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DETERMINANTS OF INDONESIA'S NON-OIL AND GAS EXPORT TO JAPAN

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ABSTRACT

This study aims to determine the impact of the Japanese economy affected by the economic crisis on the performance of Indonesian exports to Japan before and after the economic crisis. By using Japan's real GDP, real exchange rate, inflation, and the crisis dummy of Indonesia's non-oil and gas exports to Japan in 2003-2017. This study uses the VECM (Vector Error Correction Model) method to determine the short and long-term relationships of the research variables. The results obtained are: (1) Before the crisis, Indonesia's non-oil and gas exports to Japan showed positive results compared to after the crisis, (2) Japan's demand seen from Japan real GDP shows that there is a negative relationship to Indonesian exports to Japan after the crisis, (3) real exchange rate shows a positive relationship before the crisis and after the crisis shows a negative relationship, and (4) Inflation has a negative influence on Indonesia's non-oil and gas exports to Japan in the long run.

Keywords:
Crisis, Indonesia's non-oil and gas export to Japan, Japan real GDP, Real Exchange Rate, Inflation, VECM

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INTRODUCTION

The 2008 financial crisis caused by the subprime mortgage was the worst crisis ever to occur after the Great Depression in 1930. The crisis hit the world again, this time centered on the United States, which is a superpower so that the current crisis hampered the world economy. The outbreak of housing credit problems in the US began in mid-2007 due to the inability of debtors to pay their loan installments. In its development, this crisis led to a crisis in the financial sector and a slump in global economic growth. The world economy has shown a weakening condition that can be seen since the third quarter of 2008 (Bank Indonesia, 2009). World GDP has decreased from the initial growth rate of 3% during 2003-2007 to 1.5% during 2008-2012, in addition, a significant decline also occurred in the export markets of developing countries during this crisis period which was marked by the decline in world trade that started in the third quarter of 2008 to the second quarter of 2009. World trade decreased by 12.2% during 2008-2010, with a 30% decline occurring in the third quarter of 2008 and the fourth quarter of 2009 (UNCTAD, 2009).

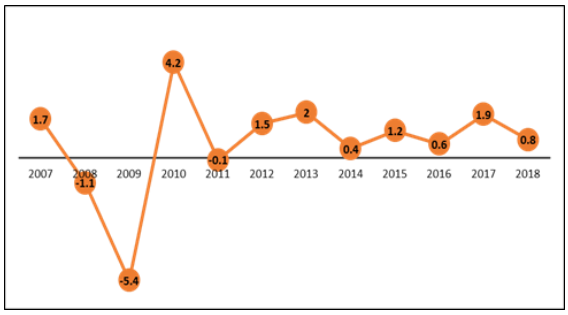
The worsening of the situation due to the crisis was not only felt by the United States as the source of the crisis but its effects were also being felt in other parts of the world. The impact felt due to this crisis is that economic growth in countries that are directly related to the United States has decreased, one of which is Japan.

Japan has the largest export market to the United States and the European Union. The domino effect caused by the economic crisis had a decreasing impact on Japan's total exports (OECD, 2011). With the decline in demand from the US and the European Union, the rate of economic growth as seen from Japan's GDP also experienced a slowdown. The direct relationship with the source country of the crisis caused Japan's real GDP to touch negative growth. In 2008, Japan's real GDP showed a minus growth rate of -1.1% and even worse in 2009 which reached -5.4%. The Japanese economy started to experience improvement in 2010 but experienced a decline again in 2011 by -0.1% due to the earthquake.

Just like the impact felt by Japan, the countries associated with Japan also felt the weakening of relations from the economic aspect due to this crisis. Japan, which is one of Indonesia's largest trading partners after China and the United States, was also affected by the impact of this crisis on Indonesia, especially in terms of international trade.

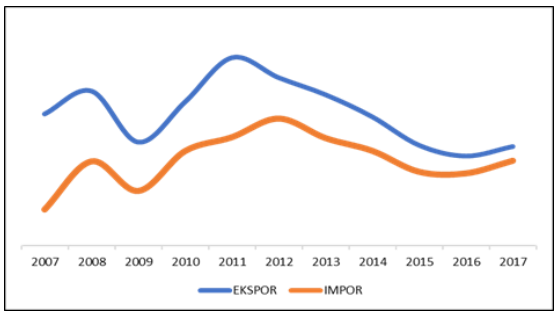
Indonesia's exports to Japan are dominated by non-oil and gas commodities rather than oil and gas. Based on the panel above, Indonesia's exports to Japan experienced a decline in the same year Japan's GDP experienced a decline due to the crisis. It is in line with what is said by Sugema (2012) that Japan, which is still a traditional export market for Indonesia, can still survive during the crisis period even though the crisis reduces purchasing power because income as seen from GDP has decreased. During 2008, there was a close relationship between GDP and the decision to import a country. This study examines whether the Japanese economy which was affected by the crisis influences Indonesia's non-oil and gas exports to Japan.

Figure 1. Japan Real GDP Growth



SOURCE: WORLD BANK DATA

Figure 2. Indonesia-Japan



SOURCE: TRADE MINISTRY OF INDONESIA

LITERATURE REVIEW

Several studies have proven that the value or volume of a country's exports is influenced by various factors, namely foreign direct investment (Beoy, 2010; Zakaria, 2013), the country's exchange rate (Alotaibi, 2016; Beoy, 2010; Yee, Waimun, Zhengyi, Ying., & Xin, 2016), the income of trading partner countries (Elshehawy, Shen, & Ahmed, 2014; Prasad, 2000), world GDP (Beoy, 2010), imports and inflation (Yee et al., 2016). Ahmad, Kaliappan, & Ismail (2017) examined the factors affecting the exports of developing countries in Asia, including Indonesia, and stated that the factors that influence developing countries to export are the exchange rate, the income of trading partners countries, and adding value to export goods. Based on the above studies, it can be concluded that the factors that influence exports are currency exchange rates, trading partner country income, foreign direct investment, imports, and inflation.

Fauziah (2014) states that there is a positive relationship between the income of a trading partner country and a country's exports. When the GDP of trading partner countries increases, this will encourage these countries to import more from other countries. The same thing was conveyed by (Herlambang, 2001) that there is a positive correlation between GDP and demand for imported products. An increase in GDP will increase demand for imported products, and vice versa. When the GDP of the importing country increases, the country will import, which will simultaneously increase the export value of the exporting country.

Sobri (2001) states that the relationship between the increase in GDP of other countries and domestic exports is positive. When the income of countries in the world is getting higher, it will cause the demand for goods and services to also increase. Changes in foreign income will naturally cause changes in demand for domestic export goods. Gylfason (1997) and Ball (2004) (in Rahman, 2017) state that the inflation rate affects international trade. When inflation is at a high level in a country, the price of goods and services offered by that country also increases (due to inflation). The increase in prices will make the goods and services offered by the country so that their products will be less competitive in the international market.

So it can be concluded that high inflation can reduce exports.

Yee et al. (2016) said the same thing that when a country experiences inflation, inflation will make the prices of goods or services rise due to increased production costs, both in the domestic and exports market. When prices increase, domestic products become less competitive at the international level. Therefore, this will reduce the level of export competitiveness and export volume. The real exchange rate is the exchange rate that states the rate at which economic actors can trade goods from one country for goods from another country. When the real exchange rate is high, it shows that the prices of domestic goods are relatively more expensive than foreign goods. This condition will encourage the domestic population to buy more imported goods (Dornbusch, Fisher, & Startz, 2004) so that there will be a negative relationship between the real exchange rate and exports.

Bank Indonesia (2009) states that one of the ways the crisis has an impact on other countries from the source country of the crisis is through the international trade route. According to the OECD (2011), there are 3 ways for a crisis to affect international trade. International trade was affected by the crisis through (1) global demand and revenue (the national income effect), (2) trade finance, and (3) the level of economic development of the exporting countries. Research conducted by Chatterjee (2017) regarding the intensity of export growth in 32 countries emerging during the crisis period has the result that there was a large decrease in the annual average of exports in emerging countries after the crisis period. In 2003-2007, the export growth rate in emerging countries tended to be high and part of them was trading with China. The effect of the crisis on international trade was further carried out by Bricongne, Fontagn, Gaulier, & Vicard (2011). According to them, trade in the final quarter of 2008 and the first quarter of 2009 was in a dire state globally. This decline in trade is an extraordinary thing: the decline in world trade reached 29% in just four months, from September 2008 to January 2009. There are two main reasons why this decline could be so sharp, so fast, and demand that its demand decreased greatly. First because of the composition effect; second, due to financial difficulties and lack of liquidity due to the financial crisis.

METHODOLOGY

This study aims to determine the factors that influence Indonesia's non-oil and gas exports to Japan so that based on this paper the dynamic response between variables both long and short term between each variable can be seen. To answer this problem, this study uses the Vector Error Correction Model. Several factors are taken based on the literature review above to analyze the performance of Indonesia's non-oil and gas exports to Japan (EXPORTS) is Japan's real GDP (GDPRJ), inflation (INFL), a real exchange rate (RER), and crisis (CRISIS). This study uses quarterly time series data starting from Q1 2003 - Q4 2007.

Several requirements must be met analysis before proceeding with VECM in research:

a.Stationarity test

This study uses test Augmented Dickey-Fuller (ADF test) to see the presence of unit roots in time series data.

Table 1. Type Variable and Data Source

Variable	Information	Source	Hypothesis
EXPORT	Indonesian non-oil export volume to Japan's	Ministry of Trade of Indonesia	
GDPRJ	Japan Real GDP	World	+
INFL	Bank'sinflation rate	Central Agency statistics	-
RER	real exchange rate	World Bank	-
CRISIS	*dummy* crisis	data *dummy* (2003-2007 = 0, 2008-2017 = 1)	+/-

Data that has a unit root in it can be said that the data is not stationary. In this stationarity test, the hypothesis that can be given is as follows:
H0: γ = 1, there is a unit root of
H1: γ ≠ 1, there is no unit root

If the t-statistic value is lower than the critical value generated at the 1% level, 5%, or 10%, then the data is not stationary. However, if the t-statistic value is higher than the critical value at the 1%, 5%, or 10% level then the data is stationary.

b. Determination of the Optimum Lag

Determination of the lag is needed in the VEC research model because a lag that is too small or large will result in an inaccurate estimate. Determination of the optimum lag can be seen in the lag results recommended by FPE, AIC, SC, or HQ in the Lag Length Criteria test, or can look at the resulting smallest lag value.

c. VAR Stability Test VAR

A stability test is needed to produce more accurate long-term estimates. In further long-term analysis, the VAR model used must be in a stable state. VAR stability testing uses the Polynomial AR Roots test by looking at the resulting modulus value. If the resulting modulus value is less than 1,000 (<1,000) then the VAR model has been stable, and if the modulus value is or is more than 1,000 (≥1,000) then the VAR model has not reached a stable condition so further long-term analysis cannot be carried out.

d. Cointegration Test

Using the VEC model requires cointegration testing to see if there is a long-term relationship between the research variables. The cointegration test in this study uses the Johansen Cointegration test. The cointegration relationship using Johansen Cointegration was carried out by comparing the trace statistic and maximum eigenvalue with their critical values at the level of 1%, 5%, or 10%. If the trace statistic and maximum eigenvalue are higher than the critical values at the level of 1%, 5%, or 10%, it can be said that there is a cointegration relationship or there is a long-term effect. However, if the trace statistic and maximum eigenvalue are lower than the critical values at the 1%, 5%, or 10% levels, it can be concluded that there is no cointegration relationship.

The data tested in this study has been transformed into natural logarithms to obtain accurate results. In the short term, the VECM equation can be written as follows:

$$\Delta EXPORT_t = \beta_0 + \beta_1 \Delta EXPORT_{t\text{-}n} + \beta_2 \Delta GDPJ_{t\text{-}n} + \beta_3 \Delta INFL_{t\text{-}n} + \beta_4 \Delta RER_{t\text{-}n} + \beta_5 \Delta DKRISIS_{t\text{-}n} + EC + \mu_t$$

and in long run, the VECM equation can be written as follows:

$$EXPORT = \beta_0 + \beta_1 GDPJ + \beta_2 INFL + \beta_3 RER + \beta_4 DKRISIS + \mu$$

Where,

$\Delta EXPORT_{t-n}$= the value of Indonesia's non-oil and gas exports to Japan in the lag period

$\Delta GDPRJ_{t-n}$= the value of Japanese real GDP in the lag period

$\Delta INFL_{t-n}$= the rate of inflation in the lag period

ΔRER_{t-n}= the real exchange rate in the lag period

$\Delta DCRISIS_{t-n}$= value dummy crisis in the lag period

n = lag length
EC = error correction
β_0 = constant
β_i = coefficient
μ_t = residual

Stock and Watson (2001) (in Ortegón & Alexander, 2018) said that the main problem in the VECM research model is the difficulty of interpreting statistical results so that to overcome these problems visual analysis can be used to help the process of interpreting the results. Visual analysis was obtained using the Impulse Response Function test (IRF) and Variance Decomposition. The IRF test describes the k-period expectation in the future from the prediction error of a variable due to innovation or shock from other variables. Thus, the duration of the effect of the shock of one variable on other variables until the effect is lost or returns to the equilibrium point can be seen or known.

Variance Decomposition is a tool in the VAR model that will separate the variance from several estimated variables into components of shock or innovation with the assumption that the shock or innovation variables are not correlated with each other. Then this variance decomposition will provide information about the proportion of the movement of the shock effect on a variable to the shock of other variables in the current period and future periods.

FINDINGS AND DISCUSSION

a. Stationarity test

Using the Augmented Dickey-Fuller test (ADF test), the results obtained are as follows:

Table 2. Results of Augmented Dickey-Fuller

ADF TEST STATISTIC	I(0)	I(1)
EXPORT	-2.657587	-5.216434*
GDPRJ	-1.256075	-5.615665*
INFL	-2.856732	-5.604271*
RER	-1.504467	-3.776722*
CRISIS	-1.408208	-7.615773*
CRITICAL VALUE 5%	-2.912631	

Table 2 indicates that all variables have not been stationary at the level for the value of t-statistic smaller than the critical value of 5% so that it requires testing at first difference. The stationarity test at the first difference gives the result that all data are stationary with the t-statistic result that is greater than the critical value of 5%.

b. Determination of the Optimum Lag

Determination of the optimum lag in this study uses the lag value recommended by AIC or Akaike Information Criterion. Results found in determining the optimum lag is shown on Table 3.

Based on the Table 3, lag 5 is the lag value recommended by AIC so that researchers use lag 5 as the research lag in the VECM model.

Table 4 AR Roots Table

Root	Modulus
0.986003	0.986003
0.870397 - 0.037289i	0.871195
0.870397 + 0.037289i	0.871195
0.670260 - 0.279045i	0.726027
0.670260 + 0.279045i	0.726027
0.372190 - 0.129380i	0.394036
0.372190 + 0.129380i	0.394036
-0.138069	0.138069
0.125477	0.125477
-0.006638	0.006638

d. Cointegration Test

Testing is intended to see whether there is a long-term relationship between research variables to meet the requirements for stationary data at first difference. Long-term information is obtained by first determining the cointegration rank to find out how many systems of equations can explain the entire existing system.

The results of cointegration testing based on trace statistics show that there is three cointegration at the 5% real level. The existence of cointegration shows that there is a long-term relationship between the variables so that the variables form a linear relationship.

Table 3. Optimum Lag Test Results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	215.6096	NA	3.25E-10	-7.65853	-7.476045	-7.587961
1	480.9879	472.8559	5.22E-14	-16.39956	-15.30465*	-15.97615
2	501.2912	32.48526	6.33E-14	-16.22877	-14.22144	-15.45252
3	527.688	37.43553	6.38E-14	-16.27956	-13.35981	-15.15047
4	571.6014	54.29287	3.61E-14	-16.96732	-13.13514	-15.48539
5	637.5524	69.54837*	9.99e-15*	**-18.45645***	-13.71185	-16.62167*

c. VAR Stability Test

The model is said to meet stable conditions if the modulus value is less than 1 (<1). The following is the result of VAR stability testing using Polynomial AR roots. The modulus value in the VAR stability test in the table above shows that no modulus exceeds the value of 1 or the modulus value is less than 1 (<1), so the VAR model is already in a stable condition for further long-term analysis.

The existence of cointegration in a system of equations implements that in the system there is error correction which describes a short-term dynamic relationship with a long-term relationship.

Table 5. Results of Cointegration Johansen Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.697285	122.6157	69.81889	0.000
At most 1 *	0.367213	58.08759	47.85613	0.0041
At most 2 *	0.353217	33.37605	29.79707	0.0186
At most 3	0.158476	9.845887	15.49471	0.2928
At most 4	0.009742	0.528669	3.841466	0.4672

e. Vector Error Correction Model

In the VECM method, each data is presented in the form of an autoregression vector and regressed with itself and other variables. In this case, the VECM test is carried out at lag 4, this is because this study uses the first derived data so that the optimum lag obtained is reduced by one lag. The test results obtained are shown at Table 6.

Table 6. VECM Test Results

Variable	Coefficient	t-statistic	t-table-
Longterm			
GDP	-3.290197	-7.36545	2.0040
RER	-1.201231	-3.81772	
INFLATION	-0.314993	-7.76547	
CRISIS	-0.521908	-13.5697	
C	78.59060		
Short-term			
D (EXPORT)	-0.660122	-4.66697	2.0040
D (GDP)	0.404559	0.53846	
D (RER)	0.699731	4.75747	
D (INFLATION)	0.031002	1.74076	
D (CRISIS)	0.048668	2.04025	
ECT	0.169546	4.79976	
C	0.011783		

Based on the results shown in the table above, the VECM equation can be written as :

Short run equation:

$\Delta EXPORT = 0.011783 – 0.660122\ \Delta EXPORT_{t-4} + 0.404559 \Delta GDPRJ_{t-4} + 0.699731 \Delta RER_{t-4} + 0.031002 \Delta INFLATION_{t-4} + 0.048668 \Delta\ CRISIS_{t-4} + 0.169546\ EC$

In the short term only the variables EXPORT, RER and CRISIS have an effect. However, this is supported by significant ECT results, which means that there is error correction in the short term to achieve equilibrium in the long term.

Long-run equation:

$EXPORTS = 78.59060 – 3.290197 GDPRJ – 1.021231 RER – 0.314993\ INFLATION – 0.521908\ CRISIS$

In the long run, it is known that all variables have a significant effect on Indonesia's non-oil and gas exports to Japan. Japan's real GDP (GDPRJ) has no effect in the long run, while in the long run, the GDPRJ has a significant positive effect on Indonesia's non-oil and gas exports to Japan. This occurs because, in the long run, Japan's real GDP is not fully allocated to carry out non-oil and gas imports from Indonesia. As stated by the Bank of Japan (2011) that after the impact of the 2008 crisis and the natural disasters in 2011 which caused Japan's economic growth to touch a minus value, during recovering period Japan shifted its income to other priority sectors, namely the export and production sectors. who can build the economy? The results of this study are also in line with research conducted by Muthamia & Muturi (2015) which examined tea exports

in Kenya and the results of their research stated that the GDP of importing countries had a negative effect in the long term. They said that in the long run, the GDP of the importing country had a negative impact because there was a shift in spending to priority sectors in the country's economy, resulting in a reduction in imports. Mabeta, Bett, Kiprop, & Gutema (2015) also stated the same thing. In his research on tobacco exports in Zambia, he concluded that the importing country's real GDP will have a negative effect in both the short and long term. According to him, in the long run, the increase in revenue from trading partner countries in the long term will divert its resources to produce domestic tobacco so that it will reduce the number of tobacco imports from Zambia.

It does not have an effect in the short term, inflation has a negative and significant effect in the long run on Indonesia's non-oil and gas exports to Japan. In the short term, inflation does not affect Indonesia's non-oil and gas exports to Japan because the inflation rate is still at a low to moderate inflation level so that the impact is not that big on exports. Meanwhile, in the long term, high inflation has an impact on higher production costs, so that it also increases the prices of domestic goods and exported goods. Yee et al., (2016) said the same thing that exports will decline when there is inflation in the economy. This inflation makes prices expensive and in the context of exports, inflation also makes domestic products became less competitive in the international market.

The real exchange rate has no effect in the short term, but in the long run, the real exchange rate has a negative and significant effect on Indonesia's non-oil and gas exports to Japan. This means that the currency depreciation will increase the volume of Indonesia's non-oil and gas exports to Japan, and vice versa when the currency appreciates, it will reduce the volume of Indonesia's non-oil and gas exports to Japan. This is in line with research conducted by Sofjan (2017) and Adam, Nusantara, & Muthalib (2017) who examined the real exchange rate for exports and imports. His research shows that in the long run, the real exchange rate has a negative effect on exports. This is because in producing export goods, Indonesia uses imported raw materials, so that when there is depreciation this will reduce production and cause exports to decrease. In addition, according to Arize, Osang, & Slottje (2000) and Sofjan (2017), the effect of exchange rates on trade depends on the period and may have a greater effect on resource allocation because exporters try to minimize the risks arising from the exchange rate. Relative prices have not affected exports in the short term because export activities are contract-bound activities so that in the short term prices have not yet had an effect on exports and adjustments to new prices can be made in the long term.

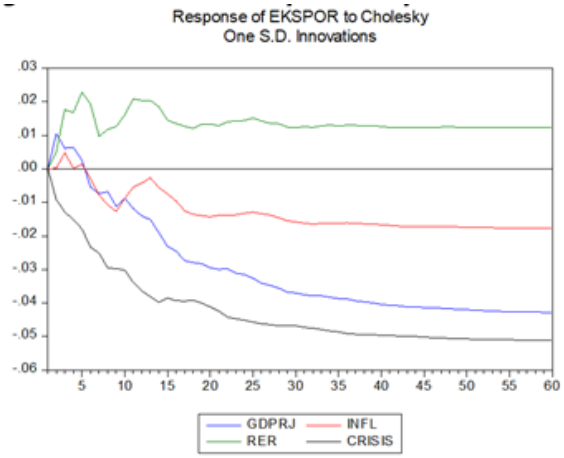
Export performance before and after the crisis showed a difference in performance. In the pre-crisis period, Indonesia's non-oil and gas exports to Japan still showed positive performance compared to the post-crisis period, where its performance showed negative results. This is in line with research conducted by Chatterjee (2017) which states that in the pre-crisis, export performance in emerging countries experienced high growth, especially with China as a trading

partner for most of these emerging countries. Meanwhile, in the post-crisis period, exports experienced a sharp decline. Japan was one of the countries that were severely affected by the crisis that occurred in 2008, which caused Japan's GDP to experience a decline so that demand for imported goods also decreased. The OECD (2011) also said the same thing that one of the ways the crisis had an impact on international trade was through global demand and income or the national income effect.

f. Impulse Response Function

IRF analysis can be used to analyze several future horizons for long-term information. The horizontal axis represents the period in years while the vertical axis shows the response value as a percentage. IRF analysis is used to show the response of exports to shocks given by GDP, inflation, real exchange rates, and the crisis dummy. The results of the IRF analysis can be summarized in Figure 3.

Figure 3. Test Results Impulse Response Function



Based on Figure 3, the response given by Exports due to the GDP shock shows that in period 1 to period 5 is positive, while in period 6 onwards the export response the shock that GDP gives is negative. This means that the movement of the balance on the occurrence of shocks from the GDP variable to exports leads to a negative direction, which means that in the long run, the effect of Japanese real GDP on Indonesia's non-oil and gas exports has a negative effect.

The export response to the inflation variable shock was positive in the 1st to 5th period, then the inflation shock was responded negatively by exports starting from period 6 to the end of the 60th period. This reflects that in the direction of equilibrium, in the long run, inflation has a negative effect on exports. This is also reflected in the table that the shock given by inflation to exports responded negatively from the 6th period to the end of the 60th period.

The export response to the shock given by the RER was positive but tended to decline until the end of the period. The movement towards long-term equilibrium starts from the 14th period to the end of the 60th period after previously experiencing fluctuations in the response to the RER shock to exports starting from period 1 to 13.

The export response to the shock dummy crisis was positive in period 1, then the shock was responded to by exports negatively until the end of the 60th period. This is also reflected in the table above that exports responded negatively to the shock dummy crisis until the end of the 60th period. This means that in the long-term balance the dummy crisis has a negative effect on exports. The weakening of the country's fundamental sectors including the economy due to the

crisis, the depreciation of the exchange rate during the crisis should have brought fresh air for exporters but this did not necessarily happen because this crisis hit both sides of the country.

g. Variant

Decomposition analysis of variance decomposition is useful for predicting the percentage contribution of variance for each variable due to changes in certain variants in the VAR system. The dynamics of a variable can be analyzed using an orthogonalized decomposition of the forecast error range.

ble dominates in explaining the non -oil and gas export variable compared to other explanatory variables. It can be seen that the contribution of the crisis variable in explaining the dependent variable reaches 21%. This indicates that the economic crisis that occurred gave a marked difference in performance to Indonesia's non-oil and gas exports to Japan before and after the crisis.

The Japanese GDP variable plays the second largest role as an explanatory variable for Indonesia's non-oil and gas exports to Japan. The Japanese GDP variant shows a negative effect on the non-oil and

Table 7. Results of Variance Decomposition

Period	Variable	Variance Decomposition				
		EXPORT	GDP	INFLATION	RER	CRISIS
1	EXPORT	100.0000	0.0000	0.0000	0.0000	0.0000
2		86.32216	6.882903	0.002675	1.629128	5.163139
10		72.52774	1.8645	1.576420	7.649924	16.38142
15		70.38127	3.240381	0.958991	6.496702	18.92266
20		68.33244	5.800489	1.421968	4.850702	19.5944
25		67.13597	7.227024	1.586051	3.987310	20.06365
30		65.97199	8.565396	1.715555	3.398360	20.3487
35		65.10447	9.567545	1.866953	2.982375	20.47866
40		64.43924	10.31917	1.950837	2.695399	20.59536
45		63.89191	10.94092	2.035426	2.470783	20.66095
50		63.4678	11.4206	2.097021	2.302521	20.71206

The result of the decomposition of variance indicated in period 1, variants of non-oil exports is explained by the variable itself is 100%. In the second period, the non-oil and gas export variant was explained by the variable itself at 86.32% while 13.68% was explained by other variables such as Japan's Gross Domestic Product (GDP), real exchange rate, inflation, and crisis dummy.

Over the period, the crisis variagas export variable in the long-term period by providing 11% as an explanatory variant of the non-oil and gas export variables. This is in line with the resulting VECM results that in the long run, the Japanese GDP variable has a negative effect.

h. Diagnostic Test

The diagnostic test is intended so that the data used in the study does experience BLUE (Best Linear Unbiased Estimator) so that the

results obtained from these data are correct and reliable estimates. The classical assumption testing in this study includes autocorrelation, heteroscedasticity, multicollinearity, and normality tests. The results of the diagnostic test can be summarized in the Table 8.

Table 8. Diagnosis Test Results

Test	Test	Test	Test
Autocorrelation Test	Breusch-Godfrey	0.5605	There is no autocorrelation
Heteroscedasticity Test	Breusch-Godfrey	0.5227	There is no heteroscedasticity
Multicollinearity test	VIF	<5	There is no multicollinearity
normality test	Jarque-Bera	0.115790	Normally distributed data

CONCLUSION

By using the VEC (Vector Error Correction) model, the dynamic relationship between research variables in the short and long term can be determined. Japan's real GDP and the inflation rate have a negative and significant impact on Indonesia's non-oil and gas exports to Japan in the long run. The real exchange rate has a significant positive effect in the short term and has a significant negative effect in the long term on Indonesia's non-oil and gas exports to Japan.

The performance of Indonesia's non-oil and gas exports to Japan was different before and after the crisis where before the crisis, Indonesia's non-oil and gas exports to Japan still showed a positive performance, while after the crisis, Indonesia's non-oil and gas export performance to Japan had negative performance. Japan, which is still a traditional export market for Indonesia, is the third-largest trading partner after China and the United States. Japan, which in the long run shows a decline in demand for Indonesian exports cannot always be used as the main export destination market. Indonesia must start to expand its export market to non-traditional markets.

Given the limitations of the research conducted, it is necessary to conduct further research on the analysis of Indonesian exports to other export markets by taking into account other factors besides GDP of trading partner countries, inflation, real exchange rates, and dummies crisis.

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