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Article

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Pakistan Journal of Commerce and Social Sciences (PJCSS)

Provided in Cooperation with:

Johar Education Society, Pakistan (JESPK)

Suggested Citation: Mudassar, Muhammad; Ali, Arshad; Nawaz, Maryam; Shah, Syed Muhammad Amir (2013) : Test of random walk behavior in Karachi stock exchange, Pakistan Journal of Commerce and Social Sciences (PJCSS), ISSN 2309-8619, Johar Education Society, Pakistan (JESPK), Lahore, Vol. 7, Iss. 1, pp. 70-79

This Version is available at:

<https://hdl.handle.net/10419/188074>

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Test of Random Walk Behavior in Karachi Stock Exchange

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Abstract

Study was carried out to check the random behavior of the Karachi Stock Exchange (KSE 100 Index) during the period of past three financial years to know whether investors could generate abnormal profits during the period or otherwise. Tests used were Runs Test, ADF Test, PP Test and Autocorrelation Function Test. During the study it was found that the performance of KSE 100 Index remained in weak form of inefficiency and investors have been able to generate excessive returns on their investment most of the times.

Keywords: KSE 100 Index, random walk, weak-form inefficiency.

1. Introduction

Performance analyses of financial markets play a vital role in investment decision making by the investors. A philosophy on market proficiency has also been given by an American economist named Eugene Fama during 1970.

The philosophy dictates that if the distribution flow of information is symmetrical, the financial market would be considered efficient and it is not possible for an investor to beat it. Generating extra ordinary profits by an investor on his investments would not be possible on the basis of information while comparing the market, when:-

- Other investors behave in logical way.
- The activity of buying and selling of shares etc in financial market is being one always at their reasonable values, which symbolize the net stipulated value of all potential cash flows about significant investment.
- There are no under / overvalued stock.

The news regarding companies' assets, performance and earnings spreads over quickly and is included immediately in the value of securities. In turn market efficiency also becomes the basis that a company's shares / securities reveal the related information. Such information doesn't pursue specific paths which make them un-predictable.

Resultantly, the study of company's past values of financial securities and performance can't help an investor generate excessive profits. In the long run, comparatively more profits can be achieved while investing randomly in different portfolios of individual securities while taking a similar risk. So in such conditions, the extent of returns on investment is by chance whereas, more profits can be generated by making riskier investments. While considering the behavior and its working, Financial Markets are further categorized in three forms, which are:-

- Weak Form Efficient Market.
- Semi Strong Form Efficient Market
- Strong Form Efficient Market

Weak Efficient Market is when no investor can get abnormal profit based on the past information, when same is the situation with the investor regarding profits from securities based on past and present information it is called Semi Strong Efficient Market, and if no abnormal profits are generate based on past, present and future (Insider) information it is called as Strong Efficient Market.

1.1 Research Question

“Can an investor generate abnormal profits from stock market basing on the past information?”

1.2 Research Objectives

- To determine the relationship and evaluate effects of Past information on the stock prices.
- To determine the relationship and evaluate that how investor can generate more profit basing on past information.

1.3 Significance of the Study

Study will be fruitful both for current and potential investors and all stakeholders of Karachi Stock Exchange Pakistan. The study is being carried out for the purpose of analyzing how quick the securities listed in Karachi Stock Exchange absorb the information, and will fill the knowledge gap by leading the investor to be precise in decision making while investing in stock market through recommendations.

1.4 Scope of Research

The study has been conducted based on the Daily activity of the Karachi Stock Exchange 100 Index during the past three financial years (i.e. F.Y 2008-09, 2009-10 and 2010-11).

To assess the impact on positioning of securities listed on Karachi Stock Exchange basing on past information and its relationship with investors' performance during the period; while critically examining the abnormal profits generated by the investors when market is weak form inefficient.

2. Literature Review

Mobarek and Keasey (2000) Examine the weak form efficiency in Dhaka Stock Exchange and Sample include daily closing prices of DSE from the period of 1988 to 1997 and for results they Use booth parametric and non parametric evidence and came to the conclusion that Dhaka Stock Market is Weak form Inefficient. Variables which are used in study is individual time series variables

Otto (2010) in his study Does the London metal exchange follow a Random Walk? Evidence from the predictability of future price .This study includes the sample size of 6 industries and sample period starts from 1989 to 2007, by using variance ratio test he came to the results to reject the Random Walk hypothesis.

Brox, Carvalho and Duckett (2003) in their study test weak form efficiency Toronto Area residential real estate, by using the autocorrelation on the sample including Housing price and property taxes came to the results that it is not a weak form efficient.

Gupta and Basu (2007) in his study, weak form efficiency in Indian stock market for the sample period of 1991- 2006 by using autocorrelation test give results that Indian market is not weak form efficient.

Hančlova and Rublikova (2006) Testing Weak Form efficiency on Czech and Slovak market from the period 2000 to 2004 by concerning conditional variance, linear and non linear validity model. Suggest that leverage Efficiency and risk evaluated.

Magusson and Wydick (2002) in their Study How efficient are African's emerging stock market, study include Resent date for eight largest African markets with Southeast Asia and Latin American market and came to the conclusion that it is not a weak form efficient.

Worthington and Higgs (2006) in their study weak form market efficiency in European emerging and developed market studied weak form efficiency in sixteen developed and four emerging European equity market by using series correlation coefficient, Runs test, Augmented Dickey-Fuller, Philips-Perron, unit root test and according to the results only Hungary is weak form efficiency

Elango and Hussain in their paper, an empirical analysis on the weak form efficiency of the GCC markets applying selected statistics. Studies tests market efficiency in seven GCC stock markets between Octobers 2001 to2006 by using different statistical tests they reject the null hypothesis, which means that this market is not a weak form efficient.

Poshakwale (1996) in his study tested weak form efficiency in Indian stock market by taking sample period between 1987-1994 came to the result that Indian stock market is not a weak form efficient market.

Awad and Daraghma (2009) studied weak form efficiency on Palestinian market by taking 35 stock listed market by using series correlation coefficient, Runs test, Augmented Dickey-Fuller, Philips-Perron, unit root test and according to the results Palestinian Stock market is not a weak form efficient.

Milieska (2004) studied weak form efficiency in Lithuanian stock market by using different statistical tools and some other tools they came to the results that Lithuanian Stock market is a weak form efficient.

Niblock and Sloan (2005) in his study entitled as “Are china’s stock markets weak form efficiency. School of commerce and management, Data used to study consist of 955 daily closing prices of Different stock market of China. Sample period chosen is of 4th march, 2002 till 28th October 2005 and we came to the result’s that china’s stock market is not weak form efficiency market. And the methodology include different tests like Runs test, series Correlation tests, Granger causalities

Worthington and Higgs (2006) This paper examine the weak form efficiency in the Asian stock market which include 10 emerging market and five developed market of different continents, to examine this different tests like series correlation tests and runs tests are conducted which conclude that all markets are inefficient Where as unit root suggest that all market are efficient except Taiwan and Australia. Sampling period varies from country to country and it includes the closing price of all fifteen countries.

Abrosimova, Dissanaikie and Linowski (2005) studied Weak form efficiency in Russian market from the period 1st September 1995 to 1st May 2001, methodology include, unit root, autocorrelation and variance ratio tests, and they conclude that Russian stock market is weak form efficient they also used ARIMA and GARCH model.

Nassir, Ariff and Mohamad (1993) conduct study on Kuala Lumpur Stock exchanged study weak form efficiency by using unit root test this test shoes that this market is weak form efficient. Sample period includes weakly from Jan 1977 to may 1989.

Haque, Liu and Nisa (2011) examined the Pakistani Stock Markets for Weak form efficiency for the period from 2000 to 2010. Methodologies used were Unit Root Test, ADF, Phillip-Perron Test, KPSS Test, Runs Test, Variance Ration Test. Tests showed that Pakistani Stock Markets are not weak form efficient, resulting in generating abnormal profits for investors.

Yildirtan and Ozun (2011) examined the market efficiency basing on Corporate Governance decision in Turkish financial markets. During the period from 31st Aug, 2007 to 26th Jan, 2010. ARFIMA-FIGARCH, Time Series, AR, GARCH, ARFIMA were used as research methodologies. Results showed that market efficiency is not based on the corporate governance practices, decisions their impact. Both ISE-100 index and CGI do not support weak form efficiency in Turkish markets.

Ibrahim, Long, Ghani and Salleh (2011) applied the Unit Root Test on the Weak-Form Efficiency of Foreign Exchange Market for the period from 2000 to 2007 through tests like Unit Root Test and Order of Integration, ADF, KPSS Unit Root Test, Phillips-Perron Test. Results for weak form efficiency using ADF and PP tests indicates that the exchange rates studied follow random walks. Therefore, the current value of an exchange rate can be predicated using its past values.

Hussain, Hamid, Akash and Khan (2011) for the period from January 2006 to December 2010 under study Karachi Stock Exchange for Day of the Week Effect and Stock Returns by using Time Series (Regression Equation), ANOVA Test as research methodologies, which concluded that investor gets constant returns for the six days out of seven days of

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the week, only the Tuesday has significant impact on the Pakistani Stock Markets which results in abnormal returns for the investors.

Abushammala (2011) tested the Weak form Efficiency of Palestine Exchange for the period from 1st Jan, 2007 to 31st Dec, 2010; using ADF, PP and KPSS tests to check the randomness the indexes, results showed that stock market behaves abnormal and investors can generate abnormal profits.

3. Methodology

3.1 Research Sample

Research sample is based on the daily Index of Karachi Stock Exchange (KSE) pertaining to period from 1st July, 2008 to 30 June, 2011; in order to evaluate the results and conclude the research question. Sample was taken from 100 companies listed on the KSE. SPSS and E-View software's are used to reach the resulting figure and to check whether they play a significant role or not.

3.2 Research Hypothesis

Researcher is trying to measure not only the validity and reliability of data but also test the efficiency of KSE market in order to evaluate whether KSE is providing equal chances to all investors so that each one have equal opportunity of making extra profits out of securities.

- **H₀**: Karachi Stock Exchange (KSE) is Weak Form Efficient Market.
- **H₁**: Karachi Stock Exchange (KSE) is Weak Form Inefficient Market.

3.3 Research Models

Research model is based on the following tests to check the random behavior of the data series.

3.3.1 Runs Test

Run test is used to check the random behavior of the data, that is whether the KSE 100 index is following the random behavior or not. SPSS is used to apply the runs test on the data, total numbers of runs are 127 and significance is 0.000. Results showed in table 1 that the data is not random as the Z value is -4.874 which is insignificant and should be less than 2 to fit the random behavior criteria.

Table: 1 Runs Test

| | |
|------------------------|--------|
| Test Value | 0.01 |
| Cases < Test Value | 171 |
| Cases >= Test Value | 171 |
| Total Cases | 342 |
| Number of Runs | 127 |
| Z | -4.874 |
| Asymp. Sig. (2-tailed) | 0.000 |

3.3.2 *Augmented Dickey-Fuller (ADF) Test*

ADF is used in time series as a test instrument to check the random behavior, its results are based on the values of t-statistic critical value of ADF test, and Test-statistics is 1.22354, whereas critical values at 1%, 5% and 10% significance level are -3.43896, -2.86522 and -2.56878 respectively. These results based analysis show that market is weak form inefficient.

Table: 2 Augmented Dickey-Fuller test statistic

| | | | | |
|---|--------------------|-----------------------|--------------------|---------------|
| Null Hypothesis: INDEX has a unit root | | | | |
| Exogenous: Constant | | | | |
| Lag Length: 1 (Automatic based on SIC, MAXLAG=19) | | | | |
| | | | t-Statistic | Prob.* |
| Augmented Dickey-Fuller test statistic | | | -1.223549 | 0.6660 |
| Test critical values: | 1% level | -3.438936 | | |
| | 5% level | -2.865219 | | |
| | 10% level | -2.568785 | | |
| *MacKinnon (1996) one-sided p-values. | | | | |
| Augmented Dickey-Fuller Test Equation | | | | |
| Dependent Variable: D(INDEX) | | | | |
| Method: Least Squares | | | | |
| Date: 12/23/11 Time: 17:57 | | | | |
| Sample (adjusted): 3 744 | | | | |
| Included observations: 742 after adjustments | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| INDEX(-1) | -0.003007 | 0.002458 | -1.223549 | 0.2215 |
| D(INDEX(-1)) | 0.22322 | 0.035852 | 6.226072 | 0 |
| C | 28.58015 | 23.91657 | 1.194994 | 0.2325 |
| R-squared | 0.051179 | Mean dependent var | | -0.270889 |
| Adjusted R-squared | 0.048612 | S.D. dependent var | | 125.6816 |
| S.E. of regression | 122.5888 | Akaike info criterion | | 12.45958 |
| Sum squared resid | 11105699 | Schwarz criterion | | 12.47822 |
| Log likelihood | -4619.505 | F-statistic | | 19.93085 |
| Durbin-Watson stat | 2.019496 | Prob(F-statistic) | | 0.000000 |

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3.3.3 Phillips Perron (PP) Test

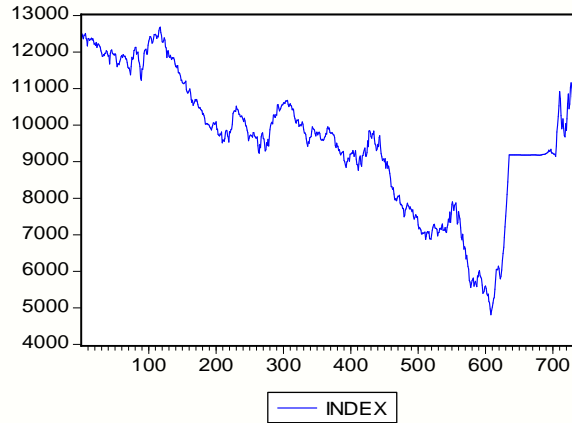
PP is also used to test the random behavior; its results are based on the values of t-statistic's critical values. The test statistics is -1.326758, whereas values at 1%, 5% and 10% significance level are -3.43824, -2.865214 and -2.568782 respectively which are almost similar to the ADF values. All these results prove that the data under study does not follow the random behavior and is weak form inefficient.

Table :3 Augmented Dickey-Fuller test statistic

| | | | | |
|--|--------------------|-----------------------|--------------------|--------------|
| Null Hypothesis: INDEX has a unit root | | | | |
| Exogenous: Constant | | | | |
| Bandwidth: 10 (Newey-West using Bartlett kernel) | | | | |
| | | Adj. t-Stat | Prob.* | |
| Phillips-Perron test statistic | | -1.326758 | 0.6187 | |
| Test critical values: | 1% level | -3.438924 | | |
| | 5% level | -2.865214 | | |
| | 10% level | -2.568782 | | |
| *MacKinnon (1996) one-sided p-values. | | | | |
| Residual variance (no correction) | | | 15736.84 | |
| HAC corrected variance (Bartlett kernel) | | | 27579.49 | |
| Phillips-Perron Test Equation | | | | |
| Dependent Variable: D(INDEX) | | | | |
| Method: Least Squares | | | | |
| Date: 12/23/11 Time: 18:01 | | | | |
| Sample (adjusted): 3 744 | | | | |
| Included observations: 743 after adjustments | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| INDEX(-1) | -0.002651 | 0.002513 | -1.05472 | 0.2919 |
| C | 24.97352 | 24.46546 | 1.020766 | 0.3077 |
| R-squared | 0.001499 | Mean dependent var | | -0.36878 |
| Adjusted R-squared | 0.000152 | S.D. dependent var | | 125.6252 |
| S.E. of regression | 125.6157 | Akaike info criterion | | 12.50702 |
| Sum squared resid | 11692470 | Schwarz criterion | | 12.51943 |
| Log likelihood | -4644.358 | F-statistic | | 1.112434 |
| Durbin-Watson stat | 1.553369 | Prob(F-statistic) | | 0.291897 |

3.3.4 Autocorrelation Function

Autocorrelation shows us the relationship of degree of dependence of one observation on the other. There exists a very strong correlation between the observations which showed a decreasing trend after twenty six entries which clearly depicts that the series is not following the random behavior pattern and is weak form inefficient.



4. Conclusion

Researcher carried out study on the past three fiscal years i.e. 2008-09, 2009-10 and 2010-11, by applying Runs Test, ADF, PP and Autocorrelation Function tests under 1%, 5% and 10% significant levels. Results of all these proved that performance of KSE for the period under study was weak form inefficient as the results of tests lies in the insignificant area of the normal distribution.

Based on the past information and trend of the market, investors were able to generate abnormal profits from the securities/investments. The flow of information in most of the developing countries' financial markets is not symmetrical, which make it very difficult for the investors to keep them updated with the market's current events/ information.

5. Recommendations

It is very important for both, the investors as well as the government who should work for the betterment of flow of financial market's information system, to be more effective. This will not only improve the financial strength of individual investors but also the country.

Financial markets of developed countries normally remain/operate as weak form efficient, thus not giving chance for the investors to generate abnormal profits from the securities. Whereas, KSE 100 Index, attracts the foreign investor and provide them opportunity to gain/generate abnormal profit from their investment/ securities.

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