



Determinants of Indonesian Trade Balance: A Vecm Analysis Approach

Ferdian Adi Cristanto^{1✉}, ²Prasetyo Ari Bowo

^{1,2}Universitas Negeri Semarang

Article Information Abstract

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The Trade Balance is one of the indicators used to see the condition of a country's economy, especially in the trade sector. The trade balance value will affect how the state of the national macroeconomic indicators. In addition, the trade balance is used as additional information in determining foreign trade policy. This study aims to analyze the factors that affect Indonesia's trade balance in 2010-2019. The variables used are investment, rupiah exchange rate, economic growth and trade balance. The method used in this research is VECM (Vector error correction model) analysis with time series data using Eviews 9.0 data processing software. The results show that (1) direct investment has a significant positive effect in the short and long term, (2) exchange rate has a significant negative effect in the long term. short and long term, and (3) economic growth has no significant effect in the short and long term on Indonesia's trade balance.

INTRODUCTION

The international trade of a country is a trade relationship that involves the exchange of goods and services with other countries. International trade or trade between countries is caused because a country cannot produce everything that country needs. So it has to import from other countries. This is due to natural and non-natural factors such as geographical location, human resources, and so on.

International trade is currently supporting the economies of various countries, especially in

the current era of globalization. International trade currently has an increasingly strong influence on the economy of a country, so that most countries in the world depend their economies on international trade. It aims to obtain the welfare of the people of the country and increase economic growth (Purnomo, 2020). Indicators of a country's trade performance can usually be seen from the value of the country's trade balance, which is a surplus or deficit. Because it reflects the competitiveness between countries in the trade of goods and services.



Figure 1. Indonesian Trade Balance in 2014-2019
Source : Bank Indonesia, 2020

Based on Figure 1, it shows that starting from the beginning of 2014 there was a deficit of up to 3 billion USD and an increasing trend until 2017 that reached 4.5 billion USD. In 2017 to the end of 2018 there was a downward trend and in 2018 Indonesia experienced a trade balance deficit which reached 4.2 billion USD at the end of 2018. Starting from the end of 2018 to the end of 2019 it has increased but has not reached a trade balance surplus which means that the number of imports is more much than exports. The trade balance is said to be a deficit if the value of exports is smaller than imports and it is said to be a surplus if exports of goods are greater than imports. The trade balance is said to be balanced if the export value of a country is the same as the value of imports made by that country.

The trade balance deficit has an impact on several macroeconomic indicators of a country. The trade balance affects the number of Indonesia's foreign reserves and when the trade balance to rise, it will increase foreign exchange reserves (Dekki et al., 2017) . In addition, the trade balance also affects economic growth by increasing GDP. Research conducted by Blavasciunaite et al. (2020) states that the deteriorating trade balance has a negative impact on the economy.

The opening of access to trade as a result of an open economic system or trade liberalization causes various impacts, especially on conditions of domestic trade. Trade liberalization has opened doors for trade between countries. This trade liberalization will have an impact on a country's trade. Research conducted by Ju et al, (2010) and

Biramo Allaro (2012) shows that trade liberalization policies can also affect some liberalization policies due to adopting an open economic system affect the trade balance, especially in developing countries. Besides trade liberalization policies due to adopting an open macroeconomic variables such as exports and imports (net exports) and economic growth (Semančíková,2016).

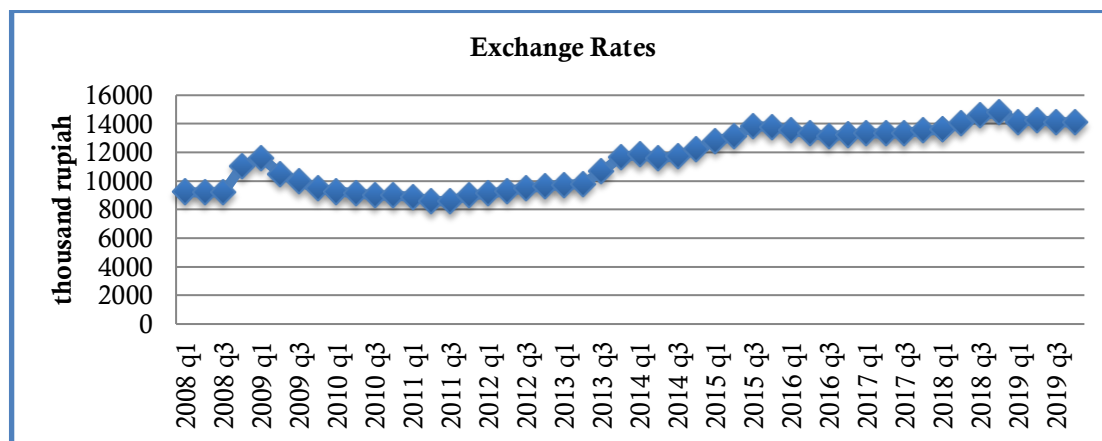


Figure 2. Rupiah Exchange Rates in 2008-2019

Source : Bank Indonesia, 2020

The rupiah exchange rate (exchange rate) is one of the factors affecting Indonesia's trade balance. Based on Figure 4.3 from 2008 to 2019, the value of the rupiah exchange rate has fluctuated and has an upward trend. This means that the rupiah exchange rate is depreciating. In 2018 the fourth quarter reached 14,791, the highest during 2008 to 2019. In 2009 to 2011, the exchange rate experienced a strengthening or appreciation. From 2013 to 2019 it experienced a weakening with a consistent trend.

Changes in exchange rates need to be examined more deeply about how the impact of the exchange rate will affect the economy, especially the trade balance.

The depreciation of the Indonesian rupiah exchange rate will affect the amount of Indonesia's trade balance because the amount of exports and imports is still using the unit price of US dollars. So that the price of a good or service will increase or decrease due to changes in the rupiah exchange rate against the US dollar.

Changes in the rupiah exchange rate will of course cause exports and imports to change. Research conducted by Darwanto (2014) states that changes in the rupiah exchange rate affect the amount of Indonesia's trade balance through changes in total exports and imports. In addition,

Ginting (2014) also concluded that changes in exchange rates have an impact on Indonesia's trade balance. In addition, Bakhromov & Head (2011) and Shahbaz et al. (2012) In Pakistan and Uzbekistan, the exchange rate of the rupiah caused a decline in net exports. The relationship between exchange rates and net exports in the Mundell-Flemming theory is negative. The Flemming idea can be described in an IS (Investment Saving) curve. In addition, the Marshall-lerner phenomenon suggests that the exchange rate can also change exports and imports in a country provided that it has a us elasticity of more than 1 (Darwanto, 2014).

The Mundell-Fleming transmission mechanism says that when a lower price level lowers interest rates, investors move some of their funds abroad and this in turn causes the relative depreciation of the domestic currency against the foreign currency. This depreciation makes local goods cheaper than foreign goods and thus triggers net exports (Mankiw, 2002).

Research conducted by Daulay (2013) on exchange rate changes responds to net exports in Indonesia. Research conducted by Darwanto (2014) shows that the elasticity of the rupiah exchange rate on exports and imports results in a number of more than 1 (> 1). This shows that the

relationship between the rupiah exchange rate and imports- exports (net exports) is elastic.

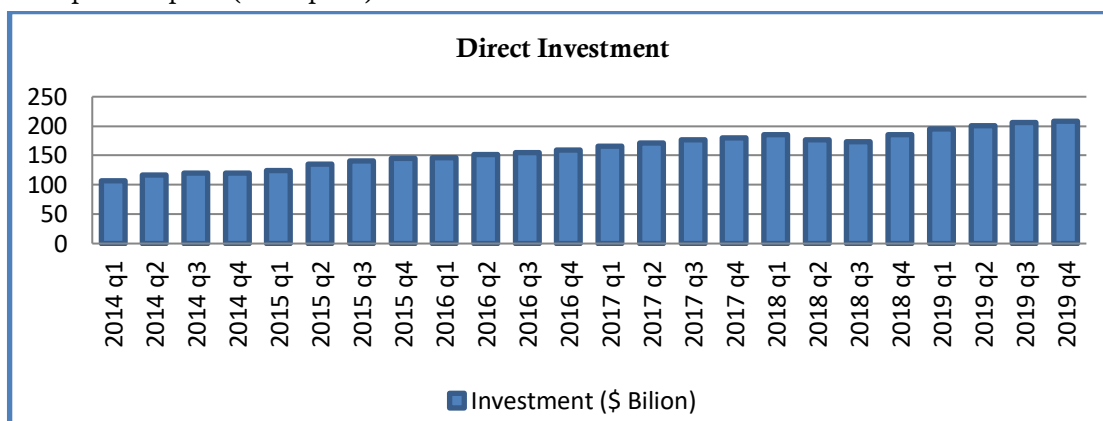


Figure 3. Realization of Direct Investment in Indonesia in 2014 q1-2019 q4
 Sumber : bkpm.go.id, 2020

From 2014 to 2019, Indonesian investment experienced an upward trend. In 2014-2019 the realization of direct investment in Indonesia was worth 106.6 trillion and at the end of 2019 it was 208.3 trillion. This investment comes from within and outside the country.

Keho (2020) in his research revealed that investment causes changes in the trade balance. This is because the investment or additional capital stock of a company can improve product quality and it is hoped that it will be able to compete in the international market. Increasing capital stock through policies can affect the trade balance and reduce trade imbalance between countries (Bardazzi & Ghezzi, 2018).

Ginting (2014) in his research states that foreign direct investment has a positive effect on Indonesia's trade balance. In addition, in the Mundell-Flemming theory, the flow of capital from abroad to the country (foreign direct investment) will have an impact on the trade balance through changes in the rupiah exchange rate and will later affect net exports (Mankiw, 2002).

Ginting (2014) in his research uses only foreign direct investment variables. Meanwhile, in this study, direct investment from domestic sources is added because domestic capital affects the development of the production sector. In addition, in this study using the vector error

correction model analysis method. This is to improve the results of previous research. The VECM method can be used to see the effect of short-term and long-term as well as to see the effect of Impulse Response and Variance Decomposition.

In the VECM analysis method, the lag length is used so that it can be seen how long it takes for the independent variable to affect the dependent variable. So from the results, forecasting analysis can be carried out for the next several periods. In addition, in some fluctuating conditions such as the exchange rate, it is necessary to look at the impact of the shocks of these conditions. In previous research conducted by Ginting (2014) and Daulay (2013), this has not been focused on. Therefore in this study will see if there is a shock from an economic condition.

Another factor that affects the trade balance is the economic growth of a country. The amount of a country's GDP can affect the position of a country's trade balance. The components forming pdb can be used to see what percentage is produced from each component that makes pdb. Research conducted by Parikh, Ashok and Corneliu, (2004) and concluded that changes in economic growth are accompanied by changes in the trade balance. In addition, in 3 European Union countries, namely Bulgaria, Hungary and

Lithuania, economic growth affects the country's trade balance (Varamini & Kalash, 2010) .

Boediono (2002) states that the effect of GDP on exports can be explained through the concept of vent for surplus originally put forward by Adam Smith, where exports are related to a surplus or excess of domestic production output. In addition, an increase in the production surplus, which is indicated by GDP growth, will boost exports because excess domestic output will be channeled through exports.

Bhagwati (1988) argues that an increase in GDP will generally lead to an increase in exports, unless the growth pattern of supply and demand creates an anti-trade bias. Third, namely feedback. This hypothesis suggests that there is a reciprocal relationship between exports and economic growth . According to Bhagwati (1988) an increase in exports for any reason will cause an increase in income (GDP) so that this increase in income will ultimately increase exports.

The trade balance is one of the foreign sectors that is used as an indicator of the success of the economy in a country, especially in Indonesia. This study aims to see the impact of the entry of foreign and domestic direct investment. Fluctuations in the rupiah exchange rate, and domestic economic growth on Indonesia's trade balance using the Vector Error Correction Model analysis approach.

RESEARCH METHODS

In this study, the authors used quantitative research methods. Research is using the study of literature about the effect of Investments, Value Rate Rupiah, Growth Economy and to the Balance of Trade of Indonesia. Research is using time series data from the 2008 quarter I until 2019 quarter IV. This study uses data from the Central Statistics Agency, Bank Indonesia and the Investment Coordinating Board.

The analytical tool used in this research is the Vector Error Correction Model (VECM) . Vector Error Correction Model (VECM) is a Vector Autoregressive (VAR) designed for use on non-stationary data which is known to have a

cointegration relationship. The existence of cointegration in the VECM model makes the VECM model referred to as an restricted VAR. The assumption that must be fulfilled in the VECM analysis is that all variables must be stationary in the same order or degree, namely in the first difference (Gujarati, 2003) .

The VECM method is a derivative of the VAR (Vector Autoregressive) method, VECM is a work procedure that can be used to separate long-run and short-run components from the data generation process. The model equation in this study can be written as follows:

$$NP=\beta_0+\beta_1Inv+\beta_2ER+\beta_3PE+\varepsilon \dots\dots\dots(1)$$

Where, NP is Indonesian Trade Balance; PE is Economic Growth; Inv is Direct Investment; ER is Exchange Rates; $\beta_1 - \beta_3$ are coefficients; β_0 is constanta; and ε is eror term.

The VECM model contains the Impulse Response Function test, the Impulse Response Function (IRF) is a method used to determine the response of an endogenous variable to a particular shock. In other words, the IRF measures the effect of a shock at one time on the innovation of an endogenous variable at that time and in the future. IRF aims to isolate a shock to be more specific, which means that a variable can be affected by a particular shock or shock.

The Impulse Response test is carried out to see the effect of shock on the economy. IRF describes the shock of one variable against another over a certain period of time. So it will be seen how long the shock affects the variables against other variables until the shock effect disappears and returns to the initial balance.

The next test in the VECM model is Variance Decomposition. Analysis of Variance Decomposition in the VAR model aims to predict the percentage contribution of the variance of each variable due to changes in certain variables in the VAR system. Variance Decomposition will provide information about the proportion of the movement of the effect of a shock or shock on a variable to other variable shocks in the current and future periods. Shocks (shock) here means that a variable is influenced by other variables. As the dependent variable is influenced by the

independent variable. Model VECM has Impulse Response Function testing,

a unit root contained between variables so that the relationship between variables becomes valid. This test is carried out in an effort to determine the regression model data obtained is not spurious regression. The unit root test in this study used Augmented Dickey Fuller (ADF). The results obtained from testing see the value of the ADF <McKinnon critical value, so the data is said to be stationary. All variables can be tested stationary at the level and the first difference.

RESULTS AND DISCUSSION

At the initial stage of the research, it is necessary to test the stationarity of the data to analyze whether the data is stationary or not. Stationarity testing is the most important stage in analyzing time series data to see whether there is

Table 1. Stationery Test

Variable	Level		First Difference	
	ADF	Krisis Mc. Kinon Value	ADF	Krisis Mc. Kinon Value
NP	-2.165.563	-2.938.987	-8.803.859	-2.941.145
INV	-0.282391	-2.938.987	-5.710.749	-2.943.427
KURS	-1.044.004	-2.941.145	-3.975.068	-2.941.145
PE	-2.019.389	-2.945.842	-111.5267	-2.945.842

Source : Ouput of Eviews 9.0, Data Prosseced

The test results at the level and first difference level can be seen in Table 1. The four variables show that the results are not stationary at the first difference level, because the ADF

value is greater than the McKinnon value so that all variables can be continued to the next stage. The next stage is Lag Optimum Test,

Table 2. Lag Optimum Test

Lag	LogL	LR	FPE	AIC	SC	HQ
0	3.959.311	NA	193671.3*	23.52536	23.70493*	23.58660*
1	3.848.303	18.93672	260570.6	23.81354	24.71140	24.11974
2	3.692.901	22.85311	279494.6	23.84060	25.45674	24.39175
3	3.572.447	14.87960	394505.8	24.07322	26.40765	24.86933
4	3.471.027	10.14207	701338.0	24.41780	27.47053	25.45887
5	3.064.883	31.05802*	254422.9	22.96990*	26.74091	24.25592

Source : Ouput of Eviews 9.0, Data Prosseced

Determination of the optimum lag is one of the indicators in estimating the VAR model. Determination of the Optimal Lag is useful for showing how long the reaction of a variable takes to other variables, determining the optimal lag is also useful for eliminating autocorrelation problems in a VAR system. This test also serves to test the accuracy of the information generated from the VECM model estimation. Lag candidates were estimated using (LR), (AIC), (FPE), (SC), and (HQ). The optimum lag can be seen from the most results of all tests. The test results in Table 2 show the optimal lag at lag 5.

Table 3. VAR Stability Test

Root	Modulus
0.123095 – 0.730471i	0.740770
0.123095 + 0.730471i	0.740770
-0.670793	0.670793
0.462092 – 0.174232i	0.493848
0.462092 + 0.174232i	0.493848
-0.430358	0.430358
0.005511 – 0.280731i	0.280785
0.005511 + 0.280731i	0.280785

Source: Ouput of Eviews 9.0, Data Prosseced

The stability of the VAR is tested to determine whether the maximum lag of the VAR is stable or not. If the VAR estimate is unstable, the next IRF and FEDV test will be invalid. The stability of the VAR model can be seen from the modulus of less than one.

The results of the research tests shown in table 3 show the modulus values ranged from 0.280785 to 0.740770, where all the modulus results were less than 1.

Table 4. Cointegration Test

Trace		Max-Eigen	
Statistic	Critical Value	Statistic	Critical Value
None *	0.528253*	67.20628*	54.07904
At most 1 *	0.409525*	40.15906*	35.19275

Trace		Max-Eigen	
At most 2 *	0.308541*	21.19328*	20.26184
At most 3	0.197281	7.911007	9.164546

Source: Ouput of Eviews 9.0, Data Prosseced

The cointegration test aims to determine whether the variables that are not stationary are cointegrated or not. If there is cointegration, research using the VECM model can be continued. The cointegration test is used to see the long-term relationship.

Based on table 4, there is cointegration with a statistical value that is greater than the critical value in the Trace and Max-Eigen tests. So that there is a long-term relationship and the VECM analysis can be continued.

Table.5 Output of VECM in Short Run and Long Run

Variable	Coefficient	Std.Error	T.Statistic
Short Run			
CointEq1	-1.015.447	0,18353	-5,53291
D(NP(-1))	0,34618	0,17101	2,0243
D(NP(-2))	0,490138	0,14024	3,49496
D(NP(-3))	0,580773	0,18383	3,15931
D(NP(-4))	0,575429	0,21302	2,70132
D(INV(-1))	0,092418	0,06039	1,53048
D(INV(-2))	-0,078162	0,06392	-1,22275
D(INV(-3))	-0,121374	0,07408	-1,63852
D(INV(-4))	-0,198802	0,06847	-2,90352
D(KURS(-1))	-0,000416	0,00099	-0,42
D(KURS(-2))	-0,003855	0,00104	-3,69478
D(KURS(-3))	-0,00169	0,00125	-1,35165
D(KURS(-4))	-0,003028	0,00136	-2,22631
D(PE(-1))	4,891978	-1,90179	2,5723
D(PE(-2))	6,65302	-2,0849	3,19105
D(PE(-3))	2,618142	-1,79815	1,45602
D(PE(-4))	-0,410947	-1,31786	-0,31183
Long Run			
D(NP(-1))	1		
D(INV(-1))	0.084014	0.01448	5,80370
D(KURS(-1))	-0.001357	0.00028	-4,87855
D(PE(-1))	0.241048	0.30944	0,77897
C	135,4088	233.568	579.741

Sumber : Ouput Eviews 9.0, Data Processed,

The estimation results of the VECM model in Table 4 show that the INV variable has a significant positive effect in the long and short term. The INV variable which has a positive effect on NP can be concluded that if there is an increase in investment, it will increase the Indonesian trade balance figure or the number of exports is more than the number of imports. In other words, the increase in exports is greater than imports. The results of research on the significant positive effect of investment on the trade balance are in line with research conducted by Ginting (2014) and Ginting (2015) which states that investment flows from foreigners have a positive effect on the trade balance in the short and long term. This is because when there is capital inflow, it will increase net exports through the appreciation of the rupiah exchange rate.

Increasing the value of investment in Indonesia can increase the company's financial value. Increasing company finances can be used for the benefit of company production such as improving product quality and expanding business. On the other hand, the increase in investment value also adds to the number of new companies. The number of new companies that did not previously exist in Indonesia will reduce imports or increase exports. This happens because the goods and services that previously had to be imported from abroad with the new company being able to produce the goods and services themselves. Thus increasing the investment value can increase production factors, production capacity and expand markets.

The results of the analysis of the effect of the rupiah exchange rate on the trade balance are in accordance with the Mundell-Fleming theory which states that the relationship between the exchange rate and the trade balance is negative. This means that the higher the rupiah exchange rate against the dollar (depreciation), the lower the net exports (trade balance). Data in Indonesia shows that in the short and long term it shows a negative number. negative means that if the rupiah exchange rate depreciates, it will reduce the value of the trade balance.

The results of the deteriorating trade balance in the short and long term reflect that cheaper prices abroad have not been able to become a weapon to increase Indonesian exports and will even increase Indonesia's imports. Thus, the existence of depreciation or devaluation of the rupiah exchange rate has not provided a perfect reflection to overcome the decline in the trade balance in Indonesia. So that the power of devaluing policies has not been able to be an instrument to increase the competitiveness of Indonesian exports. This result is in line with research conducted by Darwanto (2014) which states that depreciation has not been perfectly reflected as an alternative to increasing the trade balance in Indonesia. In addition, this research is in line with that conducted by Ginting (2014) which states that the real exchange rate has a significant negative effect in the long and short term. Research conducted by Ali et al.(2017) found that the depreciation of the rupiah exchange rate in South Asian countries causes a decrease in the trade balance or net exports. therefore, there is no visible improvement in the trade balance as a response to exchange rate depreciation. Apart from South Asian countries in the OECD (Organization for Economic Cooperation and Development) the impact of exchange rate depreciation or devaluation also does not cause an increase in the value of the trade balance (Ebadi, 2020) . In addition, Jibrilla Aliyu & Mohammed Tijjani (2015) for the country in Nigeria devaluation or depreciation actually worsens the value of the trade balance.

The estimation results of the VECM model show that the Economic Growth variable has an insignificant effect in the short term and in the long term. The results of these findings are not in accordance with the initial hypothesis which states that in the short and long term an increase in GDP or economic growth will increase the amount of exports and increase the trade balance surplus.

Table 6. percentage of Public Consumption and Trade Sector (Export and Import) in 2013-2018

Years	Consumption	Trade(export-import)
2013	54%	20%
2014	54%	22%
2015	54%	22%
2016	54%	23%
2017	54%	24%
2018	54%	21%

Source : Badan Pusat Statistik, 2020

Based on table 6, most of Indonesia's GDP structure consists of public consumption of 54% as shown in the table. But the trade sector only contributed 20-25% over the last 6 years. This means that the increase in GDP is dominated by household consumption and is not followed by a significant increase in the domestic production surplus. This shows that Indonesia's economic growth still depends on public consumption, not the trade sector (Darma & Susi, 2011) . In addition, net exports do not have a significant effect on increasing Indonesia's economic growth (Mustika et al., 2015) . On the other hand, this also illustrates that the competitiveness of Indonesian products abroad is still weak.

The insignificant effect of the Economic Growth variable on the trade balance obtained in this study is not in accordance with the classical theory put forward by Adam Smith, where exports are the impact of a surplus or excess of domestic production output. An increase in the production surplus, which is indicated by GDP growth, will boost exports because the excess domestic output will be channeled through exports. If exports increase, the trade balance will also increase.

This result is same with research conducted by Tran et al. (2020) which states that economic growth does not have a significant effect on the trade balance. But in the present era this theory is not reflected in this research. Currently, export activity occurs not because of excess domestic production surplus but demand for goods and services from other countries. So there is no need to wait for a surplus of domestic production to export.

The results of these findings are in line with research conducted by Asnawi & Hasniati (2018) which states that GDP or economic growth does not have a significant effect on the trade balance.

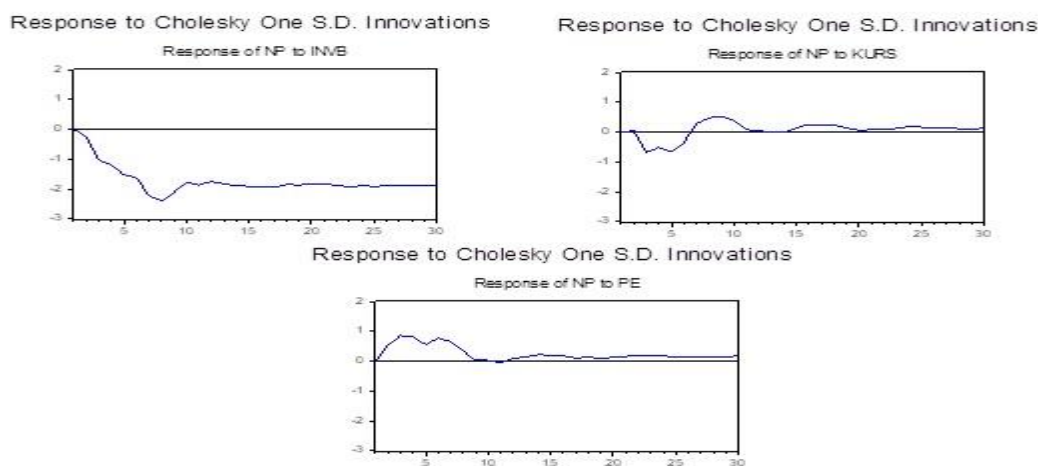


Figure 4. Impulse Response Function Test
Source: Ouput of Eviews 9.0, Data Processed

The results of the Impulse Response Function Test in Figure 4 show that the shocks caused by the investment variable fluctuated until the 16th period. This means that if there is a

change in the amount of investment, either decreasing or increasing, it will cause fluctuations in the trade balance value until the 16th period and will be stable after the 16th period. The NP

variable takes about 16 periods to adjust due to shocks from the investment variable. The impact of the investment variable shocks causes a decrease in the trade balance by only 1-2%.

The exchange rate variable gives shocks to the NP variable and fluctuates until the 8th period. This means that the shocks caused by the exchange rate variable can only adjust and be

stable in the 8th period. The impact resulting from exchange rate shocks was only 0.1-0.4%.

The PE variable provides shocks to the NP variable until the 10th period. This means that the trade balance will be stable after 10 periods caused by shocks from domestic economic growth. The impact resulting from exchange rate shocks was only 0.1-0.5%.

Table 7. Variance Decomposition Test

Period	S.E.	NP	INVB	KURS	PE
1	1,272942	1000000	0.000000	0.000000	0.000000
2	1,412893	81,64913	3,237253	0,096132	15,01748
3	2,065421	38,3318	26,38318	10,96247	24,32255
4	2,575139	25,21646	38,24964	11,02549	25,50842
5	3,187217	20,81261	47,79588	11,66458	19,72693
6	3,673667	15,67485	55,40914	9,677873	19,23815
7	4,354918	11,35001	65,37202	7,295789	15,98218
8	5,011197	8,782095	72,26473	6,424453	12,52872
9	5,484471	8,1815	75,03442	6,320089	10,46399
10	5,800577	8124261	76,4063	6,112379	9,357056
13	6,713133	9,462198	78,89098	4,580573	7,066244
14	6,991825	9202052	79,96015	4,223176	6,614623
15	7,272185	9,083904	80,78736	3,942834	6,185900
16	7,541908	8,914153	81,49523	3,784181	5,806439
18	8,052118	8,769807	82,60959	3,479930	5,140672
23	9,172635	8,851118	84,30063	2,745755	4,102495
27	9,994714	8741805	85,28708	2,423800	3,547312
28	1,018771	8,730817	85,48751	2,345302	3,436368
29	1,037866	8730051	8566588	2,270559	3,333513
30	1,056389	8,699938	85,84802	2,207272	3,244769

Source: Ouput of Eviews 9.0, Data Prosseced

The results of the Variance Decomposition Test in Table 7 show that the Investment variable explains 3-85% up to 30 periods of all variables in the model on the trade balance. In this model it shows that investment is the dominant variable in influencing the trade balance. the inflow of capital from abroad will change the exchange rate and will affect net exports. In addition, investment will also increase domestic production capacity and will encourage exports and reduce imports.

The exchange rate variable contributes to the trade balance from the beginning of the period by 10% and from the 30th period by 2%

only. This is a consideration in government policy to encourage other factors because in the long run the rupiah exchange rate does not dominate.

The PE variable only contributed 15% and continued to decline until the period 30 to 3% of the trade balance value. This is because the structure of GDP in Indonesia mostly consists of public consumption, not from the trade sector. so that the contribution of economic growth to the trade balance is only at the beginning of the period. After a long time, it will experience a decline and be more dominated by other variables.

CONCLUSION

Investments in the short term and in the long term have a significant positive effect on the trade balance. The exchange rate of the Rupiah in the short and long term has a significant negative effect. Economic growth in the short and long term has a positive but insignificant effect.

The Impulse response function test shows that in the event of an investment shock, the trade balance value will take around 16 quarters, the rupiah exchange rate takes about 8 quarters, Economic Growth will take around 10 quarters to be able to readjust. Variance decomposition test Investment contributes 3-85%, the rupiah exchange rate contributes 2-10% of the total trade balance value and Economic Growth only contributes 3-15% of the total trade balance value of the total trade balance value.

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