

# Interdependence Analysis of Factors Affecting Indonesia's of Payments

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**Abstract:** This study aims to analyze the interdependencies between variables on a reciprocal basis using the VECM method through a stationary test, determination of optimal lag, stability test models, and cointegration test. The result showed that: (1) In the short-term, inflation negatively affects the balance of payments; interest rate and GDP positively affect the balance of payments. In the long run, inflation is a positive effect on the balance of payments; interest rate and GDP negatively affect on the balance of payments. Meanwhile, the exchange rate negatively affect the balance of payments and money supply positively affect on the balance of payments both in the short-term and long-term (2) the test of Impulse Response Function indicate a positive response that given by the balance of payments toward the shock that occurred on inflation, exchange and interest rates towards the end of the period, while the response of the balance of payments to the shock that occurred in the money supply and GDP towards the end of the period is negative (3) the test of Decomposition Varian shows that at the end of the period of contributions, the balance of payments has decreased while the contribution of the exchange rate experienced enhancement.

## 1 INTRODUCTION

The adoption of an open economic system by many countries, including developing countries, is highly dependent on the high level of the economy. High economic growth can be realized through the application of expansionary policies. But in practice, this policy cannot be separated from the problem of imbalance between the high growth of demand and the limited capacity for available supply. This condition will cause shocks to the external balance such as the occurrence of high import volumes followed by low export volumes, high inflation as a result of excess demand. This will directly reduce competitiveness between countries which will ultimately exacerbate external imbalances so that it will further impact the deterioration of the current account in the balance of payments (Maipita, 2015).

The balance of payments is an important application to analyze the economy (Astuti, Oktavilia, & Rahman, 2015) as one of the indicators that influence the actions of market participants who have an important role in the formation of a state

income (Effendy, 2014).

In the period of last ten years, the data shows the development of Indonesia's balance of payments fluctuating trend. In the second quarter of 2011, the balance of payments reached the highest surplus of USD 11,879 million, mainly driven by a surge in capital and financial account surplus reached USD 12,849 million, a significant increase compared to USD 6,646 million in the previous quarter. Achievement of positive in the second quarter of 2011 was not followed by the next quarter which recorded a BOP deficit of USD 3,960 million. The significant reduction was due to the capital and financial account which recorded a deficit of USD 4,107 million (Indonesia's Balance of Payments Report, 2011).

Along with the development of the economic system, the theory of the balance of payments is also experiencing growth, but some researchers have argued that a more intensive school of thought which outlines the theory of the balance of payments is the Keynesian theory and the theory of Monetarist (Masdjojo, 2010). Both groups have a different view

in the analysis of the balance of payments, mainly located on the aspects of the factors that influence it,

Table 1: BOP, Inflation, Interest Rate, Exchange Rate, Money Supply and GDP in 2013:1-2017:4.

Years	BOP (Million USD)	Inflation (%)	Exchange Rate (Rp/USD)	Interest Rate (%)	Money Supply (Billion Rupiahs)	GDP (Billion Rupiahs)
2013:Q1	-6,614	5.90	9,680	5.75	3,322,529	1,958,396
2013:Q2	-2,477	5.90	9,781	6.00	3,413,379	2,036,817
2013:Q3	-2,645	8.40	10,652	7.25	3,584,081	2,103,598
2013:Q4	4,412	8.38	11,675	7.50	3,730,197	2,057,688
2014:Q1	2,066	7.32	11,833	7.50	3,660,606	2,058,585
2014:Q2	4,297	6.70	11,629	7.50	3,865,891	2,137,386
2014:Q3	6,475	4.53	11,770	7.50	4,010,147	2,207,344
2014:Q4	2,410	8.36	12,244	7.75	4,173,327	2,161,553
2015:Q1	1,303	6.38	12,807	7.50	4,246,361	2,158,040
2015:Q2	-2,925	7.26	13,131	7.50	4,358,802	2,238,704
2015:Q3	-4,566	6.83	13,873	7.50	4,508,603	2,312,844
2015:Q4	5,090	3.35	13,769	7.50	4,546,743	2,272,929
2016:Q1	-287	4.45	13,525	6.75	4,561,873	2,264,680
2016:Q2	2,162	3.45	13,313	6.50	4,737,451	2,355,422
2016:Q3	5,708	3.07	13,130	5.00	4,737,631	2,429,286
2016:Q4	4,505	3.02	13,247	4.75	5,004,977	2,385,244
2017:Q1	4,514	3.61	13,348	4.75	5,017,644	2,378,176
2017:Q2	739	4.37	13,309	4.75	5,225,166	2,473,425
2017:Q3	5,359	3.72	13,333	4.25	5,254,139	2,552,217
2017:Q4	973	3.61	13,537	4.25	5,419,165	2,508,932

Source: Badan Pusat Statistik and Bank Indonesia the mechanisms of influence and propositions on the balance of payments.

A few researchers who have examined the balance of payments in Indonesia, some of them such as (Boediono, 1979) with simultaneous models; (Hakim, 2000) and (Nusantara, 2000) with a single dynamic equation; (Masdjojo, 2010) and (Effendy, 2014) with a model ECM and (Astuti et al., 2015) with a model of Thirlwall and Hussain. Most of these studies use monetary and Keynesian approach. These approaches explained that inflation, exchange rates, interest rates, money supply and Gross Domestic Product (GDP) have relevance in determining the balance of the current account and capital account ultimately affect the BOP.

According to Keynesian theory, if the inflation rate of a country relatively increases toward trading partner countries, the current account balance will decrease due to the increase of imports. If the value of imports is higher than exports, it would cause a deficit of the balance of payments by the trade balance. Furthermore, the Keynesian elasticity approach views that the trade balance will only increase when the real exchange rate depreciates if the conditions of the Marshall-Lerner fulfilled. When the real exchange rate depreciates, it will cause the price of goods produced by the country abroad to be cheap and the price of foreign goods in the country is becoming more expensive. This condition will automatically increase exports and surplus of the balance of payments (Salvatore, 1997). However, the data shows that at Qtly. IV-2014 inflation rose to 8.36 percent, but in the same period, BOP recorded a

surplus of USD 2,410 million. Other than that, at Qtly. II-2015 exchange rate depreciated from Rp12,807/USD to Rp13,131/USD, but in the same period, BOP recorded a deficit of USD 2,925 million. This condition is not in accordance with Keynesian theory.

Through the transmission of multiplier effects, the Keynesian theory explains the relationship between GDP and BOP, where if aggregate income increases, imports will increase and a BOP deficit will occur. Whereas Monetarists theory explains that GDP will affect the balance in the domestic money market through changes to the domestic demand for money that would bring in a surplus of the BOP. On the other hand, Keynesian through revenue mechanisms explains that the relevance of interest rates and BOP, where if interest rates rise, the decline in investment and a decline in aggregate income. This condition will reduce imports and cause the BOP surplus. his theory supports the results of (Ehikioya & Mohammed, 2015) and (Chinedu, 2018) research which show results are statistically very small, in other words, the positive relationship between interest rates and balance of payments in Nigeria.

While the Monetary theory explains if interest rates rise then through the balance of the money market, domestic money demand will increase so that the value of the domestic currency appreciates. This condition reduced exports and caused a balance of payments deficit. Monetarists outlook is consistent with the results of the study (Masdjojo, 2010) find that interest rates negatively affect balance of payments in both the short and long-term. Furthermore, this theory explains the relationship of money supply and the balance of payments based on the view that the balance of payments is a monetary phenomenon, where there is a relationship between the balance of payments of a country and the supply of money in it. The disproportion of the balance of payments is a reflection of an disproportion in the money market. Balance of payments surplus is a reflection of the excess money supply, while the balance of payments deficit is a reflection of the excess demand for money (Nopirin, 2000).

Generally, this paper analyzes the interdependence of factors affecting Indonesia's balance of payments due to the conventional theory of macroeconomics, economic variables often have links with each other. Changes or shocks to one economic variable will also affect changes in other variables. The relationship is not even a one-way relationship but is a reciprocal relationship (Halwani, 2002). The purpose of this paper to analyze the relationship and to analyze the contribution of shock

inflation (INF), exchange rate (EXC), the interest rate (IR), the money supply (MS) and Gross Domestic Product (GDP) against Indonesia's balance of payments (BOP).

## 2 THEORETICAL FRAMEWORK

Keynesian group thinking about balance of payments is based on economic theory John Maynard Keynes (1883-1946). Keynes argued that the balance of payments does not automatically achieve a balance but government intervention is required. Keynes instead argued that the level of wages and prices has a rigid nature and the state is always dealing with the issue of unemployment. Keynes's thinking was later developed by economists thereafter who focused on the balance of payments theory (Duasa, 2004).

Elasticity approach emphasizes the effect of devaluation on the trade balance, the devaluation will improve the trade balance. It is called the Marshall Lerner Condition. The essence of the approach is that the improvement in the elasticity of the balance of payments occurs as a result of the devaluation and depends on the elasticity of foreign demand for exports and domestic demand elasticities for imports. It is assumed that the level of domestic and foreign prices is the same. If the elasticity of domestic exports is greater than one, exports will grow more than the percentage of devaluation. Therefore, the domestic balance of payments will increase. This will happen because of the increase in the value of exports, which will exceed the value of imports. However, the elasticity approach recognizes that the effect of exchange rate changes on the balance amount of the domestic currency traded, depending on the elasticity of supply and demand involved (Sakuntala, 2015).

Sidney Alexander in 1952 introduced a new approach, namely the absorption approach, developed to highlight the importance of the change in income in the adjustment process. This approach argues that currency devaluation will lead to price inflation, which in turn would deprive the initial effects of rising prices. The resulting process can only be prevented if the inflation itself reduces aggregate demand for goods through re-distribution effects of approach or through a reduction in the real value of existing money balances (Danjuma, 2013).

Monetarist group thinking on the balance of payments was first developed by the research department of the IMF headed by Mundell (1968) and then followed by others such as Johnson (1975, 1976, 1977), Polak and others. The main basis of this

approach is the suggestion that there is stability in the demand for money as well as the government does not take action sterilization (reduce or eliminate the influence of the balance of payments on the money supply). With the assumption that the government does not perform sterilization measures, then the surplus or deficit in the balance of payments is temporary. In other words, the surplus or deficit will arise, which causes the money supply to increase or decrease until excess demand or money supply is lost (the money market becomes balanced). Therefore, the balance of payments that is not balanced a reflection of the imbalance in the money market. In the long-term, money market balance and the balance of payments will occur automatically. But if the government take action sterilization (cons with monetary approach), then the surplus or deficit of the balance of payments

Table 2: Phillip-Perron Unit Root Test Results.

Variables	Unit Root Tests Level			Unit Root Tests 1 <sup>st</sup> Difference		
	Value PP	Prob	Interpretation	Value PP	Prob	Interpretation
BOP	-4.429442	0.0008	Stationary	-11.47852	0.0000	Stationary
INF	-2.329540	0.1669	Non-Stationary	-6.540867	0.0000	Stationary
EXC	-0.577593	0.8663	Non-Stationary	-4.581684	0.0005	Stationary
IR	-0.983364	0.7525	Non-Stationary	-3.789331	0.0055	Stationary
MS	-3.887355	0.0041	Stationary	-11.29220	0.0000	Stationary
GDP	-1.349402	0.5995	Non-Stationary	-20.34843	0.0001	Stationary

Source: Eviews 10 (Processed)

Table 3: Determination Optimal Lag Result.

Lag	LogL	LR	FPE	AIC	SIC	HQ
0	218.6301	NA	4.74e-12	-9.048088	-8.811899*	-8.959209
1	279.4858	103.5843	1.67e-12	-10.10578	-8.452457	-9.483624
2	336.0531	81.84203	7.49e-13	-10.98098	-7.910527	-9.825551
3	393.4111	68.34142	3.71e-13	-11.88983	-7.402242	-10.20112
4	466.9126	68.80988*	1.16e-13*	13.48564*	-7.580915	11.26365*

Source: Eviews 10 (Processed)

will occur continuously (Nopirin, 2000). Based on the theory and some results of empirical studies that have been done by previous researchers, the research hypothesis is:

- Inflation, exchange rates, interest rates, money supply, and GDP have interdependencies on Indonesia's balance of payments.
- Shock Inflation, exchange rates, interest rates, money supply, and GDP contribute to Indonesia's balance of payments.

## 3 RESEARCH METHOD

This research using Vector Error Correction Model (VECM) with the help of software EViews 10. VECM is a VAR form that is estimated because of the existence of non-stationary forms of data at the level but 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. The use of VECM model analysis requires stationary test, determination optimal lag, model stability test, and cointegration test.

## 4 RESULTS

### 4.1 Stationary Test

This test is performed to determine which variables were tested stationary or not. Stationary testing in this study has used the Phillip-Perron (PP) test with a critical value of 5 percent. In testing using EViews software, the guideline used is if the absolute value of PP t-statistic is greater than the critical value (by looking at the prob value must be less than 0.05), then the data is stationary.

Based on the test table PP unit root test on a level (table 2) only variable BOP and MS are stationary. Furthermore is the integration degree test to station the data. Through the integration degree test at the 1<sup>st</sup> difference (table 2) was seen that all these data be stationary for all variables have prob value < 0.05.

### 4.2 Determination of Optimal Lag

The uses of VECM models are very sensitive to the lag length of the data used. Based on the calculations on each of the criteria provided in the program Eviews, optimal lag marked with a \* (star). If the long-lag test showed that most of the asterisk is at the same lag, then the length of the lag is the lag.

Based on the determination of optimal lag test (table 3) note that the criteria LR, FPE, AIC, and HQ is the recommended candidate lag 4, seen from asterisk most though criteria SIC recommend lag 0.

### 4.3 Model Stability Test

The stability of the model needs to be tested because if the model stability estimation is not stable then the analysis of Impulse Response Function (IRF) and Variance Decomposition (VD) becomes invalid. The test is stable or not the estimated VECM then checking through the roots of the characteristic polynomial. A VECM system is stable if all its roots have modulus smaller than one (Basuki & Prawoto, 2016). Based on a stability model test results (table 4)

note that the modulus of the entire root unit < 1 then the model specification is stable.

### 4.4 Cointegration Test

Cointegration test is performed to determine the existence of the relationship between variables, especially in the long-term. In testing using EViews, the guide is taken if the value of the trace statistic and the value of the Max-Eigen statistics > critical value 5 percent, then the data cointegrated. Table 5 shows that the data cointegrated. Cointegration test results indicate that among the BOP movement, INF, EXC, IR, MS, and GDP have stability or equilibrium relationship and similarity of movements in the long term.

Table 4: Model Stability Test.

Roots of Characteristic Polynomial	
Root	Modulus
-0.038409 - 0.925213i	0.926010
-0.038409 + 0.925213i	0.926010
-0.809792	0.809792
0.490669 - 0.344704i	0.599647
0.490669 + 0.344704i	0.599647
-0.569855	0.569855
-0.175068 - 0.519075i	0.547803
-0.175068 + 0.519075i	0.547803
0.255643 - 0.266422i	0.369234
0.255643 + 0.266422i	0.369234
0.275038	0.275038
-0.022807	0.022807

Source: Eviews 10 (Processed)

Table 5: Cointegration Test Results.

Rank Test (Trace)		Rank Test (Maximum Eigenvalue)	
Trace Statistic	Critical Value 5%	Max-Eigen Statistic	Critical Value 5%
165.7509	95.75366	77.45187	40.07757

Source: Eviews 10 (Processed)

### 4.5 VECM Estimation with 4 Lags

This study has used 6 variables with a number of observations of 52, then obtained a t-table value of 2.01290 so that it can be analyzed the influence of variables in the short and long term. If the value of t-statistic > t-table value, it can be concluded that there is are significant effect and vice versa. Based on

estimates VECM with a lag of 4 (table 6) the hypothesis testing of each independent variable on Indonesia's balance of payments as follows:

#### 4.5.1 BOP Interdependence Period Ago toward BOP Now

The estimation results indicate that the  $BOP_{(t-1)}$  and  $BOP_{(t-2)}$  positive and significant effect on the balance of payments current. This means that the increase in  $BOP_{(t-1)}$  and  $BOP_{(t-2)}$  will lead to the addition of BOP current balance. Meanwhile,  $BOP_{(t-3)}$  and  $BOP_{(t-4)}$  also has a positive effect but not significant to the BOP now. No significant effect shows that although the government has implemented a policy increase in exports and reduction in imports through import substitution policies and export promotion, still there is intervention by Bank of Indonesia on the monetary policy. On the other hand, allegedly because of the attitude of more rational economic actors, as the impact of the economic crisis of the past lessons, which in the short term they tend to "wait and see" to the changes that take place, before taking economic decisions.

#### 4.5.2 Inflation Interdependence toward BOP

Short-term estimation results indicate that the variable  $INF_{(t-1)}$  and  $INF_{(t-4)}$  positive and significant effect on alpha 5 percent against the BOP now. In the event of an increase in inflation will cause an increase in the balance of the BOP. These findings are inconsistent with the theory that rising inflation will cause a balance of payments deficit. This discrepancy can be explained as follows: in spite of the increase in inflation led to import prices cheaper than domestically produced goods. But suspected

Table 6: VECM Estimation of Short-Term and Long-Term BOP with 4 Lags.

Variables	Coefficient	t-statistic	Interpretation
Short-Term			
CointEq1	-1.146991	[-3.26677]	-
D(LNBOP(-1))	0.708524	[ 2.48194]	Significant
D(LNBOP(-2))	0.596875	[ 2.09609]	Significant
D(LNBOP(-3))	0.521618	[ 1.54748]	Insignificant
D(LNBOP(-4))	0.327448	[ 1.18011]	Insignificant
D(LNINF(-1))	13.57924	[ 2.03559]	Significant
D(LNINF(-2))	-9.466290	[-1.41444]	Insignificant
D(LNINF(-3))	-3.682499	[-0.65244]	Insignificant
D(LNINF(-4))	11.86841	[ 2.15374]	Significant
D(LNEXC(-1))	25.52099	[ 0.63087]	Insignificant
D(LNEXC(-2))	-80.35120	[-1.74466]	Insignificant
D(LNEXC(-3))	34.02898	[ 0.63263]	Insignificant

D(LNEXC(-4))	-83.77408	[-1.57192]	Insignificant
D(LNIR(-1))	25.56936	[ 0.91883]	Insignificant
D(LNIR(-2))	30.32042	[ 1.16475]	Insignificant
D(LNIR(-3))	19.32322	[ 0.94912]	Insignificant
D(LNIR(-4))	5.461924	[ 0.27860]	Insignificant
D(LNMS(-1))	208.6157	[ 2.31346]	Significant
D(LNJMS(-2))	332.8488	[ 3.29920]	Significant
D(LNJMS(-3))	181.3044	[ 1.70782]	Insignificant
D(LNMS(-4))	55.09422	[ 0.75236]	Insignificant
D(LNGDP(-1))	281.5600	[ 1.27347]	Insignificant
D(LNGDP(-2))	300.5649	[ 1.32447]	Insignificant
D(LNGDP(-3))	203.6904	[ 0.87560]	Insignificant
D(LNGDP(-4))	348.3178	[ 1.53747]	Insignificant
C	-38.73327	[-2.33921]	-
Long-Term			
LNBP(-1)	1.000000	-	-
LNINF(-1)	16.41184	[ 1.98655]	Insignificant
LNEXC(-1)	-63.60414	[-5.20134]	Significant
LNIR(-1)	-11.79401	[-0.90579]	Insignificant
LNMS(-1)	91.76460	[ 2.75204]	Significant
LNGDP(-1)	-185.5906	[-2.39868]	Significant
C	1895.796	-	-

Source: EViews 10 (Processed)

that more low import prices cannot be automatically led to imports growing faster than exports, due to consumer decision in increasing purchases of foreign goods is not only influenced by price alone, consumers also consider the rupiah exchange rate against foreign currencies. The weakening of the rupiah will cause consumers to prefer goods produced in the country so that imports declined. On the other hand, exports will increase because of the increased competitiveness which will increase the number of capital inflows in the country, so in the domestic economy led to inflation balance of payments surplus. Although these findings do not support the Keynesian theory, the results of this study support the findings of the study (Effendy, 2014) and (Danjuma, 2013) were also obtained results that inflation variable positive effect on the balance of payments.

Meanwhile, the variable  $INF_{(t-2)}$  and  $INF_{(t-3)}$  negative and insignificant effect on the BOP now. The estimation results indicate that the INF long-term positive effect on the BOP but not significantly. No significant influence of the INF because of rising inflation in Indonesia is relatively low. This low rising inflation as a lubricant in the Indonesian economy which could further increase the national income. When national income increases, the BOP will rise. The results support the research conducted (Chinedu, 2018); (Effendy, 2014) and (Danjuma, 2013) which states the rate of inflation in the Nigerian economy has positive statistics on the balance of payments.

#### 4.5.3 Interdependence of Exchange Rate toward BOP

Short-term estimation results indicate that the variable  $EXC_{(t-1)}$  and  $EXC_{(t-3)}$  and insignificant positive effect on the BOP now amounted to 25.52099 and 34.02898. This means that if there is an increase exchange rate of 1 percent in the previous period, it will improve the balance of the BOP now at 25.52099 percent and if there is an increase exchange rate of 1 percent in the three previous periods, it will improve the balance of the BOP now at 34.02898 percent.

Meanwhile,  $EXC_{(t-2)}$  and  $EXC_{(t-4)}$  and negative and insignificant effect on the BOP now. Long-term estimation results show that exchange rate has a negative and significant influence on alpha 5 percent against BOP, this means that changes in the domestic exchange rate negatively affect changes in BOP balance. These findings are consistent with the view of Keynesian and Monetarist. The results support the research conducted (Udochi, 2017); (Ali Shahzad, Nafees, & Farid Govt, 2017); (Azra Batool, Memood, & Khan Jadoon, 2015) and (Chiawa, Asare, & Dauran, 2013) who found the result that exchange rate depreciation has an impact on improving the balance of payments.

#### 4.5.4 Interdependence of Interest Rate toward BOP

The estimation results indicate that the variable short-term  $IR_{(t-1)}$ ,  $IR_{(t-2)}$ ,  $IR_{(t-3)}$  and  $IR_{(t-4)}$  has a positive effect but not significant at alpha 5 percent toward the BOP now. This result is consistent with the Keynesian theory which suggested a positive relationship between interest rates and changes in the balance of the balance of payments. if for some reason a country's domestic interest rate increases, then through the money market this condition will attract foreign investors to save their funds in the country's banking system. There is an increased inflow of foreign exchange effect on the surplus balance of capital and financial account (CFA) and if the Current Account (CA) has not changed, then the surplus CFA can cause BOP surplus.

Meanwhile, the long-term estimation results indicate that IR variable has a negative impact and insignificant at alpha 5 percent against the BOP is equal -11.79401. The results support the research of (Masdjojo, 2010) and (Effendy, 2014) who found the result that the long-term interest rates had a negative effect and no significant effect on the balance of payments.

#### 4.5.5 Interdependence of Money Supply toward BOP

Short-term estimation results indicate that the variable  $MS_{(t-1)}$  and  $MS_{(t-2)}$  have a positive and significant effect on alpha 5 percent toward the BOP now at 208.6157 and 332.8488. In the short-term increase in the money supply will lead to improvements in the balance of payment. These results are consistent with Monetarist theory, the mechanism can be explained through prices and incomes approach: that increases in the money supply should be linked to what occurred to the price level.

Meanwhile, the variable  $MS_{(t-3)}$  and  $MS_{(t-4)}$  have a positive effect but not significant toward the BOP now. The insignificance can be explained that with the increase in the money supply can encourage an increase in aggregate demand. However, this condition is not followed by an increase in aggregate supply, then it will encourage inflation. Inflation further negative impact on exports. The decline in exports was not accompanied by a rise in imports is alleged to be the cause of insignificant influence money supply three periods ago and money supply four periods ago against the BOP now. On long-term, money supply is also a positive and significant effect on alpha 5 percent against the BOP. These findings support the theory Monetarists, a positive relationship between money supply and BOP can also be seen from the data the development of money supply and BOP during the study period showed a trend equally increased (unidirectional). The findings of this study support the results (Udochi, 2017); (Azra Batool et al., 2015) and (Ehikioya & Mohammed, 2015) who obtained the result that the amount of money in circulation has a direct and significant effect on the balance of payments in Nigeria.

#### 4.5.6 GDP Interdependence toward BOP

The results of short-term estimates indicate that  $GDP_{(t-1)}$ ,  $GDP_{(t-2)}$ ,  $GDP_{(t-3)}$  and  $GDP_{(t-4)}$  have a positive effect but not significant at alpha 5 percent toward the BOP now. The findings of this study are in line with Monetarist thinking which states that economic growth will affect the balance of payments balance through the mechanism of balance of money markets. That mechanism according to Monetarists theory can be explained by changes in the demand for money. The results of this study support the research of (Masdjojo, 2010) and (Azra Batool et al., 2015) who found the results that GDP has a positive effect on BOP in the short term. Whereas in the long run,

the GDP variable has a negative and significant effect on BOP.

ECT is negative (convergen) of -1.146991 and significant at the alpha 5 percent. ECT value of 1.146991 means that when there is an imbalance in the previous period by 1 percent, the BOP will adjust to the decreased -1.146991 percent. The difference between the balance of the BOP with a value that is equal to 1.146991 balance will be adjusted in 1 quarter.

#### 4.6 Impulse Response Function (IRF) Test

Analysis of IRF to see the response of each variable to the shock of other variables, not just in the short term but can be analyzed for some future horizon as a long-term information. IRF analysis also serves to see how long these effects occur (Basuki, & Prawoto, 2016). In this study, IRF test results are shown in a tabular form which drawn along the 60 periods (quarter). The next will be seen in three periods, namely a period of short-term (1-4 quarters), medium term (5-20 quarters) and long-term (21-60 quarters).

The IRF Indonesia's balance of payments results (table 7) for the short term that each standard deviation of BOP shocks will be responded to by the BOP itself up to 0.151890. While each standard deviation of inflation shocks will be responded to by inflation to decline by -0.767687. This means that if an increase in inflation of 1 percent will result in a decrease in the BOP balance of -0.767687 percent, the higher the inflation, the lower the BOP. Every single standard deviation occurs exchange rate

Table 7: Impulse Response Function BOP Test Results.

Periods	LNBP	LNINF	LNEXC	LNIR	LNMS	LNGDP
1	6.052845	0.000000	0.000000	0.000000	0.000000	0.000000
4	0.151890	-0.767687	1.945682	0.972387	0.168241	0.945733
5	-0.587737	-0.123759	1.170329	1.630482	-1.417237	0.244385
20	0.160425	1.036502	2.691661	0.781709	-0.984196	-0.448605
21	0.213971	0.829373	2.884149	0.820507	-0.917014	-0.464483
60	-0.074454	1.026930	2.971716	0.822760	-1.253308	-0.596086

Source: Eviews 10 (Processed)

Table 8: Variance Decomposition BOP Test Results.

Period	S.E.	LNBP	LNINF	LNEXC	LNIR	LNMS	LNGDP
1	6.052845	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	8.151459	72.37227	7.392246	13.01001	1.696631	1.781018	3.747826
3	9.336979	59.33682	5.896560	13.13966	6.464563	8.207963	6.954431
4	9.666722	55.38245	6.131824	16.30975	7.042916	7.687837	7.445222
17	13.93092	28.85452	8.546359	41.68921	8.879044	7.760917	4.132230
18	14.29140	27.42457	8.800129	42.92920	8.845204	7.868672	4.132230
19	14.60660	26.26825	8.797847	43.97760	8.745372	8.158379	4.052548
20	14.94921	25.08953	8.879940	45.22686	8.622544	8.222152	3.958974
57	25.74598	8.485236	8.482338	62.73900	6.568390	10.65884	3.066191
58	25.98320	8.332293	8.484873	62.89071	6.542054	10.69205	3.058027
59	26.22040	8.183134	8.498742	63.02010	6.516886	10.73445	3.046692
60	26.45758	8.037867	8.497704	63.15684	6.497271	10.76725	3.043071

Source: Eviews 10 (Processed)

shocks, BOP will respond until it rises by 1,945682. Every single standard deviation of interest rate shock will be responded to by BOP up to 0.972387 which means that if an interest rate increase of 1 percent will result in an increase in BOP of 0.972387 percent, the higher the inflation, the lower the BOP. Every single standard deviation occurs exchange rate shocks, BOP will respond until it rises by 1,945682. Every single standard deviation of interest rate shock will be responded to by BOP up to 0.972387 which means that if an interest rate increase of 1 percent will result in an increase in BOP of 0.972387 percent. Every single standard deviation occurs money supply shock, then BOP will respond until an increase of 0.168241. Every single standard deviation occurs when GDP shocks will be responded to by BOP up to 0.945733, the higher the GDP, the higher the BOP.

In general, in the short term period (4<sup>th</sup> quarter) BOP responds positively to BOP variable shocks themselves, exchange rates, interest rates, money supply, and GDP. While the response given by BOP to inflation variable shocks is negative. In the medium term period (21<sup>st</sup> quarter) BOP responds positively to the shock of the BOP variable itself, inflation, exchange rates, and interest rates. While the response given by BOP to variable shocks of money supply and GDP is negative. In the long term period (60<sup>th</sup> quarter) BOP responds positively to inflation variable shocks, exchange rates, and interest rates. While the responses given by BOP to the BOP variable shock itself, the money supply and GDP are negative.

#### 4.7 Variance Decomposition (VD) Test

VD analysis aims to explain the contribution of each research variable to the shocks caused to the main endogenous variables observed. This analysis is used to predict how much the variance contribution of each variable has an effect on other variables at present and future periods. The BOP VD results (table 8) show that in the first quarter of the BOP variance decomposition was determined by the BOP variable itself of 100 percent and continued to decline until the 60<sup>th</sup> quarter. At the end of the short-term quarter, the contribution of other variables in preparing the BOP was 6.13 percent of inflation, 16.31 percent of the exchange rate, 7.04 percent of interest rates, 7.69 percent of the money supply and 7.45 percent of GDP. But in the 4<sup>th</sup> quarter, the BOP variable itself still contributed the most to BOP.

As the period increases to the end of the medium term period (20<sup>th</sup> quarter) the exchange rate variable starts to contribute more to the preparation of BOP

than the BOP variable itself is 45.27 percent. Meanwhile, the smallest contribution is given by the GDP variable of 3.96 percent. Contributions given to this exchange rate variable continued to increase until the end of the long-term period (60<sup>th</sup> quarter) by 63.16 percent. While the BOP variable itself only contributed 8.04 percent, the rest were given variables of inflation, interest rates, the money supply, and GDP respectively at 8.50 percent, 6.50 percent, 10.77 percent, and 3.04 percent.

The contribution of each variable in this study has increased and decreased on a quarterly basis. Variable BOP itself and GDP decreased from short term to long term. Variable exchange rates and money supply increased contribution from short term to long term. Meanwhile, the variable inflation and GDP from short-term to medium term to increase contributions, contribute to the further decline in the medium term to long term. In the long term that contributes most to the BOP is a variable exchange rate. This shows that the exchange rate is one of the most important indicators to determine the surplus or deficit of the BOP balance in the future. The need for supervision and government intervention in maintaining exchange rate stability so that there is no shock to the equilibrium of external balance.

## 5 CONCLUSIONS

The VECM estimation results show ECT values of -1.146991. This shows that in the case of Indonesia it takes approximately 1 quarter to achieve BOP balance. This illustrates the ability of the Government and Bank Indonesia to be relatively good in anticipating various changes that occur in the macroeconomy, especially those concerning BOP balance.

The IRF test results indicate that the response given to the shock BOP variables that occur in the variable BOP itself, inflation, exchange rates, interest rates, money supply, and GDP tends to fluctuate at the beginning of the period and consistent towards the end of the period. BOP response to shocks that occur in the BOP itself disappeared towards the end of the period for forming the balance back. BOP response to shocks that occur in the variable inflation, exchange rates and interest rates towards the end of the period was positive and permanent. While the BOP response to shocks that occur in the variable of the money supply and GDP towards the end of the period was negative and permanent.

The VD test results show that BOP variables, inflation, exchange rates, interest rates, money supply, and GDP each contribute to the BOP variable where the BOP contribution itself decreases while the exchange rate contribution increases until the end of the period. This shows that the exchange rate has a strong effect on the formation of the BOP balance in the long run. This finding is in accordance with the theory put forward by Monetarists.

The government is expected to continue to improve the high economic growth mainly through increasing the number of exports and foreign investment. The high export and inflow of funds will contribute to the improvement of Indonesia's balance of payments balance. In addition, Bank Indonesia is expected to maintain the stability of the rupiah exchange rate against the USD. The exchange rate should find its equilibrium level to form the balance of payments.

For further researchers who want to conduct an analysis of the balance of payments should develop a research model and add variables such as domestic credit. Because according to Keynesian and Monetary theory domestic credit has a relationship with the balance of payments.

## REFERENCES

- Ali Shahzad, A., Nafees, B., & Farid Govt, N. (2017). Marshall-Lerner Condition for South Asia: A Panel Study Analysis, *Pakistan Journal of Commerce and Social Sciences*, 11(2), 559-575.
- Astuti, I. P., Oktavilia, S., & Rahman, A. R. (2015). Peranan Neraca Pembayaran Internasional dalam Perekonomian Indonesia. *Jejak*, 8(2), 178-188.  
<https://doi.org/10.15294/jejak.v8i2.6169>.
- Azra Batool, S., Memood, T., & Khan Jadoon, A. (2015). What Determines Balance of Payments: A Case of Pakistan. *Journal of Management and Business*, 2(1), 47-70.
- Badan Pusat Statistik. <https://www.bps.go.id>.
- Bank Indonesia. Beberapa Edisi. *Laporan Neraca Pembayaran Indonesia (NPI)*. <http://www.bi.go.id>.
- Basuki, A. T., & Prawoto, N. (2016). *Analisis Regresi Dalam Penelitian Ekonomi & Bisnis : Dilengkapi Aplikasi SPSS & EVIEWS*. Depok: PT Rajagrafindo Persada.
- Boediono. (1979). *Econometric Model of the Indonesian Economy for Short-run Policy*



- Analysis. *Disertasi*. University of Pennsylvania.
- Chiawa, M. A., Asare, B. K., & Dauran, N. S. (2013). A Cointegrated Vector Autoregressive Model of Determinants of Balance of Payment Fluctuations in Nigeria. *American Journal of Scientific and Industrial Research*, 4(6), 512-531.  
<https://doi.org/10.5251/ajsir.2013.4.6.512.531>
- Chinedu, O. (2018). Institutional Quality and Balance of Payments Equilibrium in Nigeria. *Journal of Economics, Management and Trade*.  
<https://doi.org/10.9734/JEMT/2018/40905>.
- Danjuma, F. (2013). An Empirical Analysis of the Balance of Payments as a Monetary Phenomenon: Nigeria's Experience. Finance and Banking (JEIEFB). *An Online International Monthly Journal*. Retrieved from [www.globalbizresearch.com](http://www.globalbizresearch.com)
- Duasa, J. (2004). The Malaysian Balance Of Payments: Keynesian Approach Versus Monetary Approach. *Global Economic Review, Perspective on East Asian Economies and Industries*, 37(1).
- Effendy, A. K. (2014). Analisis Neraca Pembayaran Indonesia Dengan Pendekatan. *Jurnal Ilmiah Universitas Brawijaya*.
- Ehikiyoa, I. L., & Mohammed, I. (2015). Monetary Policy and Balance of Payments Stability in Nigeria. *International Journal of Academic Research in Public Policy and Governance*.  
<https://doi.org/10.6007/ijarppg/v2-i1/1625>.
- Hakim, L. (2000). Faktor-Faktor Yang Mempengaruhi Cadangan Devisa Indonesia 1989.1-1997.4. *Media Ekonomi*, 6(1), 667-682.
- Halwani, R. H. (2002). *Ekonomi Internasional dan globalisasi ekonomi*. Jakarta: Ghalia Indonesia.
- Maipita, I. (2015). Keterkaitan Instrumen Kebijakan Moneter dengan Neraca Pembayaran di Indonesia. *QE Journal*, 2(1), 15-27.
- Masdjojo, G. N. (2010). Kajian Pendekatan Keynesian Dan Moneter Terhadap Dinamika Cadangan Devisa Melalui Penelusuran Neraca Pembayaran Internasional: Studi Empiris Di Indonesia Periode 1983- 2008. *Disertasi*. Semarang: Universitas Diponegoro.
- Nopirin. (2000). *Ekonomi Moneter*. Buku II, Yogyakarta : BPFE-Yogyakarta.
- Nusantara, A. 2000. *Perkembangan Pendekatan Moneter tentang NPI: Equilibrium, Disequilibrium dan Global Approach*. Edisi 2, Gema Stikubank.
- Sakuntala, D. (2015). Analisis Faktor-Faktor Yang Mempengaruhi Neraca Pembayaran Indonesia Melalui Pendekatan Moneter. *Tesis*. Medan: Universitas Negeri Medan.
- Salvatore, D. (1997). *Ekonomi Internasional*. Edisi 5, Jilid 2, Jakarta: Penerbit Erlangga.
- Udochi, D. (2017). Analysis of Balance of Payments Trend in Nigeria: A Test of Marshall-Lerner Hypothesis. *Saudi Journal of Business and Management Studies*, 2(5), 468-474.  
<https://doi.org/10.21276/sjbms>.