



# Dynamic Relationship between the Dow Jones Industrial Average, Nikkei 225, Hang Seng Index and the Jakarta Composite Index

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## ABSTRACT

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This aims of study to determine the short-term and long-term effects of the Dow Jones Industrial Average, Nikkei 225, Hang Seng Index and the Jakarta Composite Index (JKSE). The data analysis technique uses the Vector Error Correction Model (VECM). The results showed that in the long term the Dow Jones Industrial Average variable had a significant negative effect on the JKSE while in the short term the Dow Jones Industrial Average had no effect on the JKSE, in the long term the Nikkei 225 variable had a positive and significant effect on the JKSE, while in the short term the Nikkei 225 did not. has an influence on the JKSE, in the long term the Hang Seng variable has a negative and significant effect on the JKSE, while in the short term the Hang Seng Index variable has no effect on the JKSE. In the short term the Dow Jones Industrial Average variable has a relationship with the Nikkei 225 variable, and the Nikkei 225 variable has no significant effect on the Hang Seng variable, while in the short term the Dow Jones Industrial Average variable has no relationship with the Hang Seng variable. This study proves that in the long term the stock index of a country with a strong economy will affect the stock index of other countries, the negative impact of this finding is that the economy of a country is easily affected by economic crises that occur in other countries.

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## 1. Introduction

The Indonesian economy is influenced by various factors including natural resources, human resources, capital market developments, taxes, technology, export and import activities and exchange rates. (Syahputra, 2017). The development of the capital market also affects the Indonesian economy, the development of the capital market is a fact that gives an indication of investor confidence due to the country's economic development (HR et al., 2020). In making investment decisions, investors are considered to be able to choose stocks by conducting fundamental analysis, fundamental analysis is an analysis used to calculate the intrinsic value of shares using company financial data (Jogiyanto, 2015).

In Indonesia, the performance of the stock market can be seen in the JKSE, in America the movement of its shares can be seen through the Dow Jones Industrial Average (DJIA), S&P 500 and NASDAQ, in Japan itself it can be seen based on the performance of the Nikkei 225, TOPIX and JASDAQ, while in China it is Hang Seng, SZSE, and SSEC (Indeks Harga Saham Dunia, 2021). The integration of the capital market is the effect of economic globalization, according to previous research, there are several causes, namely the increasing institutionalization of financial markets, technological advances and market liberalization. Capital market integration occurred in three periods, namely the 1998 monetary crisis, the 2008 subprime mortgage crisis and the 2020 Covid-19 pandemic crisis. During the 1998 monetary crisis the Dow Jones Industrial Average, Nikkei 225, Hang Seng and JKSE experienced the same movement as the Dow Jones Industrial Average as an index reference which if it increases, other indexes also move up and vice versa. In the 2008 global financial crisis, the Dow Jones Industrial Average, Nikkei 225, Hang Seng and JKSE experienced the same movement. In the Covid-19 crisis in 2020, the JKSE performance in the 2018 to 2020 period experienced not so encouraging changes in the stock market. The JKSE performance in 2018 decreased,



recorded at the close of trading at the end of 2017, the JKSE was in the position of 6,355 while the JKSE at the close of trading in 2018 was at 6,195, this performance is considered the worst in the last 3 years, not only the JKSE, most of the indexes listed in IDX also experienced a decline (Saleh, 2021). During the year the index was minus 2.54% from the beginning of January to December 2018. This decline could not be separated from negative catalysts both from within the country such as Indonesia's economic growth which has not moved from 5%, the depreciation of the rupiah exchange rate, the balance of payments deficit to foreign sentiments such as the trade war and the increase in the US central bank's Fed Funds Rate. Despite being the worst in the last 3 years, the JKSE's performance is still better than the performance of other stock exchange indices in the world such as Hang Seng (Hong Kong), Straits Times (Singapore), Nikkei 225 (Japan) (Saleh, 2021).

In 2019, the JKSE ended the year with a positive performance, although it failed to break the 6,300 level. Based on Bloomberg data, the JKSE scored a positive movement with a 1.7% strengthening to the level of 6,299.54 at the end of trading. The index achievement in 2019 also tends to be better than 2018, in the course of which the index fluctuates (Nugroho, 2021). The increase occurred due to the increasing number of investors, the growth of the capital market industry, as well as investor confidence in the market and the fundamentals of Indonesia's economic prospects (Wareza, 2021).

Meanwhile, in 2020, the JKSE closed in the negative zone and ended at 5,979. This position made the JKSE corrected up to 5.09 percent year to date. JKSE had touched the level of 6,325 at the beginning of the year. In 2020, the main actor in the rise and fall of the JKSE, namely the COVID-19 pandemic, before the new type of corona virus or SARS-CoV-2 was officially declared to enter the country by President Joko Widodo, the JKSE had decreased in the first two months of 2020, starting from from the position of 6,300 at the end of January the JKSE fell to the level of 5,900 and at the end of February the JKSE corrected to the level of 5400(Atmoko, 2021).

From the phenomena and inconsistencies of previous research results, it shows that the integration of the stock market is getting stronger every year, this is very scary because it means that if a country experiences an economic crisis, other countries will be easily affected by the crisis. This research is very important considering that a model approach is needed as a means of early detection of the dangers of the flow of economic crises from other countries.

## 2. Method

The population in this study is the weekly data of the Dow Jones Industrial Average, Nikkei 225, Hang Seng Index and JKSE from the period 2017 to 2020, so the population is 207 time series data. The data used in this study is quantitative data in the form of numbers and obtained from secondary data sources, namely the Dow Jones Industrial Average, Nikkei 225, Hang Seng Index and JKSE data. Furthermore, to make a long-term and short-term relationship model for each variable, we will use autoregression vector analysis.

## 3. Result and Discussion

The method used is the vector autoregression method with the Augmented Dickey-Fuller Test for the unit root test in this study. In the ADF test, if the variable is not stationary at level, then it must be continued with unit root testing in 1st difference, with the same procedure as at level.

**TABLE 1**  
Stasioneritas Data

Variables	Unit Root	ADF Test Statistic	Critical Value 5%	Prob*	Description
JKSE	At Level	-1.859960	-2.875398	0.3508	Not Stationary
	1 <sup>st</sup> Difference	-13.89065	-2.875468	0.0000	Stationary
DJIA	At Level	-1.928160	-2.875398	0.3189	Not Stationary
	1 <sup>st</sup> Difference	-15.38257	-2.875468	0.0000	Stationary
Nikkei 225	At Level	-1.577538	-2.875398	0.4923	Not Stationary
	1 <sup>st</sup> Difference	-14.78967	-2.875468	0.0000	Stationary
Hang Seng Index	At Level	-2.613810	-2.875398	0.0918	Not Stationary
	1 <sup>st</sup> Difference	-14.93393	-2.875468	0.0000	Stationary



The standard for determining whether data is stationary or not is the ADF value, if the ADF value is greater than the critical value, then  $H_0$  is accepted, which means there is a unit root and it is not stationary. Conversely, if the ADF value is less than the critical value of 5%, then  $H_0$  is rejected, which means there is no unit root and the data is stationary. In using VAR modeling, the optimal lag test is very important to do to eliminate autocorrelation symptoms, the optimal lag test uses the Akaike Information Criterion (AIC) value, as shown in the following table

**TABLE 2**  
Optimal Lag Test

Lag	AIC
0	67.56473
1	58.26675
2	58.24882*
3	58.27757
4	58.33047
5	58.38672
6	58.40831
7	58.47218
8	58.52471

The next step is the VECM stability test, the VECM model is said to be stable if all the roots have a modulus less than 1, the test results can be seen in the following table:

**TABLE 3**  
Stability Test

Root	Modulus
0.969936	0.969936
$0.960373 - 0.026311i$	0.960734
$0.960373 + 0.026311i$	0.960734
0.930796	0.960796
-0.224624	0.224624
$-0.064291 - 0.214775i$	0.224191
$-0.064291 + 0.214775i$	0.224191
-0.017278	0.017278

Based on table 3, the VECM stability test shows that the VECM model formed is stable. The next step is to perform a cointegration test using the Johansen's Cointegration Test method, the test results can be seen in the following table:

**TABLE 4**  
Comparison of Cointegration Test

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.088470	34.39116	47.85613	0.4806
At most 1	0.031321	15.49440	29.79707	0.7472
At most 2	0.028177	9.002769	15.49471	0.3651
At most 3	0.015429	3.172029	3.841465	0.0749

The calculation results show that by using a significance level of 5% there is no cointegrated equation. This result can be seen from the Trace Statistics value which is smaller than the critical value. The next step is to test the two-way relationship between each variable using the Granger causality test, which can be seen in the following table:

**TABLE 5**  
Granger Causality Test

Null Hypothesis	Prob	Difference
DJIA does not Granger cause JKSE	0.4512	Not
JKSE does not granger cause DJIA	0.1873	Not
NIKKEI_225 does not Granger cause JKSE	0.0937	Not
JKSE does not Granger Cause NIKKEI_225	0.2422	Not
HANGSENG does not Granger cause JKSE	0.5763	Not
JKSE does not Granger Cause HANGSENG	0.1144	Not
NIKKEI_225 does not Granger Cause DJIA	0.0546	Not
DJIA does not Granger Cause NIKKEI_225	0.3295	Not
HANGSENG does not Granger Cause DJIA	0.3002	Not
DJIA does not Granger Cause HANGSENG	0.2632	Not
HANGSENG does not Granger Cause NIKKEI_225	0.3248	Not
NIKKEI_225 does not Granger Cause HANGSENG	0.8850	Not

From table 5, the following conclusions can be drawn: DJIA does not affect JKSE, JKSE does not affect DJIA. Nikkei 225 does not affect JKSE, JKSE does not affect Nikkei 225. Hangseng doesn't affect JKSE, JKSE doesn't affect Hangseng. Nikkei 225 doesn't affect DJIA, DJIA doesn't affect Nikkei 225. Hangseng doesn't affect DJIA, DJIA doesn't affect Hangsen. Hangseng doesn't affect Nikkei 225, Nikkei 225 doesn't affect Hangseng Furthermore, the results of the short-term VECM estimation of the Dow Jones Industrial Average, Nikkei 225 and Hangseng Index against the Jakarta Composite Index can be seen in the following table:

**TABLE 6**  
Comparison of Short-Term VECM Estimation Results

Variables	T Statistik	Effect
JKSE and DJIA	0.79365	Positive and not significant
JKSE and Nikkei 225	-0.18781	Negative and not significant
JKSE and hangseng	-0.91476	Negative and not significant
Nikkei 225 and DJIA	2.52761	Positive significant
Hang Seng and Nikkei 225	0.26104	Positive and not significant
Hang Seng and DJIA	-0.26603	Negative and not significant

Table 6 shows that in the short term the Nikkei 225 and Dow Jones Industrial Average variables have a significant positive effect, while the other relationships showed insignificant symptoms. The next step is to test the function response between each variable to find out how the impact of shocks on one variable on other variables, The results of the impulse response function test can be seen in the following figure:



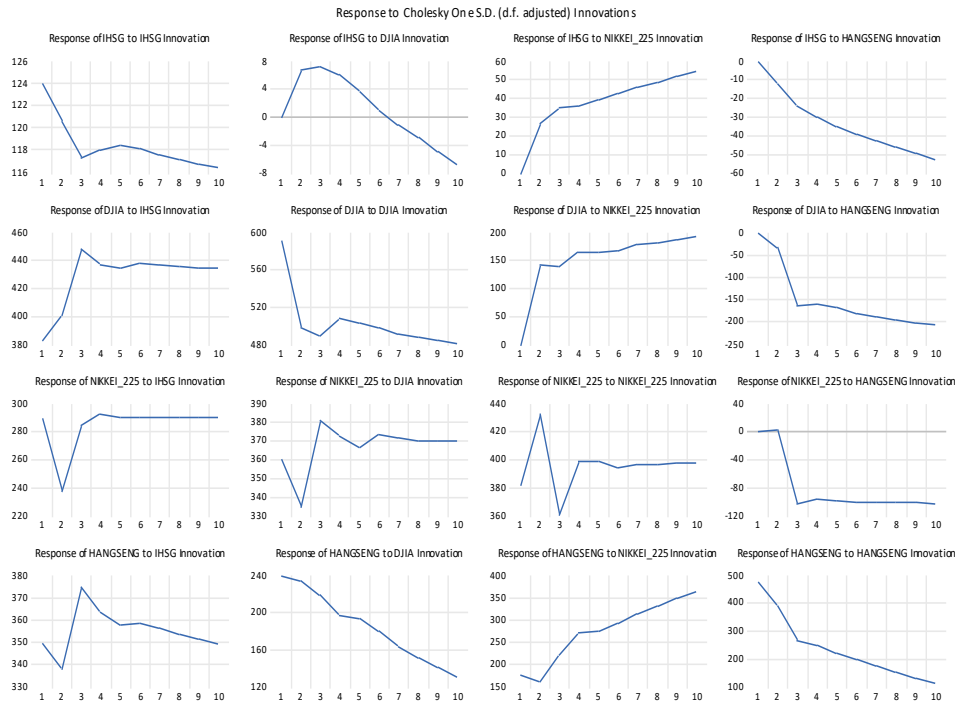


Figure 1. Impulse Response Function

Based on Figure 1, it can be seen that if there is a shock to the JKSE, the DJIA will respond positively and increase until period 3 but decreases until it finally increases in periods 5 and 6, in periods 7 to 10 it decreases. Nikkei 225 responded positively to the JKSE but decreased until period 2, increased to period 3 and again decreased to period 6 but slightly increased until period 8 and decreased until period 10. Hangseng responded positively to the JKSE and decreased until period 2, in the 3rd period it increased, but decreased again from period 4 to period 5, and increased in period 6, then decreased until the end of the period (10th period). The last step is to test the contribution of diversity that is used how much influence one variable has on other variables, the test results can be seen in the following picture:

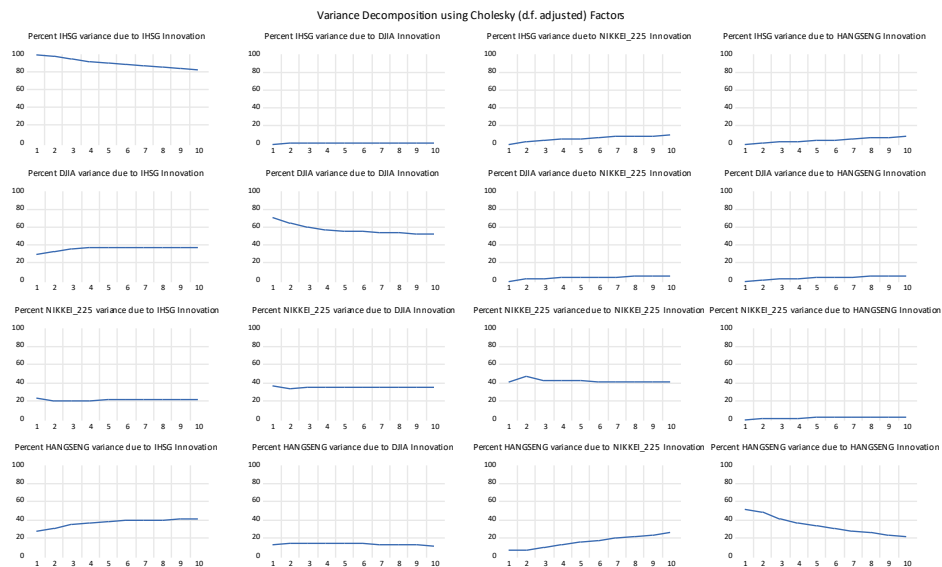


Figure 2. Variance Decomposition

From the picture of variance decomposition of the JKSE variable, it shows that the contribution to the diversity of the JKSE in the first period is determined by the JKSE itself at 100%. Furthermore, in period 2 and so on, the differential effect of the JKSE began to decline by 97%. In period 3 the differential effect of JKSE decreased to 94% and 82% in the final period. In the medium period (5) the variable that contributed to the JKSE was the Nikkei 225 at 5.9%. Meanwhile, in the final period (10), the shocks to the JKSE were the Nikkei 225 at 9.7%, the Hang Seng at 7.9% and the DJIA at 0.13%. From the results of the VD above, it can be seen that in the short, medium and long term the impact of the Nikkei 225 is too large.

#### 4. Conclusion

The results of the short-term VECM estimation of the composite stock price index and the Dow Jones industrial average have no significant effect, this study is in line with research conducted by Ardana & Irviani (2018) which shows that the results of the short-term estimation of the Dow Jones Industrial Average have no significant effect on JKSE. In the short term JKSE with the Nikkei 225 has no significant effect, these results are in line with research conducted by Wibowo et al., (2016) with the results of the study showing that the Nikkei 225 has no significant effect on the JKSE. In the short term JKSE variable with the Hang Seng Index has no significant effect, this result is in line with research conducted by Wijaya (2019). Nikkei 225 with the Dow Jones Industrial Average has a positive and significant effect, this study is not in line with research conducted by Jusuf, (2012). The Hang Seng Index with Nikkei 225 has a positive but not significant effect, this study is not in line with research conducted by Jusuf (2012). Indeks Hang Seng berpengaruh negatif tetapi tidak signifikan dengan Dow Jones Industrial Average, penelitian ini tidak sejalan dengan penelitian yang dilakukan oleh Jusuf (2012) this result proves that if the Dow Jones Industrial Average experiences an increase, the Nikkei 225 does not necessarily experience a similar increase, and vice versa. The results of this study can of course be used by investors in the stock market as a tool to perform fundamental analysis, especially in terms of macroeconomics, investors can predict the condition of a country's stock market from stock markets in other countries.

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