CHAPTER V

DISCUSSIONS AND RESULTS

The writer wants to do the test toward determinant analysis of foreign exchange reserve in Indonesia, whereas the dependent variable is foreign exchange reserve, meanwhile, the independent variable is foreign debt, exchange rate and, net export. This data was taken based on the monthly data from 2009:01 until 2016:12 and the data analysis by using *Error Correction Model (ECM)* which has the purpose to test the specification of the model and suitable theory with reality. the test of data is using Eviews 7.

A. Descriptive Analysis

The Descriptive statistic in this research based on minimum value, maximum value, standard deviation and average value from each variable, the goals of the descriptive statistic as follows:

Table 5.1
The Result of Descriptive Analysis

Descriptive	FR	FD	ER	NX
Min	50,56400	147,2870	8508,000	-1471824
Max	124637,8	325,2610	14657,00	4423667
Stadev	36410,36	53,16375	1811,829	1187351
Mean	91280,16	246,6896	10857,58	1236114

Source: Appendix 1

Based on the table above, the minimum value of foreign exchange reserve is about 50,56400 billion of USD and maximum value is about U$124637,8 billions from period 2009:01 until 2016:12, the average value of foreign exchange reserve for 96 months is about U$ 91280,16 billions. Then Foreign debt has minimum value is about 147,2870 billion and maximum value is about U$ 325.2610 millions, the average value of foreign debt is about U$ 246,6896 millions, exchange rate toward dollar have minimum value around IDR 8.508,00 and the maximum value is about IDR 14.657,00. The average value of exchange rate is about IDR 10.857,58 from period 2009:01 until 2016:12. The last variable is net export, it has maximum value is about U$ 44,23667 billions and minimum value is about US -14,71824 billions for 96 months, the maximum value shows the negative result, because import is more than export and make the negative value of net export.

B. Classical Assumptions

This regression model should show the correlation equation which is valid or BLUE (Best Linear Unbiased Estimator) this model must fulfill classical assumption. The following assumption they are: firstly, there is no autocorrelation it means there is correlation between observation residual, secondly, there is no multicolinearity which is mean there is correlation among independent variables, and the last, there is no heteroskedasticity it means there is variable which is not

constant from disturbing variable, therefore that classical assumption is necessary (Prawoto 2016)

1. Multicolinearity Test.

   Multicollinearity test has the purpose to test whether there is high correlation or complete between independent variables in the regression model. The good model must free from the correlation between independent variables. The detection of multicolinearity in this test was conducted by VIF value (Variance Inflation Factor) if VIF value less than 10,the result show if there is not multicolinearity in the regression, the table below shows the result of multicolinearity test:

Table 5.2
The Result of Multicollinearity Test

Variable	**Centered VIF**
C	NA
D(Foreign Debt)	1,266196
D(Kurs)	1,273083
D(Net Export)	1,020351
Res(-1)	1,039645

Source: Appendix 3A

Based on table 5.3, multicolinearity results shows if all of coefficients correlation value less than 10. From that result can be concluded if there is not multicollinearity or relations among independent variables in the regression model.

The table below shows other result of multicolienarity test by using correlation:

Table 5.3: Result of correlation

	FD	KURS	NETEXPORT
FD	1.000000	0.754485	-0.122145
KURS	0.754485	1.000000	-0.285266
NETEXPORT	-0.122145	-0.285266	1.000000

Source: Appendix B

The result is all independent variable is free from multicollinearity problem, because there is no variable which have value more 0.85, so can be concluded if there is no multicollinearity in this research.

2. Heteroscedasticity Test.

Heteroscedasticity test have the purpose to know whether residual of the model have a constant variance or there is not constant variance. The good model is the model which is free from heteroskedasticity. The detection of heteroscedasticity is used ARCH Heteroskedasticity Test. If the probability Obs*R-squared more than 0.05 so that can be concluded if there is not heteroskedasticity in the model. The table below shows the result of heteroscedasticity test:

Table 5.4
The Result of Heteroskedasticity Test

Heteroscedasticity Test: ARCH			
F-statistic	0,015416	Prob F	0,9015
Obs* R-squared	0,015748	Prob Chi-square	0,9001

Source: Appendix 3B

Based on the table above, can be concluded if Obs*R-squared value is 0,015748 which have the probability value around 0,9001, because of the probability value 0,9001 more than 0,05, so that there is no heteroskedasticity in this model.

3. Autocorrelation Test.

Autocorrelation test has the purpose to know whether is there any correlation among residual in the model or there is no correlation among them. The good model is the model which is free from autocorrelation problem. The autocorrelation test in this model is used Breusch Godfrey Serial Correlation LM Test. If the probability value Obs*R-squared more than 0.05, so can be concluded if there is no correlation in the model. The table below shows the result of autocorrelation test:

Table 5.5
The Result of Autocorrelation Test

Bresudh-Godfrey Serial Correlation LM Test			
F-statistic	0,515596	Prob F	0,5989
Obs* R-squared	1,100324	Prob Chi-square	0,5769

Source: Appendix 3C

Based on the result above, the Obs*R-squared value is 1,100324 which have probability value around 0,5769, because of probability value 0,5769 is more than 0,05, so can be concluded if there is no autocorrelation in this model

C. The Dynamic Assumption

1. Stationary test

   Stationary test have the purpose to know whether research data stationery or not, if the data have stationary, so the data will avoid spurious regression or other dubious regression

   a. Unit Root Test

      Unit Root test in this research using Augmented Dickey-Fuller (ADF) test, based on ADF in the level, the result are:

Table 5.6
Unit Root test with ADF test at the level

Variable	Uji Df
Foreign exchange reserve	Prob 0,1161

Net Export	Prob 0,2460
Foreign debt	Prob 0,5109
Exchange rate	Prob 0,9380

Source: Appendix 2A

Based on table 2, all variables (Foreign exchange reserve, net export, foreign debt, and exchange rate) non-stationary at the level, since the probability value is more than 5% of the critical value.

b. Stationery test in 1st different

The result of all variable in unit root test is non-stationary in the level, then it must be the Unit root test again in the 1st different, to know at what level data will be stationer. The test integration degree from each variable is shown in the table below:

Table 5.7
Stationery test in 1st differential

Variable	Uji Df	explanation
Foreign exchange reserve	0.0000	Stationer
Net export	0.0001	Stationer

Foreign debt	0.0001	Stationer
Exchange rate	0.0000	Stationer

Source: Appendix 2B

Based on data in table 3, can be concluded if all variables are stationer in the 1st different, because the probability is lower than 5% critical value, so that the result can be continue to the cointegration and ECM test

c. Cointegration test

This research use cointegration with residual-based test, and also use Augmented dickey-fuller to observe whether residual regression of cointegration is stationer or not. The value of ADF can be resulted by cointegration regression equation with OLS method (Ordinary Least Squares). The cointegration regression equation, they are :

$$CD_t = \alpha_0 + \alpha_1 NX + \alpha_2 FD + \alpha_3 ER + \mu t$$

This table below shows the result of cointegration regression equation:

Table 5.8

The Result of OLS Cointegration Regression

Dependent variable	coefficient	t-statistic	Probability	Adjusted R

Foreign Debt	911,2438	34,44837	0,0000	0,90
Exchange Rate	-15,40939	-1,046729	0,0000	
Net Export	0,007285	0,001056	0,0000	

Source: Appendix 2C

Based on the table above, foreign debt, exchange rate, and net export give the significant influence at 5% critical value toward foreign exchange reserve. R squared value around 0.90 which is means if the variation of endogenous variables can be explained by Independent variables at the equation around 90%, meanwhile another factor around 10% is explained by other factor beyond the research.

The next step is to test unit root test toward residual value ect by using ADF method. the formula below shows the result of regression equation:

$$ect = CD = \beta_0 + \beta_1 FD + \beta_2 ER + \beta_3 NX + e \dots\dots\dots\dots\dots\dots\dots\dots$$

The next step after having residual value is to test residual value, whether it has stationer or not stationer.

This table 4.5 showing the result of cointegation test with ADF method in level:

Table 5.9
The Value of Cointegration Test with ADF method in level

Variable	Adf Value	Critical value 5%	Probability	Decision

Residual	-4,776555	-2,892200	0,0001	Stationer

Source : Appendix 2D

Based on cointegration test with ADF method, in the table above show if residual value absolut ADF -4,9776555 > 5% critical value that is -2,892200, so that residual value have stationer in the level and be conclude if there is cointegration in the model, so that ECM formulation can proceed.it have meaning if there is balance or stabilization among variables in the long-term.

4. Error Correction Model Test (ECM)

The next step after do cointegration test is to establish Error Correction Model equation, the equation will be set as follows:

$$\Delta CD = \Delta\beta_0 + \Delta\beta_1 FD + \Delta\beta_2 ER + \Delta\beta_3 NX + \Delta\beta_4 e - 1 + e \dots\dots\dots\dots\dots\dots\dots\dots$$

Explanation:

CD = Cadangan Devisa (Foreign Exchange Reserve)

FD = Foreign Debt

ER = Exchange rate

NX = Net Export

e-1 = Residual Equation

The equation was built based on the result if all variables have stationer in *first difference* which is shown by Δ notation.ECM model is used

to estimate the effect of short term and long term which is caused by fluctuation and time lag for each independent variable. The table below shows the result of ECM test:

Table 5.10 The result of ECM Model

Variable	**Coefficient**	**Std Error**	**t-statistic**	**Prob**
C	-644,1174	792,6851	-0,812577	0,4186
D(Foreign debt)	1031,064	240,2754	4,291175	0,0000
Exchange rate	0,829128	2,506600	0,330778	0,7416
Net export	0,002614	0,000679	3,848709	0,0002
ECT (-1)	-0,282344	0,058388	-4,835631	0,0000
R-squared	0,365756	Probability (F-statistic)	0,000000	

Source: Appendix 2E

The equation below obtained from the result of ECM test:

$$CD = \beta_0 + \beta_1 FD + \beta_2 ER + \Delta\beta_3 NX + ect\ (-1)$$

CD: -644,1174+ 1031,064 FD+ 0,829128 ER+ 0,002614 NX – 0,282344 ect (-1)

The equation above shows if coefficient value ECT in this model is negative and significant for foreign exchange reserve estimation. The result of ECM estimation above explains if there is the significant influence of model

toward foreign exchange reserve in the long term and short term. If ect value smaller, so the correction process of short term is faster to reach the balance of long-term, because of that ect variable in ECM is often called by the factor of inaction, which has the value smaller than 0,ect < 0. The ect coefficient in this model, reach -0,282344 and have probability which is significant at 5% critical value that is around 0,0000, because of that the ECM model is valid. The speed of error correction to correct the behavior of each variable in the short term is around 27%, so that can reach the balance in the long term.

Based on the estimation of ECM above the constant value is around -644,1174 which is means if all of the variable is considered constant or there is no change, then the rate of foreign exchange reserve is around -644,1174

Based on that estimation in short-term shows if R-squares is around 0,365756 which is mean if foreign exchange reserve model can be explained by foreign debt, exchange rate and net export around 37%, meanwhile the other explanatory is explained beyond the model.

D. Discussions

Table 5.11

The Recapitulation of Influence Independent Variable toward Dependent Variable in Short term and Long term

Variable	Short-Term	Long-term

	Coefficient	Probability	Coefficient	Probability
C	-644,1174	0,4186	24788,07	0,0026
Foreign debt	1031,064	0,0000	911,2438	0,0000
Exchange rate	0,829128	0,7416	-15,40939	0,0000
Net Export	0,002614	0,0002	0,007285	0,0000

1. The influence of Foreign Debt variable toward Foreign Exchange Reserve in Indonesia

   The coefficient value of foreign debt in the short term around 911,2438 that shows if foreign debt increasing 1 unit, then foreign exchange reserve will increasing around IDR 91.12438 with the assumption if exchange rate and net export constant and there is no change. The coefficient foreign debt has positive value toward foreign exchange reserve in the short term, the probability value of foreign debt around 0,0000, this value is smaller than critical value 5% which is mean if the foreign debt have significant influence toward foreign exchange reserve, meanwhile the coefficient of foreign debt in the long term is around 1031,064 that shows if foreign debt is increasing 1 unit, then foreign exchange reserve will increasing around IDR 1.031,064, with the assumption if exchange rate and net export are constant and there is no change. The coefficient of foreign debt has positive value, so that foreign debt have significant influence toward foreign exchange reserve in the long term, which is mean if the test is suitable with the hypothesis which is used in this research.

This research also strengthened by the goal of research was conducted by (Maulana 2014), the goals is foreign debt have positive influence toward foreign exchange reserve and also suitable with the theory of Michael Todaro, foreign debt is one of financial source from outside (whether grant or loan) and also have important role to complete the lack of domestic resources to encourage the growth of foreign exchange and saving (the analysis of foreign loan "two gaps"). The goals of this research also suitable with other research was conducted by (Febriyanti 2013), the goals are foreign debt have a positive impact toward foreign exchange reserve, because the calculation of foreign debt can give additional toward capital account. increasing capital account can give influence to the asset in the balance of payment, and the calculation of foreign debt in the asset can give additional toward foreign exchange reserve, which is mean foreign exchange reserve will be increasing because of foreign debt calculation.

The research above indicates if foreign debt has the positive influence toward foreign exchange reserve in the short term and long term, as we know the government use and maintain the foreign debt to increase infrastructure and cover budget deficit which is occurs at APBN in Indonesia. Indonesia as the developing country need to develop their infrastructure, health sector, education sector and others, because the infrastructure one of the source to give positive impact toward economic growth. Even though foreign debt always increasing until reach U$ 316,0 million, but the prediction of foreign

debt still safety in 2016, the accumulation of foreign debt which is not controlled by good management will make burden to the economy growth and can reduce the foreign exchange reserve, meanwhile the private sector maintain the foreign debt as fund to protect their activity, whether to make investment continuously or to protect the market which is controlled by them, if that investment from foreign country have good control toward productive sector and also it produces foreign exchange in the future, so the burden of foreign debt payment can be overcome, in order to avoid monetary crisis which is occurs in several years ago.

2. The influence of Exchange Rate toward Foreign Exchange Reserve in Indonesia

The coefficient value of exchange rate in the short term is around 0,829128, that show if exchange rate value is increasing 1 unit, then foreign exchange reserve will be increasing around IDR 0,829128 with the assumption if foreign debt and net export is constant and there is no change. The coefficient value of exchange rate has positive value toward foreign exchange reserve in the short term. However, it have probability value around

0,62, this value is higher than 5% which is mean if there is no impact of exchange rate toward foreign exchange reserve in the short term.

Meanwhile, the coefficient value of exchange rate in the long term is around -15,40939 that shows if the exchange rate is increasing 1 unit, then foreign exchange reserve will decreasing around IDR15,40939, with the assumption, if foreign debt and net export is constant and there is no change. The coefficient of exchange rate has the negative value and have probability 0,0000 which is mean if exchange rate has the negative impact on foreign exchange reserve in the long-term.

The result above is suitable with other research was conduct by (Maulana 2014) the goal of research is exchange rate have negative influence toward foreign exchange reserve, the reason is because if there is transaction in international trade, the demand of valas will increasing and make the exchange rate depreciate toward dollar, so that makes the decreasing value in foreign exchange reserve. The research was conducted by (Pundy Sayoga 2017) also have result, if exchange rate give negative influence toward foreign exchange reserve, when exchange rate increase which is mean depreciate, because of dollar is appreciated toward rupiah, then exchange rate(Rupiah) will depreciate and causes the foreign exchange reserve decreasing, so that exchange rate has negative influence toward foreign exchange reserve.

According to the theory of (Syarifuddin 2015) Exchange rate itself have relations with foreign exchange, when exchange rate depreciate that can give influence toward import, the import will be increasing, and the demand of foreign exchange is higher, so that can give influence toward deficit in the balance of payment. This deficit can give negative influence toward foreign exchange reserve, oppositely when the exchange rate appreciate toward dollar. The export activity will be increasing and make the supply of foreign exchange will be increasing, finally this foreign exchange can give additional toward the balance of payment, and it will give positive influence toward foreign exchange reserve.

Several months previously, the exchange rate is fluctuated and reach IDR 14.000,00 in the end of 2015, this condition makes bank Indonesia give intervention from foreign exchange reserve to make stabilization toward exchange rate, because that intervention, foreign exchange reserve decrease, meanwhile exchange rate return to the IDR 13.000,00 in the beginning of 2016. Exchange rate still fluctuated until the end of 2016, therefore foreign exchange reserve still safety to adequate import liabilities around 7-8 monthly import. According to the international regulation, the safety of foreign exchange reserve measurement is based on the capability of foreign exchange reserve to make stabilization toward exchange rate and also can adequate import liabilities around 3 months, meanwhile the fluctuation of

exchange rate not give influence toward foreign exchange reserve in the short term, because of foreign exchange reserve still capable to make exchange rate more stable, when exchange rate depreciate toward dollar.

3. The Influence of Net Export toward Foreign Exchange Reserve in Indonesia

The coefficient value of net export in the short term is around 0,007285 that shows if net export increasing 1 unit, then foreign exchange reserve will decreasing IDR 0,007285, with assumption, if exchange rate and foreign debt is constant and there is no change. The coefficient of net export has positive value toward foreign exchange reserve in the short term. the probability value of net export is around 0,002, this value is smaller than critical value 5% which is mean if there is positive influence on net export and foreign exchange reserve in the short term.

Meanwhile, the coefficient value of net export in the long term is around 0,007285, that shows if net export is increasing 1 unit, then foreign exchange reserve will increasing IDR 0,07285, with assumption, if exchange rate and foreign debt is constant and there is no change. The Coefficient of net export have positive value toward foreign exchange reserve and have probability value around 0,0000 which is mean if net export have significant value and there is significant influence between foreign exchange reserve in the long term for period (2009:01- 2016:12)

This goal of research also strengthened by the research was conducted by (Febriyanti 2013), the result is net export have the positive influence toward foreign exchange reserve.net export is the one source of calculation in the balance of payment. The total of net export surplus, when export activity is higher than the import activity, because the next export will give positive influence toward the balance of payment and after that BOP can give influence toward foreign exchange reserve. Meanwhile the export activity is one component of the source in foreign exchange reserve, in contrast when the import activity is higher rather than export activity it means the net export is deficit. The deficit in balance of payment can give negative influence toward foreign exchange reserve, so that the calculation of foreign exchange reserve will decreasing when the net export faces deficit in the balance of payment. This result also suitable for the theory of advantage export activity was written by (Sutedi 2014) in the book of law export-import, explain if one of advantage from export activity is one source for increasing foreign exchange reserve in the country. Meanwhile the export activity always increases from 2014 until 2016 even though oil import is higher rather than export from oil sector. The influence of net export toward foreign exchange reserve is positive significant in the short term, even though the import liabilities is bigger than export spending, so that make the balance of payment is deficit in several months at 2013, the calculation of net export still show positive and safety toward foreign exchange reserve, this condition is because foreign exchange

reserve still to adequate import liabilities. according to the (Dumairy,1997), the position of foreign exchange reserve is safety if can adequate import requirement at least 3 months payment, although oil import is higher rather than oil export, but this condition does not give negative influence toward foreign exchange reserve in Indonesia