Testing the Weak Form Efficiency of Islamabad Stock Exchange (ISE)

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Abstract
The characteristics of stock prices reflect the all available information in market. This study explored the weak form efficiency of Islamabad Stock Exchange (ISE). In this research paper, we have also revealed the behavior of stocks prices traded in Islamabad Stock Exchange, and how it behaves in different unusual events. Stock markets are the major contributor to economy. To test the weak form efficiency of Islamabad Stock exchange, we have tested Efficient Market Hypothesis. EMH is a method to measure the stock prices trends in the market. Efficient market hypothesis also helps for making the right investment decisions. From last two decades EMH has obtained much importance in the field of finance. So it has attracted many researchers to explore the anomalous behavior of efficient stock market. Efficient market hypothesis has three main categories: 1. Weak form 2. Semi-strong form 3. Strong form. We will focus only weak form of market efficiency in ISE. Focus of the study is to analyze the weak form of ISE-10 in the stock market. For this purpose we have used different statistical techniques for analyzing the data that is collected from the official website of ISE. Data will be in the form of weekly ISE-10 share index. Time period of data is From January, 2013 to December, 2013. To render this study to the conclusion, we have use the famous tests of statistics such as run test and ADF test to check the weak form of ISE. We have also focused on the random walk behavior of stock market of Islamabad. Because the price movement in random form, that investor could not predict the stock prices due to weak form. In weak form, no investor can get abnormal return in stock market. There is very large debate on stock activities that would be explode further.
Keywords: EMH, Islamabad Stock Exchange, Market efficiency, Test of weak form efficiency

1. INTRODUCTION

Stocks markets play a very critical role in any country's economy. So this research topic broadly analyzes the stock exchange behavior. This research area is very important in economics and finance. Basically markets are functioning with the help of investor's behaviors and the activities performed by the markets. A philosophy of market proficiency has also been given by fama (1970). From the last three decades the researchers are working to find out, how an investor can earn abnormal return through using analytical techniques, because markets are performing according to market conditions so investors should have full knowledge about the market to earn excess returns. The Efficient market hypothesis (EMH) tells us the three basic forms of markets, which one is under study that is weak form efficient market. And the others two are semi-strong form, and strong-form of market efficiency. In the efficient market, prices reflect all available information, but how this information is reflected into the prices of securities and other stocks. So there are three types of efficient markets.

1.1 Weak-form efficient:

In weak-form, no investor can trounce the market by using past price movement because in weak-form prices adjust according to the past information as he is reflected speedily in adjusting prices of stocks. These lines can be translated into simple words that past prices of stocks have no correlation with today's stock price. Market called efficient in weak-form because it processes the information speedily, so prices cannot be predicted by the investors, so technical analysis for this phenomenon does not work for investors.

1.2 Semi-strong Efficient:

In semi-strong efficient market, it refers that markets stock prices adjust as the public information reflect immediately, as the event occurs, prices get adjusted accordingly. So in this form, investor cannot predict the return by using publicly information. For this fundamental analysis fails to predict the market return because information is publicized. If market is semi-strong, it is also weak-form efficient market in which all public information used for predicting.

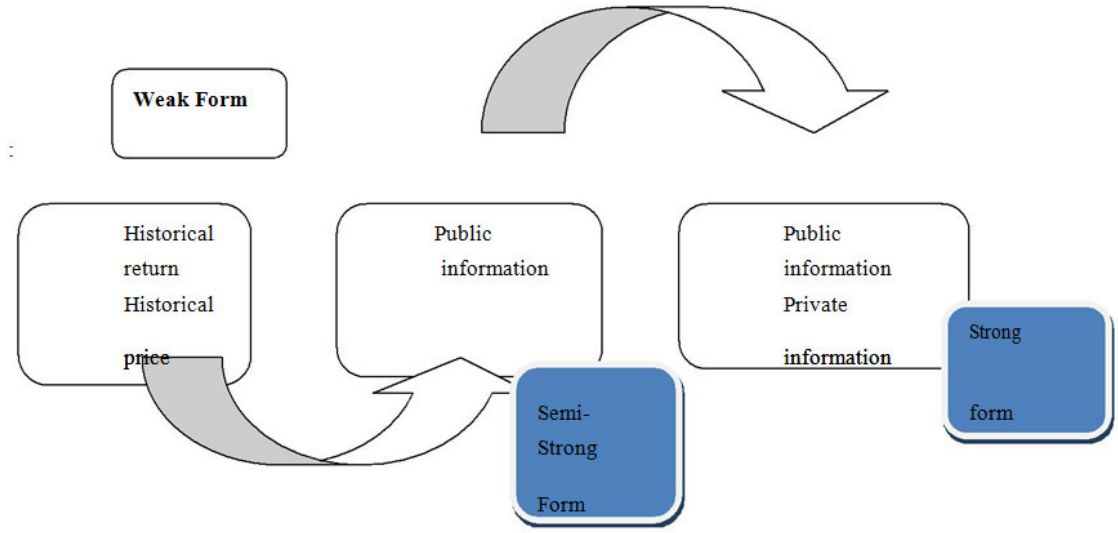
1.3 Strong-form efficient:

In this type, market prices are adjusted according to publicly information as well as inside or private information. In this form of market efficiency, to get the abnormal profit you need to inform about the private information that prices are going up or down in a particular period of time for the concerned firm. So by using this

information, an investor can get abnormal return. A strong form efficient market is also a weak-form and semi-strong form efficiency because public and past historical returns are used in this type of efficiency. For this reason, all the three types of EMH have been tested again over again to find out the efficiency level of a particular market. Higgs (2003) worked to find out the weak-form efficiency level in different European countries and four emerging markets. Various researches are available for developing countries and underdeveloped countries.

The aim is to find out the efficiency of Islamabad Stock Exchange that in which category it lies. Particularly, it is to determine whether trading in ISE market is random or not. Sample period of 1 year is used to test the market from period January 1, 2013 to December 31, 2013.

4 Network Diagram



1.5 Introduction to Islamabad Stock Exchange:

Stock markets have much importance in any country's economy. Stock market is the place where number of buyer and sellers purchase or exchanges stocks of listed companies in stock exchange. Islamabad Stock Exchange (ISE) is the youngest stock exchange in Pakistan and was incorporated in 1989, but later on licensed as stock exchange in January ,1992 and started trading on July, 1992.

1.6 Problem Statement

Investors have been a serious problem facing to make the decision of investment in stock markets across the world. Random walk behavior tells us that how prices move randomly due to market information concerned. So this is our need to identify the solution of this problem that how investors can make abnormal return by making right decisions about investment. For this, it is a need to study the various forms of stock market given by fama in 1970. There are three form of stock market on the basis of flow of information. So to test the weak form efficiency in which share prices reflect all the past historical share prices of stock market. To identify the weak form efficiency of Islamabad Stock exchange is taken in this article to find out the efficiency of this market. Much research is available regarding Pakistan stock exchanges. Several methods have been proposed in order to combat this. Perhaps the most popular techniques will use to identify solution of this problem. We will propose different solutions to this problem.

1.7 Variable Identification:

To measure the serial correlation between return, following equation will be used.
Rt = + Rt-1 +€
Dependent variable =Rt which is current time period return
Independent variable= Rt-1 which is previous time period return.

2. LITERATURE REVIEW

Fama (1970) characterized a theory which efficient markets do affect due to the information available in the market. The theory divide efficient market hypothesis into three sub hypothesis; weak form efficiency, semi-strong form and strong form market efficiency. Weak form efficiency tells us that the current prices of stock

reflect the past available information in stock market.

The testing of weak-form market efficiency hypothesis has an extensive history. This idea comes from Fama (1970), many investors and economists have found unlike behavior of share prices in stock market. This testing does not follow any sequential pattern because different researchers have different results due to different data used in different time horizon. The dissimilar result broad our concepts regarding this study. Lot of Literature is available regarding this topic for emerging markets, developed markets and for the stock market of Pakistan.

In the study of emerging markets like India, it was revealed that emerging markets are inefficient in different economies. It may be base on the data involved in research or time period in which result is drawn. Rakesh Gupta et al. (n.d.) tested two stock markets. i.e. Bombay Stock Exchange (BSE) National Stock Exchange (NSE). Results were blended in different time periods and data involved. They applied various tests and found that in 1997-2007 market was inefficient, but in the time period 2007-2011 market was efficient in weak form. They used various statistical tests to get results. Rabbani et al. (2013) concluded that overall market of Pakistan showed market inefficiency in some specific time period of time, but also showed weak form efficiency in other period of time. Various tests were applied in this study to find out the pure solution of this problem. But as far security market is concerned it is revealed that security market is in weak form so it can derive price by available historical data to predict the future share prices.

In emerging and developing markets, a large work is available. Asma mobarek revealed that the Dhaka stock exchange is not weak form efficient. The empirical analysis of Dhaka stock exchange suggested that, the rationality for the inefficiency of market is the lack of accountability and deficiency in corporate governance. The procedure of flowing new information is very weak in DSE, so improving DSE information flow and also removing by deficiency in Dhaka stock exchange, it can be converted into efficient market as well.

Haque (2013) empirically tested out the emerging market of Pakistan from (2000-2010) by analyzing the KSE-100 weekly share index. Run test KPSS test were applied to get the result to test efficiency of stock market of Pakistan. After applying these tests, he concluded that autocorrelation results rejected the random walk behavior so KSE is weak form efficient. Unit root test after the application in data involved, it proposed that there is randomness in weekly share index data so that it demonstrated that Karachi stock exchange is not efficient market in weak form. From this, he had brought to closes that investors would earn abnormal profit after predicting future prices in inefficient market. Nisar et al. (2012) performed empirical analysis to find out the weak form efficiency hypothesis and divulged empirical evidence from South Asian capital markets as well. As the South Asian market including Pakistan, India, and Bangladesh having developing markets can out-perform in Era during emerging stage. Major investors are moving toward these developing markets to get abnormal returns. This study basically examined the testing of market efficiency of main market of South Asia for the period of 14 years, (1997-2011). He had used various statistical techniques to test the south Asian markets. Consequence of these test performed. Results for run test showed dissimilar from the other tests that were applied for market efficiency. It has determined that monthly data of Karachi stock exchange (KSE), Bombay Stock exchange (BSE) weekly and monthly data and Dhaka stock exchange (DSE) weekly and monthly share index data resulted back up the market efficiency in this case. But he had found that by using daily returns data and discovered that market is not efficient when daily return data is involved. Results of Durbin test showed that main markets are not efficient in weak form because in the four main markets, there is correlation among the sequential return. Third test was used ADF test and it determined that four markets are not efficient in weak form and investors can predict future prices to earn abnormal returns. Weak form efficiency states that there is random walk behavior in return so no investor can make high profits, but on the basis of this test, these market do not comply with random walk behavior (RWB), these markets showed market inefficiency in south Asia.

Mishra (2012) also has done an empirical analysis to find out the efficiency of the south Asian markets. He had described that markets of Asia have attracted investors and researchers across the world. This study examined the four markets including Mauritius and others are KSE, DSE, BSE for the period of (2005-2010). He applied most popular techniques ADF test and unit root rest and it gave the results that markets were not form efficient he also mentioned that weak form efficiency is the successful step for moving toward long run efficiency of market.

In the study of developed economies, it was exploded by Mishra (2012) by empirical analysis of developed capital markets such as BOVESFA Brazil, SENSEX of India, China stock market, DAX, stock markets of Russia, UK and South Korea markets. This study explored the market from 2007-2010, popular techniques were used to test weak form of developed markets. Unit root tests showed that selected markets are not weak form

efficient. This inefficiency is having significance of investing. So inefficiency may cause financial innovation to get toward market efficiency. So therefore corporate authorities should make policies to disclose the information and announcements so that markets could reflect available information and adjust information according to markets situation.

Abraham et al. (2013) conducted the study to test the random walk behavior and efficiency of Gulf stock market. Many researchers have found that emerging markets rejected the hypothesis of market efficiency. Vase literature is available regarding this study. Basically, this study examined the random walk pattern hypothesis of three equity markets Gulf stock market. To check this and efficiency, ratio test and run test had been used to show up the results. These results showed that successive prices changes in dependent of other stocks. These Gulf markets were found inefficient markets. Alexeev et al. (2011) studied the efficiency of Toronto stock exchange. In this study he had used stock individually not by taking whole stock market index. He had analyzed stocks compared with well known proficiency of statistics to test out the results concerning reversal patterns of stock prices and to determine relationship between them. They had concluded that randomness in stock prices valid in long run but it showed market efficiency in shorter period of time.

Oscar et al. (2012) studied to test the weak form of Botswana stock market (BSE) for the time period of (2004-2008). In this study random walk hypothesis was refused when they used monthly and weekly both data. This resulted that BSE is not efficient. To use this inefficiency, key player could earn high returns. And investment made on the basis of past prices can give positive returns.

Lots of empirical analysis has been made for testing the market of stock. Sogair et al. (2005) proposed by doing an empirical analysis of Dhaka stock exchange (DSE). The elementary objective was to test the DS-20 share index. Random walk hypothesis rejected by using unit root test of randomness, and it proved that DSE is not effective in weak-form.

This study tried to examine the Indonesia stock market that is considered to be very positive environment for investment. It is better to test out this market for this peculiar behavior. Nikita et al. (2012) proposed a study to test out weak form of Indonesia stock market for the period of (2008-2011). The aim of the study was to test market efficiency by using data of ISE closing index price of different securities. The overall regaining in this study proposed that tow HSG and LQ45 provided manifestation to refuse the research hypothesis. The non randomness of the data showed inefficiency of ISE. There is significant relationship between predictors of ISE. They predict on the basis of past share prices, they do not consider the present returns, so as we suggested that Indonesia stock market is inefficient and this research showed that no one can use fair return for risk strategy to endow investment.

There is lot of work available on theoretical literature on efficient market hypothesis. Three models interpreted this hypothesis that which one random walk model is very famous. This theoretical model entails that future prices cannot be predict in efficient market model. Most of the research criticizes this phenomenon, so market does not get abnormal profits. This paper foregrounds the three forms of efficient market hypothesis. Some of studies support the weak form, and some an empirical studies support market in inefficient way. Developing stock markets are efficient in weak form due to unique characteristics. Gimba tested this market by taking five stocks by exploiting daily and weekly return data from period (2007-2009) and from (2005-2009). To test hypothesis, three of the techniques were used. The result from autocorrelation test showed that null hypothesis of random walk was rejected for four stocks out of five stocks. Run test provided evidence that weekly return of five stocks and more variance ratio test also suggested that it also failed to help the EMH in Nigeria capital market. This study explode that where investors can make high profits by using past data available in stock market. To moving ahead due to finding this strategy to earning high gain, the research is going on. Further consideration is being made by many researchers. This study is very vast and researchers want to explore that how investors can earn high profits by making right decision according to market situation. Therefore some valuable research work has been done on the various stock markets of the world.

2.1 Hypothesis

Ho: The Islamabad stock exchange is weak-form inefficient
H1: The Islamabad stock exchange is weak-form efficient

3. RESEARCH METHODOLOGY

This study is based on the daily closing prices index ISE-10. The data time period is 1 year from January 1, 2013 to December 31, 2013. Data is taken from the official website of Islamabad Stock Exchange. There are total 246

observations that were collected through the source. These observations are employed with various techniques of statistics to know the randomness in the data. Data is non-normal data so it required non-parametric techniques for analysis. Run Test, autocorrelation test, descriptive statistics. Basically descriptive statistics tells us that data is normal or not. Run test is used to check the random behavior in daily closing index of ISE-10. Autocorrelation is used for the independence checking in the data. And further Augmented Dickey fuller test is applied for stationary of data. These techniques are done in SPSS and Eviews software.

3.1 Methodology Description:

(i) Run test; this test is performed to analyze and judge the randomness in data that is taken on daily basis. i.e. closing index of ISE-10

(ii) Augmented Dickey fuller test; this test is used to check the stationary of data and the randomness of time series data. T statistics critical value is used to draw the results at various significant levels i.e. 1%, 5%, and 10% respectively.

(iii) Serial or autocorrelation; the serial correlation is non-parametric statistics technique is used to check the interdependence of the time series data to analyze with autocorrelation function in SPSS software. It measures the return with present and previous time period and correlates. Basically autocorrelation gives the value of successive variable for their interdependence. 16 lags have been used for analysis for autocorrelation.

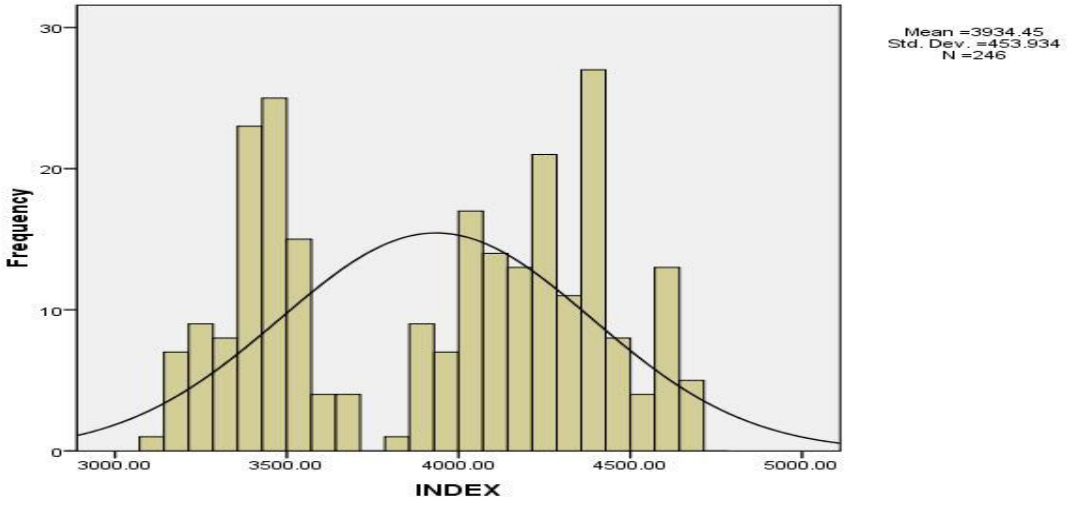
3.2 Results and Discussion:

Data compose of daily closing price index ISE-10. Trends show that returns are varied in different quarters. The test of descriptive statistics applied which demonstrated that data is non-normal. It is shown in the table. The value of standard deviation is 453.93, and data is negatively skewed at last quarter. Table of Descriptive statistics graph of data normality is given below:

Table 1. Descriptive Statistics

Mean	28.94174
Max. Index	4668.60
Min. Index	3140.28
St. deviation	453.93351
Variance	2.01
Skewness	-.146
Kurtosis	-1.419
S.E kurtosis	0.309

Graph of the data is shown below;



A carefully run test is examined to test the randomness behaviour of daily return using daily closing price index ISE-10. Run test is performed in the popular statistics analysis software SPSS to test the data, basically two run test are performed on the basis of mean and median as cut point so result obtained as given below:

Table 2. Runs Test

	INDEX
Test Value[a]	4044.00
Cases < Test Value	123
Cases >= Test Value	123
Total Cases	246
Number of Runs	10
Z	-14.567
Asymp. Sig. (2-tailed)	.000

a. Median

	INDEX
Test Value[a]	3.9345E3
Cases < Test Value	106
Cases >= Test Value	140
Total Cases	246
Number of Runs	6
Z	-15.066
Asymp. Sig. (2-tailed)	.000

b. Mean

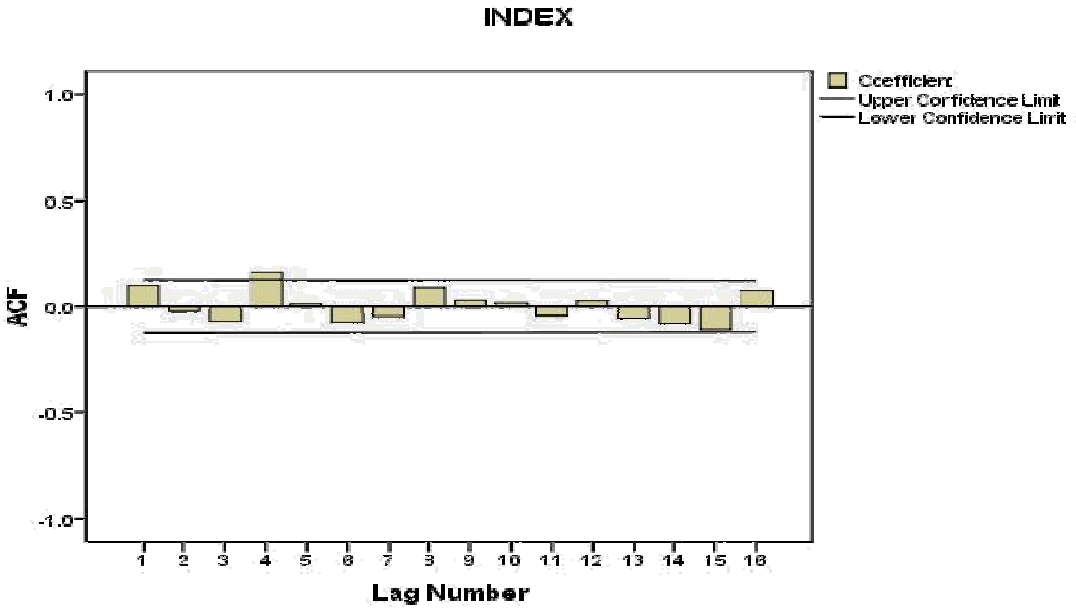
There are 10 runs in Table 1 because median is taken as cut point, and the value of the Z= -14.567, which is outside the critical region, and rejects the H1 hypothesis and accepts null hypothesis. But in case of mean as taken cut point Z=-15.066, so it also rejects H1. So from the results it is concluded that data is not random because if the value of Z is less than -1.96, then it meets the criteria of randomness. So Data is not random.

A deliberate examination of serial correlation showed that there is a positive serial correlation at different lags that rejects the null hypothesis but over the different lags it shows negative correlation that means market has inefficiency. So it rejected null hypothesis when there is positive autocorrelation but accepted it when there is a positive autocorrelation. So it cannot be predicted by investors to earn excess return using past movement of the prices in the market, but at different time periods in a year ,market shows inefficiency and at different quarters show weak-form market efficiency. So further need is to analyze or check the stationarity of the data by using augmented dickey Fuller Test. Result for auto correlation are shown:

Table 2. Index

Lag	Autocorrelation	Std. Error[a]	Box-Ljung Statistic		
			Value	df	Sig.[b]
1	0.098	0.063	2.374	1	0.123
2	-0.023	0.063	2.502	2	0.286
3	-0.071	0.063	3.755	3	0.289
4	0.158	0.063	10.049	4	0.04
5	0.012	0.063	10.087	5	0.073
6	-0.075	0.063	11.52	6	0.074
7	-0.048	0.063	12.102	7	0.097
8	0.088	0.063	14.065	8	0.08
9	0.029	0.062	14.277	9	0.113
10	0.017	0.062	14.348	10	0.158
11	-0.045	0.062	14.87	11	0.189
12	0.026	0.062	15.051	12	0.239
13	-0.056	0.062	15.883	13	0.256
14	-0.082	0.062	17.659	14	0.223
15	-0.112	0.062	20.952	15	0.138
16	0.072	0.062	22.321	16	0.133

a. The underlying process assumed is independence (white noise).
b. Based on the asymptotic chi-square approximation.



ADF test showed in the table that test statistics value of -14.16, which is strongly negative, and which is outside the acceptance region and the null hypothesis has a unit root of index. So the test critical values are also negative -3.47,-2.87,-2.57, at the 1%, 5%, 10% significance level respectfully. From these values it showed that data is not stationary and non random, unit root is applied to test the stationarity of the data of ISE-10index so it rejects the null hypothesis of weak-form inefficiency. It also opposes the random walk behavior of the returns. This test is also used to check the randomness of the times series. The results are described below;

Null Hypothesis: D(INDEX) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=16)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-14.151619878 9028834e-19486	5.08289290 25
Test critical values:	1% level	-3.457060865705117	
	5% level	-2.873190388031943	
	10% level	-2.57305361878862	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(INDEX,2)

Method: Least Squares

Date: 01/13/14 Time: 15:54

Sample (adjusted): 3 246

Included observations: 244 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INDEX(-1))	-0.902039441372544	0.0637410734531626	-14.15161987819486	1.56014920e-33
C	5.135739995335204	2.9701401832 7545	1.7291237714 14569	0.08506219941470184

R-squared	0.4528208888583398	Mean dependent var	0.16069672 13114782
Adjusted R-squared	0.4505598181511429	S.D. dependent var	62.1509802 2003309
S.E. of regression	46.06893697357222	Akaike info criterion	10.5063178 1894437
Sum squared resid	513607.9628377426	Schwarz criterion	10.5349831 3226644
Log likelihood	-1279.770773911213	Hannan-Quinn criter.	10.5178626 2372338
F-statistic	200.2683451769199	Durbin-Watson stat	1.98735986 1865263
Prob(F-statistic)	1.560149201915284e-33		

4. CONCLUSION

This study enquires the weak-form market efficiency of Islamabad Stock Exchange in Pakistan. The main objective of the study is to test that it follows random walk or not. This study analyzes the daily closing index of ISE-10 from period Jan 1, 2013 to Dec 31, 2013. It also reveals that no excess profits can be earned through using technical analysis. Many statistical techniques were applied to check the data normality and randomness and their dependence through various concerned tests. Run test and auto correlation test show market inefficiency at specific periods but ADF test descriptive showed market efficiency in weak form. ISE-10 showed market. So investors cannot predict market for gaining abnormal returns because market has dual nature and cannot be easily predictable to beat market so, it shows Islamabad Stock exchange is in weak efficient.

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