Impact of Futures Contracts on Weak Form of Market Efficiency in Pakistan

Maqsood Ali Shah*, Naimat Ullah Khan and Mian Muhammad Atif*****

Abstract

The paper analyses the impact of futures contracts on weak form of Efficient Market Hypothesis on the Pakistan Stock Exchange (PSX). The current study uses ten years data of 18 companies, which offer futures contact, and 58 firms which do not offer futures contracts over the period from January 2006 to December 2015. This study applies Variance Ratio Test (VRT), Auto Correlation Function Test (ACF), Unit Root Test and Run Test (RT) to measure weak form of market efficiency. The results find that returns for both samples do not follow random walk and document a particular trend in the form of significant correlation with previous returns. This study shows that futures contracts have insignificant impact on market efficiency on the PSX. One implication of the research is that investors may earn abnormal returns looking at the pattern of past share prices of the firms issuing future contracts. In addition, the results confirm that Pakistani market is not different from other markets (especially emerging) regarding efficiency.

Keywords: Efficient Market Hypothesis, Pakistan Stock Exchange, Random Walk, Single Stock Futures

* MPhil Scholar at Institute of Management Studies, University of Peshawar Pakistan
** Assistant Professor at Institute of Management Studies, University of Peshawar Pakistan, corresponding author: naimatims@yahoo.com; naimat@uop.edu.pk
***Assistant Professor at FAST School of Management Lahore.

1. Introduction

Efficient Market Hypothesis (EMH) provides a theoretical framework for share prices behavior. Fama (1965) argued that a market is efficient when current stock prices represent a random departure from past share prices and such departure is created by incorporating the newly available information (Israil and Khan, 2016; Iftikhar and Khan, 2017). Later on Fama (1970) documented three forms of EMH i.e. (1) Weak form, (2) Semi-strong and (3) Strong Form. This paper tests the weak form of efficient market hypothesis where stock prices reflect all historical information. Technical analysis, where graphs and historical trends are used to predict prices, is meaningless in weak form of EMH and it provides no opportunities to earn abnormal return. One the other hand, it is possible to earn abnormal return by using fundamental analysis in weak form of EMH (Shah et al., 2020; Bano and Khan, 2020; Ashraf et al., 2018; Khan and Khan, 2016; Khan et al., 2013; Khan et al., 2011).

A number of research studies have confirmed that derivative market plays an important role in increasing the efficiency (Shah and Khan, 2019). There are two main objectives of derivatives i.e., to provide opportunity to manage risk by shifting it among players in financial market and secondly, to improve the liquidity of the market to bring efficiency to the market (Shah & Malik, 2017). Malik and Tarique (2020) investigated the impact of index future on market volatility and efficiency in BRICS economies and their result indicated that it has increased the market volatility and efficiency.

On July 1, 2001 for the first time, Single Stock Futures (SSFs) were introduced Karachi Stock Exchange (KSE) currently known as Pakistan Stock Exchange (PSX) after meeting the strict criteria established by Security and Exchange Commission of Pakistan (SECP). In the beginning, SSFs time duration was limited to a month because they were very small in volume and value with respect to spot market. By the end of 2004 and in the following year of 2005, trading volume of SSFs increased dramatically and reached to almost 40% of the total market volume for short span of time (Shah and Khan, 2019; Shah, Malik & Khan, 2019). In 2008, after being banned for the short time of period, SSFs were re-introduced with more sophisticated risk management mechanism to reduce the underlying risk. Any broker can start trading in PSX futures market subject to prior notice to the exchange. For each contract, the stock exchange always notifies the name of the contact, date of opening and closing and other relevant information for the future communication. The time duration for Pakistan single stock futures contracts is 90 days as per rules. Futures contracts are issued to the market at the beginning of each month. All the futures contracts are named by the month in which the contracts expire (Malik and Khan, 2012).

In developed countries, studies showed that derivative market brings efficiency to the market (Mckezine, Refferty & Backett, 1998; Claessen & Mittnik, 2002). From emerging countries, results were not certain to support a single conclusion. Zonghao (2014); Chauhan and Arora (2015) documented that flow of information increased after introducing the derivatives. Lai (1991); Zang (1999); Thompson and Laws, (2004; Dabasish and Das (2008) stated that futures contracts did not bring efficiency to market in India. Malik and Tarique (2020) found that derivatives increased the market volatility and efficiency in BRICS economies.

For Pakistani market, Malik and Khan (2012) found that SSFs do not have any significant impact on market efficiency with sample of pre- and post-period using ARCH and GARCH models. They also used comparison based sample i.e., SSFs companies and non-SSFs companies for the same year. Shah and Malik (2017) documented that introduction of the SSFs have no influence on the market efficiency. Shah, Malik & Khan, (2019) documented the effect of SSFs on the market volatility and efficiency after its resumption with stringent regulation requirement. Their study reflected that it did not bring significant change to the market efficiency. Due to the contradictory results, the current study reinvestigates the futures contracts (derivatives) impact on market efficiency in Pakistan. For this purpose, data is extended to 10 years from 2006 to 2015 including the period when the SSFs are re-introduced in July 2008 after 6 months ban with new regulations. To test market efficiency of companies offering future contracts, only derivative market data is collected. The stock prices data of 18 companies, that have issued SSFs, is collected and tested using various statistical tests such as Variance Ratio Test (VRT), Run Test (RT), Autocorrelation Function Test (ACF) and Unit Root Test (URT). Based on the extant literature, we assume both possibilities that initiation of derivatives may have significant or insignificant effect on underlying spot prices.

2. Literature review

Many studies are conducted to check EMH in both developed and developing countries. Most of the authors, studying developed countries, found weak form of efficiency. Rossi and Gunardi (2018) studied the markets of France, Germany, Italy and Spain and found that EMH is not unified to calender effects. They used daily stock data

over the period of 2001-2010 using GARCH and OLS regression for weekdays and monthly effect. Similarly, Dockery and Kavussanos (1996) found that Athens Stock exchange (ATHEX) is not weak form efficient, using Augmented Dickey-Fuller test (ADF) and Wald Statistics test.

Different restuls are documented in developing counties. Kalu and Joseph (2018) studied the Ugandan Stock Exchnage (USE) was using auto correlation in stock prices through linear and non-linnear models. Both linear and non-linear model supported the weak form of EMH and argued that participants could earn above the normal returns using fundamental analysis. Zhong et al. (2004) documented efficiency for United Arab Emirates (UAE) market.

Dorina and Simina (2007) checked market efficiency in developing markets i.e., Czech Republic, Lithuania, Hungary, Turkey, Poland, Romania, Slovakia and Slovenia. They used Q-test, Run test and Serial correlation. Their results indicated that markets were weak form of efficient. Suhir, Sing and Mazumdar (2017) investigated the EMH in Indian stock market after government action for transperancy in stock exchange. Their study targeted the post liberlization area (1991-2013) and the authors found that Indian stock market is still not effieicnt and participants can generate abnormal profit. Nisar and Hanif (2013) examined Pakistan, India, Sri Lanka, and Bangladesh stock exchanges and documented that markets were not weak form of EMH.

Claessen and Mittnik (2002) analyzed the impact of option pricing on EMH and market volatility on DAX-Index daily returns data of Germany using GARCH Model. The study concluded that option increased market efficiency. Nilsson (2009) studied market efficiency using the co-integration model. They concluded that spot price and futures market prices were not co-integrated and futures contracts increased market efficiency. Oduncu (2009) documented that futures market reduced volatility and enhanced market efficiency for Turkish currency market. Chail (2015) argued that spot market volatility increased after introduction of futures contracts using daily closing stock prices of S&P500, Nikkei 225, HIS and BSE Sensex. Debasish and Das (2008) studied the impact of futures trading on the conditional and un-conditional volatility and market efficiency of Indian stock market using daily and monthly BSE Sensex Stock Index. They used Wilcoxon rank and Kolmogorov Smirnov sample test for Pre and Post period and found that futures contracts did not bring efficiency to the market. Rejput, Kakker and Batra (2014) examined the impact of futures trading on spot market volatility and market efficiency and documented efficiency using GJR GARCH models. Zonghao (2014) observed the daily stock prices of S&P 500 from USA, InexASX from Australia, and Mikkie 225 from Jappan. The authors found that volatility and market efficiency increased in post period for both Nikkie-225 Index and international portfolio. Chauhan and Arora (2015) investigated market efficiency and volatility spillover effect of Agriculture commodity for spot and futures prices. They found that futures market helped to determine the spot price in futures and the flow of information was good by offering futures market.

Malik and Khan (2012) studied the relationship between efficiency and volatility for pre and post period of SSFs in Pakistan. Event study showed that SSFs have insignificant effect on market efficiency. Shah and Malik (2017) studied the effect of SSFs on volatility and efficiency for a data of 10 years from 1999-2008 of companies. The findings of the study suggested that SSFs had no significant impact on market

efficiency. Malik and Shah (2018) studied the impact of SSFs on risk. Daily data has been collect from 1999 to 2008. The result shows that it does not bring change to the systematic risk (proxy for microstructure related noise) and uncontrollable risk (proxy for trading noise).

The current paper tests the weak form of efficiency for both forms of companies for comparative analysis i.e, firms which issue SSFs and the companies which do not issue derivatives. Weak form of efficiency is debatable phenonmenon as it varies on the basis frequency of data (daily, weekly and monthly) and across markets (Shah et al., 2020; Bano and Khan, 2020; Suhir, Sing and Mazumdar, 2017; Ashraf et al., 2018; Khan and Khan, 2016; Khan et al., 2013; Khan et al., 2011). Hence, the study expects both significant and insignificant association between future contract initiation and market efficiency. This study is open for both possibilities based on the extant literature.

3. Methodology

This paper analyses the effect of SSFs on market efficiency. Initially, the study has taken the data of 37 companies which offered futures contracts; however, due to the lack of availability of data, only 18 companies are selected as final sample from Pakistan stock exchange. The same sample is used by Haque, Liu and Nisar (2011), Malik & Khan (2012), Shah & Malik (2017) in Pakistan context. The null hypothesis, H_0, of the study is: Share prices of companies offering futures contracts do not follow trend. In addition, the alternative hypothesis, H1, is: Share prices of companies offering futures contracts do follow trend.

The study uses two types for samples to have a comparative analysis. Both samples' sizes include the daily stock price returns over the period from 2006 to 2015. The first sample has data of firms that issue futures contracts and the second sample has the companies that do not issue derivatives and they are also listed on the PSX.

To check market efficiency, researchers have used different models such as Wilcoxon Rank Sum test and Kolmogorov Smirnov 2-sample test and by Debasish & Bhagaban (2008). Johanana' co-integration test and Block exogeneity test by (Chauhan & Arora, 2015; Lai & Lai, 1991); *GARCH* by (Jabeen & Ismail, 2015; Oduncu, 2009; Baklaci & Tutek, 2006); Ljung box test by Zonghao (2014) and Unit root test, Variance ratio, Run test and auto correlation by (Laws & Thompson, 2004; Haque & Liu, 2011; Nisar & Hanif, 2012; Smith & Ryoo, 2003; Rehman & Rizwan 2014).

The models used for this research paper are run test, unit root test, variance ratio test and auto correlation. The equation used for the calculation of returns is adopted from the studies of Hajieh (2014); Jagannathan (2014); Haque & Liu (2011); and Akber & Muhammad (2014).

$$R_t = \ln (P_t / P_t - 1)$$

Where R_t means the rate of return for stock prices; L_n = natural log, P_{t-1}=the previous day price of the stock and P_t= the current price of the stock.

The detail for statistical tools used in this study are explained below.

3.1 Unit Root Test

This test checks the randomness in the data which testifies the weak form of efficiency (Khan and Khan, 2016; Akber and Muhammad, 2014; Nisar and Hanif, 2012; Rabbani, Kamal and Salim, 2013; Hameed and Ashraf, 2006). The assumption of market efficiency is that the data should be non-stationarity (have unit root) and follows a random walk. Augmented Dickey-Fuller (ADF) test is used for testing Unit root in the

data. The presence of unit root (non-stationary) assures randomness of the data, which refers that the returns follow Random Walk Theory and weak form of EMH. If results are less than critical value, then reject the null hypothesis and accept the alternative hypothesis for the market stationarity, which refers that stock prices do follow a trend and also indicates the absence of random walk (weak form of EMH). The equation for the ADF is:

$$\Delta\rho_{it} = a_0 + a_1 t + \rho_0 \rho_{it-1} + \sum_{t=1}^{q} \rho_i \rho_{it-1} + \in_{it}$$

Whereas P_{it} means the current share price, P_{it-1} is the lag value of the share price, the parameter a_0 represents the mean and $\in_{it}$ shows the random error (Khan and Khan, 2016). The decision of stationarity is based on critical threshold of MacKinnon tabulated value.

3.2 Variance Ratio Test

This test is used for the prediction of assets price, proposed by the Lo and MacKinlay, and Hassan (2005); Dockery and Kavussanos (1996). It examines the probability of time series data, difference of variance in data (return) at different time intervals. To find the existence of predictability in share prices, it is assumed that the data follow a random walk. If the results of variance ratio test come with value "one" then it can be stated that market follows a random walk and null hypothesis is to be accepted. If the P-value is less than critical value, then eject the null hypothesis and alternative hypothesis is accepted that market is not weak form EMH and it does follow a trend and vice versa.

3.3 RunsTest

This test is proposed by Bradley (1968) to measure the random walk in the data (Beer, 2009; Ahmed &Hassan, 2005; Awan & Shah, 2014; Khan & Khan, 2016). The series of consecutive positive or negative returns is known as run. The assumption behind the test is that every run is independent of each other. The significance of the run test is measured with Z-Score, which is calculated as follows:

$$z = \frac{R - \overline{R}}{S_r}$$

Where R denotes number of run in sequence of data, S_r shows standard deviation of the number of run and $\overline{R}$ represents the number of expected runs. The null hypothesis is that data follow random walk. It refers that consecutive runs are independent of one another. We reject the null hypothesis when the value of Z statistics is more than (±1.96) at 5% level of significant.

3.4 Auto-Correlation Test

The auto-correlation test measures the association of one value with the lag values (Dockery & Kavussanos, 1996; Haque & Liu, 2011; Ali, 2012; Khan and Khan, 2016). When a value it related with the lag values, it shows the dependency and trend in the data. The absence of auto-correlation assures the randomness in the data. Ljung Box Q-statistics is used to measure the auto-correlation. The null-hypothesis assumes no auto-correlation, which means that there is no relationship of the value with its lagged values and follow a random walk. The rejection of null hypothesis refers that the values are interrelated with the lagged values and follow a trend.

4. Results

The aim of this paper is to find the impact of futures contracts on weak form of market efficiency with the help of testing the random walk in the data. The various tests, discussed in the previous section, are used for the same purpose.

4.1 Unit Root Test Results

Table 1 shows the finding of ADF test for Futures Contracts firms (Panel A) and Panel B (No Futures Contracts Companies). The null hypothesis of the test is that data is non-stationary and has unit root. The findings of both Panel A and B reject the null hypothesis and show that the data is stationary and do not have unit root as p-value is less than 5% level of significance. It refers that both types of returns have a particular trend and do not have random walk (weak form of EMH). The findings show that the introduction of futures contracts do not have impact on weak form of market efficiency (Debasish & Bhagaban, 2008; Oduncu, 2009; Khan and Khan, 2016).

Table 1: ADF Test

Panel A: Futures Contracts Companies			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-123.8229	0.0001
Test Critical Values	1% level	-3.430209	
	5% level	-2.861362	
	10% level	-2.566715	
Panel B: No Futures Contracts Companies			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-143.0376	0.0001
Test Critical Values	1% level	-3.430281	
	5% level	-2.861393	
	10% level	-2.566732	

* Null Hypothesis: The data has a Unit Root (non-stationary) and MacKinnon (1996) one-sided p-values.

4.2 Variance Ration Test Results

In Table 2 shows the Variance ratio test to check the randomness for futures contracts companies (Panel A) and no futures contracts firms (Panel B). To check out the significance level of the result we use the statistics of Chow-Denning maximum [Z] i.e., 5.031086 (2.9309390) with p-values of 0.0000 (0.0201) for companies with futures contracts and no futures contracts respectively. Based on significant p-value, we reject the null hypothesis of non-stationary of data. It refers that the data is stationary and do have particular trend and nullifies the random walk theory (weak form of efficiency).

Table 2: Variance Ratio Test

Joint Tests	Value	df	Probability
Panel A: Futures Contracts Companies			
Max |z| (at period 8)*	5.031086	65714	0.0000
Panel B: No Futures Contracts Companies			
Max |z| (at period 16)*	2.930939	237312	0.0201

Note: Null Hypothesis: RT is a martingale

4.3 Run Test

The Table 4 shows the findings of run test for both types of data. The results indicate that stock prices are following the trend and they do not follow a random walk.

Here the market is not weak form of efficient for Pakistan stock exchange for companies offering futures contracts as well as for the firms that do not issue futures contracts.

Table 4: Run Test

Panel A: Futures Contact Companies		**Panel B: No Futures Contact Companies**	
RUNTEST	**2006-2015**	RUNTEST	**2006-2015**
N(RT <= 0)	45505	N(RT <= 0)	173935
N(RT > 0)	20210	N(RT > 0)	63378
Obs	65715	Obs	237313
N(runs)	25077	N(runs)	80678
z	-26.68	z	-64.11
Prob>|z|	0	Prob>|z|	0

4.3 Auto-Correlation Test

The Q-statistics for both samples are highly significant at all 20 lags which show serial correlation. It rejects the null hypothesis of no-correlation of values with the lagged. It means that the values are related with the lagged values and follow a particular trend. The results nullify the existence of random walk and weak form of efficiency.

Table 4: Auto-Correlation Test

Panel A: Futures Contracts Companies

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
| |	| |	1	0.023	0.023	35.335	0
| |	| |	2	0.011	0.011	43.577	0
| |	| |	3	0.02	0.019	68.619	0
| |	| |	4	-0.002	-0.003	68.86	0
| |	| |	5	-0.009	-0.009	74.365	0
| |	| |	14	0.03	0.03	135.12	0
| |	| |	15	-0.001	-0.003	135.21	0
| |	| |	16	-0.002	-0.003	135.47	0
| |	| |	17	0.002	0.001	135.74	0
| |	| |	18	0.007	0.007	138.85	0
| |	| |	19	0.006	0.006	141.3	0
| |	| |	20	-0.002	-0.002	141.48	0

Panel B:No Futures contracts firms

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
| |	| |	1	0.028	0.028	191.76	0
| |	| |	2	0.01	0.009	213.67	0
| |	| |	3	0.01	0.01	237.68	0
| |	| |	4	-0.028	-0.029	428.12	0
| |	| |	5	-0.013	-0.011	465.31	0
| |	| |	14	-0.003	-0.003	767.05	0
| |	| |	15	0.013	0.013	806.12	0

				16	0.02	0.019	905.25	0
				17	0.012	0.009	938.3	0
				18	0.019	0.018	1021.84	0
				19	0.01	0.009	1043.39	0
				20	-0.001	-0.002	1043.86	0

5. Conclusion

The paper analyses the impact of futures contracts on EMH in Pakistan stock exchange (PSX) based on the assumption that returns follow Random Walk Theory. For this study, companies offering futures contracts are included in a sample size along with firms which do not offer futures contracts. The sample period is about ten years from 2006 to 2015. The study uses statistical tools of Unit root test, Auto-Correlation Function, Variance Ratio Test and Run Test (Asma & Keavin, 2000; Malkiel, 2003; Khan et al., 2004; Dornia & Samina, 2007; Elbarghothi et. al., 2012; Nisar and Hanif, 2013; Khan and Khan, 2016). The findings of all the tests show that derivatives market do not bring efficiency to the market (Malik & Khan, 2012; Jabeen and Ismail, 2015; Malik and Shah, 2018; Khan, Shah & Malik, 2019). The results confirm that Pakistani market is not different from other markets (especially emerging) regarding efficiency. The findings documents that Pakistan stock market is not weak form of efficient and it follows a trend where investors may be able to earn unexpected returns (Khan & Khan, 2016). One of the implications is that investors may earn abnormal returns from the market after adjusting for risk-return trade off.

The results of study have an importance regarding the regulation of futures market. In 2001, SSFs were introduced with 10 stocks on the PSX. In 2008, the trading of SSFs were discontinued by SECP because of Global Financial Crises. However, 18 companies re-introduced SSFs with improved and stringent risk management mechanism. If there is ease in regulations of SSFs it will enhance the derivative market trading with respect to risk management tool and the liquidity of the market would increase that in turn will make the market efficient. These results will help regulators for reviewing of contracts specifications (i.e., daily price limit, contracts period, contracts size, expiration date, taxes on transactions etc.). As the primary objectives of derivatives is to reduce risk and increase the liquidity thereby increasing market efficiency. Finally, the results will also be helpful for national and international investors and managers.

References

Akber, U., & Muhammad, N. (2014). Is Paksitam Stock Market Moving Towards Weak-Form Efficiency? Evidence From The Karachi Stock Exchange and The Random Walk Nature OF Free Flot Of Shares Of KSE 30 Index. *Asian Economic and Financial Review*, *4*(6): 808-836.

Ashraf, M. A; Masood, O; Khan, N. U., and Nayab, D. (2018), "Studying EMH and Deflationary Pressures in China Economy by Modelling of China Stock Market". *Journal of Managerial Sciences*, Vol. 12, No. 4, pp. 65-77

Asma, M. & Keavin, K. (2000). Weak-form market efficiency of an emerging Market: Evidence from Dhaka Stock Market of Bangladesh. *ENBS Conference paper Oslo.*

Bano, G., Khan, N.U. (2020), "Terrorism and Pakistani Stock Exchange: Evidence from 'War on Terror" *Pakistan Journal of Criminology,* 12*(2), 19-33*

Baklaci, H., & Tutek, H. (2006). The impact of the futuress market on spot volatility: an analysis in Turkish derivatives markets. *WIT Transactions on Modelling and Simulation*, Vol 43.

Chauhan, A. K., Singh, S., & Arora, A. (2013). Market efficiency and volatility spillovers in futures and spot commodity market: The agricultural sector perspective. *Samvad*, *6*(2), 61-84.

Chail, S. (2015). Examinging the impact of index future on information efficiency of stock market:. *International Journal of Economics and Finance*, Vol. 7, No. 8;.

Claessen, H., & Mittnik, S. (2002). Forecasting Stock Market Volatility and the Infomration Efficiency of the DAX-Index Options Market. *CFS Working Paper*.

Debasish, S. S., & Das, B. (2009). An econometric study on impact of futures trading on the stability of stock Index in India. *International Journal of Business and Management*, *3*(12), 70.

Dockery, E., & Kavussanos, M. G. (1996). Testing the Efficient Market Hypothesis using panel data, with application to the Athens stock market. *Applied Economics Letters*, *3*(2), 121-123.

Dorina, L., &Simina, U. (2007). Testing efficiency of the stock market in emerging economies. *The Journal of the Faculty of Economics-Economic Science Series*, *2*, 827-831.

EmenikeKalu, O., & Joseph, K. K. (2018) Empirical Evaluation Of Weak-Form Efficient Market Hypothesis In Ugandan Securities Exchange. *Journal of Contemporary Economic and Business Issues*, 35.

Elbarghouthi, S., Yassin, M., & Qasim, A. (2012). Is Amman stock exchange an efficient market? *International Business Research*, *5*(1), 140.

Fama, E. (1965). The behavior of stock market prices. Journal of Business 38, 34–105.

Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *The journal of Finance*, *25*(2), 383-417.

Iftikhar, A. and Khan. N. U. (2017), "Impact of Dividend Announcements on Share Prices – A case of Pakistan", *Journal of Social and Organizational Analysis*, Vol. 3, No. 1 pp. 26-41

Israil, S. and Khan, N. U., (2016) "The Impact of Merger and Acquisition on the Karachi Stock Exchange" *Sarhad Journal of Management Sciences*, Vol. 2, No: 2, pp. 139-156

Khan, N. U., Khan, S., (2016) "Weak Form of Efficient Market Hypothesis – Evidence from Pakistan" *Business & Economic Review* Vol. 8, Special Edition, pp. 1-18

Khan, N.U., Burton, B.M., Power, D.M. (2011), "Managerial Views about Dividend Policy in Pakistan", *Managerial Finance*, Vol. 37 Issue: 10 pp. 953 – 970

Khan, N.U., Burton, B.M., Power, D.M. (2013) "The signalling effect of dividends in Pakistan: executive and analyst perspectives", *Journal of Accounting in Emerging Economies*, Vol. 3 Issue: 1, pp.47 – 64

Khan, N.U., Burton, B.M., Power, D.M. (2016) "The Share Price Behaviours around Dividend Announcements in Pakistan" *Afro-Asian J. of Finance and Accounting*, Vol.6, No.4, pp.351 - 373

Hajieh, H. (2014). Market efficiency and volatility in an Islamic financial market interpreted from a behavioural finance perspective: a case study of the Amman stock exchange. *Working paper*.

Hameed, A., & Ashraf, H. (2006). Stock Market Volatility and Weak-form Efficiency:Evidence from an Emerging Market. *The Pakistan Development Review, 45* (3): 1029–1040.

Haque, A., Liu, H. C. (2011). Testing the Week Form Efficiency of Pakistani Stock Market (2000-2010). *International Journal of Economics and Financial Issues*, *1*(4), 153.

Jabeen, M., & Ismail, A. (2015). Exchange rate volatility and market efficiency:Evidence from paksitan stock exchange. *The journal of economic corporation and development*, *36*(3), 67-92.

Jagannathan, U. K. (2014). Testing For The Weak Form Of Market Efficiency In Bombay Stock Exchange. *SAS TECH journal*, Volume 13, Issue 1.

Lai, K. S., & Lai, M. (1991). A cointegration test for market efficiency. *Journal of Futures Markets*, *11*(5), 567-575.

Laws, J., & Thompson, J. (2004). The efficiency of financial futuress markets:Tests of Prediction Accuracy. *European Journal of Operational Research*, *155* (3),284–298.

Malkiel, B. G. (2003). The Efficient Market Hypothesis and its critics. *Journal of economic perspectives*, *17*(1), 59-82.

Malik, I. R., & Khan, S. (2012). Gains and costs associated with introduction of equity derivatives: Empirical evidence from Pakistan. In *eighth conference of Asia-Pacific Association of Derivatives (APAD)*.

Malik, I. R., & Shah, A. (2017). The impact of single stock futures on market efficiency and volatility: A dynamic CAPM approach. *Emerging Markets Finance and Trade*, *53*(2), 339-356.

Malik, I. R. and A. Shah (2018). Single Stock Futures and their Impact on Risk Characteristics of the Underlying Stocks: A Dynamic CAPM Approach, South Asian Journal of Management Sciences. 12(1), 46-6.

Malik, I. R., Shah, A., & Khan, S. (2019). Gains and Costs Associated with Resumption of SSFs with Stringent Regulations: A Modified Approach. *Pakistan Business Review (PBR)*, *20*(4).

McKenzie, R. C., Rafferty, T. S., & Beckett, G. J. (1998). Selenium: an essential element for immune function. *Immunology today*, *19*(8), 342-345.

Nilsson, M. (2009). Is the Oil Market Efficient? *Department of Social Science*, *11*(5), 27-75

Nisar, S., &Hanif, M. (2013). Testing weak form of Efficient Market Hypothesis: Empirical evidence from South-Asia. *World Applied Sciences Journal*, *17*(4), 414-427.

Oduncu, A. (2009). The Effects of Currency Futuress Trading on Turkish Currency Market. *JEL CLASSIFICATION*, 76 (7), 34-87.

Rajput, N., Kakkar, R., & Batra, G. (2013). Futures trading and its impact on volatility of Indian Stock Market. *Asian Journal of Finance & Accounting*, *5*(1), 289-305.

Rehman, S., &Rizwan, Q. M. (2014). Testing weak form efficiency of capital markets: A case of Pakistan. *International Journal of Research Studies in Management*, *3*(1), 65-73.

Rossi, M., & Gunardi, A. (2018). Efficient market hypothesis and stock market anomalies: Empirical evidence in four European countries. *Journal of Applied Business Research*, *34*(1), 183.

Shah, A., & Malik, I. R. (2017). The impact of single stock futuress on market efficiency and volatility: A dynamic CAPM approach. *Emerging market finance and trade*, *24*(2), 121-142.

Shah, F. and Khan, N. U. (2019), "Initiation of Futures Contracts and Volatility–Using Firm-Level Data in Pakistan" *City University Research Journal*, 9(3), 462-472

Shah, S. A. A., Khan, N. U., & Ali, M. D. (2020), "Testing Market Efficiency, Predictability and Profitability at Pakistan Stock Exchange Using Firm-level Data" *Journal of Accounting and Finance in Emerging Economies*, *6*(1), 1-10

Smith, G., & Ryoo, H. (2003). Variance ratio tests of the random walk hypothesis for European. *The European Journal of Finance*, *9*(3), 290-300.

Tarique, J., & Malik, I. R. (2020). The Impact of Index Futures on Market Efficiency and Volatility of Spot Index: An Empirical Evidence from Emerging Economies (BRICS). *This paper is published in*, *5*(2), 1-17.

Tutek, H., & Baklaci, H. (2006). The impact of the futuress market on spot volatility: an analysis in Turkish derivatives markets. *WIT Transactions on Modelling and Simulation*, Vol 43.

Zang, L. (1999). Research on stock Index futures. *The Journal of Futuress Markets*, *15*(8), 390-434.

Zhong, M., Darrat, A. F., & Otero, R. (2004). Price discovery and volatility spillovers in Index futuress markets: Some evidence from Mexico. *Journal of Banking & Finance*, *28*(12), 3037-3054.

Zonghao, C. (2014). Index futuress trading, spot volatility and market effciency. *Journal of Management Sciences*, *1*(2), 73-112