Analysis of the Effect of Asean 4 Stock Exchange, Japan and China to the Indonesian Stock Exchange in the Period of 2009- 2019 Using Vector Error Correction Model (Vecm) Method

Nuryunianto*, Adriana Syariefur Rakhmat

Pelita Bangsa University

Indonesia

*corresponding author email: <u>denmasantok88@gmail.com</u>

ABSTRACT. The form of economic integration between countries can be established through cooperation between countries. Economic integration can have an impact on both domestic and regional capital markets. This study aims to determine and analyze the influence of the capital markets of ASEAN countries, Japan and China on performance of IHSG from 2009 until 2019. This type of research is quantitative research. The research samples were four countries in the ASEAN region and the two countries with the highest PMA in Indonesia. The data analysis technique in this study used the VECM (Vector Error Correction Model) method with stationary test, VAR stability test, optimum lag test, cointegration test, VECM. The results of the study indicate that there is integration between the Indonesian capital market and the regional capital markets have no significant relationship, while in the long term only the Singapore and Japanese capital markets have a significant relationship.

Keywords: Integration, ASEAN, index, VECM.

1. INTRODUCTION

The capital market is one of place for trading long-term investment instruments with market players, who companies and investors or financiers are. Companies as issuers are companies listed in the stock exchange and issue investment products like as stocks, bonds and others with the aim of raising external funds in the form of equity. Meanwhile, investors are equity owner who diversify their financial assets into securities products to get a profit with a calculated risk level.

Increasing the efficiency of capital receipts for entrepreneurs, increasing returns and risks received by investors can be overcome by integrating capital markets in regional and global areas. The integrated capital market will provide benefits for investors such as push down the level of risk by diversifying anywhere without obstacles [1]. Capital market integration can provide easier access for companies to collect public funds and capital flexibility movements in the regional area [2].

Jacob Viner in 1950 introduced economic

integration which through the concept of trade creation and trade diversion will increase welfare which is the impact of economic integration itself. With these concepts, it can increase supply and demand highly for products imported between countries in the economic integration area, this is because the import tariffs for products with lower prices (trade creation) have an impact on the price of products from other countries to be cheaper (trade diversion).

Through the integration of the Indonesian economy with other member countries that are members of ASEAN by implementing a cooperation system such as PTA (Preferential Trade Aggrement), AFTA (ASEAN Free Trade Area) and AEC (ASEAN Economic Community) will have an impact on the domestic and regional capital markets. Capital markets in the same region tend to have the same movements and a high contagion effect, so that the capital markets in these regions will be mutually integrated [3].





FIGURE 1. Chart of Index Return ASEAN 5, Japan and Chinese Stock Exchanges Source: Yahoo Finance, 2020

Based on the chart above, it is known that stock exchange index returns from 2009 to 2019 in the five ASEAN countries, Japan and Chinese have the same movement trend. In 2011 there was a decline in the return index in the five ASEAN countries, Japan and Chinese which the Singapore Stock Exchange was the worst with a return of -17.59% or decreased by 270.28% compared to 2010 and the Indonesia Stock Exchange was the best with a return of 3.17% with a decrease of 93, 12%. Meanwhile, in 2017, four out of five ASEAN countries, Japan, and Chinese experienced an increase in return index, which only Thailand experienced decrease in return index compared to 2016. The similarity of stock exchange index return fluctuations in the five ASEAN countries, Japan and Chinese indicates that there is regional integration which has an impact on the conditions of their domestic stock exchanges each others. The integration of the capital market in a regional and global area is indicated by the increasing correlation returns between exchanges.

Based on data from the 2015-2019 Foreign Investment Realization Rankings in Indonesia accessed in February 2020 on the BKPM's (Investment Coordinating Board) website, it shows the top three countries with the highest investment value, in the first number is Singapore with 24,656 projects with a total investment of US \$ 39.08 billion. In second place, Japan which has 14,970 projects with investment value US \$ 22.15 billion and next place is followed by China with an investment value US \$ 13.74 billion covering 7,885 projects in Indonesia. With the high amount of Foreign Direct Investment entering Indonesia, it is certainly a form of cooperation between Indonesia and other countries, which will directly impact on economic integration which in the end will also impact the capital market between these countries or regionally.

Some of previous research's result have difference conclusion in the effect of integration between capital market toward Indonesian capital market. [4] conducted research on the integration of the ASEAN capital market using the Orthogonal Auto-regressive Conditional Generalized Heteroscedasticity (OGARCH) method which found that Indonesia (IHSG), Malaysia (KLSE), Thailand (SET) and Singapore (STI) are integrated with each other, but PSEI tends to segmented rather than integrated. [2] also conducted the same research with the Vector Error Correction Model (VECM) method, finding a short-term integration between the capital markets of Singapore (STI), the Philippines (PSEI) and Vietnam (VN30) with Indonesia (IHSG), while the Malaysian capital market (KLSE) and Thailand (SET) have short and long term integration with the Indonesian capital market. [5] conducted a study using the Vector Auto-regression (VAR) method, which states that there is no cointegration between the Indonesian capital market and Singapore, Malaysia, the Philippines and Thailand.

2. METHODS

The population in this research is the stock exchange index of ASEAN member countries and several countries in the East Asia region. To determine the sample in this study, the researcher used purposive sampling technique, which is a sampling technique based on certain criteria that are applied based on the research objectives or research problems. In this study, researchers took samples based on the historical price and the closing price, which are time series data for the period 2009-2019. The method of analysis used in this research is the VECM (Vector Error Correction Model) method which is a method derived from VAR. The data used are all in the form of natural logarithms. In contrast to VAR which is stationary at the level, VECM must be stationary at the first differentiation and all variables must have the same stationary that is, differentiated in the first derivative. VECM method has several test step, like us :

2.1 Unit Root Test

The most important thing that must be known in the analysis using time series data is the condition of the data is stationary or not. The reasons for time series data to be stationary are: 1) If the time series data is not stationary, it can only study the behavior of the data for the period of under consideration, not forecasting; 2) Time series data that are not stationary can also lead to spurious regression (false regression) [6].

ADF (Augmented Dickey-Fuller) test is often used to detect whether data is stationary or not [7]. The procedure to determine whether the data is satsioner or not is to compare the t-ADF value with the McKinnon critical value (1%, 5%, 10%). The critical value or usually given the notation α is the magnitude of the risk of error being taken in decision making. The determination of α value depends on the objectives and research conditions. The more fatal the risk is taken, the smaller α is used [8]. If the value of the ADF Test statistic (τ) is less than Mc Kinnon critical value it means the time series data is not stationary. If the ADF Test value is more than the Mc Kinnon critical value it means the time series data is stationary.

2.2 Lag Optimum Test

Determination of the lag lenght (order) to be used in the VAR model can be determined based on the Akaike Information Criterion (AIC), Schwarz Information Criterion (SC) or Hannan Quinnon (HQ) criteria. In addition, the optimal lag length test is very useful to eliminate the autocorrelation problem in the VAR system, so that by using the optimal lag, it is expected that autocorrelation problems will no longer arise [9].

One of the most commonly used methods to determine lag length is by looking at the Akaike Information Criterion (AIC) [6]. Criteria in determining the lag used is based on the smallest AIC and SC values. From the VAR estimation results, looking at the lowest AIC value shows that the lag length is best used.

2.3 VAR Stability Test

VAR stability test is used to see whether the VAR model is stable or not. Estimation of VAR is stable when all the roots have a modulus less than 1 and are located in the circel.

2.4 Johannsen Cointegration Test

The existence of non-stationary variables causes the possibility of a long-term relationship between the variables in the system. The cointegration test is carried out to determine the existence of a relationship between variables, especially in the long term. If there is cointegration in the variables used in the model, it can be ascertained that there is a long-term relationship between the variables. The method that can be used in testing the existence of this cointegration is the Johannsen Cointegration test.

2.5 Vector Error Correction Model (VECM)

If the cointegration test aims to test the longterm relationship between variables that are not stationary, then the VECM contains information about changes in the variables in the short and long term with disequilibrium as an adjustment process to the long-term model. When cointegration occurs and a shock occurs which causes a disequilibrium, a short-term dynamic adjustment process occurs, such as an error correction mechanism that will push the economic system back towards long-run equilibrium. The error correction model is used to detect how much and how fast the short- term adjustments between co-integrated variables lead to equilibrium conditions [10].

In VECM testing using e-views, the value inside the square bracket [] is the t-statistic value of each independent variable. The independent variable is said to be significant in influencing the dependent variable when the t-statistic is less than the 5% level, the sign (-) is ignored. The positive or negative relationship between the independent variable and the dependent variable can be seen from the sign on the variable coefficient. The VECM model provides two main estimation outputs, these are measuring the cointegrating or long-term balance relationship between variables, and measuring the error-correction or speed of these variables in moving towards their long-term balance [9]. The error correction term is notated in the form of CointEq1, CointEq2, and so on according to the input data we enter.

3. RESULT AND DISCUSSION

3.1 Unit Root Test

TABLE 1. ADF Test								
	Level			1st Difference				
Variables	ADF t-Statistic	Mc Kinnon Critical Value 5%	Prob.	Adj	ADF t- Statistic	Mc Kinnon Critical Value 5%	Prob.	Adj
IHSG	-4.876623	-2.883579	0.0001	Stationer	-9.696335	-2.883753	0.0000	Stationer
STI	-4.571973	-2.883579	0.0002	Stationer	-12.03322	-2.883753	0.0000	Stationer
KLSE	-4.855300	-2.883579	0.0001	Stationer	-10.72199	-2.883753	0.0000	Stationer
SET	-4.186462	-2.883579	0.0010	Stationer	-9.79855	-2.883753	0.0000	Stationer
PSEI	-3.643161	-2.883579	0.0061	Stationer	-11.41714	-2.883753	0.0000	Stationer
NIKKEI225	-1.068599	-2.883579	0.7268	Not Stationer	-11.26829	-2.883753	0.0000	Stationer
SSE	-2.499780	-2.883579	0.1178	Not Stationer	-10.05777	-2.883753	0.0000	Stationer

In the table above, it can be seen that the results of the unit root test at the level with critical value 5%, the JCI, STI, KLSE, SET and PSEI variables have statistical ADF values smaller than Mac Kinnon's critical value and the probability value is smaller than the critical value of 5% (0,05). so that the data is stationary. Meanwhile the NIKKEI225 and SSE variables have statistical ADF values greater than the Mc Kinnon critical value, so the data is not stationary.

Based on the results of unit root testing at the first difference with critical value 5%, it can be seen that the statistical ADF value for all variables is smaller than the Mc Kinnon critical value and the probability value is less than the critical value of 5% (0,05) which means the data is stationary so that the process can be carried out to the next step. **3.2 Lag Optimum Test**

TABLE 2. Lag Optimum Test

THELL 2. Lag Optimum Test						
Lag	AIC	SC	HQ			
0	-14.10566	-13.94645	-14.04099			
1	-27.57953*	-26.30585*	-27.06213*			
2	-27.23797	-24.84983	-26.26785			
3	-27.09896	-23.59635	-25.67612			
4	-27.00320	-22.38612	-25.12763			
5	-26.93702	-21.20548	-24.60874			
6	-26.81556	-19.96955	-24.03455			
7	-26.85451	-18.89404	-23.62078			
8	-26.87234	-17.79740	-23.18589			

In the table above, based on the AIC, SC, and

HQ values the minimum is located at lag 1, besides that it is also supported by the presence of the most number of asentric marks which is the reference for selecting the lag. So from the basis that the optimum lag used in this study is Lag 1.

TABLE 3. Var Stability Test				
Root	Modulus			
0.978671 - 0.018354i	0.978843			
0.978671 + 0.018354i	0.978843			
0.914950	0.914950			
0.872495 - 0.064974i	0.874911			
0.872495 + 0.064974i	0.874911			
0.676953 - 0.052670i	0.678999			
0.676953 + 0.052670i	0.678999			
-0.351409	0.351409			
-0.206852 - 0.159339i	0.261107			
-0.206852 + 0.159339i	0.261107			
0.079128 - 0.151638i	0.171042			
0.079128 + 0.151638i	0.171042			
0.106609	0.106609			
-0.034423	0.034423			

3.3 VAR Stability Test

From the table above, the modulus value of the VAR stability test results is in the range 0.034423 until 0.978843 or less than 1, it's meaning that the VAR estimate is stable.

3.4 Johansen Cointegration Test

TABLE 4. Johansen Connegration Test					
Hypothesized	Trace	0.05	Prob.**		
No. of CE(s)	Statistic	Critical Value			
None *	144.1468	125.6154	0.0023		
At most 1	89.05364	95.75366	0.1323		



At most 2	51.87091	69.81889	0.5551
At most 3	26.64251	47.85613	0.8674
At most 4	16.02771	29.79707	0.7103
At most 5	8.062475	15.49471	0.4588
At most 6	1.543886	3.841466	0.2140

From Johansen's statistical output (with trace test), it can be seen that the trace statistic value of 144.1468 is greater than the critical value of 5%, **3.5 Vector Error Correction Model (VECM)**

which is 125.6154, so that H1 is accepted, meaning the variables are cointegrated. The trace statistic value shows 1 rank cointegration which is significant at $\alpha = 5\%$ indicated by the asentric sign (*). This indicates that among the movements all research variables have a long-term equilibrium relationship.

TABLE 5. Vecm Test						
Variable	Coefficient	t-statistik	t-table	Adj		
Short Term						
CointEq1	-0.016306	-6.58924		Significant		
D(IHSG(-1))	-0.125012	-1.00209		Not significant		
D(KLSE(-1))	0.074689	0.48750	1 (5714	Not significant		
D(NIKKEI225(-1))	0.073216	0.89375		Not significant		
D(PSEI(-1))	0.104480	0.96059		Not significant		
D(SSE(-1))	0.052892	0.93072		Not significant		
D(SET(-1))	0.152780	1.36386		Not significant		
D(STI(-1))	-0.092157	-0.70525		Not significant		
Long Term						
KLSE(-1)	-1.186540	-0.26417		Not significant		
NIKKEI225(-1)	-3.942479	-3.01815		Significant		
PSEI(-1)	6.496512	1.62401	1 65714	Not significant		
SSE(-1)	2.061558	1.46981	1.03714	Not significant		
SET(-1)	-4.635776	-1.16206		Not significant		
STI(-1)	12.24590	3.31131		Significant		

Based on the table of VECM test results above, it shows that in the short term (one month, according to the type of data used that is monthly edition data from January 2009 to December 2019) the ASEAN 4, Japan, and Chinese exchanges do not have a significant effect due to their value tstatistic is smaller than the significance level at the 5 percent real level.

In the long term (eleven years according to the research period, from 2009 to 2019), the KLSE, PSEI, SET, and SSE exchanges also do not have a significant effect, however STI and NIKKEI225 have a significant effect on the JCI. If there is a one point increase in the STI, it will increase the JCI by 3,31131 points, as well as the NIKKEI225 exchange, if there is an increase in the NIKKEI225 by one point it will reduce the JCI by 3,01815 points because between NIKKEI225 and JCI have a negative influence value which means opposite directions.

4. CONCLUSION

Based on the research and data analysis that has been done, it can be concluded that there is an integration between the Indonesian capital market and the ASEAN regional capital markets (Singapore, Malaysia, Philippines, Thailand), Japan and China. In the short term, all capital markets have no significant relationship. However, in the long run, only the Singapore and Japanese capital markets have a significant relationship, the Singapore capital market has a positive relationship, while the Japanese capital market has a negative relationship with the Indonesian capital market.

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