One of the most relevant theories is the random walk theory which has been tested by many of the researchers of the world in many different settings. Another related concept here is the Efficient Market Hypothesis (EMH) which was proposed by Eugene Fama (1970). An American economist Karl Pearson was the first one to introduce the term random walk in 1905. Random walks states the observed behaviors of different phenomenon in different practices and thus serve as a basic model for randomness in a process.

In simple words the central idea of this theory is that the prices of stock follow a random

walk which means that prices of securities changes randomly and no patterns can be identified in them so we can say that the prices of stocks cannot be forecasted on the grounds of past information about prices as they follow a random walk. It states that the present stock prices fully exhibit all available information about the company and there is no way to make extra profits by making use of this information.

This hypothesis deals with one of the most basic issue in finance that why prices changes in the stock market and in which way these changes takes place. This hypothesis has very high significance for investors as well as for finance managers and technical analysts. It was proposed by Eugene Fama in his 1965 paper that "in an efficient market, intrinsic value of stocks instantaneously exhibit any new information that comes into the market. In simple words we can say that the effect of informational changes will be reflected quickly in stock prices so that no one is able to take advantage of the informational changes and earn abnormal profits. Such a market is called informational efficient market.

There are three different forms of the EMH

I.   Weak form EMH
II.   Semi strong form EMH
III.   Strong form EMH

The weak form of the efficient market hypothesis states that the current price of a security full reflect all the past price related information and the this information cannot be used to make abnormal profits (Fama,1965).

Semi-strong-form of market efficiency hypothesis states that the present stock price fully exhibits all publicly available information. Public information adds not only past prices, but also data reported in a company's financial statements, announcements about dividends and earnings, mergers and acquisitions plans, the financial condition of firm's competitors, expectations regarding macroeconomic factors (such as inflation, unemployment), etc.

The strong form of market efficiency hypothesis says that the present price fully exhibits all existing information, both public and private (occasionally called inside information) (Fama, 1965).

 Our study investigated the weak form EMH in the Pakistani stock market by using the monthly data of KSE-100 index for ten years from January 2000 to December 2010. The methods used to check the efficiency included Augmented Dickey Fuller test of unit root and Run tests which are the most widely used tests for checking the efficiency of the stock market. The conclusions of our study are updated because the data used for the empirical analysis is new and updated.

LITERATURE REVIEW

Most of the early work on the market efficiency is based upon the random walk theory and focused on the questions" Are security prices serially connected? Do security prices pursue a random walk? The idea of market efficiency was first introduced by Jules

a French broker and by Louis Bachelier a French mathematician in his thesis titled "The Theory of Speculation" in 1900. Louis Bachelier for the first time linked the random walk and market efficiency process to economic processes. He identified that change of prices of French government papers are unpredictable. On the basis of this he reached the conclusion that "The mathematical anticipation of the speculator is zero" Bachelier & Louis (1900). According to him "past, present, and discounted future events are reflected in market prices, but often show no apparent relation to price changes. It means that identifying the patterns and trends in the past prices and then predicting the future prices on the grounds of past information is of no use. Bachelier's work was overlooked for over a half century, but other researchers who worked independently, started to found similar conclusions.

After the development of the EMH many studies were undertaken to test the three forms of it all around the globe and different results were produced in different settings and environments. Moreover different approaches were used to test the various forms of EMH .Initially only the correlation between the prices were checked to see whether the stock follow a random walk or not. Then many studies were conducted to check whether technical analysis is worth any value in stock exchange or not.

One of the major breakthrough methods for testing the market efficiency was event study. In an event study, researchers select similar events that taken place at different times in different firms and find out how, on average, this event affected the share price and whether on its basis abnormal returns can be made or not? It is important to note that the results of market efficiency tests are different for developed and developing markets. The EMH hypothesis and the random walk model are found to be valid in developed markets, particularly the U.S. market. Kendall (1953); Fama (1965); are unable to reject the RW hypothesis. In particular, Fama's study claims to have found strong and empirical evidences in favor of the RW hypothesis while analyzing daily stock return behavior in the New York stock exchange. Other studies leading to same results are those of Sharpe (1966), Friend et al. (1970), and Williamson (1972). Fisher (1996) also suggested autocorrelations of monthly returns. The studies of Granger and Morgenstern (1963), and Solnik (1973) supported the random walk model. Cooper (1982) studied 36 world stock markets to examine the validity of the random walk hypothesis. With respect to US and UK, the random walk hypothesis was accepted while it was rejected in all other markets.

After this many individual studies as well as comparative studies has also been carried out to check the efficiency of the different markets relative to one another and yielded different results for markets of different regions.

Andrew Worthington & Helen Higgs (2005) checked the weak-form market efficiency in more than one country's stock markets: every day returns for five developed markets (Hong Kong, Australia, Japan, New Zealand and Singapore) and ten developing markets (India, China, Korea, , Indonesia, Malaysia, Sri Lanka, the Philippines, Pakistan, Taiwan and Thailand) was taken. Runs tests and serial correlation coefficient,

Augmented Dickey-Fuller, Phillips-Perron and KPSS and variance ratio tests were applied. Serial correlation and Run test conclude so as to each of these markets are weak form inefficient with the exception of Taiwan and Australia. The results from the more stringent variance ratio tests indicate that not any of the developing markets are characterized by random walks and therefore are weak-form inefficient, while only the developed markets in New Zealand Hong Kong, and Japan are consistent with the most stringent random walk criteria.(Worthington & Higgs, 2005) Francesco Guidi and Rakesh Gupta analyzed the Efficient Market Hypothesis (EMH) for Association of South-East Asian Nations (ASEAN) stock markets for the time span of January 2000 through April 2011 to find out that whether these markets are efficient separately and in a combination by using some tests. Their results rejected it for the markets of Malaysia, Indonesia, Vietnam and Philippines and found that the stock markets in Thailand and Singapore are weak form efficient. They also got idea that together these markets do not chase the same trend; this means that prices of one market cannot be forecasted in terms of information in another so it is inappropriate (Guidi & Gupta, 2011). The study conducted in China by Chung (2006) which looked for the random walk and tests the weak-form efficiency of two important stock markets of China namely Shanghai and Shenzhen stock exchange and uses daily data of both the exchanges from the period 1992 to 2005 and checked the Chinese stock market for weak form efficiency. The statistical tools used were a serial correlation test, runs test, a variance ratio test, and an AGF and PP unit root tests. The empirical results of this study showed both of the Chinese stock markets are not the weak-form efficient (Chung, 2006). The autocorrelation tests were first applied to the simple data but it gave contradictory results with runs test so it was very problematic to reach a proper conclusion then it was applied to the first difference of the data which gave a suitable result consistent with the runs test's result (Sharma & Mahendru, 2009). Abdul Rashid and Fazal Husain (2010) checked the phenomena of random walk in KSE. The sample consisted of 36 stocks of eight sectors and a market index. The data was taken for the period of 1989 to 1993. The autocorrelation tests were applied to test the hypothesis of dependence. The conclusion of the study show that prices of stocks in KSE cannot be characterized by random walk efficient hypothesis for Pakistani market. (Rashid & Husain, 2010). One of the latest studies by Taqadus Bashir, Muhammad Ilyas, Ayesha Furrukh also checked the weak form efficiency in KSE. The sample of the research consisted of daily stock prices of the individual firms in the banking sector which has been never been used previously in Pakistan. A timeline of thirteen years was chosen from 1997 to 2009. The tests used in the study were Augmented Dickey Fuller and Phillips-Perron tests to inspect stationary, whereas Co integration and VAR tests are employed to inspect the weak form efficiency. The conclusion of the study rejected existence of weak form Efficient Market Hypothesis in banking sector.

The above mentioned literature clarifies all the previous work done on the RWM and EMH and shows that different markets present different results regarding the

at different times. So we can say that it is always important to check the efficiency of the stock market at different times because a market may not be efficient or inefficient always.

In Pakistan the importance of stock market is increasing with the passage of each single day because it reflects the overall picture of the economy. Moreover the Karachi stock exchange has been declared as the finest functioning markets of the world in 2004. Although at present its performance is not as well as it was in the past which is probably because of the poor law and order conditions. However the government is increasingly realizing the importance of efficiency of KSE and its impact on the development of the private sector and the overall economic growth f the country. By keeping the importance of the efficiency of the KSE in mind, it seems quite logical to test the efficiency of the KSE 100 index .Moreover the past studies in Pakistan have tested the efficiency of KSE b using weekly or yearly data but this research provides new insights as it tests the efficiency of the market on the basis of the recent 10 year monthly data (2000-2010).

Objectives of the Study
The main objective of this research is
*   To test the efficiency of the Karachi stock exchange (KSE 100 index), by analyzing the monthly statistics of KSE 100 index
*   To look for the phenomenon of weak form of EMH, i.e., whether the past stock prices track a manner or not and whether they be capable of or not to be used to predict the upcoming changes of the stock prices.

Questions of the Study
Following questions are to be answered in this paper
1.   Whether the stock prices in KSE follow a random walk?
2.   Is it possible to trick the market and make abnormal profits consistently not occasionally on the basis of past available price information?
3.   Is technical analysis worth any value in KSE?

Hypothesis to be Tested
H1:   *Stock prices in KSE follow a random walk.*

Sampling Design
Monthly data for KSE 100 index was used for this research. The reason for choosing the Karachi Stock exchange is that it is the biggest stock exchange of Pakistan and KSE 100 is a measure of the overall economy.

ANALYTICAL TECHNIQUES
One of the most popular way of checking the weak form efficiency of the stock exchange is by checking the randomness in a series. Runs test and unit root test are

frequently employed to check the randomness in a time series. The randomness in the times series make it sure that consecutive price changes are autonomous and are randomly determined. Alternatively , present price (Pt) is free of precedent prices (Pt-1,Pt-2……..) and are not even supportive in predicting   the upcoming price (Pt+1) changes. A unit root test checks whether a time series is stationary or not . Presence of unit root in a time series implies that the time series is non-stationary and there is random walk. Absence of unit root in a time series implies that the time series is stationary and there is no random walk in the series .One of the most popular unit root tests are Augmented Dickey Fuller test. Runs test is also a very useful test used for checking the randomness in a time series. Both of these tests are used in this study by using the Gretel software.

Augmented Dickey Fuller Test
For a series of the type Pt= μ + ρPt-1 + t Where PtandPt-1are the present and lagged values of the price, μ are the mean and t is thought to be white noise.
A test of unit root checks that whether value of coefficient ρofPt-1 is larger than or equivalent to 1. The null hypothesis of this test isH0: [ρ]>1, and   it implies that the series has a unit root and is non-stationary. Approval of H0: [ρ]>1 implies that the variance of the series is out of control and various price changes are free and random, finally supports the RWH. The AGF tests the null hypothesis of unit root against that of stationary (no unit root). Its value is usually negative and the greater the negative value the more strongly is the refusal of the null hypothesis that there is a random walk. (Allin Cottrell, 2008).

Runs Test
Runs test is a very popular test used in many finance studies to check the randomness of a time series. A run is a series of consecutive positive or negative returns and the run span is a count of successive symbols. According to random walk, actual number of runs and the anticipated number of runs are same.
The negative value of Z statistic for this test indicates that actual numbers of runs areless than the anticipated and there is no randomness in the series.(Abdul Haque, H.-C.L and Fakhar-Un-Nisa (2011).

ANALYSIS, FINDINGS AND DISCUSSION
The AGF test has been applied to the first difference of the monthly prices series. The first difference has been used to make the data stationary so that a test can be applied on it. The results of the AGF test has clearly rejected the null hypothesis of unit root as the value of the test value is -8 which is quite high ,as it is mentioned earlier the more negative this value the more stronger is the refusal of the null hypothesis that there is unit root. Moreover if the p value is less than 0.05 than it also refuse refuse the null hypothesis of unit root and if p value is greater than 0.05 than we cannot reject the null hypothesis Garcia, J. (2010). Here the p value is far less than 0.05 so we can clearly

reject the null hypothesis of unit root which implies that the data series is motionless and there is no unit root, and hence there is no random walk in monthly prices data. The results here are consistent with the (Abdul Haque, H.-C. L and Fakhar-Un-Nisa2011), (Taqadus Bashir, M. I and Ayesha Furrukh2011),(Chung, 2006)

Table 1: Result of the Augmented Dickey Fuller Test

ADF Test	Test Statistic	p –value
With constant and trend	-8.02689	1.587e-012
With constant	-8.05677	3.406e-013

Runs test is usually find out the randomness in the data series the Null hypothesis for the test is that the positive and negative runs are not dependent on each other and does not exhibit a manner of taking place and thus does not help in predicting the pattern of occurrences (Abdul Haque, H.-C. L and Fakhar-Un-Nisa 2011). The z statistic value for the runs test is negative which shows that the actual number of runs is quite fewer than the anticipated numbers of runs. The negative z statistic value is an indicator of non randomness in the series of prices which means that the KSE is not weak form efficient.

Table 2: Results of Runs Test

Results of Runs Test	
No. of Runs	59
z- statistic	-0.48245

CONCLUSION

The study was aimed at testing the Karachi stock exchange KSE for the weak form efficiency and whether the technical analysis in stock market worth any value or not. It implies that whether the historically available prices information can be used to predict the future prices or not? For this purpose monthly data of KSE-100 index was used for ten years from 2000-2010. Most of the early researches done in the Pakistani stock market used daily or weekly data but this research uses monthly data to provide new insights. First the unit root test was applied on the first difference of the monthly data. The first difference of the time series is taken to make it stationary so that test can be applied on it. Then Augmented Dickey Fuller AGF test of the unit root is applied on the series to check for unit root and in the series. The results of the AGF test shows that there is no unit root means the data is stationary .This implies that the stock prices in the KSE does not follow a random walk and thus the past prices information can be used to predict the future ones. In other words we can say that investors can use the past prices information to predict the future prices and make abnormal returns. A second test named runs test which is also a very popular test used to check the randomness in the time series

data is employed. The results of the runs test leads to neglect the weak form efficiency in the KSE. The actual numbers of runs are less than the expected and thus neglect the hypothesis of independence of the runs.

So on the basis of these tests it is concluded that the Pakistani market KSE is not weak form efficient and prices in it does not follow a random walk which means that the previous data and price information can be used to predict the future prices. In other words we can say that there are predictable trends in the data and on the basis of this we cannot reject the null hypothesis that prices in KSE does not follow a random walk. This also makes clear that the technical analysis also works in KSE and on the basis of previous information about prices ,the future ones can be predicted and investors can easily trick the market and can make abnormal profits.

RECOMMENDATIONS

There is a strong positive relation between the efficiency of the stock market and the economic development of a country. An efficient market is very important for an economically developed market and therefore the regulatory authorities and the government must try to establish a proper efficient market in the country. The results of this research neglect the weak form efficiency of the KSE which means that proper measure needs to be taken for its further development.

It is important to note that in our country majority of the firms are held by the powerful and government-owned-chief-administrative positions which make it complicated for the regulatory authorities to confine their monopolistic actions. Although the SECP has issue a code of conduct in 2002 but still a lot of work is to be done to for the strict compliance of the code of conduct.

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