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The Dynamics of Exports, Imports, Labor and Indonesian Government Expenditure Period 1990 – 2019

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ABSTRACT

This study analyzes the dynamic of exports, imports, labor, and government expenditure in Indonesia in 1990 - 2019. This study using time series data are analyzed using the *Vector Error Correction Model (*VECM) in *Eviews 10* software to estimate the relationship between variables. In the VECM test, export, import, government expenditure, and labor have long-term and short-term relationships. The IRF test on exports, imports, government expenditure, and labor shows positive and negative results and fluctuates in response to changes in other variables. The VD test indicates that the variation of imports and government expenditure is mostly influenced by exports, while changes in labor are influenced by imports.

Keywords: *Exports-Imports, Labor, Government Expenditure, Vector Error Correction Model (VECM).*

1. INTRODUCTION

An open economy is one of the impacts of the globalization era, where the country can easily establish cooperative relationships to carry out its economic activities. This happens because it is easy to find information and the development of technology. The activity of fulfilling services and goods from various cooperation between countries, in the end, creates a free market. It is believed that high economic openness can generate opportunities for a country to improve its economic growth.

Export and imports are economic activities that arise due to economic openness, export and import are cooperation between trading carried out between countries. Improving productivity allows a country to increase the number of labor, the large number of labor will be able to increase the amount of output in a country.

However, the existence of limitations in production factors has disrupted efforts to promote economic growth. In Indonesia, economic activity is often faced with problems with production factors, Indonesia has abundant natural resources, which is considered beneficial, but the inadequate infrastructure can hinder it.

The country of Indonesia has a fairly widespread territory, of course, has an impact on the process of mobilizing economic activity. It is hoped that the role of the government can encourage the acceleration of economic growth, through financing by the government, which is reflected in the fulfillment of infrastructure.

From the continuous activities positively on the variables of exports, imports, labor, and government expenditures, this research makes its justification for these variables is an important indicator in the process of economic growth.

Based on the background described, this research aims to analyze the relationship and the dynamics of export, import, labor, and government expenditure variables in Indonesia in the period 1990-2019.

2. METHOD

This study uses quantitative methods, where the method aims at explaining, observing, and measuring the relationships between the variables studied and the research data in the form of numbers. This data is a secondary data series for the period 1990 – 2019, which was obtained from the Indonesia Central Statistics Agency.

The variables studied in this study were *exports* (X1), *imports* (X2), *labor* (X3), and *government expenditure* (X4). Because in this study it is not known how the variables are related, these variables are assumed to be independent variables. Testing this research using Eviews software version 10, there are several stages in testing:

a. *Stationary Test / ADF (Augmented Dickey-Fuller test*). The *ADF* test can be formulated as follows:

$$\Delta Xt = \alpha + \phi^* Xt\text{-}1 + \phi 1^* \Delta Xt\text{-}1 + \phi 2^* \Delta Xt\text{-}2 + \ldots + \phi^* r\text{-}1\ \Delta Xt\text{-}r+1 + ut \quad (1)$$

From this test, the data is said to be stationary / does not contain unit roots if the probability value of this test is smaller than the error tolerance value (0.05).

b. Optimum *Lag* Test, determine the lag length of exports, imports, labor, and government expenditure

c. Model Stability Test, to determine the *Vector Autoregressions (VAR)* or *Vector Error Correction Model (VECM).*

d. Cointegration Test, the cointegration test of this research use the *Johansen Method* approach. This test can be formulated as follows:

$$\lambda \text{ Trace } (r) = -T \sum_{i=r+1}^{g} \text{in } (1 - \lambda i) \quad (2)$$

$$\lambda \text{ Max } (r, r+1) = -T \text{ in } (1 - \lambda r + 1) \quad (3)$$

e. Significance Test of Estimated Results, this test is carried out after getting the results of the cointegration test, the VAR test is carried out if there is no cointegration, but if there is cointegration, then the analysis used is VECM.

f. *Granger Causality* test, This test is carried out to see the relationship between the variables being tested.

g. *Forecasting*, this test is included *Impulse Response Function (IRF)* and *Variance Decomposition (VD)* analysis.

3. RESULTS AND DISCUSSION

The first stage in testing this data is the unit root test of the variables in this research. Time-series data will be said to be stationary if the data has a constant mean, variance, and covariance during observation (Thomas, 1996). Following are the results of the ADF test:

Table 1. *Augmented Dickey-Fuller* (ADF) Test

Variable	Result
Exports	Stationer at *first difference*
Imports	Stationer at *first difference*
Labor	Stationer at *first difference*
Government Expenditure	Stationer at *first difference*

Source: processed by the author

Based on table 1, it can be seen that the results of the ADF test of all variables, namely, exports, imports, labor, and government expenditures are stationary at a level of 1% (*first difference*). From these results it can be concluded that all tested variables are constant in exports, imports, labor, and government expenditure, so the modified data is suitable for use in the analysis of *Vector Autoregressions* (VAR) and *Vector Error Correction Model* (VECM).

The next step is the cointegration test, cointegration testing in this study uses the *Johansen Methods*. The test aims to determine whether or not there is a long-term effect for the variables under study, if there is evidence of cointegration, the *Vector Error Correction Model* (VECM) test stage can be continued. The following are the results of the cointegration test with the *Johansen Method*

After doing Optimum Lag testing with *Vector Autoregressions* (VAR), then determining recommendations from the test results. Determination of the Optimum Lag can be seen from the information recommended by the smallest value of *Final Prediction Error* (FPE), *Akaike Information Criterion* (AIC), *Schwarz Criterion* (SC), and *Hannan-Quinn* (HQ) which is marked with an asterisk on the table.

Table 1. Cointegration Test

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.795124	61.83119	47.85613	0.0014
At most 1	0.319501	20.61206	29.79707	0.3823
At most 2	0.213284	10.60389	15.49471	0.2371
At most 3 *	0.154607	4.366809	3.841466	0.0366
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.795124	41.21912	27.58434	0.0005
At most 1	0.319501	10.00817	21.13162	0.7439
At most 2	0.213284	6.237086	14.26460	0.5830
At most 3 *	0.154607	4.366809	3.841466	0.0366

Source: processed by the author

Based on the results of the cointegration test using the *Johansen Method*, it can be seen that the value of the *Trace Statistics* from the *Trace test* is 61.83119 greater than the critical value at alpha (0.05) of 27.58434, which means that in this model there are co-integrated equations. Then it is known that the *Trace Statistic* value of 4.366809 is greater than the critical value at alpha (0.05) of 3.841466.

In the *Maximum Eigenvalue test*, when viewed from the highest value of the test, *Trace Statistic* is recorded as 41.2921, indicating that in this equation model there is one cointegrated equation. From the results of the *Johansen Method* cointegration test, it is known that the four variables, namely exports, imports, labor, and government expenditure in Indonesia in the 1990 - 2019 period have long-term cointegration, so the *Vector Error Correction Model* (VECM) can be applied in this study. Following are the results of the *Vector Error Correction Model* (VECM) modeling on the variables of exports, imports, labor, and government expenditure.

The results of the VECM estimation model can be rewritten as:

D(Impor)=2.62631 (ECT) + 0.053635 Expend (-1) - 0.889377 Impor(-1) - 0.000913 Labor (-1) -1.198231 D(Ekspor (-1) -0.710779 D(Ekspor(-2) -0.269119 D(Expend(-1) -0.168283 D(Expend(-2) + 0.831776 D(Impor(-1) + 0.614266 D(Impor(-2) + 0.009025 D(Labor (-1) - 0.000774 D(Labor(-2) (4)

Based on the results and equations, it is known that the variable that is included is Import, it can be seen that the ECT coefficient is 2.62631. The t-test statistic of 2.62631 is greater than t - table. It means that the specification model is positive and significant, which indicates a short-term and long-term relationship. In the long run, there are only significant government expenditure variables, while the import and labor variables are not significant. In the short term, it can be seen that the variables of imports, government expenditure, and labor have a significant value.

In the long run, there are only significant government expenditure variables, with a statistical t value of 5.10718, according to the estimation results, in the long run, the value of government expenditure shows a positive number of 0.053635, meaning that if there is an increase of 1 percent in government expenditure it will increase imports by 0.053635 percent.

In the short run, the results of Table 3 shows that 2 variables have a significant value to import, there is government expenditure and labor. In the short run in lag 1, government expenditure has a negative value of -0.269119, meaning that if there is an increase of 1 percent in government expenditure in the previous 1 period it will reduce imports by 0.269119 percent in the current year, then at lag 2, the government expenditure has a negative value of -0.168283, meaning that if there is an increase of 1 percent in expenditure in the previous 2 periods it will reduce imports by 0.168283 percent in the current period.

In the short run, labor shows a positive value of 0.009025 at lag 1, meaning that if there is an increase of 1 percent in the previous 1 year, it will increase imports by 0.009025 in the current year.

Table 3. VECM estimation

Cointegrating Eq:	CointEq1			
EKSPOR(-1)	1.000000			
EXPEND(-1)	0.053635			
	(0.01050)			
	[5.10718]			
	(0.05256)			
	[-16.9212]			
LABOR(-1)	-0.000913			
	(0.00059)			
	[-1.54613]			
C	-3899.061			
Error Correction:	D(EKSPOR)	D(EXPEND)	D(IMPOR)	D(LABOR)
CointEq1	0.204652	3.063873	2.690547	62.17635
	(0.89820)	(4.36190)	(1.02446)	(78.1158)
	[0.22785]	[0.70242]	**[2.62631]**	[0.79595]
D(EKSPOR(-1)	-0.409904	0.939282	-1.198231	-9.946480
	(0.67076)	(3.25737)	(0.76504)	(58.3353)
	[-0.61111]	[0.28836]	[-1.56622]	[-0.17051]
D(EKSPOR(-2)	-0.356477	-0.158466	-0.710779	-32.37371
	(0.43141)	(2.09506)	(0.49206)	(37.5197)
	[-0.82630]	[-0.07564]	[-1.44450]	[-0.86284]
D(EXPEND(-1)	-0.138654	-1.026090	-0.269119	2.685914
	(0.07071)	(0.34338)	(0.08065)	(6.14955)
	[-1.96090]	[-2.98818]	**[-3.33692]**	[0.43677]
D(EXPEND(-2)	-0.115216	-0.269297	-0.168283	-0.115081
	(0.06770)	(0.32879)	(0.07722)	(5.88820)
	[-1.70175]	[-0.81905]	**[-2.17922]**	[-0.01954]
D(IMPOR(-1)	0.035804	1.372578	0.831776	13.76686
	(0.58116)	(2.82226)	(0.66285)	(50.5429)
	[0.06161]	[0.48634]	[1.25485]	[0.27238]
D(IMPOR(-2)	0.129280	0.829616	0.614266	23.39170
	(0.35795)	(1.73828)	(0.40826)	(31.1303)
	[0.36117]	[0.47726]	[1.50459]	[0.75141]
D(LABOR(-1)	0.004498	0.018361	0.009025	-0.271986
	(0.00251)	(0.01217)	(0.00286)	(0.21790)
	[1.79505]	[1.50903]	**[3.15822]**	[-1.24819]
D(LABOR(-2)	-0.001813	-0.001402	-0.000774	-0.504675
	(0.00271)	(0.01315)	(0.00309)	(0.23542)
	[-0.66975]	[-0.10668]	[-0.25074]	[-2.14374]
C	1399.632	10688.97	3233.039	-12229.31
	(3119.83)	(15150.7)	(3558.38)	(271329.)
	[0.44862]	[0.70551]	[0.90857]	[-0.04507]
R-squared	0.686628	0.612481	0.777208	0.444179
Adj. R-squared	0.510356	0.394501	0.651887	0.131529
Sum sq. resids	3.93E+09	9.26E+10	5.11E+09	2.97E+13
S.E. equation	15669.66	76095.89	17872.30	1362777.
F-statistic	3.895281	2.809806	6.201754	1.420692
Log likelihood	-281.7273	-322.8143	-285.1470	-397.8317
Akaike AIC	22.44056	25.60110	22.70362	31.37167
Schwarz SC	22.92445	26.08498	23.18750	31.85555
Mean dependent	-584.0654	3476.308	653.2500	-6514.731
S.D. dependent	22393.37	97792.24	30291.48	1462336.
Determinant resid covariance (of adj.)		6.87E+37		
Determinant resid covariance		9.85E+36		
Log-likelihood		-1254.920		
Akaike information criterion		99.91692		
Schwarz criterion		102.0460		
Number of coefficients		44		

Source: processed by the author

After getting the modeling in table 6, the next step is to test the feasibility of the model:

Table 4. Model Eligibility Test

Lags	Q-Stat	Prob.*	Adj Q-Stat	Prob.*	df
1	7.312223	---	7.604712	---	---
2	18.34668	---	19.55870	---	---
3	29.57579	0.3838	32.25249	0.2644	28
4	48.02448	0.3131	54.05548	0.1424	44
5	66.13859	0.2733	76.48248	0.0742	60
6	82.69180	0.2805	98.00164	0.0456	76
7	94.03369	0.4216	113.5221	0.0635	92
8	106.4301	0.5247	131.4281	0.0623	108
9	122.7430	0.5150	156.3772	0.0261	124
10	129.5662	0.7256	167.4650	0.0566	140
11	144.6823	0.7320	193.6662	0.0218	156
12	156.7775	0.7910	216.1286	0.0126	172
13	163.6320	0.8999	229.8377	0.0202	188
14	166.4440	0.9746	235.9303	0.0621	204
15	173.6808	0.9907	253.0355	0.0625	220
16	177.8082	0.9982	263.7668	0.1036	236
17	187.2975	0.9992	291.1802	0.0454	252
18	190.3054	0.9999	300.9558	0.0811	268
19	193.1416	1.0000	311.4902	0.1259	284
20	193.9585	1.0000	315.0301	0.2641	300
*Test is valid only for lags larger than the VAR lag order.					
df is degrees of freedom for (approximate) chi-square distribution after					
adjustment for VEC estimation (Bruggemann, et al. 2005)					

Source: processed by the author

From the results of the model eligibility test shown in Table 4, it can be seen that most of the lags obtained have met the model feasibility test and do not contain residual autocorrelation because the probability value is greater than the critical alpha value of 0.05.

The next test is the causality test using the *Granger Causality* method. This test aims to determine the relationship between the variables studied, namely exports, imports, labor, and government expenditure. Below are the results of the *Granger Causality Test*:

Table 5. Granger Causality Result

Variable	Prob.	Result
G. Expenditure -Ekspor	0.0229	Have relation
Import - Export	0.1351	Haven't relation
Labor - Eksport	0.2878	Haven't relation
Import- G. Expenditure	0.2948	Haven't relation
Labor - G. Expenditure	0.0381	Have relation
Labor -Import	0.0221	Have relation

Source: processed by the author

Based on the test with the *Granger Causality* method, a variable has a relationship with other variables if the probability value of the variable is less than the critical alpha value of 0.05. From table 5 above, it can be seen that the results of the causality test, in the import and export relationship in this study, it is stated that there is no import-export relationship, this is in line with Bakari and Mabroki's (2016) research which states that there is no relationship between import and export variables in their study in Morocco and also research conducted by Batubara and Saskara (2015) which states that there is only a one-way relationship between exports and imports, which means that there is no import-export relationship, in contrast to Sari (2019) which states that there is a causal relationship between exports and imports as well as research by Yüksel and Zengin (2016), which states that there is a relationship between exports and imports in China and Turkey, as well as Bakari and Krit (2017) also mention that there is a relationship between export and import variables in Mauritania and contrast to Babatunde (2014) which explained the relationship between export and import in Nigeria.

In this study, the variables namely labor and exports are don't have a relationship, this result is not following the theory put forward by Salvatore (1997) which states that a large number of existing workers will help export activities. Lembang (2019) explain, that government expenditure through capital expenditure has a positive and significant effect on labor, Sukirno (2000) also explains in his theory that government expenditure can stabilize job opportunities, in this case, it is reflected in the results of a causality analysis which explains that at least there is a one-way relationship between labor and government expenditure. After knowing the relationship between variables through the causality test, the next step is the Impulse Responses test, the purpose of this test is to determine the impact of *shocks* from one variable to another, this test is not only for short-term analysis but also for long-term analysis. Below is the result of the *Impulse Responses Function.*

The results of impulse response illustrate how to estimate the impact of a variable's shock on other, because import is the best variable to be used as a model according to the VECM estimation results, so that only need to be considered is the results of imports.

IRF analysis with imports as a response shows the first period is at 6,000, but in the second period it drops to -9,000, then the 3rd period increases to a positive value of 1,000. Period 4 to period 10 tends to fluctuate but not too much

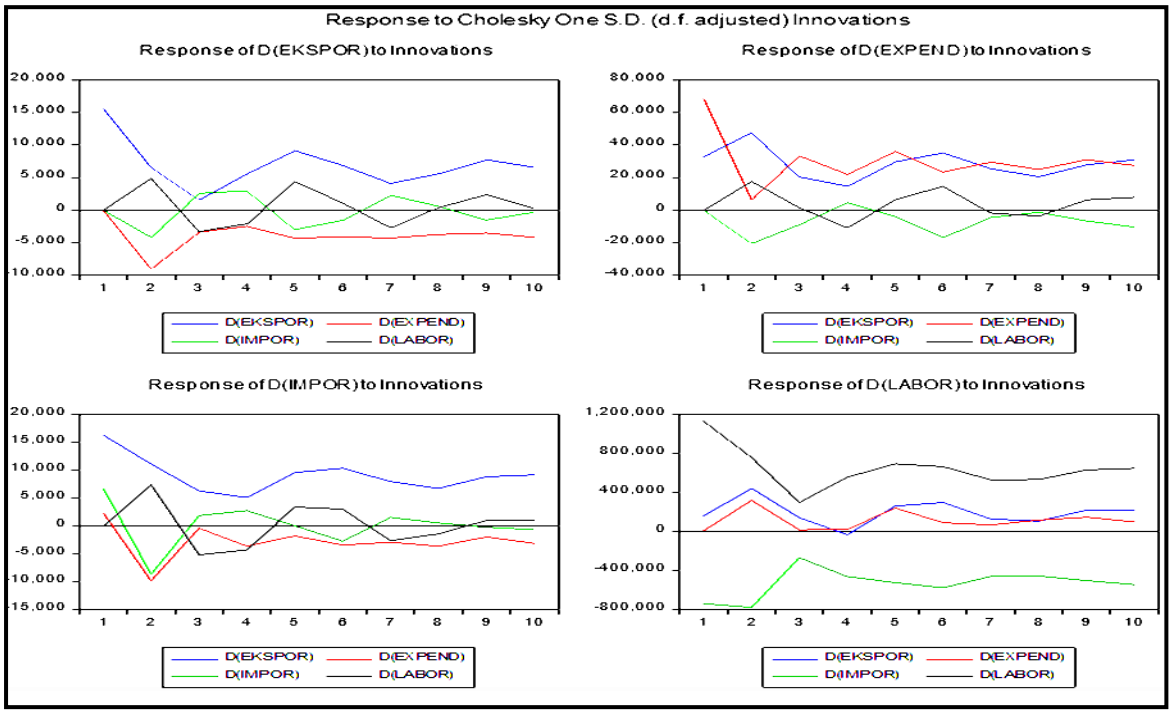

Figure 1. Impulse Response Function

After obtaining the results from the Impulse Responses Function test, the next test is to perform the Variance Decomposition test, this test is intended to strengthen the results of the previous test and provides an estimate of the magnitude of a variable. Following are the test results of the Variance Decomposition

Table 6. Variance Decomposition Test

Variance Decomposition of D(IMPOR):						
Period	S.E.	D(EKSPOR)	D(EXPEND)		D(IMPOR)	D(LABOR)
1	17872.30	83.73175	1.769525		14.49873	0.000000
2	25912.00	58.37962	15.25301		18.12554	8.241820
3	27239.60	58.21102	13.82379		16.87120	11.09400
4	28411.84	56.73161	14.34084		16.44647	12.48109
5	30240.71	60.18698	13.00641		14.51739	12.28922
6	32414.17	62.64545	12.44362		13.34723	11.56370
7	33647.61	63.75697	12.30897		12.59348	11.34057
8	34545.99	64.31814	12.78154		11.97257	10.92775
9	35732.51	66.26031	12.25015		11.19458	10.29496
10	37042.45	67.79774	12.10449		10.45005	9.647722
Cholesky Ordering: D(EKSPOR) D(EXPEND) D(IMPOR) D(LABOR)						

Source: processed by the author

Because import is the best variable to be used as a model according to the VECM estimation results,so that only need to be considered is the results of imports.The results of VD import variables that are predicted to have the largest contribution value in the next 10 years are exports, in the first period until the end of the export period it has the largest and most dominant effect, this is indicated by a value of 60% - 80% in the first period until the end of the period. Starting from the second period, there is an effect of all variables, but the biggest influence is dominated by exports until the end of the period.

4. CONCLUSIONS

Based on the results of data analysis and discussion that has been carried out, the following conclusions are obtained:

1) In the VECM test, export, import, government expenditure, and labor have long-term and short-term relationships
2) Based on the Granger Causality test, it can be seen that the variables that have a relationship, namely, government expenditure on exports, labor to government expenditure, labor and imports, meanwhile the variables that have no relationship are imports with exports, labor, and exports, imports with government expenditure.

Based on the IRF test, it can be seen that each variable causes positive and negative responses to other variables, and in the VD test, variations in variable changes are caused by variations in other variables and also the variables themselves.

Based on the results of the conclusions that have been made, the following suggestions are obtained:

1) The government must be able to regulate its export-import activities, while still increasing the intensity of exports to stimulate economic growth in every region in Indonesia, and slightly limit the intensity of imports to maximize domestic potential.
2) The private sector must play a role in absorbing the available labor, in addition to reducing the unemployment rate as well as increasing the number of goods produced, the increase in the number of goods produced may affect increasing exports.
3) The government must be able to regulate a budget, especially in the field of consumptive spending, and fully support the economy by providing infrastructure for the mobility of the use of economic activities.

5. RECOMMENDATION

Based on the results of the conclusions that have been made, the following suggestions are obtained:

1) The government must be able to regulate its export-import activities, while still increasing the intensity of exports to stimulate economic growth in every region in Indonesia.
2) The private sector must play a role in absorbing the available labor, in addition to reducing the unemployment rate as well as increasing the number of goods produced.

3) The government must be able to regulate a budget, especially in the field of consumptive spending, and fully support the economy by providing infrastructure for the mobility of the use of economic activities.

AUTHOR'S CONTRIBUTION

Imam Mukhlis, Andik Pratama

I.M.; Designed experiment, analyzed data, and supervised research

A.P.;Wrote the paper, designed experiment, analyzed data, and performed an experiment

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