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# **SOCIAL AND MANAGEMENT RESEARCH JOURNAL**

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# **Inter-relationship between Performance of Bursa Malaysia and Foreign Stock Markets**

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## **ABSTRACT**

*This paper explores the general perception that the Malaysian stock market is influenced by leading overseas stock markets. Employing correlation analysis comparison was made between the performance of Bursa Malaysia's Composite Index and six stock market indices namely Straits Times Index, Hang Seng Index, Nikkei 225 Stock Average, Australia All Ordinaries Index, Dow Jones Industrial Average Index and Financial Times 100 Index. This study also seeks to determine if there is any significant stability of correlations over time. These indices were studied over a period of fifteen years from 1 January 1990 to 31 December 2004, beginning with the cessation of trading of Malaysian shares on the Singapore stock exchange, which is synonymous with the pre-Asian financial crisis period, the crisis period and a post crisis period of almost five years. The study found that the daily returns of the Composite Index over the period is positively co-related with the foreign indices indicating that the markets were moving in the same direction, in other words there is interdependency between the stock markets. However, the low to moderate correlation refutes the belief that the Malaysian stock market is influenced by the performance of the major stock markets. The study also found that generally the correlations are unstable over time.*

**Keywords:** *Composite Index, Correlation Analysis, foreign assets*

## **Introduction**

Investment theory states that it is almost impossible to beat the market as share prices incorporate all relevant information. Eugene Fama who formulated the Efficient Market Hypothesis (EMH) in the 1960s stated that all publicly available information is reflected in securities prices and so fundamental analysis is of no use. This question about market efficiency has led to many studies attempting to explain whether markets are in fact efficient and if so to what extent. The globalization of information means that the performance of one stock market will affect another especially if the stocks of a corporation are traded in both the markets. In addition these countries may have trade relations with each other and therefore one economy may affect the other and this in turn will be reflected in the stock market of the respective countries.

It is generally perceived that Bursa Malaysia is greatly influenced by the performance of major stock markets especially the New York, London, Hong Kong and Tokyo stock exchanges. This is reinforced by articles in most business publications that never fail to compare the performances of these stock exchanges with the performance of Bursa Malaysia (formerly known as Kuala Lumpur Stock Exchange). This was also the belief of Yong who in 1990 studied the “Inter-relatedness of Stock Market Performances” by comparing the performances of the Hong Kong, Tokyo, Sydney, London and New York with that of the Kuala Lumpur Stock Exchange.

## **Objectives of the Study**

The objective of this study is to determine whether there exists a correlation between the performance of Bursa Malaysia and selected foreign stock markets. In addition this study also attempts to examine the stability of the correlations.

## **Research Methodology**

The following stock markets are selected and their indices are used as a measure of their performance:

- Bursa Malaysia - Composite Index
- Singapore Stock Exchange - Straits Times Index
- Hong Kong Stock Exchange - Hang Seng Index
- Tokyo Stock Exchange - Nikkei 225 Stock Average
- Sydney Stock Exchange - Australia All Ordinaries Index
- New York Stock Exchange - Dow Jones Industrial Average Index
- London Stock Exchange - Financial Times 100 Index

The period of study chosen is from 1 January 1990 to 31 December 2004. The data set is developed from daily series of the selected stock market indices over the 15-year period. This study period begins early enough to include the cessation of trading of Malaysian shares on the Singapore Stock Exchange as well as to cover the Asian financial crisis period in 1997 and the recovery phase. The daily closing stock market indices are obtained from the Yahoo! Finance database, available at <http://finance.yahoo.com>. Any days where there is no trading on any one of the sample stock markets are eliminated from the database. Then daily returns for each of the sample stock market indices are calculated and the final data set consists of 3,242 observations covering a period of 15 years for each of the seven indices. In order to ensure that the research objectives are achieved, the following hypotheses are developed.

Hypothesis 1 : The average daily return of one stock market is the same as that of another stock market.

Hypothesis 2 : The correlation coefficients between the returns of Composite Index and each of the selected foreign stock market indices are zero.

Hypothesis 3 : The correlation coefficients between the returns of Composite Index and each of the selected foreign stock market indices between two sub-periods are the same.

## **Data Analysis**

The data analysis is divided into two parts, the descriptive statistics and inferential statistics. Descriptive Statistics are used to show the mean, standard deviation, maximum and minimum value of the stock market returns. The inferential statistics used are paired sample t-test, bivariate correlation analysis, and Z-statistics.

The daily returns on the seven stock indices are calculated using the following equation:

$$r_{i,t} = \frac{I_{i,t} - I_{i,t-1}}{I_{i,t-1}}$$

where  $r_{i,t}$  = Daily rate of return for stock market  $i$  in day  $t$   
 $I_{i,t}$  = Closing stock index for stock market  $i$  at day  $t$

The stock markets performance is measured using the percentage changes in the indices because percentage changes reflect the relative changes. Furthermore, percentage changes are more meaningful in making comparisons between different stock markets.

All the indices employed in the current study are not converted to a common currency for a number of reasons. First, the conversion of the respective foreign

stock market index to a common currency might distort the possible impact of local economic conditions and domestic economic policy especially if the spot exchange rate used to convert to common currency is also influenced by local conditions and policy (Leong and Felmingham, 2003). Similarly, Yong (1990) is of the opinion that the returns from stock market are affected by other factors such as dividends, taxes, transaction costs and inflation rates in the respective countries. Hence, the purpose of a study on the correlation between a stock market and another is still valid even though no adjustment is made for currency exchange rate.

Secondly, according to Grubel and Fadner (1971), the effect of exchange rate on the stability of the value of foreign assets is theoretically indeterminate. Their findings showed that there was no statistical difference between the standard deviation of returns from holding foreign assets with and without exchange rate adjustments. They also found that there was no statistical difference between the correlation of returns between US and foreign assets with and without exchange rate adjustment. Finally, the question of which currency should be used as the common one is still unresolved (Leong and Felmingham, 2003).

Using the time-series returns, the correlation coefficients between the daily returns of Composite Index and each of the selected foreign stock market indices are computed for the whole study period from 1990 to 2004 and also for sub-periods. The sub-periods are before the Asian financial crisis, during the crisis and after the crisis. The period before the Asian financial crisis is from 1 January 1990 to 30 June 1997. The crisis period covers 1 July 1997 to 24 March 1999. Finally, the after crisis period is from 25 March 1999 to 31 December 2004.

The purpose of doing the analyses for the sub-periods is to find out whether or not there exists any stability in correlation between Composite Index and the selected indices over the study period.

Z-statistic is used to test whether the correlations between two sub-periods are equal. The Z-statistic (Maldonado and Saunders, 1981) is calculated using the following formula:

$$Z = \frac{X_1^{ij} - X_2^{ij}}{\sqrt{\frac{1}{N_1 - 3} + \frac{1}{N_2 - 3}}}$$

Where  $X_k^{ij} = \ln \sqrt{\frac{1 + \rho_{ij}}{1 - \rho_{ij}}}$

is a Fisher transformation of the correlation coefficients in sub-periods one ( $k = 1$ ) and two ( $k = 2$ ).

$\rho_{ij}$  = correlation coefficient of market  $i$  and market  $j$  for sub-period  $k$ .

$N_k$  = Number of observations in sub-period  $k$ .

The null hypothesis that the correlation coefficients between the returns of Composite Index and each of the selected foreign stock market indices between two sub-periods are the same is rejected at 5 percent level of significance if the calculated Z-statistic is greater than or equal to 1.96 and less than or equal to -1.96.

## Findings and Discussion of the Results

Paired Sample T-Test is employed to determine whether there is significant difference between the average daily return of Composite Index and the other foreign markets and amongst the other markets.

Table 1: T-Values of Paired Sample T-Test (1990-2004)

	Composite Index	Straight Times Index	Hang Seng	Nikkei	Australian All Ordinary	Dow Jones	Financial Times
Composite Index	.000 (1.000)						
Straight Times Index	.502 (.616)	.000 (1.000)					
Hang Seng	.958 (.338)	1.694 (.090)	.000 (1.000)				
Nikkei	-1.481 (.139)	-1.307 (.191)	2.483* (.013)	.000 (1.000)			
Australian All Ordinary	-.100 (.921)	.478 (.632)	1.230 (.219)	1.892 (.059)	.000 (1.000)		
Dow Jones	.463 (.643)	1.069 (.285)	.504 (.614)	2.211* (.027)	-.858 (.391)	.000 (1.000)	
Financial Times	-.176 (.860)	.295 (.768)	1.198 (.231)	1.583 (.114)	.136 (.892)	.983 (.326)	.000 (1.000)

Note 1: P-values in parentheses.

Note 2: \* indicates significantly different at 5 percent level.

Table 1 reports the results of the Paired Sample T-Test for the whole period of study. The results reveal that there is no significant difference between the average daily return of Composite Index and the other foreign indices. In addition, there is also no significant difference among the average daily return of the other indices except between Nikkei and Hang Seng and between Nikkei and Dow Jones. In other words, there is a significant difference between the average daily return of these 2 pairs of stock markets at 5 percent level of significance.

## Correlation Coefficients For The Whole Study Period

Table 2: Correlation Coefficients Among the Selected Stock Indices (1990-2004)

	Composite Index	Straight Times Index	Hang Seng	Nikkei	Australian All Ordinary	Dow Jones	Financial Times
Composite Index	1.000						
Straight Times Index	.494** (.000)	1.000					
Hang Seng	.404** (.000)	.553** (.000)	1.000				
Nikkei	.215** (.000)	.338** (.000)	.332** (.000)	1.000			
Australian All Ordinary	.286** (.000)	.406** (.000)	.425** (.000)	.361** (.000)	1.000		
Dow Jones	.124** (.000)	.221** (.000)	.202** (.000)	.168** (.000)	.200** (.000)	1.000	
Financial Times	.160** (.000)	.284** (.000)	.315** (.000)	.266** (.000)	.270** (.000)	.396** (.000)	1.000

Note 1: P-values in parentheses.

Note 2: \*\* Correlation Coefficient is significant at 1 percent level.

The correlation coefficient matrix in Table 2 depicts the correlation results for the whole study period in the form of inter-correlation among the daily returns of the sample stock markets.

All the correlation coefficients are significant at 1 percent level. This means that significant correlation exist among the stock markets. Furthermore all the correlation coefficients have positive value. This implies that these markets move in the same direction.

The Composite Index has the strongest relationship with Straits Times Index with a correlation value of 0.494. This is followed by Hang Seng with a correlation value of 0.404. Meanwhile, the relationship between Composite Index and the other indices is quite weak, i.e. between 0.16 to 0.286. The Composite Index has the weakest relationship with Financial Times (correlation coefficient of 0.16). Among all the pairs of stock market indices, Hang Seng and Straits Times Index have the highest correlation coefficient i.e. 0.553. The second and third highest correlation coefficients are between Composite Index and Straits Times Index and between Hang Seng and Australia All Ordinaries with correlation values of 0.494 and 0.425 respectively. The lowest correlation coefficient is between Composite Index and Financial Times, i.e. 0.16. Hence it

can be concluded that the correlations among these stock markets range from weak to moderate.

### Test on Stability of Correlation

Z-Statistic is calculated in order to determine whether the correlation coefficients are the same between 2 sub-periods. If the calculated Z value is greater than or equal to 1.96 and less than or equal to -1.96, then significant difference exist between the correlation coefficients of 2 sub-periods at 5 percent level.

Table 3 provides the calculated Z-Statistics for the correlation between Composite Index and the selected stock indices.

**Table 3: Calculated Z Statistics For Significant Difference of the Correlation Coefficients Among Sub-Periods between Composite Index and Various Other Market Indices**

Composite Index	Straits Times Index				Hang Seng Index				Nikkei 225 Stock Average		
	Before	During	After	1990-2004	Before	During	After	1990-2004	Before	During	After
Before	0.00	2.77*	7.95*	5.46*	0.00	-2.21*	1.58	-0.93	0.00	0.78	-0.48
During		0.00	2.38*	0.12		0.00	3.15*	1.80		0.00	-1.07
After			0.00	4.02*			0.00	2.63*			0.00
1990-2004				0.00				0.00		Financial Times 100 Index	

  

Composite Index	Australia All Ordinaries Index				Dow Jones Industrial Average Index						
	Before	During	After	1990-2004	Before	During	After	1990-2004			
Before	0.00	-0.50	-0.17	0.07	0.00	-0.41	3.03*	1.44	0.00	-1.89	4.69*
During		0.00	0.37	0.56		0.00	2.34*	1.24		0.00	4.83*
After			0.00	0.26			0.00	2.11*			0.00
1990-2004				0.00				0.00			

Note 1: \* indicates significant at 5 percent level.

According to Table 3, the correlation coefficient between Composite Index and Straits Times Index for the sub-period between before crisis and during crisis, between before crisis and after crisis and between during crisis and after crisis are significantly different.

The Z-statistics for the correlation coefficients between Composite Index and Hang Seng among the sub-periods are mixed. The result also shows that there is significant difference between the correlation coefficients of the sub-periods before crisis and during crisis as well as between during crisis and after crisis.

The correlation coefficients between Composite Index and Nikkei are not significantly different among all of the sub-periods. The results between Composite Index and Australia All Ordinaries are also likewise. As for Dow Jones and Financial Times there is a significant difference for the sub-periods before the crisis and after the crisis and during and after the crisis. The calculated Z-statistics showed mixed results. Thus, it appears that the correlation among the markets under consideration is not stable from one sub period to another.

## **Conclusion**

The purpose of this study is to determine whether correlation exists between the movement of Composite Index and selected foreign stock indices. It also examines whether the correlations are stable over time.

Several conclusions can be drawn from the results of the study. The study found that there is no significant difference among the average daily returns of the sample stock indices. This implies that on average the returns obtained from investment in any of these markets are almost the same. In other words, diversification into foreign stock markets will not result in different returns compared with investing in any one of the stock markets.

The current study has shown that there is positive low to moderate correlation between the performance of Composite Index and the performance of the selected foreign indices, namely Straits Times, Hang Seng, Nikkei, Australia All Ordinaries, Dow Jones and Financial Times. Hence it can be concluded that the findings confirm the claim that there is interdependency between stock markets. This could be due to free flow of information across national boundaries resulting stock markets of different countries being affected by common factors or events. However the low to moderate correlation refutes the belief that the performance of Bursa Malaysia is greatly influenced by the performance of the major stock markets in the world.

Although the selected stock markets performances are positively correlated, it appears that the correlations are not strong. Therefore, there is still benefit (though limited) from diversification by including stock from these different markets in a portfolio. This is because as long as the correlation between two stock markets is less than 1, diversification can reduce the risk of investment.

Bursa Malaysia is quite efficient in responding to the past and public information on the movement of foreign stock markets. In other words Bursa Malaysia is efficient in semi-strong form. Furthermore, the study also found that in general the correlations are not stable from one year to another. Thus, it is quite hard to construct a trading model based on past movements in foreign stock indices.

## **Limitations of the Study**

The results of the current study and the conclusions drawn are subject to several limitations. First, his tudy only covers the stock markets of seven countries. They are Malaysia, Singapore, Hong Kong, Japan, Australia, United States and United Kingdom.

Then the correlation test and other analyses performed in this study are based on daily returns only. It does not include returns based on longer holding periods such as weekly, monthly or yearly.

## **Future Research**

The limitations open up opportunities for future research. As this study only includes stock markets of certain well-developed countries, it is suggested that future studies should add more countries such as New Zealand and South Korea. Apart from developed countries, less-developed countries stock markets such as other South East Asian countries might have impact on the performance of Bursa Malaysia. Since this study only uses daily returns, perhaps future research can employ returns of longer investment holding periods such as weekly, monthly, quarterly or even yearly. This may provide further insight on this area of research.

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