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Original Article

Are Southeast Asian Stock Exchanges Integrated?

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Abstract: *The purpose of this study is to test the cointegration of stock exchanges in Southeast Asia, namely the Indonesian, Singapore, Malaysian, Thai, and Philippine Stock Exchanges, using data from January 2010 to December 2022. The study's results, as determined by the Johansen Test, which examined the number of integrated vectors at 1% and 5% significance levels, revealed five integrated vectors at both levels. These integrated vectors illustrate the presence of cointegration, or long-term equilibrium, among the Southeast Asian stock exchanges. The integration of Asian stock exchanges enables investors to diversify their portfolios across countries whose stock exchanges are the focus of this study. Future research should expand the sample of stock exchanges and examine short-term relationships between exchanges across Asia, as this study did not examine short-term relationships.*

Keywords: *ASEAN, Cointegration, Johansen Co-Integration Test.*

I. INTRODUCTION

A country's financial situation is significantly influenced by international economic conditions, particularly for developing countries. Currently, developing countries remain highly dependent on developed countries, meaning the economic conditions of developed countries have a significant impact on them. Therefore, it is no surprise that the movement of the Indonesian Stock Exchange (IDX) and other ASEAN indices closely follows the movements of developed country stock market indices.

With increasing market integration, global financial markets have become increasingly interconnected and interdependent, making changes in one country's economy inextricably linked to the economies of other countries. Rapid economic growth in Southeast Asia has led to increased integration among the countries in the region, strengthening their position in the global economy.

Capital markets play a crucial role in a country's economy, channeling funds from those who have funds to those who need them. Historically, the economic development of developed countries has been heavily supported by capital market funding. With the implementation of open economic and free market policies, coupled with rapid technological advancements, investors have easy access to capital markets worldwide. The interdependence and dynamic relationship between stock exchanges has become a research gap that has been widely studied by several researchers, including Lamba and Otchere (2001), Narayan et al. (2004), Shachmurove (2006), Zuhri and Endri (2008), and Marashdeh and Bin (2010).

Furthermore, Hendrawan and Gustyana (2010) conducted research aimed at testing whether Asian stock exchanges are integrated. By conducting the Johansen Test, which examines the number of integrated vectors at the 1% and 5% significance levels, it is found that there are 5 integrated vectors at both the 1% and 5% significance levels. These integrated vectors indicate that cointegration or long-term equilibrium existed among Asian stock exchanges during the period from January 2000 to January 2010.

Based on the description above, this research aims to examine the relationship between stock exchanges in Southeast Asia, comprising those of Indonesia, Malaysia, Singapore, Thailand, and the Philippines, using data from January 2010 to January 2022.

II. DATA AND METHODOLOGY OF RESEARCH

This study uses daily closing price data for each stock index from the Indonesia Composite Index (^IDX), Malaysia namely the Kuala Lumpur Composite Index (^KLSE), Singapore namely the Strait Times Composite Index (^STI), Thailand namely the Thailand Composite Index (^SET), and the Philippines namely the Philippines Composite Index (^PSEI), from January 1, 2010 to December 31, 2022 for 2905 days of observation.

The research methodology employed the Johansen (1988) procedure. The stage involved cointegration testing for five stock exchanges: Indonesia, Malaysia, Singapore, Thailand, and the Philippines, using the multivariate cointegration test for

the period January 1, 2010, to December 31, 2022. This technique was used to determine whether the stock exchange index variables across countries exhibit a long-term relationship.

III. RESULTS AND DISCUSSION

Table 1: Correlation Between Southeast Asian Stock Exchanges
Period of January 2010 – December 2022

Variable	IDX	KLSE	PSEI	SET	STI
IDX	1.000000	0.927172	0.902097	0.552068	0.881443
KLSE	0.927172	1.000000	0.963213	0.582671	0.926947
PSEI	0.902097	0.963213	1.000000	0.553622	0.938844
SET	0.552068	0.582671	0.553622	1.000000	0.582799
STI	0.881443	0.926947	0.938844	0.582799	1.000000

Table 1 shows the correlation matrix between stock indices on the stock exchanges of the five countries. The correlation coefficients among the five countries yielded positive results. This result indicates a strong and unidirectional correlation between the five stock exchanges. In other words, the five stock exchanges move in tandem (co-movement). Among the five stock exchanges, the highest correlation was observed between Malaysia and the Philippines, at 96.3%, while the lowest was between Indonesia and Singapore, at 55.2%.

Table 2: Stationarity Test Results At The Level
Period of January 2010 – December 2022

Variable	t-Statistic ADF	P. Value	MacKinnon t-critical value			Remark
			1%	5%	10%	
^IDX	0.1993	0.9720	-3.432	-2.8625	-2.5673	Non-Stationary
^KLSE	-0.5628	0.8741	-3.432	-2.8625	-2.5673	Non-Stationary
^STI	-1.1866	0.6951	-3.432	-2.8625	-2.5673	Non-Stationary
^SET	-2.9551	0.0351	-3.432	-2.8625	-2.5673	Non-Stationary
^PSEI	-0.7350	0.8385	-3.432	-2.8625	-2.5673	Non-Stationary

From the table 2 above, the results of the data stationarity test at the level above, either with trend and intercept or with intercept alone with lag based on the AIC (Akaike Information Criterion) criteria, the absolute value of the ADF statistic (ta) is smaller than the MacKinnon critical value for each a, so that the data is non-stationary data.

Table 3: Stationarity Test Results At *First Difference*
Period of January 2010 – December 2022

Variable	t-Statistic ADF	P. Value	MacKinnon t-critical value			Remark
			1%	5%	10%	
^IDX	-43.402	0.0001	-3.432	-2.862	-2.567	Stationary
^KLSE	-45.888	0.0001	-3.432	-2.862	-2.567	Stationary
^STI	-51.355	0.0001	-3.432	-2.862	-2.567	Stationary
^SET	-24.370	0.0000	-3.432	-2.862	-2.567	Stationary
^PSEI	-45.730	0.0001	-3.432	-2.862	-2.567	Stationary

From Table 3, the test results show that the first-difference level stationarity test produces stationary data because the absolute value of the ADF is greater than the absolute value of the MacKinnon statistic, both with trend and intercept, or with intercept alone.

Table 4: Multivariate Cointegration Test Results
Period of January 2010 – December 2022

	Eigen Value	Trace Statistic	Critical Value	
			1%	5%
None*	0.0481	471.70	210.48	197.09
At most 1*	0.0428	337.50	171.05	159.57
At most 2*	0.0347	221.15	135.32	125.64
At most 3*	0.0224	154.83	104.15	95.756
At most 4*	0.0182	92.433	77.884	69.889
At most 5	0.0086	48.478	54.650	47.813
At most 6	0.00657	25.860	35.457	29.707

At most 7	0.00372	8.6837	19.931	15.491
At most 8	3.2E-03	0.0880	6.6347	3.8416

Testing for the presence or absence of equilibrium between variables is performed by comparing the estimated trace statistic and maximum eigenvalue with their critical values at a 5% significance level. If the estimated trace statistic and maximum eigenvalue are greater than the critical value at the 5% significance level, this indicates the presence of a cointegration vector at the 5% significance level. However, if the estimated trace statistics and maximum eigenvalue are less than the critical value, it can be concluded that there is no cointegration vector.

Table 4 above shows that there are five cointegration vectors at the 1% and 5% significance levels. The estimated trace statistic and maximum eigenvalue exceed the critical value at both the 1% and 5% significance levels. This suggests the presence of long-term equilibrium on the stock exchanges of Indonesia, Malaysia, Singapore, Thailand, and the Philippines, given the presence of more than one cointegration vector.

IV. CONCLUSION

The results of the study, as indicated by the Johansen Test, which examined the number of integrated vectors at the 1% and 5% significance levels, revealed five integrated vectors at both the 1% and 5% significance levels. These integrated vectors demonstrate the existence of cointegration, or long-term equilibrium, among Southeast Asian stock exchanges from January 2010 to December 2022.

The integration of Asian stock exchanges enables investors to diversify their portfolios across countries whose stock exchanges are the focus of this study. Future research should expand the sample of stock exchanges and examine short-term relationships between exchanges across Asia, as this study did not examine short-term relationships.

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