Causality Relationship between Foreign Direct Investment, Trade and Economic Growth in Indonesia

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Abstract: The aim of this paper is to analyse the relation between foreign investment, economic growth, and trade in Indonesia. using secondary data in the form of time series data from 1981 to 2017. Data is obtained from the World Bank website. For data analysis using vector autoregression (VAR) method. Stationary data at first difference and cointegrated. Thus, the vector error correction (VECM) model is used to analyze the short and long-term relationships of each variable. The results obtained are that there are no significant variables in the short term and obtained significant long-term effects of FDI, export and import variables on GDP in Indonesia. After a causality test, the conclusion is that the FDI variable has a one-way causality relationship to the variables GDP, exports and imports. The import variable has a one-way causality relationship to GDP and exports. Meanwhile, the import variable has a one-way causality relationship with exports.

1 INTRODUCTION

Indonesia is located in the Southeast Asia region. It is an archipelago with abundant natural resources and beautiful landscapes. Based on these explanations, Indonesia has a very large possibility for investment activities, especially foreign investment (FDI) because there are many available raw materials from various sectors such as agriculture, plantations, mining. also the potential of nature that can be used as a tourist area. If this potential can be utilized optimally, it will improve the economy in Indonesia.

Apart from foreign investment, trade can also boost a country's economic growth. One of the objectives of international trade is to increase GDP (Gross Domestic Product) or the total value of production of goods and services in a country for one year. The impact of international trade can be felt in terms of social, political and economic interests to help drive the progress of industrialization, transportation, globalization and the presence of multinational companies.

Based on the description above, this study was made to analyze the relationship between foreign investment, trade and GDP growth in Indonesia. This paper is divided into five parts. The first part is the introduction. The second part is aimed at the theoretical framework. The third part contains the research methods used. The fourth part contains the results and research discussions. And the last part includes the conclusions obtained.

2 THEORETICAL STUDY

2.1 Economic Growth

Prof. Simon Kuznets, defined economic growth as "a long-term increase in the ability of a country to provide more and more types of economic goods to its population. This ability grows according to technological progress, and institutional and idiological adjustments that are needed ".

Economic growth is one of the most important indicators in carrying out an analysis of economic development that occurs in a country. Where this economic growth shows the extent to which economic activity will generate additional income for the community in a certain period. Economic growth is closely related to the amount of GDP. If the amount of GDP in a region is high, it can be concluded that economic growth is high. GDP is

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used for various purposes, but the most important is to measure economic performance.

In Indonesia, GDP growth from 2010 to 2017 is in the range of 4-5 percent. The highest growth recorded in 2010 was 6.2 percent, with GDP at a constant price of US $ 755.09 billion. In 2015 the GDP value of US $ 988.13 billion with economic growth at that time amounted to 4.9 percent. in general, total GDP growth in Indonesia has increased every year.

2.2 Foreign Direct Investment

Foreign direct investment is carried out by foreign parties or it can also be said as a full-fledged company investment, where management of both management and part of the workforce is determined by foreign parties. Direct investment includes capital transfers or the establishment of factories and usually uses production techniques of the country of origin of investors, managerial services, marketing and advertising determined by the foreign investor.

Based on data obtained from the World Bank, the value of foreign investment entering Indonesia each year continues to fluctuate. In 2010, foreign capital was recorded at US $ 15.29 billion, and in 2017 amounted to US $ 21.46 billion. Although it had dropped in 2016 amounting to US $ 4.54 billion. This indicates that the investment climate in Indonesia is quite good, so that foreign investors do not hesitate to invest their funds.

2.3 International Trade

International trade is an interaction between countries in the form of buying and selling goods and services on the basis of mutual agreement. International cooperation in the field of trade is not something that has just begun, but has been around since the Middle Ages.

International trade is an "engine of growth". Exports and imports are important factors in stimulating a country's economic growth. Where, exports and imports will enlarge the consumption capacity of a country, increase output and provide access to scarce resources and potential international markets for various export products which without these product products, poor countries will not be able to develop activities and life of the national economy (Todaro, 1993).

Based on data obtained from the World Bank. The value of Indonesian exports and imports from 2010 to 2017 has fluctuated. In 2010 the value of Indonesian exports amounted to US $ 166.64 billion and imports amounted to US $ 145.42 billion, resulting in a surplus of US $ 21.21 billion. In 2012 the value of Indonesian exports increased to US $ 211 billion, followed by imports which also increased by US $ 212.89 billion, resulting in a deficit of US $ 1.88 billion. The trade deficit continued until the next two years. In 2017 the value of Indonesian exports was US $ 193.55 billion and imports amounted to US $ 182.53 billion, a surplus of US $ 11.03 billion.

2.4 Literatur Review

Based on the research of Zuzana Szkorupova (2014), there was a long-term causal relationship between the variables studied. This paper also discovers the positive impact of foreign direct investment and the positive impact of exports on gross domestic product in Slovakia. Seng Shotan (2017), found strong evidence about the causal impact of FDI on Cambodia's economic growth (GDP). Afaf Abdull J, Saaed and Majeed Ali Hussain (2015), show that there is unidirectional causality between exports and imports and between exports and economic growth in Tunisia. Muhammad Shaikh and Hussain Shar (2010), show that there is a causal relationship between economic growth, exports and foreign inventories (FDI). And concluded that investment (FDI) in Pakistan has attracted economic growth and exports. Rehmat Ullah, Khalid Javed and Falak Sher (2012), showed that economic growth was also positively influenced by investment. But the Causality test does not support the causality of trade openness to GDP. And José Luis, Carlos Rivera and Priscilla Castro (2009), entitled Economic growth, foreign direct investment and international trade: evidence on causality in the Mexican economy, shows the bidirectional causal relationship of FDI and GDP in Mexico.

3 RESEARCH METHOD

This study uses the VAR and VECM methods to analyze the relationships between variables. Data used in the form of secondary data in the form of time series from 1981 - 2017 in Indonesia. All data is sourced from the World Bank website. Data is processed using the program Eviews 10. The variables examined are in the form of constant total GDP in 2010, the foreign direct investment net inflows variable, the variables of export and import values.

Before deciding to use the right model for the data in this study. There are several steps that must be passed first, such as:

3.1 Data Stationarity Test

Time series economic data are generally stochastic (having a trend that is not stationary / data has unit roots). If the data has a unit root, the value will tend to fluctuate not around the average value, making it difficult to estimate a model. (Rusydiana, 2009). Unit Root Test is one of the concepts that lately is increasingly popular to be used to test the stationary time series data. This test was developed by Dickey and Fuller, using the Augmented Dickey Fuller Test (ADF). The stationarity test that will be used is the ADF (Augmented Dickey Fuller) test using the 5 percent real level.

3.2 Optimum Lag Length Test

VAR estimation is very sensitive to the lag length used. Determination of the number of lags (orders) to be used in the VAR model can be determined based on Akaike Information Criterion (AIC) criteria, Schwarz Information Criterion (SC) or Hannan Quinnon (HQ). Besides testing the optimal lag length is very useful to eliminate the problem of autocorrelation in the VAR system, so that the use of optimal lags is expected to no longer appear the problem of autocorrelation. (Nugroho, 2009).

3.3 Stability Test of the VAR Model

VAR stability needs to be tested before doing further analysis, because if the VAR estimation results will be combined with the unstable error correction model, then Impulse Response Function and Variance Decomposition become invalid (Setiawan, 2007 in Rusydiana, 2009).

3.4 Granger Causality Analysis

Causality tests are conducted to determine whether an endogenous variable can be treated as an exogenous variable. This starts from ignorance of influence between variables. If there are two variables y and z, then y causes z or z to cause y or applies both or there is no relationship between the two. The y variable causes the variable z to mean how many z values in the current period can be explained by the z value in the previous period and the y value in the previous period.

3.5 Cointegration Test

As with the Engle-Granger statement, the existence of non-stationary variables causes the possibility of a long-term relationship between variables in the system. Cointegration tests are carried out to determine the existence of relationships between variables, especially in the long term. If there is cointegration on 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 Johansen Cointegration method.

3.6 Empirical Model of VAR / VECM

After cointegration is known, the next test process is carried out using the error correction method. If there are differences in the degree of integration between test variables, the test is carried out simultaneously (jointly) between the long-term equation with the error correction equation, after it is known that in the variable there is cointegration. The difference in degrees of integration for cointegrated variables is called Lee and Granger (Hasanah, 2007 in Rusydiana, 2009) as multicointegration. But if there is no cointegration phenomenon, then the test is continued by using the first difference variable. (Rusydiana, 2009).

VECM is the form of VAR that is estimated because of the existence of data forms that are not stationary but are cointegrated. VECM is often referred to as the VAR design for non-stationary series that has a cointegration relationship. The VECM specification restricts the long-term relationship of endogenous variables to converge into their cointegrated relationship, but still allows the existence of short-term dynamics.

4 RESULTS AND DISCUSSION

4.1 Stationary Test

The test method used to test the data stationarity is the ADF (Augmenteed Dick Fuller) test using a real level of five percent. If the t-ADF value is smaller than the critical value of MacKinnon, it can be concluded that the data used is stationary (does not contain unit roots). Testing the roots of this unit is carried out at the level up to the first difference.

The results of the ADF test can be seen in the table below:

Table 1: ADF Unit root test

Null hypothesis : lnGDPC, lnFDI, lnEX, lnIM

Variabel	ADF Test statistic (p value)	
	Level	**1st difference**
lnGDPC	-2.29 (0.42)	-4.37 (0.00)***
lnFDI	-3.89 (0.02)***	-6.49 (0.00)***
lnEX	-2.91 (0.17)	-5.28 (0.00)***
lnIM	-2.48 (0.33)	-4.91 (0.00)***

Note: (1) Test critical values at 1%, 5% and 10% level are -3.53, -2.91 and -2.59, Respectively
(2) ***, ** and * denote rejection of null hypothesis at 1%, 5% and 10% level of significance, respectively.

From the table above it can be seen that the data is stationary at the 1st difference because the probability value is smaller than α = 5 percent.

4.2 Optimal Lag Test

The next step to estimate the VAR model, must first determine the optimal lag that will be used in the VAR estimation. Determination of optimal lag is important because in the VAR method, the optimal lag of endogenous variables is the independent variable used in the model. Testing the optimal lag length is very useful to eliminate the problem of autocorrelation in the VAR system which is used as a VAR stability analysis. So that with the use of the optimal lag it is expected that the autocorrelation problem will not appear again. The optimal lag length will be searched using the available information criteria. The selected lag candidates are length lag according to criteria such as Likehood Ratio (LR), Final Prediction Error (FPE), Akaike Information Crition (AIC), Schwarz Information Crition (SC), and Hannan-Quin Crition (HQ). Determination of optimal lag in this study was based on sequential modified LR statistical test (LR) criteria.

Table 2: Optimal Lag Test

VAR Lag Order Selection
Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-7.22	NA	2.27e-05	0.660	0.839	0.722
1	110.68	201.14*	5.72e-08*	-5.334*	-4.436*	-5.028*
2	122.93	18.01	7.44e-08	-5.113	-3.497	-4.562
3	140.62	21.85	7.54e-08	-5.213	-2.878	-4.417

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Based on table 2 above, the selected lag is lag 1.

4.3 Stability Test of the VAR Model

Before entering into a further stage of analysis, the estimated estimation of the VAR system system must be tested for stability through VAR stability condition check in the form of roots of characteristic polynomial for all variables used multiplied by the number of lags of each VAR. VAR stability needs to be tested because if the estimated VAR stability is unstable, the IRF and FEVD analysis becomes invalid. Based on the results of these tests, a VAR system is said to be stable if all roots or roots have modulus smaller than one. In this study, based on the VAR stability test shown in the Table it can be concluded that the estimation of VAR stability to be used for IRF and FEVD analysis has been stable because of the modulus range <1.

Table 3: VAR Stability Test

Roots of Characteristic Polynomial
Endogenous variables: D (lnGDPC) D (lnFDI) D (lnEX) D (lnIM)
Exogenous variables: C
Lag specification: 1 2

Root	Modulus
0.991023	0.991023
0.233548 - 0.600717i	0.644520
0.233548 + 0.600717i	0.644520
0.516572 - 0.293687i	0.594221
0.516572 + 0.293687i	0.594221
0.538923	0.538923
-0.118734	0.118734
-0.035249	0.035249

4.4 Cointegration Test

The purpose of the cointegration test in this study is to determine whether a group of variables that are not stationary at that level meets the requirements of the integration process, namely where all variables are stationary at the same degree, namely degrees 1 or I (1). Based on the results seen in the Table, cointegration testing in this study uses the Johansen Trace Statistic test cointegration test method.

Long-term information is obtained by first determining the cointegration rank to find out what the system of equations can explain from the whole system. Cointegration testing criteria in this study are based on trace statistics. If the trace statistic value is greater than the critical value of 5 percent, the alternative hypothesis that states the number of cointegration is accepted so that it can be known how many equations are cointegrated in the system.

This test aims to determine whether there is a long-term effect on the variables that we will examine. If there is proven cointegration, the VECM stage can be continued. But if it is not proven, then VECM cannot continue.

Table 4: Johansen Cointegration Test

Sample (adjusted): 1983 2017
Included observations: 35 after adjustments
Trend assumption: Linear deterministic trend (restricted)
Series: LNGDPC LNFDI LNEX
LNIM
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigen-value	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.6307	**73.801**	**63.87610**	0.0058
At most 1	0.5322	38.934	42.91525	0.1183
At most 2	0.2001	12.346	25.87211	0.7875
At most 3	0.1214	4.5319	12.51798	0.6644

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
 * denotes rejection of the hypothesis at the 0.05 level
 **MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigen-value	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.6307	**34.867**	**32.118**	0.0225
At most 1 *	0.5322	26.587	25.823	0.0396
At most 2	0.2001	7.8146	19.387	0.8377
At most 3	0.1214	4.5319	12.518	0.6644

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
 * denotes rejection of the hypothesis at the 0.05 level
 **MacKinnon-Haug-Michelis (1999) p-values

Based on the table above, it can be seen that the trace statistic value and maximum eigenvalue at r = 0 are greater than the critical value with a significance level of 5 percent. This means that the null hypothesis which states that no cointegration is rejected and the alternative hypothesis which states that there is cointegration is accepted. Based on the analysis from the table above, it can be seen that among the four variables in this study, there is cointegration at the 5 percent significance level. Thus, the results of the cointegration test indicate that between the movements of GDPC, FDI, EX and IM have a relationship of stability / balance and similarity of movements in the long run. or, in each short-term period, all variables tend to adjust to each other, to achieve long-run equilibrium.

4.5 Granger Causality Test

he Granger Causality Test aims to see whether two variables have a reciprocal relationship or not. In other words, does one variable have a significant causal relationship with other variables, because each variable in the study has the opportunity to become an endogenous or exogenous variable. The bivariate causality test in this study used the VAR Pairwise Granger Causality Test and used a real level of five percent. The following table presents the results of the Bivariate Granger Causality test analysis.

Table 5: Results of Granger causality test

Pairwise Granger Causality Tests
Sample: 1981 2017
Lags: 1

Null Hypothesis:	Obs	F-Stat	Prob.
LNFDI does not Granger Cause LNGDPC	36	0.15	0.69
LNGDPC does not Granger Cause LNFDI		**9.99**	**0.00**
LNEX does not Granger Cause LNGDPC	36	0.08	0.78
LNGDPC does not Granger Cause LNEX		**6.87**	**0.01**
LNIM does not Granger Cause LNGDPC	36	0.16	0.69
LNGDPC does not Granger Cause LNIM		**5.25**	**0.03**
LNEX does not Granger Cause LNFDI	**36**	**9.37**	**0.00**
LNFDI does not Granger Cause LNEX		0.08	0.78
LNIM does not Granger Cause LNFDI	**36**	**8.44**	**0.01**
LNFDI does not Granger Cause LNIM		0.01	0.90
LNIM does not Granger Cause LNEX	36	2.36	0.13
LNEX does not Granger Cause LNIM		**9.89**	**0.00**

- H0 : LNFDI does not affect LNGDPC
  H1 : LNFDI affect LNGDPC
  The F-Statistic probability value is greater than α = 5%, (0.69> 0.05), H1 is accepted (LNFDI affects LNGDPC).
  H0 : LNGDPC does not affect LNFDI
  H1 : LNGDPC affect LNFDI
  F-Statistic probability value is smaller than α = 5%, (0.00 <0.05), H0 is accepted (LNGDPC does not affect LNFDI).
  Thus, it was concluded that there was unidirectional causality between the LNFDI and LNGDPC variables.

- H0 : LNEX does not affect LNGDPC
  H1 : LNEX affect LNGDPC
  The F-Statistic probability value is greater than α = 5%, (0.78> 0.05), H1 is accepted (LNEX affects LNGDPC).
  H0 : LNGDPC does not affect LNEX
  H1 : LNGDPC affect LNEX

F-Statistic probability value is smaller than α = 5%, (0.01 <0.05), H0 is accepted (LNGDPC does not affect LNEX).
Thus, it was concluded that there was unidirectional causality between LNEX and LNGDPC variables.

- H0 : LNIM does not affect LNGDPC
  H1 : LNIM affect LNGDPC
  The F-Statistic probability value is greater than α = 5%, (0.69> 0.05), H1 is accepted (LNIM affects LNGDPC).
  H0 : LNGDPC does not affect LNIM
  H1 : LNGDPC affect LNIM
  F-Statistic probability value is smaller than α = 5%, (0.03 <0.05), H0 is accepted (LNGDPC does not affect LNIM).
  Thus, it was concluded that there was causality in the direction of the variables LNIM and LNGDPC

- H0 : LNEX does not affect LNFDI
  H1 : LNEX affect LNFDI
  F-Statistic probability value is smaller than α = 5%, (0.00 <0.05), H0 is accepted (LNEX does not affect LNFDI).
  H0 : LNFDI does not affect LNEX
  H1 : LNFDI affect LNEX
  F-Statistic probability value is greater than α = 5%, (0.78> 0.05), H1 is accepted (LNFDI affects LNEX).
  Thus, it was concluded that there was unidirectional causality between LNFDI and LNEX variables.

- H0 : LNIM does not affect LNFDI
  H1 : LNIM affect LNFDI
  F-Statistic probability value is smaller than α = 5%, (0.01 <0.05), H0 is accepted (LNIM does not affect LNFDI).
  H0 : LNFDI does not affect LNIM
  H1 : LNFDI affect LNIM
  The F-Statistic probability value is greater than α = 5%, (0.90> 0.05), H1 is accepted (LNFDI affects LNIM).
  Thus, it was concluded that there was unidirectional causality between LNFDI and LNIM variables.

- H0 : LNIM does not affect LNEX
  H1 : LNIM affect LNEX
  F-Statistic probability value is greater than α = 5%, (0.13> 0.05), H1 is accepted (LNIM affects LNEX).
  H0 : LNEX does not affect LNIM
  H1 : LNEX affect LNIM
  F-Statistic probability value is smaller than α = 5%, (0.00 <0.05), H0 is accepted (LNEX does not affect LNIM).
  Thus, it can be concluded that there is a unidirectional causality between the LNIM and LNEX variables

4.6 VECM Model

The VECM estimation results will get a short-term and long-term relationship between Total GDP, Foreign Investment, Export and Import. In this estimation, Total GDP is the dependent variable, while the independent variable is Foreign Investment, Export and Import.

Based on the estimation results of the VECM model there are no significant influencing variables in the short term because the t-statistic values obtained by almost all variables are smaller than the t-table value at α = 0.05.

However, for the long term there is a significant influence between the variables of foreign investment (lnFDI), exports (lnEX) and imports (lnIM) on GDP (lnGDPC) in Indonesia.

Table 6: Long term influence

Variables	Coefficient	T-Stat
lnFDI (-1)	0.533134	4.71614
lnEX (-1)	3.659332	4.85363
lnIM (-1)	3.964144	4.65306

Source : Output eviews

Based on the table above. It can be concluded that there is a positive and significant long-term effect of foreign investment of 0.53 percent, exports of 3.65 percent and imports of 3.9 percent of total GDP in Indonesia at the level of confidence α = 0.05.

5 CONCLUSIONS

The purpose of this study is to examine the relationship between GDP, foreign investment and trade (exports and imports) in Indonesia. This paper presents some facts about patterns of FDI inflows, international trade and GDP growth in Indonesia. from the data obtained (1981-2017) it shows that international trade (export-import) and GDP growth increase over time. Although foreign investment into Indonesia tends to fluctuate, the trend is positive. All variables studied have a long-term relationship in I

(1). In the VECM model there are short-term effects that are not significant for the FDI, import and export variables on GDP. However, there is a long-term relationship between the three dependent variables on GDP in Indonesia. Based on the results of the test granger causality, the results of the FDI variable have a one-way causality relationship to the variables GDP, exports and imports.

The import variable has a one-way causality relationship to GDP and exports. While the import variable has a one-way causality relationship with exports. Thus it can be concluded that in this paper the GDP variable is an endogenous variable whose value is influenced by other variables (FDI, import and export). The variable foreign investment (FDI) is an exogenous variable that can affect other variables (GDP, exports and imports). Meanwhile, the export and import variables can be exogenous and endogenous variables. Therefore, foreign investment (FDI) in Indonesia must be continuously improved because it can affect GDP and Indonesia's trade.

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