Long-Term Relationship Analysis of Stock Exchanges in Asean, The United States of America and China

Amsal Irmalis[1], Fajri Hadi[1]
[1] Faculty of Economics, Universitas Teuku Umar
Email: amsal.irmalis@utu.ac.id

Abstract: This study examines stock market cointegration using the latest data to investigate countries with the least integrated stock market and provide the most profitable diversification opportunities. This study aims to see the cointegration of the stock market of ASEAN countries (Indonesia, Malaysia, Singapore, Thailand, Philippines, Cambodia, Vietnam and Laos) with the stock markets of more developed countries, namely the United States and China. The data used is the monthly price index of the composite stock index (Composite Index) of each country from 2012-2018. The methods used is a bivariate cointegration approach with testing using the Johansen's Test. The results of this study indicate that stock exchanges in ASEAN do not have cointegration with the stock markets of the United States and China.

Introduction

The large number of foreign investors investing in the stock exchanges of Indonesia, Malaysia, Singapore and other ASEAN countries can indirectly cause these stock exchanges to be integrated with one another. This is because foreign investors who invest have included shares listed on a stock exchange and stock exchange of another country in their portfolio so that if these investors sell shares that are in their portfolio together it can cause a movement in the stock price index and other stock exchange stock price indices and moving simultaneously either up or down. Investors who have implemented international diversification in their stock portfolios are very risky to the dangers of a monetary crisis in other countries whose shares come from the country's capital market. If a foreign country is hit by a monetary crisis which causes the country's capital market to collapse, investors who invest in that capital market will also experience losses. So, investors in investing by forming a stock portfolio consisting of domestic and foreign stocks need to pay attention to economic conditions in the capital market of the foreign country whose shares are included in the stock portfolio so as to reduce investment risk.

The role of developing countries is increasingly important in the global world, especially after regions that are considered developed such as America and Europe have shown a reduced climate of opportunities to benefit from an investment. As a result, a lot of capital has moved to developing market areas, one of which is the capital market in ASEAN with the aim of getting diversification opportunities. This can happen because it is supported by developments in communication and technology that have penetrated the world of finance and economy. Research on stock market cointegration is very important because it is a direct consequence of globalization and has important implications for investors. The main objective of this study is to examine the short-term and long-term dynamic relationships that exist among stock market indices in ASEAN and between the stock markets of ASEAN countries and the stock market indices of America and China. Another important related objective of this analysis is to illustrate the potential for diversification between stock markets in Southeast Asia by considering the effects of volatility in the US and Chinese stock markets. The results of this analysis alone will not only provide an indication of the direction of market interactions, but will provide an assessment of the interdependence between these

markets, particularly the intra-regional impact on the Southeast Asian market and with America and China. In addition, the results of this study will also prove the efficiency of these markets.

The importance of information from the results of international stock market cointegration analysis encourages many researchers to examine long-term relationships between stock market indices. Khan (2011) in his research shows that Malaysia, China and Austria are countries with the lowest sensitivity to the global economy. Yang *et al.*, (2014) found that the influence of the US, Japanese and Chinese stock markets on global stock markets, both developed stock markets and emerging market stock markets, is highly dependent on certain periods, such as crisis, pre-crisis and post-crisis periods. Hendrawan and Gustyana (2011) tested the cointegration of Asian stock exchanges and found that there was cointegration in Asian stock markets.

The domination of the world economy by two giant economies, namely China and America, makes these two countries a must for both investors and researchers and the government. Much of the investment in developing countries comes from China and America. For this reason, the market will tend to be more sensitive to the policies undertaken by these developed countries. In addition, the enmity between the two countries is like a tariff war, the chaos of international politics between the two countries is also enough to give fear to the global market. America and China are the two most powerful players in global affairs, especially in economic matters, and more importantly, their trade relations, security and other crucial relations. How they choose to cooperate and compete affects various aspects and regions. Often the US-China relationship shows complexity, presenting many critical issues that America and China and even other countries must explore together. Nishimura and Men (2010) found that the Chinese stock market has a significant influence on other G5 countries (US, UK, Germany and France). Therefore, this study wants to see how the long-term relationship between China and America is in a cointegration analysis with ASEAN countries and whether America still has a significant influence on ASEAN countries when compared to its biggest competitor, namely China.

Methods

The data used in this study are the monthly closing prices of each stock market index of ASEAN countries (^ KLCI, ^ IHSG, ^ STI, ^ PSE, ^ SET, ^ HOSE, ^ CSE and ^ LSX), United States. (^ NYA) and RRC (^ SSE) from 2012 to 2018. The closing stock price of each object or research variable is included in the time series data. The characteristics of time series data are often assumed to be non-stationary. This means a series of data that implies that the mean, variance, and covariance are not constant over time. To find out the stationarity of the data for each variable, it can be seen using a graphical plot of the share price data from each variable below or using the ADF-test. Stationary data will show fluctuations in the mean.

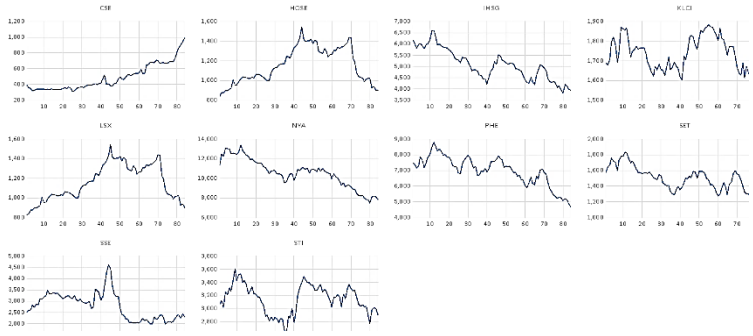

Figure 1. Stock Price Trend 2012-2018

Figure 1 shows the data series for each variable does not show fluctuations around the mean of each series, in other words, the series does not show the mean-reversion. The graph of the data shows an upward and downward trend. The chart above is obtained by processing stock price data on the stock exchanges index under study using E-views. So that the graph visualization above indicates the data is not stationary.

However, the ADF-test will provide more specific conclusions if a data series has a stationarity problem or not. To see the long-term relationship between several variables that have stationarity problems, we cannot use ordinary regression analysis such as Ordinary Least Square, unless these variables are cointegrated. In various literatures, there are two approaches, namely Eagle Granger (1987) and Johansen Test (1991) to see whether the Yt and Xt variables, for example, are co-integrated or not (Damodaran and Porter, 2009).

The ADF-test checks whether a data series is stationary at the level or first-difference. If a time series data is stationary at the level, the data is said to be Integrated of order zero I (0), if the data series is not stationary at the level but in the first difference then the data is said to be integrated of order 1 or I (1). From the graph analysis above, we assume that this study will use cointegration analysis to explain it linearly because it has a stationarity problem. Therefore, this study must meet the requirements for conducting a cointegration test with the Johansen method.

Furthermore, based on the data criteria above, the hypothesis of this study is; Ho: there is no cointegration and Ha: Ho is rejected. The Johansen test can be carried out by ensuring that the data are not stationary at the level, but at first-difference. This test will provide two test results, namely trace-statistics and maximum-eigen value with the rejection criteria at the 0.05 level. This means that Ho will be rejected if the trace-statistics and maximum-eigen value are higher than 0.05.

The interpretation of the results of the cointegration test is if there is cointegration it shows that these variables are related and can be combined linearly. If there is a shock / shock in the short term, which can affect the movement in the data series, namely the price of individual shares, the shock will converge with the timeframe. This means that the trend between these variables will show the same direction after being exposed to shocks in the economy. So that it is often called the variables as having a common trend or co-trend and this is what is called cointegration. So it can be said that the stock exchanges studied in this study have long-term relationships that might be represented in a linear model. However, cointegration analysis only provides information on whether or not there is a long-term association between

variables, but does not provide the direction of the trend. For this reason, the final interpretation of the results of the cointegration test is that the equation for cointegrating variables will be estimated using the Vector Autoregressive Model (VECM) to obtain a mathematical equation or model, if it does not have cointegration then it is enough to use ordinary VAR estimation. In this research, only cointegration tests will be carried out from all the ASEAN, United States and China stock exchanges.

Result

Table 1 below shows the results of the sationerity test using the ADF-test method, all data series on the stock exchanges show a stationarity problem at the level. This means that the monthly stock price data from 2012-2018 does not have a mean-reversion characteristic, even based on the initial indication on the graphical plot of Figure 1 showing upward and downward trends. On the other hand, all data series from the tested stock exchanges do not have stationarity problems at their 1st difference as shown in Figure 2.

In table 1 below the indication that the data has a stationarity problem can be seen from the probability value in each column. A probability value smaller than 0.05 indicates that a data series does not have a stationarity problem. And based on the observations in the table below it proves that time series data do often have stationarity problems or are also called unit root, meaning that the monthly stock price data used in this study cannot be analyzed using regular regression because each series has its own trends. each of which is not the same so that it is impossible to analyze with a straight line equation (Linear). However, the unit root of the series will disappear if after being analyzed with the Johansen test and if there is cointegration, then the stock price index data series can be analyzed linearly and are called the cointegration regression equation.

Table 1. Stationarity Test

ADF-TEST										
	SSE		*NYA*		*IHSG*		*KLCI*		*SET*	
	t-stat	*Prob*	*t-stat*	*Prob*	*t-stat*	*Prob*	*t-stat*	*Prob*	*t-stat*	*Prob*
At Level	*-0,642*	0.9736	-3,028	0.1310	-2,315	0.4209	-1,831	0.6805	-2,881	0.1744
1st Difference	*-6,232*	0.0000	-11,159	0.0000	-7,698	0.0000	-9,165	0.0000	-8	0.0000
ADF-TEST										
	PHE		*CSE*		*HOSE*		*STI*		*LSX*	
	t-stat	*Prob*	*t-stat*	*Prob*	*t-stat*	*Prob*	*t-stat*	*Prob*	*t-stat*	*Prob*
At Level	-2,146	0.5130	-0,6415	0.9736	-0,361917	0.9875	-2,149	0.5110	-0,211	0.9918
1st Difference	-8,069	0.0000	-8,791	0.0000	-8,781	0.0000	-1,011	0.0000	-8,775	0.0000

Note: *SSE (Shanghai Stock Exchange), NYA(New York Stock Exchange, IHSG(Indonesian Stock Exchange), KLCI (Kuala Lumpur Stock Exchange), SET (Stock exchange of Thailand), PSE (Philipine Stock Exchange),CSE (Cambodia Stock Exchange), HOSE (Ho Chi Min Stock Exchange), STI (Singapore Stock Exchange), LSX (Laos Stock Exchange).*

Then it can be seen in Figure 2 that shows the graphical plot pattern of the first difference stock price index data which looks fluctuating on average or is called the mean-reversion. Obviously different if we compare it to Figure 1 which shows an up and down trend. So that we can conclude that the stock index price data in this study is stationary in its first difference. This supports researchers to continue the cointegration analysis.

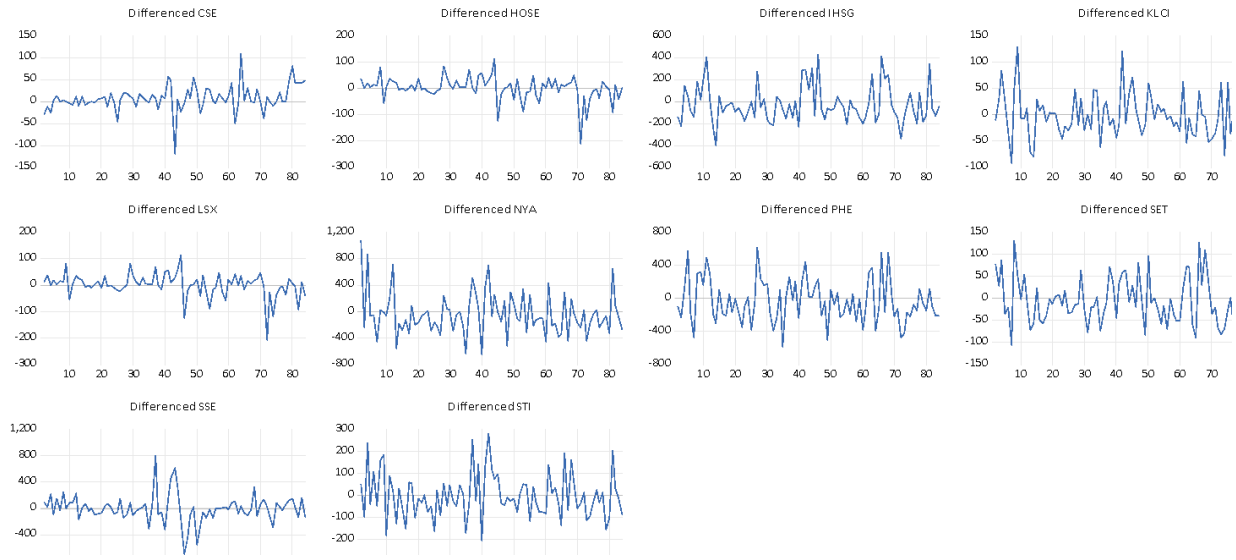

Figure 2. ***Mean Reversion of Stock Price 1st difference data***

Tabel 2. Johansen Test

Johansen Test													
		IHSG			KLCI			STI			PHE		
Hypothesized No. of Cointegration		*Trace-Stat*	*Critical value*	*Prob*	*Trace-Stat*	*Critical value*	*Prob*	*Trace-Stat*	*Critical value*	*Prob*	*Trace-Stat*	*Critical value*	*Prob*
None	NYA	12,38996	15,49471	0,1392	*6,89132*	*15,49471*	*0,5903*	*4,82999*	*15,49471*	*0,8266*	*8,60185*	*15,49471*	*0,4035*
None	SSE	*7,850172*	*15,49471*	*0,4816*	*7,23364*	*15,49471*	*0,5507*	*8,92188*	*15,49471*	*0.3726*	*6,75558*	*15,49471*	*0,6062*
Johansen Test													
		SET			HOSE			LSX			CSE		
Hypothesized No. of Cointegration		*Trace-Stat*	*Critical value*	*Prob*	*Trace-Stat*	*Critical value*	*Prob*	*Trace-Stat*	*Critical value*	*Prob*	*Trace-Stat*	*Critical value*	*Prob*
None	NYA	*7,91573*	*15,49471*	*0,4744*	*3,94686*	*15,49471*	*0,9078*	*4,84861*	*15,49471*	*0,8247*	*10,48976*	*15,49471*	*0,2449*
None	SSE	*6,58528*	*15,49471*	*0,6263*	*11,05279*	*15,49471*	*0.2083*	*13,25865*	*15,49471*	*0,1057*	*12,84097*	*15,49471*	*0,1208*

**: There is cointegration*

The results of the pairwise cointegration test between stock price indices show that there is no cointegration between the stock exchanges of ASEAN countries and the stock exchanges of the People's Republic of China and the United States. This can be seen from the value of critical value and trace-statistics, all test results show that the critical value is greater than the trace-statistics figure, which indicates there is no cointegration between stock exchanges. This means that the stock price index of the ASEAN stock exchanges does not move in the same direction. If a shock occurs in the global economy, the direction of stock movement cannot be said to have a linear relationship in the long run. Then, based on table 2 above, the null hypothesis cannot be rejected because the significance value of all tests shows a value greater than 0.05, so based on the above test results it concludes that the null hypothesis which states that there is no cointegration between stock market indices must be accepted . This result is the result expected by an investor, because the absence of cointegration will provide opportunities for investors investing in stock markets in ASEAN, the People's Republic of China and the United States to benefit from international diversification.

Discussion

The capital markets of ASEAN countries after the economic crisis in the period from 2008 to the recovery period in 2012 became the prima donna for foreign investors. The economic crisis at that time affected all countries in the world, especially those with strong export-import trade ties. The United States and the People's Republic of China have become major export and import destinations for ASEAN countries and vice versa. Not only that, the USA and China are the investment destinations for world investors, especially in the financial market sector.

However, countries in the Southeast Asian region also have attachments to investors in the world that promise high growth (Emerging markets). Consumptive behavior of the people becomes a market for foreign products. This is because although the crisis had a bad effect on big countries, it was not felt by ASEAN countries, such as Indonesia, Malaysia and Singapore and other countries. In addition to the role of the government which responded quickly to the crisis at that time, the economic strength of the community which was supported by small and medium enterprises provided strength to the economy.

The results of this study also provide evidence that the capital market in ASEAN countries is a destination for investors in shaping their portfolios. The weak cointegration of stock exchanges in ASEAN provides an opportunity to minimize the risk of the entire investor portfolio, especially for investors investing in the markets of the United States and the People's Republic of China. Where the hope is that investors can get all the benefits of investing in a large capital market such as the New York stock exchange or the Shanghai stock exchange. However, this investment requires a combination with assets that have different trends. The higher the cointegration between stock exchanges, the higher the correlation of returns on investment assets, thereby reducing the opportunity for investors to gain profits and minimize risks. Therefore, markets that are not cointegrated can be good news for investors who diversify internationally.

Based on the findings of this study, none of the capital market indices of Southeast Asian countries show a long-term relationship. So that it cannot be interpreted in a cointegrating regression equation which tells the straight line relationship between variables. So it can be interpreted that a shock or shock to the American and Chinese stock markets does not have a linear effect on the capital market in ASEAN.

The results of this research are supported by research that has been carried out on stock exchanges in the ASEAN region. Irmalis and Hadi (2020) find that there is no cointegration between the Indonesia, Malaysia and Singapore Stock Exchanges. Mishra and Mishra (2020) conducted a cointegration analysis on five stock markets in ASEAN and found no cointegration. Apart from the ASEAN region, cointegration analysis of the stock price index is also carried out in areas with a wider coverage, namely Asia, Europe, Africa and America. Marozva (2017) analyzed the stock exchanges of Zimbabwe, South Africa, Egypt, Kenya, and Nigeria) with the United States and the results also found no relationship between these stock exchanges.

Conclusion

This study aims to determine whether stock exchanges in Southeast Asia have strong cointegration with the two giant world economic stock exchanges, namely the United States and China. The absence of strong cointegration in this case gives a signal to investors that the ASEAN region is a target for world investors to include investment assets on stock exchanges in ASEAN as an investor's strategy in reducing the risk caused by the high correlation of stocks in ASEAN. American and Chinese exchanges. So that the stock exchanges in the ASEAN region become a counterweight to the assets available on the stock markets of the United States and China.

References

Damodar, N. Gujarati and Dawn C Porter. 2009. *Basic Econometrics, Fifth Edition*. McGraw-Hill Irwin. New York.

Engle, R and Granger, C. (1987) *Co-integration and Error Correction*. Representation.

Hendrawan, R., & Gustyana, T. T. 2011. Kointegrasi Bursa-Bursa Saham di ASIA. *Jurnal Keuangan dan Perbankan*, *15*(2).

Johansen, Søren (1991). *Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian*.

Khan, T. A. 2011. Cointegration of international stock markets: An investigation of diversification opportunities. *Undergraduate Economic Review*.*8*(1): 7.

Marozva, G. 2017. Africa stock markets cross-market linkages: A time-varying dynamic conditional correlations (DCC-GARCH) approach. *Journal of Applied Business Research (JABR)*. *33*(2): 321-328.

Nishimura, Y., & Men, M. 2010. The paradox of China's international stock market co-movement. *Journal of Chinese Economic and Foreign Trade Studies*.

Yang. C, Che. Y, Niu. L, Li. Q. 2014. Cointegration analysis and influence rank—A network approach to global stock markets. *Physica A: Statistical Mechanics and its Applications*. 400: 168-185.