RANDOM WALK BEHAVIOR OF EMERGING STOCKS MARKETS: EVIDENCE FROM KARACHI STOCK EXCHANGE

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Abstract:

This paper is about the behavioral aspects of capital markets. The research work emphasis on the weak form efficiency of Karachi stock exchange (KSE) which is an emerging stock market of Pakistan. It is researched that investors in KSE gaining abnormal profits or not by using historical prices. For this purpose KSE index data was taken and three econometric tests including Runs test, Unit root and Autocorrelation function test were applied. The results rejected the null hypothesis and concluded that the Karachi stock market is weak form inefficient. The results of this research are in line with the previous studies.

Key words: *KSE, Market returns, Weak form efficient market, Unit root test, Runs test*

1. Introduction

The world has become a global village. New advance methods, technologies, new ways of doing business and new tools of communication are some reasons behind the transformation of world into global village. Now people have many choices in doing businesses. One of these is investment in stock markets. The globalization of financial markets attracts lots of investors to invest in these markets. The main concern of investors for their investment is the required return. There are many researchers who analyze the emerging markets and their patterns of returns like (Urrutia, 1995; Ojah and Karemera, 1999; and Grieb and Reyes, 1999). Some concerns regarding the efficiency of emerging markets also present. It is considered that markets of underdeveloped countries and developing countries are not efficient in their operations (Mobarek & Keasey, 2000).

The weak form efficiency of Capital markets is also known as the "Random Walk Theory". If the current prices and buying and selling volume of the market is reflected by the historical information of the market, them the market will be weak form

efficient (Spate & Ansari, 2011). This is also called the Efficient Market Hypothesis (EMH). All the investors are very concerned before investing in particular securities traded on any stock market of the world. They need to calculate the market risk before investing. For this purpose they need to evaluate the volatility parameters as the main input for their investment strategies. Volatility of stock prices is the tendency of change in upward or downward of the security price. The increase in the volatility of stock prices indicates a higher risk of investment in the market and hence the investor loses confidence on the market (Hameed & Ashraf, 2006).

Pakistan is one of the developing countries in the world having three operational stock markets namely Karachi Stock exchange, Lahore Stock Exchange and Islamabad Stock exchange. The prior one is the largest and oldest stock market of the country hence the same was taken for this study. Before this study, a lot of academic literature is available on the volatility of Karachi Stock Exchange but all the studies cover different time frames when the market was performing well or there is a little business. Furthermore the previous researchers also use one type of test at one time for testing the existence of Efficient Market Hypothesis. The basic aim of this study is to test the weak form efficiency of Karachi stock market in a time frame which was not covered in the previous studies. This will contribute in the academic literature of the stock markets as it uses both parametric and non-parametric tests at the same time. With the help of this study investors will be able to better understand the behavior of stock market when the index is continuously growing after recession at weak level. This will also enable the investors to estimate that whether the current market prices of stocks are reflected by the historical prices of the market.

2. Literature review

According to Fama (1970) an efficient market is "one in which prices always fully reflect available information". Some investors exploit these information and gain abnormal returns. They sometimes beat the market when market does not performing efficiently in its operation. Prices of stock market follow random walk so it is not easy to predict the prices of stock market (Fama 1965). If investors gain abnormal profit by exploiting the past market data then it is weak form efficient market and if investors are unable to gain abnormal profit from past information then it is weak form inefficient market. Mobarek and Keasey (2000) test the weak form efficiency on Dhaka stock exchange. They applied different parametric and non-parametric tests; and found that DSE is weak form inefficient market, also found that the returns are not following random walk model. Raja, Sudhahar & Selvam (2009) researched on the Indian stock exchanges with respect to IT context. They found that Indian stock markets are generally efficient with respect to IT context but in case of stock split they are not perfectly efficient markets. They found that announcement of stock split have high impact on the prices of securities.

Mishra (2011) compared the emerging markets and developed countries market. He took sample period from January 2007 to December 2010 and applied unit

root test and GAARCH model in his study. He found that prices are not following random walk so these markets are not weak efficient. He told that in a long run these markets becomes efficient because the inefficiencies give negative impact for the new developing projects but on the other hand helped in creation of innovative financial products. Al-Jafari (2011) tested the weak form of efficiency of Bahrain stock market. He used daily observations and applied unit root test, runs test and Phillips-Perron (PP) test. He found that investors in Bahrain market gain abnormal returns by using past market data so he concluded that the Bahrain market is weak form efficient in its function. Rehman & Qamar (2014) applied parametric and non-parametric tests to verify the randomness of Karachi Stock exchange and concluded that Karachi Stock market is weak form inefficient.

Nassir, Ariff and Mohamad (1993) tested weak form efficiency of Kuala Lumpur Stock Exchange. They checked it through unit root analysis and found that Kuala Lumpur stock exchange is efficient. Lima and Tabak (2004) researched on Chinese markets and found that Chinese markets are efficient but Ma (2004) rejected the efficiency of Chinese market in his study. Abrosimova, Dissanaike and Linowski (2002) checked the Russian markets and found that the Russian markets are not efficient in their functions. TAS and Dursonglu (2005) studied the Istanbul stock market and rejected the random walk hypothesis and concluded that Istanbul market is inefficient. But Buguk and Brorsen (2003) approved in their study on Istanbul market the random walk hypothesis and concluded that ISE is weak form efficient market. Hoque, Kim and Pyun (2007) studied eight Asian markets in which there where Singapore, Taiwan, Indonesia, Korea, Malaysia, Thailand, the Philippines and Hong Kong. They studied that except Taiwan and Korea all other countries did not follow random walk hypothesis so inefficient in their functions. Hameed and Ashraf (2006) studied two Indian market, National stock exchange and Bombay stock exchange and checked weak form efficiency. They took data of five years from 1999 to 2004.They rejected the random walk theorem for both of the stock exchanges and concluded that these two markets are inefficient.

On the basis of the above literature and discussion following null hypothesis has been developed to test the random walk on Karachi Stock Exchange:

H0: The Karachi stock market is weak form efficient market.

3. Methodology

The basic purpose study of this study is to test the weak form efficiency of Karachi stock market of Pakistan which is a developing country. The daily data from November 2010 to November 2011 was taken for this study mostly from the official website of KSE. During that period the stock market was open for five days in a week from Monday to Friday. Different parametric and non-parametric tests were applied to verify the results. Some statistical software's including Microsoft Excel and E-Views are

used for calculations and analysis of the historical prices of stock market. Followings are the three tests which are used in this study:

1. The Runs Test
2. Augmented Dickey-Fuller test (ADF)
3. Autocorrelation Function test

All the above tests are discussed below in detail.

3.1. The Runs test

$$\mu = \frac{2N_+ N_-}{N} + 1 \tag{1}$$

$$\sigma^2 = \frac{2N_+ N_- (2N_+ N_- - N)}{N^2(N-1)} = \frac{(\mu-1)(\mu-2)}{N-1} \tag{2}$$

The equation (1) shows the mean while (2) shows the variance.

N+ = +ve occurrence

N- = -ve occurrence

N = Total observations

Probability = mean - 1.96 s.d ≤ R ≤ mean + 1.96 s.d   (3)

R = Total runs

If equation (3) is satisfied then the markets will be weak form efficient as series is random.

3.2. Augmented Dickey-Fuller test (ADF)

To test the weak form efficiency of stock markets, unit root test in which Augmented Dickey–Fuller (ADF) method is used. It is negative number, if the value of negative number will large it means there is unit root present and chances of null hypothesis rejection will be strong.

$$\Delta y_t = \alpha + \beta t + \gamma y_{t-1} + \delta_1 \Delta y_{t-1} + \cdots + \delta_{p-1} \Delta y_{t-p+1} + \varepsilon_t$$

α is a constant

β the coefficient on a time trend

p the lag order of the autoregressive process

$$DF_\tau = \frac{\breve{\gamma}}{SE(\breve{\gamma})}$$

On the basis of ADF and critical values tell whether the values are significant or not.

If ADF value **>** critical values then market is weak form efficient. If ADF **<** critical values then market will be weak form inefficient. If there is unit root then series is non-stationary and it is weak form inefficient and if there is no unit root then weak form efficient series stationary.

3.3. Autocorrelation Function test

The third test used in this study to check the weak form efficiency of Karachi stock exchange is the Autocorrelation Function test. This is also known as the Box and Jenkins autocorrelation test and used to test the randomness in data. In this test different time lags are computed for autocorrelation of data values and on the basis of which it is concluded that whether there exist any randomness or not.

$$R_h = \frac{C_h}{C_o} \tag{4}$$

Where
Rh = Autocorrelation coefficient
Ch = Auto covariance

$$C_h = \frac{1}{N}\sum_{t=1}^{N-h}(Y_t - \bar{Y})(Y_{t+h} - \bar{Y})$$

Co = variance function

$$C_o = \frac{\sum_{t=1}^{N}(Y_t - \bar{Y})^2}{N}$$

In Runs test, Microsoft Excel is used for calculations whereas E-Views is used for statistical analysis in Unit root test and Autocorrelation Function test.

4. Results and Discussion

4.1. The Runs Test

Table 1

	VAR00001
Test Value[a]	11905.50
Cases < Test Value	126
Cases >= Test Value	126
Total Cases	252
Number of Runs	25
Z	-12.876
Asymp. Sig. (2-tailed)	.000

a. Median

The run test is used to check the randomness of data and from the above results the value of Z came -12.876 which is too high. Therefore in view of the above results reject null hypothesis has been rejected in case of Karachi stock exchange and concluded that KSE is weak form inefficient stock market as data is not random.

4.2. Unit Root (ADF) test
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=15)

Table-2

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.972743	0.0389
Test critical values: 1% level	-3.456302	
5% level	-2.872857	
10% level	-2.572875	

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

Augmented Dickey-Fuller Test Equation
Method: Least Squares
Sample (adjusted): 2, 252

Included observations: 251 after adjustments

Table-3

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SERIES01(-1)	-0.046914	0.015781	-2.972743	0.0032
C	559.5656	187.0208	2.991996	0.0031
R-squared	0.034274	Mean dependent var		4.031873
Adjusted R-squared	0.030396	S.D. dependent var		118.4823
S.E. of regression	116.6677	Akaike info criterion		12.36447
Sum squared resid	3389227.	Schwarz criterion		12.39256
Log likelihood	-1549.741	F-statistic		8.837202
Durbin-Watson stat	1.783254	Prob(F-statistic)		0.003241

From the above results the value of Augmented Dickey-Fuller came 2.972743 in total but it is 3.456302 against the critical value at 1 % and 2.87285 at critical value of 5 % and at critical value of 10% the ADF value is 2.572875. As if ADF <Critical values it means there is unit root and series is non-stationary therefore on the basis of unit root test the null hypothesis is rejected and concluded that Karachi stock market is weak form inefficient.

4.3. Autocorrelation function test

A total of 252 observations are taken for this test from the daily closing prices of KSE-100 Index and autocorrelation function test is applied with the help of e-views and found the following results.

Table-4

S.No	AC	PAC	Q-Stat
1	0.951	0.951	230.75
2	0.903	-0.025	439.30
3	0.854	-0.025	626.71
4	0.803	-0.047	793.22
5	0.754	-0.008	940.72
6	0.715	0.069	1073.7
7	0.674	-0.041	1192.3
8	0.635	0.005	1298.1
9	0.594	-0.063	1390.9
10	0.549	-0.053	1470.7
11	0.508	0.018	1539.2
12	0.474	0.043	1599.1
13	0.439	-0.028	1650.6
14	0.405	-0.021	1694.7
15	0.373	-0.007	1732.4
16	0.333	-0.107	1762.5
17	0.287	-0.084	1784.9
18	0.242	-0.025	1800.9
19	0.200	0.016	1812.0
20	0.155	-0.088	1818.6
21	0.102	-0.135	1821.4
22	0.052	-0.016	1822.2
23	0.004	-0.029	1822.2
24	-0.043	-0.018	1822.7
25	-0.086	-0.016	1824.8
26	-0.118	0.071	1828.8
27	-0.141	0.051	1834.4
28	-0.159	0.003	1841.6
29	-0.179	-0.030	1850.8
30	-0.199	-0.034	1862.3
31	-0.223	-0.062	1876.7
32	-0.247	-0.021	1894.4
33	-0.269	-0.001	1915.7
34	-0.284	0.038	1939.3
35	-0.295	-0.001	1964.9
36	-0.306	-0.020	1992.7

From the above result it can be concluded that the data is not random and there is high degree of autocorrelation present which means that the null hypothesis is rejected on the basis of autocorrelation function test. Therefore it is also concluded that according to autocorrelation test result the Karachi stock exchange is inefficient in its functions and historical prices do not reflect the current prices of the securities.

5.   Conclusion

This research work adds to the literature of Random Walk Behavior of emerging stock markets. Karachi stock exchange is one of the emerging stock market was taken as a case study for this research work. Daily data of KSE 100 index was taken from the official website from November 2010 to November 2011and applied three different econometric tests instead of relying on only one test. The tests include both parametric and non-parametric methods to get the actual behavior of the market. From the above results and discussion it has been determined that the market is inefficient and shows a continuous growing trend and has a positive relationship with the stock returns. All the three tests give similar results hence the null hypothesis has been rejected and concluded that Karachi Stock exchange which is one of the emerging stock market, is weak form inefficient and investors can't predict the prices from historical performance. The current study is also in line with the previous studies conducted by Mobarek and Keasey (2000), Hameed and Ashraf (2006) and Rehman & Qamar (2014) that used different time frame and method for such research. In future, Random Walk Hypothesis can be verified on any other emerging stock market of the world by using different time period and by applying different econometrics tests including KPSS test and Autoregressive model. It is also necessary to study more deeply into the characteristics of the market so that more valid and accurate results can be found.

6.   References

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