Testing Weak Form Efficiency of Asian Markets: An Empirical Evaluation

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Abstract

Why do we care whether stock market is efficient or not? Stock market acts as an intermediary to channelize funds from potential investors to firms who invest funds in projects to earn profit. Efficient market is a necessary prerequisite when it is desired that funds should be allocated to the highest-valued projects. Extant literature is dominated by the idea that Asian markets are efficient in weak form. The present paper attempts to examine the relevancy of efficient market hypothesis in five Asian markets for a period of fourteen years including the financial crisis. To test the weak form of market efficiency, the study analyses the pattern of short-term movements in the stock market returns and attempts to identify the underlying process generating those returns. Thus if any pattern is observed then the market is said to be inefficient and it can be inferred that the returns do not follow a random walk process. The study provide empirical evidence that Asian markets are not weak form efficient during the fourteen year period including financial crisis.

Keywords: Asian Markets, Market returns, Regression model, Weak Form Efficiency.

JEL Classification: G10, G14, G15

Introduction

To the extent that capital markets are efficient, it makes it easier for the firm to raise capital as the market performs the price discovery process i.e. it determines the price at which market players are willing to buy claims on firm's future cash flows. This is possible only if stock prices are efficiently priced i.e. reflect the fundamental value of future discounted cash flows. When the general perception prevailing in the market is that prices accurately reflect information, participation cost will be low and stock market will successfully carry out its function of channelling resources to productive projects. Extant literature is dominated by the idea that Asian markets are efficient in weak form. This gives us the opportunity to explore this phenomenon with more stringent tests. Fama has talked about three types of efficiency weak, semi strong and strong. However, these efficiencies are on continuum, which means that initially weak form of efficiency is achieved thereafter semi strong and finally strong form is achieved. Therefore, firstly weak form efficiency needs to be achieved then subsequently we can talk about further efficiencies. Previous studies mostly stress that weak form of efficiency is achieved in Asian markets, but it have also been witnessed particularly during crisis period that markets get

swept away. If markets are swaying away particularly to one direction without any fundamental reason then efficiency hypothesis need to be examined. If in our study we are able to conclude that markets are not efficient in weak form then it would indicate the fact that markets are not operating at its fundamental level. This implies that there exists opportunities for making profit but this opportunity can only be captured by big players and as a consequence markets are not good for small investors. In our study attempted examine that whether past prices are significant in explaining future prices through general linear regression model. Previous studies has been conducted by using special models like Runs test, Unit Root test, Variance Ratio test etic but these models have certain limitations and can be used in particular circumstances however we are conducting our analysis by using general regression model which is the most powerful general test.

Review of Literature

The extent of literature is voluminous with respect to the studies concerning investigation of capital market efficiency in individual (both developed and developing) as well as in group of countries. Researchers have used different test procedures to examine the efficient market hypothesis and reported contradictory results. Some studies accepted the weak form efficiency while others refuted it. Thus, the controversy on the efficiency of emerging and developed capital markets continues over a period of time. Therefore, it is imperative to examine the issue in context of the financial crisis as well. Historically EMH is closely linked with random walk model which firstly was proposed by a French mathematician Louis Bachelier (1900) wherein he proposed that past, present and discounted future events are reflected in market price, but often show no apparent relation to price fluctuations. Supporting evidence from other time series was provided by Working (1934) and from U.S. stock prices by Cowles and Jones (1937). These studies found that the serial correlation between successive price changes was essentially zero. Friedman (1953) explained that the EMH can be made only in the situations where the trading strategies of investors are correlated. Kendall (1953) analysed 22 price-series at weekly intervals and found to that they were essentially random. Also, he was the first to analyse time dependence of the empirical variance (non-stationarity).

Fama (1970) summarises the early random walk literature, his own contributions and other studies contained in the historical sequence of prices concludes that "the results are strongly in support" of the weak form of market efficiency. He concedes, however, that "much remains to be done", and indeed, Fama (1991) subsequently returned with a reinterpretation of the efficient markets hypothesis in the light of subsequent research. Jensen (1978) defines market efficiency as a market is said to be efficient with respect to information set θt, if it is impossible to make economic profits by trading on the basis of information set θt. Richardson (1993) showed that the patterns in serial-correlation estimates and their magnitude observed in previous studies should be expected under the null hypothesis of serial independence. Fama (1998) surveys the considerable body of empirical work on "event studies" that seeks to determine if stock prices respond efficiently to information. The "events" include such announcements as earnings surprises, stock splits, dividend actions, mergers, new exchange listings, and initial public offerings.

Chan. et al. (1992), found weak form efficient Asian Markets and U.S. markets, individually and jointly in the long run whereas Dickinson and Muragu (1994) provide substantiation of weak form of market efficiency in Nairobi Stock Exchange Yalawar (1988) studied the month end closing prices of 122 stocks listed on the BSE during the period 1963-82 using the non-parametric tests i.e. Spearman's rank correlation test and found the behaviour of stock prices to be random i.e. weak form efficient. Khan et al. (2011) investigated the weak form market efficiency of Indian Capital Market based on the indices of two major stock exchanges of India viz. Nifty and Sensex whereas Srinivasan (2010) examined the random walk hypothesis to determine the validity of weak-form efficiency for two major stock markets in India by using daily observations over the span from 1st July 1997 to 31st August 2010, comprising a total of 3244 observations. The random walk hypothesis is examined using unit root tests namely, Augmented Dickey-Fuller (1979) test and the Phillips-Perron (1988) test and concluded that the null hypothesis of unit root is convincingly rejected in the case of stock market returns of two major indices, viz. Nifty and Sensex. The empirical results do not support the validity of weak-form efficiency for stock market returns of Indian stock exchanges. Laurence (1986) tested the weak-form efficiency in the Kuala Lumpur Stock Exchange (KLSE) and the Stock Exchange of Singapore (SES), using both auto-correlation and run tests and concluded that both markets are not efficient in the weak-form. On the contrary, a study conducted by Barnes (1986) on the Kuala Lumpur Stock Exchange (KLSE) concluded that the market is efficient in the weak-form. Urrutia (1995) employs both variance ratio of Lo and runs tests to investigate random walk for the four Latin American emerging markets and concluded that the four Latin American emerging stock markets are weak- form efficient.

Extant Literature supports both the view that is markets are efficient weak form and markets are not efficient in weak form. However majority of literature is of the view that markets are efficient in weak form. Thus these obvious and vacuous viewpoints in respect of weak form efficiency of market raise our interest to explore this phenomenon more deeply by applying general regression techniques thoroughly over Asian stock markets.

Objectives

The primary objective of our paper is to check the efficiency of selected Asian Markets in its weak form

- To verify weak form of market efficiency of five Asian Markets under study.

- To trace whether markets are efficient in weak form during different time lags in different Asian countries.

- To test whether market are behaving similarly in different time lags in different Asian countries in terms of weak form of market efficiency.

Data And Methodology

As we are interested in examining weak form of efficiency in the market over different time lags so first issue is about identifying different time lags. These lags can be suitably identified with the help of graphs. Hence we shall use graphs to identify different time lags for a country. After identifying lag, we shall proceed to determine that whether a country's stock market is weak form efficient in these different time lags. Hence our main emphasis is to find out autocorrelation in data under study. For finding out autocorrelation in data under study we shall use general linear regression model. The main intent behind using general linear regression model is that it is most strong general test with few limitations. Hence in our general linear regression model we shall relate residuals of past returns with future return where residuals of past returns will be independent variables and residual of future return will be dependent variable. We are interested in comparison of residuals, not returns, since by taking residual we can eliminate any growth rate which is prevalent during that period. Secondly to further enhance our study we shall take residuals of past returns with lag four or five. In this way our model will present more accurate results. If residuals of past returns turn out to be significant for explaining residual of future return then this would be a proof of existence of autocorrelation and then we can suitably claim that stock markets are not efficient in weak form. As our study is basically a time series analysis and data is monthly adjusted closing indices of the representative stock market of concerned country. We have collected data for 14 years that is from 2000 to 2014 since scale of globalisation has increased during this period. Firstly we have determined the representative stock market of each country and then proceeded to collect the data from representative stock market or from Yahoo finance.

Use Of Regression Method To Examine Efficiency

In the present study we are only interested in analysing that whether past return affects future returns. For this purpose we have related residuals of past returns with future returns. Therefore, we have adjusted for two factors namely:

1. Any growth rate occurring during the period.

2. By comparing residuals we have also eliminated the average growth rate for the period under study.

To further enhance our method we have considered residuals of past returns for at least four or five lags. So in this way we are not interested in heteroscedastic assumption of regression model. Even if this assumption gets violated it will not affect the biasedness of estimated value of the parameter associated with independent variable. By applying this model we can know that whether the independent variables are significant or not, even in presence of heteroscedasticity. The presence of multi collinearity can be detected if model has higher R value but no significant independent variables. This situation would be dealt when we get higher value of R but no significant independent variable. However in our study if multi collinearity exists then it will further strengthen our study hence we should not be concerned with multi collinearity. In our study we are basically concerned with testing auto collinearity and we have tried to eliminate the auto collinearity from our model as discussed above. Even after this if there is presence of auto collinearity then it would further strengthen our case.

Formulation Of Hypothesis

For the purpose of achieving above objectives, the following hypotheses and sub-Hypotheses are tested:

1. **Null Hypothesis:** H0p1: Asian stock markets are efficient in weak form.

   Alternate Hypothesis: H1p1: Asian stock markets are not efficient in weak form.

2. **Null Hypothesis:** H0p2: Asian stock markets are efficient in weak form in different time lags.

3. **Null Hypothesis:** H0p3: Asian stock markets behave similar in different time lags in terms of weak form of market efficiency.

Model In General Form And In The Form Of Estimated Equation

In weak form of efficiency future prices cannot be predicted from past prices. Hence in our analysis we will estimate a function that can be used to predict future prices from past prices. Our function is as follows:

Residual (t) = F [Residual (t-1), Residual (t-2), Residual (t-3), Residual (t-4), Residual (t-5)]

Residual (t) is calculated as Return at t period –Average Return during the period under study

Return at t period is calculated as natural log (price at t /price at t-1)

Average return is estimated by determining instantaneous growth rate of period under study whereas instantaneous

growth rate is slope coefficient of natural logs of prices under study.

Model in Form of Estimated Equation

To use the above general model of regression analysis and empirical testing we have to estimate this model in the form of an equation.

$$RSDt = b0 + b1\ RSDt\text{-}1 + b2RSDt\text{-}2 + b3RSDt\text{-}3 + b4RSDt\text{-}4 + b5RSDt\text{-}5$$

Table: 1 Legend for Estimated Equation

Identifiers	Explanation
RSD_t	Residual for the time period t
RSD_{t-1}	Residual for the time period with lag 1
RSD_{t-2}	Residual for the time period with lag 2
RSD_{t-3}	Residual for the time period with lag 3
RSD_{t-4}	Residual for the time period with lag 4
RSD_{t-5}	Residual for the time period with lag 5
b_0	Constant term
b_1	Effect of per unit change in residual of time lag 1 on residual of current time period when other residual variables of various lags are constant.
b_2	Effect of per unit change in residual of time lag 2 on residual of current time period when other residual variables of various lags are constant.
b_3	Effect of per unit change in residual of time lag 3 on residual of current time period when other residual variables of various lags are constant.
b_4	Effect of per unit change in residual of time lag 4 on residual of current time period when other residual variables of various lags are constant.
b_5	Effect of per unit change in residual of time lag 5 on residual of current time period when other residual variables of various lags are constant.

Time Series Analysis

For the purpose of study we have selected following major stock market indices of five Asian countries:

• BSE 30 as representative of Indian Stock Market.

• KSE100 as representative of Pakistani Stock Market.

• SZSE Composite as representative of Chinese Stock Market.

• NIKKEI 225 as representative of Japanese Stock Market.

• KLSE Composite as representative of Malaysian Stock Market.

The five Asian countries were selected for analysis on the basis of GDP at purchasing power parity 2010. China and Japan are top two countries in North East Asia whereas India and Pakistan are top two countries in South Asia. Also the selected countries are amongst top 12 in Asia in terms of GDP at purchasing power parity. China ranked first, India second and Japan third in terms of GDP at purchasing power parity in 2010 amongst Asian countries.[1]

Sample Size and Data Collection

The sample includes monthly closing price of individual indices for 14 years i.e. from 2000-2014 of five Asian countries: India (Bombay Stock Exchange)[2], Japan (Tokyo Stock Exchange)[3], China (Shenzhen Stock Exchange)[4], Pakistan (Karachi Stock Exchange)[5] and Malaysia (Kualalumpur Stock Exchange)[6], which has been collected from yahoo finance or their Stock Exchange websites. The present study is conducted using monthly closing prices of selected stock markets for a period of 14 years i.e. from 1st April 2000 to 30th September 2014. The period beginning 2000 is considered in the study as although the WTO regime was initiated in 1995 its gradual impact was witnessed only after year 2000. During this phase, the financial markets started to integrate at global level. Many new financial instruments such as ADRs, GDRs, Euro bonds etc. were introduced during this period. Firms besides diversifying its operations within domestic borders also started to diversify its ownership across borders. Thus the firms also started to get their securities listed globally. As securities were now listed at global level more efficiency was automatically expected. Also the corporate governance framework strengthened during this period. After obtaining the data we plot the prices of indices with respect to time so as to identify different breaks of each country under study. Breaks have been identified with the help of abnormal movement in the stock prices whether upward or downward. If upward growth stop suddenly and down movement starts then period of continuous upward growth would be a break which would finish at the period where downward movement starts and vice versa. After identifying the breaks we studied the weak form of market efficiency within each phase of stock market.

Empirical Analysis And Results

The data collected empirically has been analysed using model discussed in the methodology. The model is then run on SPSS for linear regression, to determine the value of

parameters of associated lagged time variables. To analyse whether the impact of explanatory variables is significant or not, a criteria is chosen. Any independent variable is significant or not for explaining the dependent variable depends upon the value of parameter estimated for that independent variable. To analyse the significance of value of parameter in our study we have adopted the following criteria

P – Value associated with parameter

    Magnitude of Parameter

P – Value Associated with Parameter

P – Value tells us about the significance level of the parameter. However they are inversely related that is if the p – value of parameter is low then significance level is high and vice versa. In our study we have determined the cut – off for p –value to be 0.05. If p – value is less than or equal to 0.05 then we have considered it. However if p – value is more than 0.05 then we have ignored it.

Regression Analysis of Asian Stock Exchanges

For determining the efficiencies in stock markets the total time period is divided into different time periods so as to achieve better results. Period include many ups and downs such as period of boom, crisis, recovery, etc. It is not possible to get proper results if time period of study is not divided into suitable breaks since markets react differently in different time frame.

India

We have identified the following three phases in India on the basis of stock prices movements:

Pre-crisis period (April 2000 – December 2007)

During crisis period (January 2008 – February 2009)

Post crisis period (March 2009 –September 2014)

Separate regression analysis was conducted for these different time periods and the results are as follows:

Table: 2 Summary of Indian stock markets during different periods

Period	R	R Square	Adjusted R Square	Std. Error of the Estimate
Pre-Crisis	.598	.358	.318	.00493068
During Crisis	.823	.677	.516	.00564593
Post Crisis	.555	.308	.246	.00272225

Source: Statistical testing

Table: 3 Value of parameters, t-statistics and P value of India during different periods

Period		Value of parameter	Std. Error of the value of parameter	t-statistics	P value
Pre-Crisis	bo(Constant)	-.008	.003	-3.203	.002
	b1 (lag 1)	.715	.109	6.551	.000
	b2 (lag 2)	-.413	.130	-3.169	.002
	b3 (lag 3)	.326	.135	2.422	.018
	b4 (lag 4)	-.306	.132	-2.317	.023
	b5 (lag 5)	.188	.109	1.719	.089
During Crisis	b0(Constant)	.049	.032	1.506	.183
	b1	.640	.342	1.869	.111
	b2	-.902	.267	-3.375	.015
	b3	.376	.363	1.035	.341
Post Crisis	b0(Constant)	-.003		-3.532	.001
	b1	.551	.555	4.150	.000
	b2	-.541	-.547	-3.725	.000
	b3	.524	.572	3.668	.001
	b4	-.294	-.412	-2.239	.029
	b5	.130	.195	1.269	.210

Source: Statistical testing

It can be seen from table 3 that stock market return in any month is dependent upon previous month with magnitude of 0.715. If the return in the stock market at any time is highly dependent upon any of the previous time periods then such markets are not efficient even in weak form. Another inefficiency which is noted here is about the order of occurrence of sign of parameters in an exactly alternative way (i.e. first positive than negative). Hence it can be deduced that India markets were not efficient during pre–crisis period. From the above table 3 it can be found that stock market return in any month in the stock market is highly dependent upon return with time period of lag 2 but in negative direction. The magnitude is also very high (that is 0.902). Hence, assumption of weak form of efficiency is violated during crisis period also. Stock market return in any time period depends upon return of previous time periods with lag 1, lag 2 and lag 3 respectively. Hence in post – crisis period also market are not efficient even in weak form. The empirical analysis of Indian stock market shows that it is not efficient during all time periods. This clearly tells us about the inefficiency of Indian stock markets. It becomes evident that in Indian stock markets arbitrage process is not working and as a consequence anybody having large fund in their possession can dominate Indian stock markets. For the very same reasoning Foreign Institutional Investors (FII) are able to dominate Indian market. They can take stock market up to very high level as seen during pre- crisis period and they can also take it down to very low level as observed during crisis. If markets are not efficient even in weak form then it is highly unreliable and risky markets.

Pakistan

We have identified following three time periods in Pakistan, Pre- crisis period (April 2000 – March 2008), During crisis period (April 2008 –February 2009) and Post crisis period (March 2009 –September 2014). Separate regression analysis for different time periods has been conducted and the results are as follows:

Table: 4 Value of parameters, t-statistics and P value of Pakistan

Period	Model	Value of parameter	Std. Error of the value of parameter	t statistics	P value
Pre- Crisis	bo(Constant)	-.032	.007	-4.259	.000
	b1 (lag 1)	-.082	.109	-.755	.452
	b2 (lag 2)	-.087	.109	-.798	.427
	b3 (lag 3)	.000	.109	-.003	.997
	b4 (lag 4)	-.043	.109	-.398	.692
	b5 (lag 5)	.051	.103	.498	.620
During Crisis	(Constant)	.282	.119	2.381	.098
	lag1	-.450	.463	-.973	.402
	lag2	-.841	.451	-1.865	.159
	lag3	-1.071	.865	-1.238	.304
Post Crisis	(Constant)	-.027	.007	-4.051	.000
	lag1	-.092	.130	-.710	.481
	lag2	-.239	.131	-1.825	.073
	lag3	.000	.135	.001	.999
	lag4	-.138	.130	-1.060	.294
	lag5	.033	.131	.251	.803

Source: Statistical testing

It can be seen from above table 4 that stock market return in any month is independent of previous month with magnitude of less than 0.5 and p value less than 0.05. If the return in the stock market in any time is independent of the previous time periods then such markets are efficient in weak form. Another efficiency that is noted here is that there is no order in the occurrence of sign of parameters. Hence it can be deduced that Pakistan markets were efficient during pre–crisis period.

In this case R value is on higher side but there are no significant independent variables. This is case of multi collinearity. In this case any of the independent variable may be significant but we cannot detect that due to presence of multi collinearity. To detect the significant variable we dropped out residual of lag1 from our model and there after we obtained the following results. Now it can be seen that although R square value has dropped but P value of lag 2 has become relatively significant (although not very high) hence

it can be deduced that Pakistan markets were not highly efficient during crisis period. Return in any time period does not depend upon return of previous time periods. Hence in post – crisis period also market are efficient even in weak form.

Pakistan stock market is efficient in mostly all time periods. This clearly tells us that Pakistan stock market is efficient in weak form.

China

We have identified following four time periods in China, April 2000 – June 2005, Pre -crisis period (July 2005 – August 2007), During crisis period (September 2007 – September 2008)

Post crisis period (October 2008 – September 2014). We have conducted separate regression analysis for these different time periods and the results are as follows:

Table: 5 Value of parameters, t-statistics and P value of Shenzhen stock exchange

Period	Model	Value of parameter	Std. Error of the value of parameter	t-statistics	P value
April 2000 – June 2005	bo(Constant)	.014	.004	3.574	.001
	b1 (lag 1)	-.093	.139	-.667	.508
	b2 (lag 2)	.022	.140	.156	.876
	b3 (lag 3)	-.111	.140	-.792	.432
	b4 (lag 4)	-.066	.143	-.465	.644
	b5 (lag 5)	-.114	.146	-.778	.440
Pre –Crisis	bo(Constant)	-.055	.028	-1.940	.073
	b1 (lag 1)	.286	.272	1.053	.310
	b2 (lag 2)	-.501	.301	-1.665	.118
	b3 (lag 3)	.504	.357	1.411	.180
	b4 (lag 4)	-.218	.374	-.582	.570
	b5 (lag 5)	-.010	.329	-.029	.977
During Crisis	bo(Constant)	-.236	.000	-80324940.931	.000
	b1 (lag 1)	1.000	.000	102510483.027	.000
Post Crisis	bo(Constant)	-.001	.001	-.705	.483
	b1 (lag 1)	-.068	.125	-.542	.590
	b2 (lag 2)	-.086	.119	-.722	.473
	b3 (lag 3)	.047	.118	.400	.690
	b4 (lag 4)	.239	.118	2.025	.047
	b5 (lag 5)	-.034	.121	-.285	.777

Source: Statistical testing

It can be seen from above table 5 that return in any month in the stock market is independent of previous month with magnitude of less than 0.5 and P value greater than 0.05. If the return in the stock market in any time is highly independent of the previous time periods then such markets are efficient in weak form. The order of occurrence of sign of parameters is not following any pattern. Hence it can be deduced that Shenzhen markets were efficient during this period. It can be seen from above table 5 that return in any

month in the stock market is independent of previous month because both the conditions are not satisfied. If the return in the stock market in any time is highly independent of the previous time periods then such markets are efficient in weak form. Hence it can be deduced that Shenzhen markets were efficient during pre–crisis period. It is the perfect case of inefficiency since all the conditions are perfectly met. The conditions are:

R square is equal to one

Value of the parameter associated with residual of lag1 is equal to one

P value is equal to zero

Hence Shenzhen market is inefficient in weak form during–crisis period.

Shenzhen markets were efficient during post-crisis period as return in any month in the stock market is independent of previous month with magnitude of less than 0.5 and p value greater than .05. Moreover there is no order of occurrence of

signs also. Hence Shenzhen markets were efficient during post-crisis period. Shenzhen stock market is efficient during all time periods except during crisis period and during crisis we observed that there exists perfect case of inefficiency.

Malaysia

We have identified following three time periods in Kuala Lumpur:Pre - crisis period (April 2000 –September 2007), During crisis period (October 2007 – September 2008), Post crisis period (October 2008 – September 2014), We have conducted separate regression analysis for these different time periods and the results are as follows:

Table: 6 Value of parameters, t-statistics and P value of Malaysian Markets

Period	Model	Value of parameter	Std. Error of the value of parameter	t-statistics	P value
Pre-Crisis	bo(Constant)	-.005	.002	-3.142	.002
	b1 (lag 1)	.071	.107	.662	.510
	b2 (lag 2)	-.099	.109	-.911	.365
	b3 (lag 3)	-.029	.109	-.261	.795
	b4 (lag 4)	-.016	.107	-.154	.878
	b5 (lag 5)	.196	.106	1.855	.067
During Crisis	bo(Constant)	.043	.031	1.355	.247
	b1 (lag 1)	-.378	.563	-.672	.539
	b2 (lag 2)	-.242	.499	-.485	.653
	b3 (lag 3)	.004	.470	.009	.993
Post Crisis	bo(Constant)	-.006	.002	-2.989	.004
	b1 (lag 1)	-.015	.128	-.113	.910
	b2 (lag 2)	.092	.128	.723	.473
	b3 (lag 3)	.071	.128	.552	.583
	b3 (lag 4)	-.067	.128	-.522	.603
	b3 (lag 5)	.079	.128	.614	.542

Source: Statistical testing

It is one of the cases where market is efficient during all time periods. Kuala Lumpur markets were efficient during all periods since both the conditions are not satisfied for any of the periods. Moreover there is no observed pattern for order of occurrence of signs.

Japan

We have identified following time periods in Japan: April 2000 – February 2003, Pre-crisis period (March 2003 – May 2007), During crisis period (June 2007 - January 2009), Post crisis period (February 2009 - July 2012), August 2012 - September 2014. We have conducted separate regression analysis for these different time periods and the results are as follows:

Table: 7 Value of Parameters, t–statistic and p–value of Japan Market

Period	Model	Value of parameter	Std. Error of the value of parameter	t-statistics	P value
April 2000 to February 2003	bo(Constant)	.024	.009	2.691	.013
	b1 (lag 1)	.049	.205	.242	.811
	b2 (lag 2)	-.100	.193	-.519	.608
	b3 (lag 3)	-.068	.188	-.361	.721
	b4 (lag 4)	-.233	.190	-1.228	.232
	b5 (lag 5)	.016	.194	.083	.935

Pre-crisis period	bo(Constant)	-.014	.004	-4.037	.000
	b1 (lag 1)	-.051	.151	-.341	.735
	b2 (lag 2)	.140	.149	.938	.354
	b3 (lag 3)	.098	.148	.663	.511
	b4 (lag 4)	-.033	.144	-.232	.817
	b5 (lag 5)	-.253	.141	-1.790	.081
During Crisis	bo(Constant)	.077	.036	2.136	.065
	b1 (lag 1)	.093	.318	.294	.776
	b2 (lag 2)	-.323	.318	-1.016	.339
	b3 (lag 3)	.046	.330	.138	.893
	b4 (lag 4)	-.061	.484	-.127	.902
	b5 (lag 5)	-.870	.540	-1.611	.146
Post crisis	bo(Constant)	.003	.002	2.153	.039
	b1 (lag 1)	-.158	.178	-.888	.381
	b2 (lag 2)	-.142	.177	-.803	.428
	b3 (lag 3)	-.044	.182	-.244	.809
	b4 (lag 4)	-.149	.178	-.838	.409
	b5 (lag 5)	-.137	.177	-.776	.444
August 2012 - September 2014	bo(Constant)	-.017	.009	-2.003	.065
	b1 (lag 1)	.098	.264	.370	.717
	b2 (lag 2)	-.029	.248	-.116	.909
	b3 (lag 3)	.258	.242	1.062	.306
	b4 (lag 4)	-.213	.249	-.856	.407
	b5 (lag 5)	.010	.247	.040	.969

Source: Statistical testing

Like Kualalumpur Stock Market this is also one of the cases where market is efficient in all the time periods. Japan stock market is efficient during all time periods. Return in any month in the stock market is independent of previous month with magnitude of less than 0.5 and P value more than 0.05. Hence it can be deduced that Japan markets were efficient in all the periods.

Conclusion

After reviewing and analysing the result of this study we arrived at following findings:

Contrary to the notion that Asian Markets are efficient in weak form the findings of our study shows that Asian Markets are not efficient in weak form. As markets are not efficient in weak form so arbitrage process is not working sufficiently. As arbitrage process is not working sufficiently so there exists a possibility of making abnormal gains in share market. However these abnormal gains can be achieved if one person has sufficient resources. For the similar reason FII and hedge funds are able to dominate any stock market in Asia. As markets are not efficient in weak form this implies that market would be deviating from its fundamentals. This means small investors should remain away from these markets and only invest through financial intermediaries with good credit ratings. Our study provide empirical evidence that Asian markets are not weak form

efficient. Hence we may conclude that arbitrage process is not working sufficiently and there exists a possibility of making abnormal gains in stock market by the people who have sufficient resources, for example FIIs. Since markets are not weak form efficient it implies that market would be deviating from its fundamentals. Hence small investors should remain away from these markets and are suggested to make investment through financial intermediaries with good credit rating and perhaps with strong market analysis.

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Endnotes:

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