WEAK FORM EFFICIENT MARKET HYPOTHESIS STUDY: EVIDENCE FROM GULF STOCK MARKETS

Umar Farooq Awan
Faculty Member, Majan University College, Muscat Oman
Muhammad Subayyal
Faculty Member, Majan University College, Muscat Oman

Abstract:

Ever Since Fama (1965) presented his Efficient Market hypothesis, a lot of research has been done to test its authenticity; developed as well as emerging economies are used to validate the theory. The results are conflicting and the change in the current market circumstances persuaded the researcher to investigate the Gulf Stock Markets. Data of six Stock Exchanges in Gulf for the period of five years is taken. Daily closing stock indices of Oman, UAE, Kuwait, Saudi Arabia, Bahrain and Qatar are taken from 1st January 2011 to 31 December 2015, Auto correlation and runs test were used to test the Weak Form Market Efficiency. The results of the Parametric Tests (Both Auto Correlation and Runs test) provide evidence that the Stock prices in all the Gulf Markets are not following the random walk model and the significant auto correlation co-efficient at different lags has rejected the null hypothesis of Weak Form Efficiency.

Key Words: Market Efficiency, Gulf Markets, Auto Correlation, Random Walk model.

Introduction:

Active capital markets are vital for any country's economic growth and sustainability. The capital markets works as an intermediary between investors and lenders by guaranteeing the even flow of excess funds. In addition it helps to settle these investments, thus make it certain the maximum allocation of funds. Efficiency of the capital market is constantly questionable and a topic of debate among Investors and academicians. An efficient Capital market can be defined as the market where prices of the shares are adjusted according to the availability of new information means the current prices of shares reflect all the current information about the security. Many researchers have worked and analysed the efficiency of stock markets across the world. Efficient Market Hypothesis is the combination of some assumptions, like, transaction costs are negligible, information either private or public is easily available to all investors, time horizon is same for all traders in the market and expectations of the investors are identical. Fama (1970) introduced an efficient market as: "*a market where there are large numbers of rational profit maximizers actively competing, with each trying to predict future market values of individual securities, and where important current information is almost freely available to all participants*." Market Efficiency is divided among three interrelated theories: allocation efficiency, operational efficiency and informational efficiency:

Allocation Efficiency:

All the players in a market (both public and private) can get funding for the projects which will result in overall economic growth.

Operational Efficiency:

Transactions in the market are executed with least cost and on time with minimum errors.

Informational Efficiency:

All the information available in the market is already reflected in the current market prices.

Three Forms of efficiency were put forward by Fama which started the discussion on efficient markets which are :

Weak-Form of EMH :

Technical analysis of market is useless, it is impossible to get extra return by using historical information of the trends, indices or prices. New information can only effect the market and these changes are random due to their very nature.

Semi Strong-Form of EMH :

Fundamental investment analysis is useless, it is not possible for the investor to gain some extra return using some public information about security or company as share prices already reflect the public information.

Strong-Form of EMH :

Inside or private information is of no use, all the public or the private information is already reflected in the current share prices. Investors cannot gain any extra return by using some private information.

This study analysed the weak form efficiency of the Gulf stock markets by using serial correlation and Runs test for the period of five years on daily stock indices. Al Kharusi and Weagley (2014) studied Muscat securities market and rejected the weak form hypothesis but no study has been done for all the Gulf markets, which motivated this analysis.

Literature Review:

Developed markets:

Choudhry (1994) analysed stock indices of seven countries which are members of OECD organization, Co integrations test were used to test the monthly stock indices from 1953-1989. He expressed that stock indices in these seven countries were found efficient during this period. The results of the co integration has given no evidence about long run link between the seven stock series and using Co-integration tests, Chan, Gup and Pan (1997) tested for weak form efficient market hypothesis of the eighteen international stock exchanges. The data used was from 1962- 1992 with 384 monthly observations of each stock series. The stock markets were analysed to test the Weak from market efficiency collectively and separately also. Researchers concluded that all the stock markets analysed individually were weak form efficient.

Abrosimova, Dissannaike and Linoswski (2005) studied Weak Form Efficient Market Hypothesis for the Russian Stock market indices using daily, weekly time series for the period of 1995-2001. Results of both AC and VR tests rejected the random walk hypothesis for daily and weekly but accepted for monthly data ,so they analysed daily and weekly data for linear and non-linear dependence using ARIMA and GARCH models. They also employed model comparison approach. They concluded that none of the analysed models is better than others. They supported the weak form market efficiency hypothesis with evidence from the Russian Stock market also Maria (2007) analysed Weak form Efficient Market Hypothesis on Portuguese Stock index prices of Lisbon Stock Exchange for 1993-2006. Serial correlation test and runs test were used for the hypothesis that stock indices follows the Random walk. These test were carried out using daily, weekly and monthly returns for the entire period. Author discovered the mixed results, but on the whole the results proven that the Lisbon Stock market had been moving towards the Random Walk behavior since year 2000 with the reduction in the serial dependence of returns.

Shiller and Radikoko (2014) tested the validity of Weak form Market Efficiency hypothesis of daily index returns of Canadian equity market. Different statistical tests are used like BG, Auto correlation and the runs are used which supported that returns are serially correlated. Overall results rejected the Random walk Model of TSX index return thus supporting the phenomenon that Canadian equity markets are not weak form efficient also Birau (2015) conducted study in Romanian and Hungarian markets in the context of financial crisis during the period of 2007 to 2011 based on daily price indices. Author rejected the Weak form efficiency and concluded that both markets are inefficient.

Emerging Markets:

Pant and Bishnoi (2002) rejected the Weak form Efficient Market Hypothesis while analysing the Indian stock markets while using the AC, DF and VR tests. They conducted the study for the period of 1996-2001using daily and weekly stock indices also Gupta and Singh (2006) conducted study to investigate Weak from Market efficiency using future market in India. They used 24 stock futures and NIFTY futures and concluded that both are deviating from normal distribution. The future prices were non stationary at all levels AMIRA process discovered that both NIFTY and stock future returns are dependent and shown strong dependency. Likewise Gupta and Basu (2007) used daily indices of Bombay Stock Exchange and National Stock Exchange from 1991 to 2006 and rejected the weak form market efficiency by using the serial correlation tests.Continuing the same path Smith(2007) conducted research for weak form Efficient Market Hypothesis in five middle east stock markets. He applied multiple variance ratio test to the data. For Israeli, Lebanese and Jordanian markets were proved to be weak form and followed the random walk, while Stock markets of Kuwait , and Oman Random walk hypothesis was rejected also Vigg et al (2008) applied run test and AC on 30 companies of Bombay Stock Exchange Sensex to check the Weak Form Market Efficiency hypothesis and concluded that Bombay Stock Exchange was Weak Form Efficient.

Thomas and Kumar (2010) investigated Indian Stock market for the Weak Form Efficient Market Hypothesis and used statistical tests like Auto correlation and runs test and concluded that both parametric and non parametric test provide evidence that the Stock markets do not follow the random walk so Indian stock markets are not weak form efficient and Mishra (2011) selected the emerging and developed countries to investigate the Weak form market efficiency and selected 8 countries for the analysis using the data from 2007 to 2010. He applied the unit root test GARCH model and observed that these markets are not weak form efficient during the period of study but are moving towards efficiency in the long run.

Haroon and Muhammad (2012) rejected the Weak Form Efficient Market Hypothesis while analysing the Karachi Stock Exchange and discovered the proof of Monday (Week day) effect. 20 years data from 1991 to 2011 was used for analysis purpose. Strong serial correlation pointed out the non-randomness and violation of Efficient Market Hypothesis. They used auto-correlation test to find the serial independency of data and proved that Karachi Stock Market is not weak form efficient, they supported their stance with arguments that Karachi Stock Market is an emerging market and it takes time to absorb the information and technical analysis can be used to gain the abnormal returns. Patel, Radadia, and Dhawan (2012) selected and investigated weak form efficiency for four Asian markets. Daily closing prices were used for the period of 2000 to 2011and divided the entire period into three interval periods. Various tests like Auto correlation, runs test and Unit root test were utilized and concluded that BSE Sensex has given the highest standard deviation which depicts the highest risk. Auto correlation and runs test indicated that HANSENG and SSE composite are Weak form efficient but the BSE Sensex and NIKKEI markets are not weak form inefficient also Ansari and Khan (2012) studied Indian Stock exchanges and applied momentum strategies on monthly data from 1994-2006 and concluded that profitable momentum strategies are evident and hence rejected the Weak form Efficiency hypothesis. Riaz ,Hasan and Nadim (2012) investigated the Karachi Stock Exchange, using daily indices for the period of 1997 to 2011. Researchers found no evidence about the efficient market during the period analysed and concluded that investors can utilize the technical analysis in predicting the stock market behavior in the short run and can get extra return on their investments. Al Jafari (2013) observed the Istanbul Stock Exchange and used the daily stock indices from 1997 to 2011. Researcher applied unit root tests and runs test to find the evidence of weak form efficiency in the Istanbul Xu030 index and concluded that Turkish market does not follow a random walk behavior so can be considered as weak form inefficient. Author suggested that investors can get abnormal gain by using the historical data of about volume of the market.

Jain, Vyas and Roy (2013) studied the Weak form efficiency during the period of global financial crisis from April 2005 to March 2010 using daily closing prices of NSE and BSE of India. Researchers used both parametric and non parametric test to analyse the relevant data. They concluded that Indian stock markets are weak form efficient especially in the time of global financial crisis and even a use of privileged information by any investor cannot give a abnormal return. Al Kharusi and Weagley (2014) studied the Weak form efficiency in Muscat Securities Market from 2007 to 2011by using the daily stock indices. The parametric test of serial correlations were used and rejected the Efficient market hypothesis by researchers in all the three periods of pre crisis during crisis and post crisis in MSM. Akber and Muahmmad (2014) studied Karachi Stock exchange to test the Weak Form Efficient Market Hypothesis. They studied the index returns from 1992 to 2013 both years inclusive. Parametric and non parametric tests are used for analysis, They concluded that in last 22 years Karachi Stock Market is overall weak form in efficient, but in the last 4 years have shown some evidence of efficiency. KSE 30 index was found more efficient as compared to KSE 100 index. Bapusaheb (2016) observed that emerging stock markets including India are less efficient than developed countries and Indian stock markets do not match to weak form efficiency as concluded by earlier studies also with the few exceptions of mixed results.

Ananzeh (2016) investigated the Amman Stock Exchange by using daily values stock indices for the period of 2000 to 2013. Analysis has been done by using the serial correlation which rejected the existence of random walk in daily returns, the unit root test also rejected the Weak form efficiency Market Hypothesis.

Overall results:

There is no agreement among the researchers about the efficiency of the market, the different results yielded as a result of different tests. Most of the empirical studies of the developed countries supported the random walk hypothesis and most of the markets are weak form efficient. Early research conducted that used serial correlation and trading rules supported that most of the developed markets are weak form efficient

On the other hand the empirical studies on the developing or emerging countries found the mixed results. Developing countries stock markets are normally less efficient then the developed countries.

Research Methodology:

The observations are daily closing values of stock market indices for 6 gulf markets including Oman, Bahrain, Kuit, UAE, Saudi Arabia and Qatar. Observations are taken for the period January 2011 to31 December 2015. Market returns are computed as follows.

Rt = ln (Pt / Pt-1)

Pt = Market Price at time „t‟
Pt-1 = Market Price at time„t-1‟

Auto Correlation and Ljung Box Statistics
The serial autocorrelation is used to test the relationship between the time series its own values at different lags. If the serial autocorrelation is negative it means it is mean reverting and accepts the null hypothesis and if the result is positive coefficients then it rejects the null hypothesis.
Another technique that will be use is Ljung-Box. Ljung-Box test provides a superior fit to the chi-square (χ) distribution for little samples.

The test statistic is:[2]

$$Q = n\,(n+2)\sum_{k=1}^{h}\frac{\hat{\rho}_k^2}{n-k}$$

where *n* is the sample size, $\hat{\rho}_k$ is the sample autocorrelation at lag *k*, and *h* is the number of lags being tested. Under H_0 the statistic Q follows a $\chi^2_{(h)}$. For significance level α, the critical region for rejection of the hypothesis of randomness is

$$Q > \chi^2_{1-\alpha,h}$$

where $\chi^2_{1-\alpha,h}$ is the α-quantile of the chi-squared distribution with h degrees of freedom.

3.3. Runs Test

We apply runs test to analyze the serial independence in the returns stream which search out whether succeeding price variations are autonomous to each other as it happens under the random walk null hypothesis. If the number of runs are being observed and the forthcoming price variations (or returns change) with the similar sign. In a series of consecutive price variations (or returns change) the null hypothesis can be tested. We can take into consideration two approaches i.e., positive return (+) which means that return > 0 and secondly a negative return (-) which means that returns < 0 and it is based on with respect to mean return. Second consideration has the benefit of permitting for and to accurate the impact and effect of an ultimate time drift in the return series. It is notable element that it is a nonparametric test and does not entail the normally distributed returns. The runs test stands upon the argument that if price changes or returns are random then actual number of runs (*Runs*) must be near to the expected number of runs. Let + *m* and -*m* are reflecting the totality of positive returns (+) and totality of negative returns (-) regarding to a sample with "*m*" observations, where *m* = *m*. For greater sample size the test statistic is just about normally distributed:

Hypothesis:

H 1: Muscat Securities Market is Weak Form Efficient.
H 2: Kuwait Stock Exchange is Weak Form Efficient.
H 3: Saudi Stock Exchange is Weak Form Efficient.
H 4: Bahrain Stock Exchange is Weak Form Efficient.
H 5: Abu-Dhabi Stock Exchange is Weak Form Efficient.
H 6: Qatar Stock Exchange is Weak Form Efficient.

Analysis for Muscat Securities Market Oman.

Breusch-Godfrey test for autocorrelation up to order 5 OLS, using observations 2011-01-04:2015-09-14 (T = 1225) Dependent variable: uhat

	coefficient	std. error	t-ratio	p-value
const	0.137535	0.705311	0.1950	0.8454
d_msm	0.493429	0.0163455	30.19	6.42e-150 ***
uhat_1	1.48776	0.0220430	67.49	0.0000 ***
uhat_2	−0.649307	0.0412662	−15.73	6.36e-051 ***
uhat_3	0.236318	0.0441286	5.355	1.02e-07 ***
uhat_4	−0.110018	0.0411040	−2.677	0.0075
uhat_5	0.0345503	0.0217266	1.590	0.1120

Unadjusted R-squared = 0.998051
Test statistic: LMF = 124714.454377,
with p-value = P(F(5,1218) > 124714) = 0

Alternative statistic: TR^2 = 1222.611919,
with p-value = P(Chi-square(5) > 1222.61) = 3.72e-262

Ljung-Box Q' = 5949.62,
with p-value = P(Chi-square(5) > 5949.62) = 0

Runs test (first difference)

Number of runs (R) in the variable 'msm' = 430
Under the null hypothesis of independence, R follows N(613.157, 17.483)
z-score = -10.4763, with two-tailed p-value 1.11057e-025

Analysis for Kuwait Stock Exchange.

Breusch-Godfrey test for autocorrelation up to order 5 OLS, using observations 2011-01-03:2015-09-28 (T = 1236) Dependent variable: uhat

	coefficient	std. error	t-ratio	p-value
const	−2.21443	9.16657	−0.2416	0.8091
d_Kuwait	0.493429	0.0163455	30.19	6.42e-150 ***
uhat_1	0.228098	0.0281086	8.115	1.17e-015 ***
uhat_2	0.208770	0.0284135	7.348	3.67e-013 ***
uhat_3	0.188738	0.0285312	6.615	5.52e-011 ***
uhat_4	0.175978	0.0284231	6.191	8.11e-010 ***
uhat_5	0.168039	0.0281285	5.974	3.03e-09 ***

Unadjusted R-squared = 0.836657

Test statistic: LMF = 1260.032283,
with p-value = P(F(5,1230) > 1260.03) = 0

Alternative statistic: TR^2 = 1034.107913,
with p-value = P(Chi-square(5) > 1034.11) = 2.48e-221

Ljung-Box Q' = 4615.36,
with p-value = P(Chi-square(5) > 4615.36) = 0

Runs test (first difference)

Number of runs (R) in the variable 'kuwait' = 541
Under the null hypothesis of independence, R follows N(617.819, 17.5448)
z-score = -4.37848, with two-tailed p-value 1.19512e-005

Analysis for Bahrain Stock Exchange (Bourse).
Breusch-Godfrey test for autocorrelation up to order 5 OLS, using observations 2011-01-04:2015-10-08 (T = 1243) Dependent variable: uhat

	coefficient	std. error	t-ratio	p-value
const	0.0936702	0.136065	0.6884	0.4913
d_bahrain	0.750349	0.0230311	32.58	1.38e-168 ***
uhat_1	1.14447	0.0208608	54.86	0.0000 ***
uhat_2	−0.166636	0.0315314	−5.285	1.49e-07 ***
uhat_3	0.0341173	0.0315587	1.081	0.2799
uhat_4	−0.00937807	0.0314727	−0.2980	0.7658
uhat_5	−0.00276434	0.0208747	−0.1324	0.8947

Unadjusted R-squared = 0.998774

Test statistic: LMF = 201370.784770,
with p-value = P(F(5,1236) > 201371) = 0

Alternative statistic: TR^2 = 1241.475981,
with p-value = P(Chi-square(5) > 1241.48) = 3.05e-266

Ljung-Box Q' = 6182.34,
with p-value = P(Chi-square(5) > 6182.34) = 0

Runs test (first difference)

Number of runs (R) in the variable 'bahrain' = 594
Under the null hypothesis of independence, R follows N(620.115, 17.5533)
z-score = -1.48775, with two-tailed p-value 0.00136816

Analysis for Saudi Stock Exchange (Tadawal).

Breusch-Godfrey test for autocorrelation up to order 5 OLS, using observations 2011-01-04:2015-10-23 (T = 1254) Dependent variable: uhat

	coefficient	std. error	t-ratio	p-value
const	−0.615347	1.22700	−0.5015	0.6161
d_Ksa	0.551166	0.0139796	39.43	2.05e-221 ***

uhat_1	1.46972	0.0189597	77.52	0.0000 ***
uhat_2	−0.665390	0.0346190	−19.22	2.58e-072 ***
uhat_3	0.274682	0.0369812	7.428	2.04e-013 ***
uhat_4	−0.111769	0.0345560	−3.234	0.0013 ***
uhat_5	0.0324430	0.0188988	1.717	0.0863 *

Unadjusted R-squared = 0.998908

Test statistic: LMF = 228181.072129,
with p-value = P(F(5,1247) > 228181) = 0

Alternative statistic: TR^2 = 1252.630885,

with p-value = P(Chi-square(5) > 1252.63) = 1.17e-268

Ljung-Box Q' = 6192.46,
with p-value = P(Chi-square(5) > 6192.46) = 0

Runs test (first difference)

Number of runs (R) in the variable 'ksa' = 558
Under the null hypothesis of independence, R follows N(620.185, 17.4781)
z-score = -3.55788, with two-tailed p-value 0.000373854

Analysis for Qatar Stock Exchange (Bourse).

Breusch-Godfrey test for autocorrelation up to order 5 OLS, using observations 2011-01-04:2015-10-28 (T = 1257) Dependent variable: uhat

	coefficient	std. error	t-ratio	p-value
const	−0.654638	1.38143	−0.4739	0.6357
d_Qatar	0.587845	0.0133479	44.04	1.58e-256 ***
uhat_1	1.44197	0.0177117	81.41	0.0000 ***
uhat_2	−0.621422	0.0317840	−19.55	1.75e-074 ***
uhat_3	0.257540	0.0336250	7.659	3.73e-014 ***
uhat_4	−0.106729	0.0317891	−3.357	0.0008 ***
uhat_5	0.0284332	0.0176954	1.607	0.1083

Unadjusted R-squared = 0.999279

Test statistic: LMF = 346393.873213,
with p-value = P(F(5,1250) > 346394) = 0

Alternative statistic: TR^2 = 1256.093450,

with p-value = P(Chi-square(5) > 1256.09) = 2.08e-269

Ljung-Box Q' = 6238.51,
with p-value = P(Chi-square(5) > 6238.51) = 0

Runs test (first difference)

Number of runs (R) in the variable 'Qatar' = 575
Under the null hypothesis of independence, R follows N(628.208, 17.6836)
z-score = -3.00887, with two-tailed p-value 0.00262218

Analysis for Abu Dhabi Securities Exchange.

Breusch-Godfrey test for autocorrelation up to order 5 OLS, using observations 2011-01-04:2014-12-03 (T = 1022) Dependent variable: uhat

	coefficient	std. error	t-ratio	p-value
const	0.147753	1.06601	0.1386	0.8898
d_UAE	0.383757	0.0257283	14.92	1.22e-045 ***
uhat_1	1.31473	0.0285151	46.11	3.29e-251 ***
uhat_2	−0.365098	0.0478033	−7.638	5.10e-014 ***
uhat_3	0.0505010	0.0491266	1.028	0.3042
uhat_4	−0.0151152	0.0477875	−0.3163	0.7518
uhat_5	0.0147923	0.0284872	0.5193	0.6037

Unadjusted R-squared = 0.999014

Test statistic: LMF = 205750.428855,
with p-value = P(F(5,1015) > 205750) = 0

Alternative statistic: TR^2 = 1020.992656,

with p-value = P(Chi-square(5) > 1020.99) = 1.71e-218

Ljung-Box Q' = 5087.61,
with p-value = P(Chi-square(5) > 5087.61) = 0

Runs test (first difference)

Number of runs (R) in the variable 'UAE' = 462
Under the null hypothesis of independence, R follows N(508.869, 15.8785)

z-score = -2.95171, with two-tailed p-value 0.00316018

The researchers tested gulf markets to check for weak form of market efficiency. As the data was time series, first difference was taken for the index values to make them stationary, which is this basic requirement for the time series analysis. Two tests were conducted for testing weak form of market efficiency, autocorrelation and runs test. It has been evident that previous researchers have frequently used this methodology to check for weak form of market efficiency. The market should be weak form efficient if we are unable to reject null hypothesis of that there is no autocorrelation in the error terms of market indices. Upon testing for auto correlation both auto correlation tests and runs test have significant p- values stating that all the gulf markets have auto correlation in their error terms, so the null hypothesis is rejected in current scenario, concluding the markets are not weak form efficient.

Conclusion and Implications:

This study examines the weak form efficiency of Gulf stock markets for the period of five years using the closing stock indices and findings confirm that technical analysis of the stock market is significant in producing extra ordinary returns. Overall results of the study prove that Gulf Markets are inefficient in the Weak form. This result is definitely consistent with those documented in past studies (Smith G., 2007; Haroon 2012 ; AL Kharusi 2014). As such this study put in new evidence to the literature on Weak Form Market efficiency in context of the Gulf and emerging markets. The emerging markets like Gulf are inefficient because of issues in liquidity, lack of information and transparency, irregular trading and the discontinued trading. Other issues includes insider trading, legal complications and overreaction of the traders after getting some information about the market. . Gulf markets will be mature with the passage of time so in the future it will be difficult to beat the markets. The Weak form inefficiency suggests that those investors who are expert in technical analysis have a great chance to gain abnormal profits from the timing of the Stock market. Using some technical tool could be an useful to develop financial literacy and financial wellbeing of the youth in the gulf. Using past prices and the volume data, investors can predict the future stock prices in the Gulf markets. The results of the study implies that mastering some technical tool or software the youth can become a successful entrepreneur as this will generate abnormal profits and gains by reducing the risk in the volatile markets. Investors should predict the future movements and trends to invest on the basis of past data to manage the funds in the unstable markets

References:

Abrosimova N., Dissanaike G. and Linowski D., (2005), “*Testing Weak-Form Efficiency of the Russian Stock Market*” [Online] Available at Social Science Research Network (SSRN) : [Accessed 05 March 2016]

Akber, U. and Muhammad, N., (2014). "*Is Pakistan Stock Market Moving towards Weak-Form Efficiency? Evidence from The Karachi Stock Exchange and the Random Walk Nature of Free-Float of Shares of KSE 30 Index*." Asian Economic and Financial Review, 4(6), pp. 808-836.

AL Kharausi, S. and Weaglay, R.O., (2014). "*WEAK FORM MARKET EFFICIENCY DURING THE 2008 FINANCIAL CRISIS: EVIDENCE FROM THE MUSCAT SECURITIES MARKET*. "The International Journal of Business and Finance Research, 8(4), pp. 27-42.

AL-JAFARI, M., (2013). *The Random Walk Behavior and Weak-Form Efficiency of the Istanbul Stock Market 1997-2011: Empirical Evidence.* International Journal of Management, 30(3), pp. 169-185.

ANANZEH, I.E.N., (2016). *Weak Form Efficiency of the Amman Stock Exchange: An Empirical Analysis (2000-2013*). International Journal of Business and Management,11(1), pp. 173-180.

Ansari, V. A. and Soha Khan (2012) “*Momentum anomaly: evidence from India*”, Managerial Finance, vol. 38, no. 2, 206-223.

Bapusaheb, S.U., (2016). *A STUDY OF WEAK FORM OF MARKET EFFICIENCY IN INDIA*. Online Department of Business Administration. Aligarh Muslim University India. Available at http://ir.inflibnet.ac.in/ Accessed on 8th March 2016.

Birau, F.R., (2015). "*Emerging capital market efficiency: a comparative analysis of weak-form efficiency in Romania and Hungary in the context of the global financial crisis". AI & Society*, 30(2), pp. 223-233.

Chan, K. C., Gup, B. E., and Pan, M. P. (1997), “*International Stock Market Efficiency and Integration: A Study of Eighteen Nations*”. Journal of Business Finance & Accounting, vol. 24, no. 6, 803-813.

Choudhry, T. (1994), “*Stochastic trends and stock prices: an international inquiry”.* Applied Financial Economics, vol. 4, 383-390.

Gupta, R., and Basu, P. K. (2007), “*Weak Form Efficiency in Indian Stock Markets*”, IBER Journal, Vol.6, No.3, pp. 57-64.

Kapil G., and Balwinder S., (2006), “*Random Walk and Indian Equity Futures Market*”. [online] Indian Institute of Capital Markets 9th Capital Markets Conference Paper. Available at SSRN: < http://ssrn.com/abstract=874913 > [Accessed 24 February 2016].

Haroon MA (2012). “Trend *Analysis of Karachi Stock Exchange: A Case Study of Ten Years* (1992-2002)”. Doctoral Dissertation in Business Administration. Hamdard University, Karachi.

Jain, P., Vyas, V. and Roy, A., (2013). "A study on weak form of market efficiency during the period of global financial crisis in the form of random walk on Indian capital market." *Journal of Advances in Management Research*, 10(1), pp. 122-138.

Maria Rosa B., (2007), "*Random Walk Tests for the Lisbon Stock Market*," [online] Working Papers Department of Economics at the School of Economics and Management (ISEG), Technical University of Lisbon. Available at < http://ideas.repec.org/ p/ise/ isegwp/wp142007.html > [Accessed 09 March 2016]

MISHRA, P.K., (2011). "*Weak Form Market Efficiency: Evidence From Emerging And Developed World*." *The Journal of Commerce,* 3(2), pp. 26.

Pant, B., and Bishnoi, T. R. (2002), “*Testing Random Walk Hypothesis for Indian Stock Market Indices*”, Working Paper series, IIM, Ahmadabad.

Patel, N.R., Radadia N. and Dhawan, J., (2012). "*An Empirical Study on Weak-Form of Market Efficiency of Selected Asian Stock Markets*." *Journal of Applied Finance and Banking,* 2(2), pp. 99-148.

Riaz, T., Hassan, A. and Nadim, M., (2012). *Market Efficiency In Its Weak-Form; Evidence From Karachi Stock Exchange Of Pakistan. The Journal of Commerce,* 4(4), pp. 9.

Smith G., (2007) *'Random Walks in Middle Eastern stock markets*.' Applied Financial Economics, 17 (7). pp. 587-596.

Shiller, I. and Radikoko I., (2014), "*Testing Weak-Form Market Efficiency On The TSX". Journal of Applied Business Research,* 30(3), pp. 647-n/a.

Thomas, A.E. and Kumar, M.C.D., (2010), *"Empirical Evidence on Weak Form Efficiency of Indian Stock Market.*" *ASBM Journal of Management,* 3(1), pp. 89-100.

Vigg S., Kaur S., Nathani N. And Holani U., (2008), “*Efficient Market Hypothesis: A Case Study on Bombay Stock Exchange*,” Indian Journal of Finance, vol. 2 no. 6.