

## CHAPTER III

### RESEARCH METHODOLOGY

#### A. Research Variables and Type of Data

The types of this research are descriptive quantitative research by using theory and data which is related to this research. This research conducted by using time series data that is foreign exchange reserve, net export, exchange rate and foreign debt, which is secondary data from period 2009: M01 - 2016: M12. The data was taken from the legal source that is the publication of Central Bank of Indonesia in shape of monthly data.

Table 3.1 Source of Data

| No | Variable                 | Unit measurement | symbol | Source of data            |
|----|--------------------------|------------------|--------|---------------------------|
| 1  | Foreign exchange reserve | Billion USD      | CD     | Central Bank of Indonesia |
| 2  | Net export               | Thousand USD     | NX     | Central Bank of Indonesia |
| 3  | Exchange rate            | IDR              | ER     | Central Bank of Indonesia |
| 4  | Foreign debt             | Million USD      | FD     | Central Bank of Indonesia |

(Source: Bank Indonesia,2016)

## **B. Variable research and Operational Definition**

The variable which is used in this research is: foreign exchange reserve, net export, exchange rate and foreign debt. The definition each operational variable are:

### 1. Foreign exchange reserve.

Foreign exchange reserve which is often called by International reserve and foreign currency liquidity or official reserve assets defined as all overseas assets were controlled monetary authority and can be useful every time. Based on that definition, foreign exchange reserve of the country can be useful for protecting exchange rate stabilization and also pay deficit in the balance of payment.

The data was obtained from statistic central bank of Indonesia from the first month in 2009 until last month in 2016.

### 2. Net Export.

According (Mankiw 2005) net export is the value of goods and service which is exported to the other country reduced by the value of goods and service which is imported from other country. Net export have the positive value if the value of export more than the value of import.

The data of net export was obtained from statistic central bank of Indonesia from the first month in 2009 until last month in 2016.

### 3. Exchange rate

The definition of the exchange rate is the price of a currency against another currency (Obstfeld 2003), meanwhile according (Sukirno 1985), a value indicating the amount of domestic currency required to get one unit of foreign currency. The exchange rate data was obtained from statistic central bank of Indonesia from first month in 2009 until last month in 2016.

### 4. Foreign debt

The Guide defines gross external debt as follows: Gross external debt, at any given time, is the outstanding amount of those actual currents, and not contingent, liabilities that require payment of principal and/or interest by the debtor at some point in the future and that are owed to non-residents by residents of an economy (IMF, 1993). Foreign debt data was obtained from statistic central bank of Indonesia from the first month in 2009 until last month in 2016.

## C. Method Analysis

The analysis method that is, to know how the relationship between net export, exchange rate and foreign debt in short term and long term toward

foreign exchange reserve. This research use Error Correction Model (ECM) method. This model usually is used to make equilibrium the economy behavior which is often showing an imbalance, so that have need of model which is entered the adjust variable to do the correction for that imbalance condition. (Robert f 1987) has developed error correction model which is used to correct regression equation among variables, which on individual not stationary so that can back to the equilibrium value in long-term with the characteristic, there is cointegration correlation among variables in equation.

#### **D. Data Analysis**

The Procedure of analysis data in this research by using eviews 7, there are several steps to do analysis data (Prawoto 2016), they are:

##### 1) Unit Root Test

Augmented Dickey-Fuller (ADF) test, make Unit Root Test which is use statistic method non-parametric for explaining is there autocorrelation among error variable except inserting different explanatory inaction variables, the hypothesis for ADF test is:

$$H_0 : \text{data non-stationer}$$

$$H_a : \text{data stationer}$$

The stationery of data can be determined by comparing statistic value ADF and ADF critical value

If ADF test statistic  $>$  ADF table it means  $H_0$  rejected

If ADF test statistic  $<$  ADF table it means  $H_a$

Stationery of data can be determined by comparing statistic value ADF and it critical value

#### 1. Cointegration test

Based on stationary test, if independent variable (export, exchange rate and foreign debt toward foreign exchange reserve) non-stationery in level, but stationary in first differential or second, if that so the research can be continued by cointegration test, the hypothesis for cointegration test is:

$H_0$  : There is no long-term correlation between independent variable and dependent variable

$H_a$  : There is long term correlation between independent variable and dependent

The core was determined by characteristic, they are:

If ADF statistic test  $>$  ADF table it means  $H_0$  was rejected

If ADF statistic test < ADF table it means  $H_a$  was received

2. Error Correction model (ECM) test

If the data non-stationary in level, but stationery in differential stage and there is cointegration among variable, it means there is long-term correlation among variable, probably there is imbalance in short term. The model which is determined the correction for imbalance is called by Error correction model (ECM). Error correction model approach was introduced for the first time by Sargan and developed by Hendry. Afterwards was popularized by Engle-Granger. ECM model was used to solve the problem of time series which is not stationary data and the limitation problem of regression. After the stationary test and cointegration test and then continue with ECM test. The previously data which is not stationary at the level, but stationary in first different and two variable have cointegration, so that is there is relationship or equilibrium in long term. The model for adjusting to correct imbalance is called by ECM.

There is general model from ECM, they are:

$$\Delta Y_t = \alpha_0 + \alpha_1 \cdot \Delta X_t + \alpha_2 EC_t + \epsilon_t$$

The ECM model which is assumed in this research, they are :

$$\Delta CD_t = \alpha_0 + \alpha_1 \Delta NX_t + \alpha_2 \Delta ER_t + \alpha_3 \Delta FD_t + \alpha_4 EC_t + \epsilon_t$$

Where:  $\alpha_0$  : constanta Regression in short term

$\alpha_1, \alpha_2, \alpha_3, \alpha_4$  : coefficient regression in short term

$NX_t$  : Net export (billion)

$ER_t$  : Exchange rate (rupiah)

$FD_t$  : Foreign debt (million)

$EC_t$  : Error correction term

### 3. Classical Assumption

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: there is no autocorrelation, it means there is the correlation between observation residual, there is no multicollinearity, it means there is the correlation among independent variables, there is no heteroscedasticity, it means there is variable which is not constant from disturbing variable, so that classical assumption is necessary (Prawoto 2016)

#### a. Autocorrelation

Autocorrelation is the condition which is happening the correlation between residual this year and the year previously. Autocorrelation can be detected by Durbin Watson test, the hypothesis is:

$H_0$ : there is no correlation

$H_a$ : there is autocorrelation

b. Heteroskedasticity

Heteroscedasticity test for looking error variable whether constant or not and can be detected by Arch test, the hypothesis is:

$H_0$  : there is no heteroskedasticity

$H_a$  : there is heterokcedasticity

If probability test  $Obs * R^2 < 0.05$  it means  $H_0$  was rejected

If probability test  $Obs * R^2 > 0.05$  it means  $H_0$  was received

c. Multicollinearity

Multicollinearity test for detecting whether there is correlation between independent variable and regression equation or there is no correlation between them, according to the Frisch, the regression model can be determined have multicollinearity problem, if there is



perfect linear correlation or exact among variables independent in the regression model

The hypothesis is:

$H_0$  : there is no multicollinearity

$H_a$  : there is multicollinearity in the data

If the probability of each variable in correlation matrix more than 0,85%, it means there is multicollinearity problem in the regression model