

ASEAN market integration: the impact on capital flow and cost of capital

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Abstract

The purpose of this research is as follows: 1) to analyze and compare the impact of the Stock Exchange of Thailand Index (SET Index) on the capital flow and cost of capital before and after the ASEAN market integration; 2) to study the relationship between the SET Index and the indices of the ASEAN stock exchanges before and after the ASEAN market integration; and 3) to study the relationship between the SET Index and the index of the MSCI World and the index of the Tokyo Stock Exchange before and after the ASEAN market integration in the form of time series data. The results of the data analysis by Vector Auto Regression and Vector Error Correction Model showed that the SET Index could significantly explain the change in capital flow and cost of capital. In contrast, the integration of the ASEAN stock exchanges was not found to affect the ability to explain the change of capital flow or the cost of capital. The finding concerning the relationship between the SET Index and the other ASEAN indices (including the MSCI World Index and the Tokyo Stock Index) showed that after the ASEAN market integration, the SET Index was able to explain the change of every index in the region when compared to the change in the period before the ASEAN market integration.

Keywords: stock market integration, SET Index, ASEAN Index,
cost of capital, capital flow



Introduction

Presently, the global economic systems are highly interconnected and volatile. Capital flows from investors all over the world in order to seek suitable returns. Investment in the stock market is one of the options that investors from all over the world are interested in. However, when focusing on the Stock Exchange of Thailand, it shows the value of 2% on the ASIA stock exchange (excluded Japan stock market) with a total value of 4th rank in ASEAN and 28th rank on the World Federation of Exchanges (WFE). However, focusing on large and highly-liquid securities, it has been found that the Stock Exchange of Thailand is second ranked after Singapore (the Stock Exchange of Thailand, 2012). In addition, collaboration will make the ASEAN Stock Exchange become 8th according to the WFE in value.

There have existed recently mergers or market integration in different regions of the world. For example, in 2006 the NYSE merged with Euronext, which was a "merger of equals". Cooperation among stock markets in the Nordic-Baltic Region (NOREX Alliance) on the development of a connection system for stock exchanges resulted in more effective securities trading. Each stock exchange revised its trading and subscription criteria for consistency. Further, collaboration amongst the Santiago (Chile), Lima (Peru), and Bogota (Columbia) stock exchanges created an Integrated Latin American Market (MILA) in 2010 so as to connect their trading systems. Later, by the end of 2011, the Mexican stock market announced joining the MILA. The stock exchanges in the BRICS countries worked together on cross-listing derivatives in 2011 in order to use the equity index reference. That was scheduled to trade in June 2012. Furthermore, in 2014, the European Commission launched the

Capital Markets Union (CMU), which aimed to integrate all Europe's capital markets into the single market by 2019, which would enhance the capital mobilization in European Union.

Three stock exchanges have begun their pilot ASEAN market integration, namely Malaysian, Singapore, and Thailand. Trading through the ASEAN link, which connected the transactions among the exchanges set to begin in the third quarter of 2012. Furthermore, In 2016 the ASEAN Exchanges collaboration ushered in the introduction of the ASEAN 5 FTSE4Good ESG Index and new MSCI ASEAN centric indices

In addition, the ASEAN market integration also has helped to minimize the volatility of the returns in the stock markets in developing countries, which are usually more fluctuating than the volatility of the global markets. This has helped to normalize higher expected returns in the stock markets in the developed countries. This is in line with Errunza's 2001 findings—that the cost of capital or expected returns in integrated markets is lower than those in unintegrated ones. Furthermore, Arshanapalli et al. (1995) and Masih and Masih (1997, 1999, 2001) found the evidence of cointegration among the emerging and developed countries. In addition, Coffee 2002 and Stulz (1999) and Karolyi (2006) noticed that cross-listing improves the visibility and domestic market opening to foreign investors, Cavoli, McIver, and Nowland (2011) found that cross-listing contributed to a higher chance of securities purchasing, and Janakiraman and Lamba (1998) revealed that return on investment in the US stock exchange affects the stock markets in the Asia-Pacific region (Australia, Hong Kong, Japan, New Zealand, Singapore, Indonesia, Malaysia, and Thailand). Aloui (2014) found that the

co-movement and dependence among Gulf Cooperation Council (GCC) Countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and United Arab Emirates) stock markets was increased and it may impact to the multi-country portfolio's value at risk levels.

Errunza (2001) summarized that market integration causes an increase of the cost of capital. Bekaert and Harvey (2000), Henry (2000), Kim and Singal (2000), together with Edison and Warnock (2003), found that market integration results in a decrease in the rate of the dividend yield with statistical significance. During the periods of pre- and post-liberalization, Bekaert and Harvey (2003) concluded that expected returns or the cost of capital would fall but only in the market integration of developed nations. Errunza and Miller (2000) studied a sample of 32 countries and found that market integration reduces the cost of capital with statistical significance. Lins, Strickland, and Zenner (2005) concluded that market integration renders a significant drop in the cost of capital.

Tesar and Werner (1994) along with Brennan and Cao (1997) concluded that inflows or outflows of capital between countries affect the rise or fall of share prices. Clark and Berko (1997), as well as Froot, O'Connell, and Seasholes (2001), found that after the inflow of capital, share prices rise. Bekaert, Harvey, and Lumsdaine (2002) summarized that market integration results in an increase of capital flows; and after market integration, the dividend yield would be shrunk and the cost of capital would permanently fall. Edison and Warnock (2003) maintained that investors would invest more in other stock markets excluding investments in cross-listed firms. Chari and Henry (2001), Patro and Wald (2005), Lins et al. (2005), Errunza and Miller (2000), and Karolyi

(1998) also advocated that financial liberalization results in a lower cost of capital or expected return on securities in stock markets. This may encourage more global private investments and capital flow.

Therefore, it is imperative to study the impacts caused by the Stock Exchange of Thailand's association with the ASEAN exchanges regarding capital flow and the cost of capital, the direction of changes, as well as the volatility of the Stock Exchange of Thailand compared with other ASEAN stock exchanges and major global market.

Research Objectives

1. To analyze and compare the impact of the Stock Exchange of Thailand Index (SET Index) on the capital flow and cost of capital before and after the ASEAN market integration
2. To study the relationship between the SET Index and the indices of the ASEAN stock exchanges before and after ASEAN market integration
3. To study the relationship between the SET Index and the index of the MSCI World and the index of the Tokyo Stock Exchange before and after ASEAN market integration.

Research Methodology

This research is quantitative. Secondary data were collected and analyzed. The data were public, including the stock indices of the ASEAN stock exchanges and other leading stock exchanges of WFE.

The samples in this study are the stock exchanges in ASEAN that participate in financial liberalization, both stock exchanges with an ASEAN Trade Link in 2012, including the Stock Exchange of Thailand (SET), Singapore Exchange Limited (SGX), and Bursa Malaysia (BM),

and the stock exchanges that did not participate in the ASEAN trade link in 2012, including the Vietnam Ho Chi Minh Stock Index (VNI), the Indonesia Stock Exchange (IDX), and the Philippine Stock Exchange (PSE). Moreover, the study also includes world-leading stock exchanges, for example the MSCI World Index World, which is a representative stock exchange in 23 developed countries, stock exchanges in the USA, and the Tokyo Stock Exchange (TSE).

The samples of leading stock exchanges were selected by using purposive sampling, including the MSCI World Index, the Tokyo Stock Exchange, and the Stock Exchanges in USA, while, the samples for the study of effect on the capital flow and the cost of capital came from the SET Index were the capital flow and the cost of capital of the Stock Exchange of Thailand.

Data collection was performed by collecting data on a daily basis from the following sources.

Stock exchange index data were gathered from daily index published through Datastream by Thomson Reuters. Two phases of data collection were for example, phase 1: the period of 5 years prior to entering the ASEAN Exchanges by the Stock Exchange of Thailand (October 15, 2007-October 14, 2012). Phase 2 was the period that covered 3 years 11 months after joining the ASEAN Exchanges by the Stock Exchange of Thailand (October 15, 2012-August 31, 2016).

The Thailand MSCI daily total return index (MSCI DTR TH) data and foreign portfolio investment (FPI) data for the study of cost of capital and capital flow were collected from published databases via Datastream by Thomson Reuters and databases from website: www.ceicdata.com, respectively. Data collection included 2 phases. Phase 1

encompassed the period of 5 years before the Stock Exchange of Thailand joining the ASEAN Exchanges (October 15, 2007-October 14, 2012). Phase 2 corresponded to 3 years and 11 months period following the ASEAN Exchanges integration by the Stock Exchange of Thailand (October 15, 2012-August 31, 2016).

Data Analysis: In conducting this research, the author converted the variables into the form of a natural logarithm and performed data analysis using the following steps.

1. Unit Root Analysis was carried out. Given that this study involved time series data, the variables normally correlated in the same direction. A test of stationary of data was also required according to the assumption that mean, variance, and covariance do not change with time. The Augmented Dickey-Fuller (ADF) test was executed since it is acceptable and popular in the study of time series data.

A stationary test of variables was conducted for the order of integration equivalent to 0 or I (0) or at level. In the event that non-stationary variables are at the confidence levels of 90, 95, and 99 percent due to the statistics being over the critical value, additional data tests must be performed for the order of integration equal to 1 or I (1) or first difference in order to find out the stationary of the analyzed variables. The results were employed for co-integration analysis in the next step.

2. Co-Integration Analysis was employed for the hypothesis test in order to find the correlation among, first, the SET Index, the ASEAN Stock Exchanges Indexes, the MSCI World Index, and the Tokyo Stock Exchange Index. Additionally, the correlation was sought between the SET Index and the cost of capital as well as the SET Index and capital flow to examine if there was any co-integration. The study period was divided into 2 phases: pre- and post- ASEAN market integration. The

reason for using co-integration analysis was due to the nature of time series data and consideration on a stationary in this research. Co-integration analysis using Johansen's method therefore was more appropriate than correlation analysis. Co-

integration analysis was used on multiple variables in the form of an equation. Since the variables in this study contained 9 stock exchange indexes, they could be analyzed for correlation concurrently through the following principal statistics.

Trance Test

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^n \ln(1 - \hat{\lambda}_i); r=0, 1, \dots, n-1$$

Where;

H0: $r = 0$	against	$H_1 : r > 0$
H0: $r \leq 1$	against	$H_1 : r > 1$ up until
H0: $r \geq n$	against	$H_1 : r > n$

Maximum Eigenvalue

$$\lambda_{max}(r, r + 1) = -T \ln(1 - \hat{\lambda}_{r+1}); r=0, 1, \dots, n-1$$

Where;

H0: $r = 0$	against	$H_1 : r \geq 1$
H0: $r = 1$	against	$H_1 : r \geq 2$
H0: $\text{rank}(\Pi) = r$	against	$H_1 : \text{rank}(\Pi) \geq r+1$

3. Vector Auto Regressive (VAR) was analyzed to forecast the effect of the SET Index on capital flow and the cost of capital. The two phases of the study were the pre- and post-ASEAN market integration periods according to the researcher's calculation.

VAR is a popular model used in the study of time series with data in the past or lagged variables. One past variable was considered for its effect on current variables. The stationary of the variable was checked before testing in order to

avoid a spurious relationship problem. The results could then be analyzed. The VAR model can be used to study and explain the casual relationship of variables. Studies by Sims (1980) and Litterman (1979) indicated that unlike others, forecasting using a VAR model can show the relationships among endogenous variables. In addition, the VAR model can also be used on multivariate time-series data that simultaneously consider several endogenous variables within a single equation. The following is the unrestricted VAR: VAR (p) equation.

$$y_t = v + A_1 y_{t-1} + A_2 y_{t-2} + \dots + A_p y_{t-p} + \epsilon_t$$

4. The Vector Error Correction Model (VECM) was used to forecast the short-term adjustment in order to arrive at the co-integration of the SET Index on capital flow and the cost of capital. Pre- and post-ASEAN Market Integration were the 2 phases of this analysis.

VECM is regarded as a restricted VAR model commonly used to study the co-integration of time series variables. An adjustment model for co-integration must be considered when the short term adjustment of each variable occurs. The following is the equation.

$$\Delta y_t = v + \Pi y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-1} + \epsilon_t$$

Where

$$\Pi = \sum_{j=1}^{j=p} A_j - I_k, \text{ and } \Gamma_i = \sum_{j=i+1}^{j=p} A_j$$

And

$$y_t = \text{K x 1 Vector Vector of Variable}$$

$$v = \text{K x 1 Vector of Parameter}$$

$$\epsilon_t = \text{K x 1 Vector Disturbance}$$

The VEC model when integrated with constant and linear trend can be:

$$\Delta y_t = \alpha(\beta' y_{t-1} + \mu + \rho t) + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + \gamma + \tau t + \epsilon_t$$

Where

$$\mu, \rho = r \times 1 \text{ Vector of Parameter}$$

$$\gamma, \tau = K \times 1 \text{ Vector of Parameter}$$

Research Result

Unit Root Test Results

The study of the impact on capital flow and cost of capital, the results of the unit root analysis of the SET Index, the cost of capital and the capital flow showed that only the capital flow time series data with a stationary at the confidence level of 99% because the statistics were over the critical value (ADF test). The stationary model was

a pure random walk with a drift and linear time trend.

The SET Index and the cost of capital showed time series data with a stationary at the confidence level of 99% at an integrated of order 1 because the statistics were over the critical value (ADF test). The stationary model was a pure random walk.

In the correlation study of the time series data of 9 market indices, the results of the unit root analysis of the 9 market indices data indicated that only the Vietnam Ho

Chi Minh Stock Index (VNi) showed time series data with a stationary at the confidence level of 99% because the statistics were over the critical value (ADF test). The stationary model was a pure random walk with a drift and linear time trend.

While the indices of 8 markets, consist of, 1) the Stock the Exchange of Thailand Index (SETi), 2) the MSCI World Index, 3) the S&P

500 Index, 4) the Tokyo Stock Price Index (TOPIX), 5) the Philippines Stock Exchange Index (PSEi), 6) the Strait Times Index (STi), 7) the Kuala Lumpur Composite Index (FBM KLCi), and 8) the Jakarta Stock Exchange Composite Index (JCI), showed time series data with a stationary at the confidence level of 99% at an integrated of order 1 because the statistics were over the critical value (ADF test). The stationary model was a pure random walk.

Results of vector auto regression and vector error correction between SET Index, capital flow, and between SET Index cost of capital

Analysis of the relationships between the SET Index and capital flow

$$\begin{aligned} \text{LnFPI_Inflow} &= 0.353697 + 0.53337 (\text{LnFPI_Inflow}_{t-1})^* + 0.082533 \\ &(\text{LnMSCI_DRT_TH}_{t-1}) + 0.459123 (\text{LnSET}_{t-1})^* + 0.02942 (\text{Dummy}) \\ &\quad (4.1 \text{ VAR}) \end{aligned}$$

$$\begin{aligned} \Delta \text{LnFPI_Inflow}_t &= -0.33519 - 1.211414(\Delta \text{LnSET}_t) \\ &\quad (4.2 \text{ Co-integration}) \end{aligned}$$

$$\begin{aligned} \Delta \text{FPI_Inflow}_t &= -0.007285 - 0.113747 \Delta (\text{LnFPI_Inflow}_{t-1}) + 1.012836 \Delta \\ &(\text{LnMSCI_DRT_TH}_{t-1}) + 0.761133 \Delta (\text{LnSET}_{t-1}) - 0.016222 (\text{Dummy}_t) - \\ &0.424276 \hat{\varepsilon}_t \quad (4.3 \text{ VECM}) \end{aligned}$$

With regard to co-integration analysis, in the long run, there is a significantly-negative correlation between the SET Index and the capital flow invested in the portfolio. In other words, a 1% increase in the Thailand Stock Exchange index leads to a considerable decrease in the cost of funds invested in the portfolio by 1.211414%, on average, *ceteris paribus* (Equation 4.2). In addition, the vector error correction analysis showed that, in the short run, if the capital flow diverts from its

long-run equilibrium, it will return to such equilibrium, at a 0.424276 speed of adjustment per period (Equation 4.3).

However, the collaboration of ASEAN market integration had no impact on the cost of capital because the co-efficiency of the DUMMY variable, which represented the period of ASEAN market integration, had no significance in the explanation of the capital flow (Equation 4.1).

Analysis of the relationships between SET Index and cost of capital

$$\begin{aligned} \text{LnMSCI_DRT_TH} &= 0.033803 + 1.011826 (\text{LnMSCI_DRT_TH-1})^* + 0.002129 \\ & (\text{Ln_FPI_Inflow-1})^* - 0.018633 (\text{LnSET-1})^* + 0.002317 (\text{Dummy}) \end{aligned}$$

(4.4 VAR)

$$\Delta \text{LnMSCI_DRT_TH} = 2.116916 - 1.244967(\Delta \text{LnSET}_t)$$

(4.5 Co-integration)

$$\begin{aligned} \Delta \text{LnMSCI_DRT_TH}_t &= -0.000103 - 0.134613 \Delta (\text{LnMSCI_DRT_TH}_{t-1}) + 0.001378 \Delta \\ & (\text{LnFPI_Inflow}_{t-1}) - 0.134607 \Delta (\text{LnSET}_{t-1}) + 0.000903 \\ & (\text{Dummy}_t) + 0.014887 \hat{\epsilon}_t \end{aligned}$$

(4.6 VECM)

With regard to co-integration analysis, in the long run, there is a significant negative correlation between the SET Index and the cost of capital invested in the portfolio. In other words, a 1% increase in the Thailand Stock Exchange index leads to considerable decrease in cost of funds invested in the portfolio by 1.244967% on average, *ceteris paribus* (Equation 4.5). In addition, the vector error correction analysis showed that, in the short run, if the cost of capital diverts from its long run equilibrium, it will return such equilibrium, at a 0.0148872 speed of adjustment per period (Equation 4.6).

However, the collaboration of ASEAN market integration had no impact on the cost of capital because the co-efficiency of the DUMMY variable had no significance in the explanation of the cost of capital (Equation 4.4).

Result of vector auto regression and vector error correction between SET Index and other Indices

Pre-ASEAN Market Integration

The analysis of the optimal lag length was determined by using different criteria, comprised of the Akaike Information Criterion (AIC) and Schwarz Information (SC), and the results showed that the optimal lag length for this study was 2.

In order to determine number of co-integration vectors, Johansen's method provides two different likelihood ratio tests, the trace test and the maximum eigenvalue test. The results showed that 4 sets of relationships ($r=3$) failed to reject the null hypothesis of no co-integration between the indices because the tests were less than significant at 0.05 as seen in Table 1.

Table 1 Test results of the long-term relationship between SET Index and other indices

	Trace	Max-Eigen	Critical Value (5%)		Prob.	
	Statistic	Statistic	Trace	Max-Eigen	Trace	Max-Eigen
r=0	865.3216*	699.2454*	159.5297	52.36261	0	0.0001
r=1	166.0762*	49.35652	125.6154	46.23142	0	0.0225
r=2	116.7196*	39.83771	95.75366	40.07757	0.0009	0.0532
r=3	76.88192*	30.31635	69.81889	33.87687	0.0122	0.1256

Vector auto regression and vector error correction analysis between the SET Index and other indices.

$$\begin{aligned} \text{LN_SET_PRE} = & -0.151532 + 0.896969\text{LN_SET_PRE}(-1)^* + 0.044215\text{LN_SET_PRE}(-2) + \\ & 0.084281\text{LN_SP500_PRE}(-1) - 0.057298\text{LN_SP500_PRE}(-2) - \\ & 0.039856\text{LN_TOPIX_PRE}(-1) + 0.033782\text{LN_TOPIX_PRE}(-2) + \\ & 0.039141\text{LN_JCI_PRE}(-1) - 0.017947\text{LN_JCI_PRE}(-2) - \\ & 0.108172\text{LN_STI_PRE}(-1)^* + 0.115663\text{LN_STI_PRE}(-2)^* + \\ & 0.052876\text{LN_KLCI_PRE}(-1) - 0.040996\text{LN_KLCI_PRE}(-2) + \\ & 0.109382\text{LN_PSEI_PRE}(-1)^* - 0.098175\text{LN_PSEI_PRE}(-2)^* + \\ & 0.036802\text{LN_VNI_PRE}(-1)^* - 0.043735\text{LN_VNI_PRE}(-2)^* + \\ & 0.42111\text{LN_MSCI_PRE}^* - 0.207212\text{LN_MSCI_PRE}(-1)^* - \\ & 0.20886\text{LN_MSCI_PRE}(-2)^* \end{aligned}$$

(4.7 VAR)

Equation 4.7 signified that at time t-1 the Philippines Stock Exchange Index (PSEi) could explain the SET Index movement at time t in a positive direction. while the MSCI World Index and the Strait Times Index (STi) at time t-1 could explain the SET Index movement at time t in a negative direction.

Moreover, at time t-2 the Strait Times Index (STi) could explain the SET Index movement at time t in a positive direction. while the Philippines Stock Exchange Index (PSEi), the Vietnam Ho Chi Minh Stock Index (VNi), and the MSCI World Index could explain the SET Index movement at time t in a negative direction.

From an analysis of the SET Index and other stock exchanges' indices before ASEAN Market Integration it can be concluded that the ASEAN Stock Exchange before the integration indicated that among the Strait Times Index (STi), the

Philippines Stock Exchange Index (PSEi), the Vietnam Ho Chi Minh Stock Index (VNi), and the MSCI World Index, in explaining the SET Index movement at time t-1, only the Philippines Stock Exchange Index (PSEi) could explain the SET Index movement in a positive direction, while the rest could explain it in a negative direction. Moreover, at time t-2 only the Strait Times Index (STi) could explain the SET Index movement in a positive direction, while the rest could explain it in the negative direction.

However, the SET Index could explain the movements of the Strait Times Index (STi) and the Tokyo Stock Price Index (TOPIX) only.

The vector error correction results before the ASEAN market integration can be concluded as follows:

Table 2 Results of vector error correction before ASEAN market integration

Indices	Co-integration	Speed of adjustment
LN_SET_PRE	✓	0.04392
LN_SP500_PRE	✓	0.0149
LN_TOPIX_PRE	✓	0.01709
LN_JCI_PRE	✓	0.02759
LN_STI_PRE	X	-
LN_KLCI_PRE	X	-
LN_PSEI_PRE	X	-
LN_VNI_PRE	X	-

Table 2 shows that prior to the ASEAN Market Integration, the SET Index, S&P 500, the Tokyo Stock Price Index (TOPIX), and the Jakarta Stock Exchange Composite Index (JCI) were out of co-integration, while they rebounded to co-integration at a velocity of 0.04392, 0.0149, 0.01709, and 0.2759 per period, respectively. In other words, that was the speed of adjustment to co-integration in the short term.

Post-ASEAN Market Integration

The analysis of the optimal lag length was

determined by using different criteria, comprised of the Akaike Information Criterion (AIC) and Schwarz Information (SC), and the results showed that the optimal lag length for this study was 1.

The results of Johansen's method showed that 2 sets of relationships ($r=1$) failed to reject the null hypothesis of no co-integration between the indices because the tests were less than significant at 0.05 as seen in Table 3.

Table 3 Test of long-term relationships between SET Index and other indices

	Trace	Max-Eigen	Critical Value (5%)		Prob.	
	Statistic	Statistic	Trace	Max-Eigen	Trace	Max-Eigen
r=0	487.8527*	343.5279*	159.5297	52.36261	0	0.0001
r=1	144.3249*	52.9641*	125.6154	46.23142	0.0022	0.0083
r=2	91.36075	31.1139	95.75366	40.07757	0.0966	0.3538
r=3	60.24685	26.03286	69.81889	33.87687	0.2279	0.3187

Vector auto regression and vector error correction analysis between the SET Index and other indices.

$$\begin{aligned}
 \text{LN_SET_POST} = & 0.107563 - 0.003192\text{LN_PSEI_POST}(-1) - 0.032318\text{LN_KLCI_POST}(-1)^* \\
 & + 0.974222\text{LN_SET_POST}(-1) + 0.022036\text{LN_JCI_POST}(-1)^* - \\
 & 0.014417\text{LN_SP500_POST}(-1) - 0.00985\text{LN_TOPIX_POST}(-1)^* + \\
 & 0.00324\text{LN_STI_POST}(-1) - 0.001\text{LN_VNI_POST}(-1) + \\
 & 0.453204\text{LN_MSCI_POST} - 0.409624\text{LN_MSCI_POST}(-1)^* \\
 & (4.8 \text{ VAR})
 \end{aligned}$$

Equation 4.8 signified that at time t-1 the Jakarta Stock Exchange Composite Index (JCI) could explain the SET Index movement at time t in a positive direction, while the MSCI World Index, the Tokyo Stock Price Index (TOPIX), and the Kuala Lumpur Composite Index (FBM KLCi) at time t-1 could explain the SET Index movement at time t in a negative direction.

However, the SET Index could explain the movements of all the regional indices and other leading indices, with the exception of only the S&P 500 Index, which differed from the pre-ASEAN market integration and could explain the movements of two indices only, as concluded in Table 4 and 5.

Table 4 Vector auto regression results before ASEAN market integration at t-1

Indices	Impact to SET at t-1	Sig	Impact from SET at t-1	Sig
LN_SP500_PRE(-1)	-	X	-	X
LN_TOPIX_PRE(-1)	-	X	Negative	✓
LN_JCI_PRE(-1)	-	X	-	X
LN_STI_PRE(-1)	Negative	✓	Negative	✓
LN_KLCI_PRE(-1)	-	X	-	X
LN_PSEI_PRE(-1)	Positive	✓	-	X
LN_VNI_PRE(-1)	-	X	-	X
LN_MSCI_PRE(-1)	Negative	✓	n.a.	

Table 5 Vector auto regression results after ASEAN Market Integration at t-1

Indices	Impact to SET at t-1	Sig	Impact from SET at t-1	Sig
LN_PSEI_POST(-1)	Negative	x	Positive	✓
LN_KLCI_POST(-1)	Negative	✓	Positive	✓
LN_JCI_POST(-1)	Positive	✓	Positive	✓
LN_SP500_POST(-1)	Negative	x	Positive	✓
LN_TOPIX_POST(-1)	Negative	✓	Negative	x
LN_STI_POST(-1)	Positive	x	Positive	✓
LN_VNI_POST(-1)	Negative	x	Positive	✓
LN_MSCI_POST(-1)	Negative	✓		

The vector error correction after ASEAN market integration can be concluded as follows:

Table 6 Vector error correction results after ASEAN Market Integration

Indices	Co-integration	Speed of adjustment
LN_SP500_PRE	X	-
LN_TOPIX_PRE	X	-
LN_JCI_PRE	X	-
LN_STI_PRE	X	-
LN_KLCI_PRE	✓	0.01469
LN_PSEI_PRE	✓	0.08453
LN_VNI_PRE	X	-

Table 6 shows that after the ASEAN Market Integration, only the Kuala Lumpur Composite Index (KLCI) and the Philippines Stock Exchange Index (PSEi) could back to the long run equilibrium, when there diverts from such equilibrium, with 0.01469 and 0.08453 speed of adjustments per period, respectively

Discussions and Suggestions

The research findings indicated that the SET Index had an effect on capital flow. In the short run, once capital flow is diverted from its long run equilibrium, it will return to such equilibrium at a 0.424276 speed of adjustment per period. This finding is consistent with a study by Brennan and Cao (1997), which found that the changing of stock prices resulted in the inflow and outflow of capital across borders. This is because foreign investors buy assets abroad when the returns on assets there are high and sell them when the returns on assets are low. The results are also in line with the studies by Tesar and Werner (1994) and by Froot, O'Connell, and Seasholes (2001). Furthermore, fair practice of financial supervision also yielded such results. A study of an integration of stock exchanges in regions in Europe, Asia, Canada and the U.S by Wellons (1997), which was cited in Lee's (2000) work also suggested that perfect integration should result in the same securities trading price for markets with the same characteristics of return and risk levels after adjustment of currency exchange rates. This was due to capital flow being freely executed by investors in buying securities in a country with lower prices and selling them in another country with higher prices until prices in the two countries were matched.

The research findings also indicated that the SET Index had an effect on the cost of capital. In the short run, once capital flow was out of co-integration, it rebounded to co-integration at a velocity of 0.014887 per period. This is consistent with a study of

Errunza (2001) that found market integration significantly reduced the cost of capital. Such a notion was also echoed by Bekaert and Harvey (2000), Henry (2000), Kim and Singal (2000); Edison and Warnock (2003), Errunza and Miller (2000), and Lins, Strickland, and Zenner (2005).

In addition, the research findings also suggested that pre- and post-ASEAN Market Integration had no effect on capital flow or the cost of capital. The reason was probably due to the fact that emerging markets did not benefit from investors' extensive trading. Because investments in multinational companies did not increase despite being affected, it bore no effect in domestic companies (Edison and Warnock, 2003). The ASEAN Market Integration might affect the SET Index only in the short term. This is in accordance with studies by Errunza (2001) as well as Claessens, Dooley and Werner (1995). They indicated that normally Market Integration and Money Market Integration only affects the short-term volatility of returns on securities, which is often caused by an inflow of capital. Moreover, Bekaert et al. (2002) found out that market integration and capital flow were positively correlated with a statistical significance. Further, the reduction of the dividend yield led to a permanent decrease in the cost of capital but only in the short term. This rendered the cost of capital in pre- and post-ASEAN Market Integration unchanged with a statistical significance.

The findings on the relationship between the SET Index and other market indices indicated that comparisons of the MSCI World Index, the S&P 500 Index, the Tokyo Stock Price Index (TOPIX), the Strait Times

Index (STi), and the Vietnam Ho Chi Minh Stock Index (VNi) pre- and post-ASEAN Market Integration yielded post integration market indices, including those already mentioned and those of other regional and most global leading indices, effect on the SET Index. Co-integration between the SET Index and other indices was also found. However, the co-integration among the indices tended to decrease. This is consistent with research by Bekaert, Havey, and Lundblad (2007), which revealed that, in the developing countries, the market integration did not affect the volatility of the expected return and such volatility did not affect economic growth, which is in conformance with, Wong, Penm, Terrell, and Lim (2004), who discovered that the SET Index had no correlation coefficient with the markets in the US, Japan, or the UK during the some periods. This probably was the result of the relationship between the market indices in the developing and developed countries being able to fluctuate at any time depending upon economic relationships, related rules and regulations, and foreign exchange and inter-trade. Phylaktis and Ravazzolo (2002) also found that economic cooperation affected the correlation and co-movement of market indices.

The findings on the relationship between the SET Index and the indices in ASEAN suggested that they were correlated. This idea was repeated by Chintrakarn and Komonrat (2010), who uncovered that the daily price indices of regional markets as well as world leading markets were correlated and usually moved in the same direction. Similarly, such a correlation was found to be likely to rise. Particularly after the ASEAN Market Integration, the SET Index could explain all regional indices movements

Suggestions

Based on the findings above, the effects that change of the SET Index have over capital flow, which represents transactions on the Stock Exchange of Thailand, should be brought into consideration by the Stock Exchange and the Bank of Thailand when they set a policy. The details are as follows: 1) policy to monitor and control net capital flow from the transactions in the SET to be able to maintain exchange rate stability; 2) public offering in the stock exchange of other countries with the collaboration of ASEAN stock exchanges, and 3) policy to promote the collaboration of the stock exchanges in the region. The exchange rate stability should be maintained with the coordination between involved parties to monitor and control the capital inflows and outflows from foreign investment. This should be done in the case of absolute necessity. Regarding public offering, the findings clearly indicated that the indices of the stock exchanges in the region were related to each other in the same direction. Therefore, competitiveness should be promoted in the private sector and the market should be extended to other ASEAN countries in order to reduce foreign exchange risks and to promote a good image of companies registered in Thailand, as well as to strengthen ASEAN stock exchanges. Regarding policy to promote the collaboration of the stock exchanges in the region, based on above-mentioned findings, they clearly indicate that after the ASEAN Market Integration the stock exchanges in the region became associated to each other. One index can also explain the movement in the other indices in the region significantly. The authority involved in regulating and developing the stock exchange in member countries should therefore focus on providing co-operation in order to enhance the linkages between the countries and in order to stabilize the market and to increase attractiveness for investors both inside and outside the region.



Reference

- Aloui, C., and B. Hkiri. 2014. "Co-Movements of GCC Emerging Stock Markets: New Evidence from Wavelet Coherence Analysis." *Economic Modelling* 36: 421–431.
- Arshanapalli, B., Doukas, J. & Lang, L. H. P. (1995). "Pre - and Post-October 1987 Stock Market Linkages between US and Asian Markets". *Pacific-Basin Finance Journal*, 3: 57-73.
- Bekaert, G., & Harvey, C. R. (2000). "Capital Flows and the Emerging Economies: Theory, Evidence and Controversies". Chicago: University of Chicago Press.
- Bekaert, G., & Harvey, C. R. (2003). "Emerging markets finance". *Journal of Empirical Finance*, 10: 3–55.
- Bekaert, G., & Harvey, C. R., & Lundblad, C. T. (2007). "Liquidity and Expected Returns: Lessons from Emerging Markets". *Review of Financial Studies*, 20:1783 - 1831.
- Bekaert, G., Harvey, C. R. & Lumsdaine, R. L. (2002). "The dynamics of emerging market equity flows". *Journal of International Money and Finance*, 21:295–350.
- Brennan, M. J., & Cao, H. H. (1997). "International portfolio investment flows". *Journal of Finance*, 52:1851–80.
- Chari, A., & Henry, P. B. (2001). "Stock market liberalizations and the repricing of systematic risk". *Stanford University Business School working paper*.
- Chintrakarn, P. & Komonrat, R. (2000). "Co-movements of International stock market indices and the role of foreign investors on Thailand's stock market index". *BU Academic Review*, 9 (1), 88-98.
- Claessens, S., Dooley, M. & Warner A. (1995). "Portfolio Capital Flows: Hot or Cold?" Harvard Institute for International Development, *Development Discussion Paper No. 501*
- Clark, J., & Berko, E. (1997). "Foreign investment fluctuations and emerging market stock returns: The case of Mexico". *Federal Reserve Bank of New York staff report* 24.
- Coffee, J. (2002). "Racing Towards the Top? the impact of cross-listings and stock market competition on international corporate governance". Columbia University, *Columbia Law and Economics Working Paper, No. 20*.
- Edison, H. J., & Warnock, F. E. (2003). "A simple measure of the intensity of capital controls". *Journal of Empirical Finance*, 10:81–103.
- Errunza, V. R. (2001). "Foreign portfolio equity investments, financial liberalization and economic development". *Review of International Economics*, 9:703–726.
- Errunza, V. R., & Miller, D. (2000). "Market segmentation and the cost of capital in international equity markets". *Journal of Financial and Quantitative Analysis*, 35:577–600.
- Froot, K. A., O'Connell, P. G. J., & Seasholes, M. S. (2001). "The portfolio flows of international investors". *Journal of Financial Economics*, 59:151–194.
- Henry, P. B. (2000). "Stock market liberalization, economic reform, and emerging market equity prices". *Journal of Finance*, 55:529–564.



- Janakiramanan, S. and Lamba, A. S. (1998). "An Empirical Examination of Linkages Between Pacific-Basin Stock Markets". *Journal of International Financial Markets, Institutions and Money*, 8: 155-173.
- Karolyi, G. A. (1998). "Why do companies list their shares abroad? A survey of the evidence and its managerial implications". *New York University: Salomon Brothers monograph series 7*.
- Karolyi, G. A. (2006). "The World of Cross-Listings and Cross-Listings of the World: Challenging Conventional Wisdom". *Review of Finance*, 10(1): 99-152.
- Kim, H. E., & Singal, V. (2000). "Stock market openings: Experience of emerging economies". *Journal of Business*, 73:25–66.
- Kunt, A. D., & Levine, R. (1996). "Stock Markets, Corporate Finance, and Economic Growth: An Overview". *The World Bank Economic Review*, 10: 223-239
- Lee, R. (2001) "Promoting Regional Capital Market Integration". Paper prepared for the Inter-American Development Bank.
- Lins, K. V., D. Strickland., & Zenner, M. (2005). "Do non-U.S. firms issue equity on U.S. exchanges to relax capital constraints?". *Journal of Financial and Quantitative Analysis*, 40:109–133.
- Litterman, R. B. (1979) "Techniques of forecasting using vector autoregression". Federal Reserve Bank of Minneapolis, Research Department, Working paper :115.
- Masih, A., & Masih, R. (1997). "A Comparative analysis of the propagation of stock market fluctuations in alternative models of dynamic causal linkages". *Applied Financial Economics*, 7: 59-74.
- Masih, A., & Masih, R. (1999). "Are Asian stock market fluctuations due mainly to intra-regional contagion effects? Evidence based on Asian emerging stock markets". *Pacific-Basin Finance Journal*, 7: 252-82.
- Masih, A., & Masih, R. (2001). "Long and short term dynamic causal transmission amongst international stock markets". *Journal of International Money and Finance*, 20: 563-587.
- Patro, D. K., & Wald, J. K. (2005). "Firm characteristics and the impact of emerging market liberalizations". *Journal of Banking and Finance*, 29:1671–1695.
- Phylaktis, K., & Ravazzolo, F. (2002). "Measuring Financial and Economic Integration with Equity Prices in Emerging Markets", *Journal of International Money and Finance*, 21, 879-903,
- Sims, C. A. (1980) "Macroeconomics and Reality." *Econometrica* 48, no. 1: 1-48.
- Stulz, R. M., (1999). "Globalization of Equity Markets and the Cost of Capital". *NBER working paper 7021*.
- Tesar, L., & Werner, I. M. (1994). "International equity transactions and U.S. portfolio choice. In *The internationalization of equity markets*, ed. J. A. Frankel". *Chicago: University of Chicago Press*.
- The stock exchange of Thailand (2512). Asean exchanges. Retrieved from http://www.set.or.th/th/asean_exchanges/asean_exchanges.html



Wellons, P. (1997). "A Integration of Stock Exchanges in Regions in Europe, Asia, Canada and the U.S". *CAER Discussion Paper No. 14 (4/1997)*.

Wong, W. K., Penm, J., Terrell R. D., & Lim K. Y. C. (2004). "The relationship between stock markets of major developed countries and Asian emerging markets". *Journal of Applied Mathematics and Decision Sciences*, 8.4, 201-218.