CHAPTER III
RESEARCH METHODOLOGY

A. Research Object

Objects observed in this study are Indonesia's foreign debt in the period of quarter 1 2005 to quarter 4 2017, the external debt under study is the foreign debt of the Indonesian government as the dependent variable. Meanwhile, exchange rate, government expenditure, economic growth denoted as gross domestic product (GDP), and government revenue are variable that influence/independent variable.

B. Data type

The type of data in this research is secondary data. Secondary data is a source of research data obtained by researchers indirectly through intermediary media (obtained and recorded by other parties). Secondary data are generally in the form of evidence, records or historical reports that have been compiled in published and unpublished documentary (data documenter) files. In this case, the data used to complete this research is time series data in the form of quarterly data with period 2005:Q1-2017:Q4. The data are collected from various sources, namely Bank Indonesia, Kementerian Keuangan Republik Indonesia, and scientific journals as well other literature related to the topic.

C. Data Collection Technique

Data collection method in this research is through literature study and document study. Library study is done by collecting information through the

deepening of the literature-related literature on object studies such as journals, theses, and books relevant to the topic of the research. Document study is done by taking data related to research variables in accordance with the research year from Bank Indonesia as well Kementerian Keuangan Republik Indonesia and documenting it. Documentation technique is done by tracing and documenting the data and information relating to the object of study.

D. Operational Definition of Research Variables

The definition of operational variables is the definition of the variable (expressed in the definition of the concept), operationally, practically, in the real of the research object (object under investigation). Variable used in this research is independent variable and dependent variable.

1. Independent variable.

   Independent variable is a variable that affects, which causes the emergence or change of dependent variable. The independent variables used in this study are the rupiah exchange rate against the dollar, government expenditure, economic growth denoted by GDP and government revenue.

2. Dependent variable.

   Dependent variable is a variable that is influenced by the independent variable. The dependent variable used in this research is the Indonesian government's foreign debt.

An operational definition of research variables is an explanation of each variable used in research on the indicators that shape it. The operational definition of this research variable can be seen in the following description.

1. Foreign Debt.

   Foreign Debt is the income of a State in the form of foreign currency in rupiah or in the form of goods and services received by Foreign Grants (PPHLN) paid under certain conditions. In the definition of State budget, foreign debt is also referred to as an alternative funding source used to finance the State budget. Foreign debt data is obtained from the Indonesian Banking Financial Statistics (SEKI) in the form of quarterly data in its creditor group and covers the private, government, long-term and short-term foreign debt from 2005:Q1-2017:Q4.

2. Exchange Rate (Indonesian rupiah exchange rate against US dollar).

   The exchange rate is the price of a currency of a State as measured or expressed in other currencies. The exchange rate plays an important role in expenditure decisions since exchange rates allow a State to translate prices from different countries into one common language (Krugman and Obstfeld, 1999). The exchange rate data is obtained from the official website of Kontan Data in the form of quarterly data in the Indonesian rupiah (IDR) exchange rate against the US dollar (USD) in 2005:Q1-2017:Q4.

3. Government Expenditures.

Government spending reflects government policy. If the government has established a policy to purchase goods and services, government spending reflects the costs that governments must incur to implement the policy. Government expenditure data are obtained from Indonesian Banking Financial Statistics (SEKI) in the form of quarterly data on Indonesian government spending from 2005:Q1-2017:Q4.

4. Economic Growth.

   Economic growth is a measuring tool for the achievement of an economic development. In a macroeconomic analysis, the level of economic growth a country wishes to achieve is measured from the real national income growth achieved in a given year. Economic growth data is obtained from Indonesian Bank Indonesia Financial Statistics (SEKI) in the form of Indonesia's GDP quarter data in the period of 2005:Q1-2017:Q4.

5. Government Revenue.

   Government revenue reflects government policy. If a government has established a policy to purchase goods and services, government revenue reflects the capital that governments have to support in implementing the policy. Government revenue data are obtained from Indonesian Banking Financial Statistics (SEKI) in the form of quarterly data on Indonesian government revenue from 2005:Q1-2017:Q4.

E. Hypothesis Testing and Data Analysis

This research is using quantitative method. Quantitative method is scientific approach toward economic and managerial decision making

(Kuncoro, 2007). This method is stated as quantitative method since the data on this research consists of numbers and uses statistical analysis (Sugiyono, 2008). In this research, the researcher uses descriptive research. According to Sukardi (2007) the objective of descriptive research is to describe fact systematically and object or subject characteristics appropriately.

Multiple linear regression analysis with ordinary least square method is obtained to analyze data and model in this research. The analysis of multiple linear regression is a linear relationship between two independent variables or more ($X_1, X_2, \ldots . X_n$) with the dependent variable denoted as (Y). The objective of this analysis is to determine the direction of a relationship between independent variable and dependent variable. The direction means whether each independent variables have positive or negative correlation toward dependent variable and to estimate the value of dependent variable if the decreasing or increasing occur (P, 2011). As the objective of this analysis method, multiple linear regression is used to determine what factors that influence government foreign debt in the period of the first quarter of 2005 until the fourth quarter of 2017.

According to Ghozali (2013) regression analysis in addition to measuring the strength of the relationship between two or more variables, it also shows the direction of the relationship between the dependent variable with the independent variable. The dependent variable is assumed to be random/stochastic, which means it has a probabilistic distribution. Independent variables are assumed to have a fixed value (in repeated samplers). The

technique of estimating the dependent variable underlying the regression analysis is called Ordinary Least Squares. The OLS method was first introduced by Carl Friedrich Gauss, a mathematician from Germany. The essence of the OLS method is to estimate a regression line by minimizing the sum of the squares of errors of each observation against the line.

1. Ordinary least squares assumption.

   According to Gujarati (2003), the main assumptions underlying classical linear regression models using OLS models are (Ghozali, 2013):

   a. Linear Regression Model, meaning linear in the parameter. Described in Basuki (2015), the linear regression model in the analysis of this study is multiple linear regression: Regression analysis with two or more independent variables, with the general formulation as follows:

      $Y = a + b_1X_1 + b_2X_2 + \cdots + b_nX_n + e$

      Information:

      Y = Dependent variable
      a = Constant
      b_1 = Regression coefficient of X_1
      b_2 = Regression coefficient of X_2, etc
      e = Residual / Error

      Below is research model which is used in this research:

      $Yt = f$(ER, GOVEXP, GROWTH, GOVREV):

      Debt =$b0 + b1$ERt + $b2$Govexpt + $b3$Growtht + $b4$Govrevt + ut

      Information:

      Debt = government foreign debt
      ERt = Indonesia rupiah against dollar exchange rate period t

Govexpt = government expenditure period t
Growtht = economic growth denoted by GDP period t
Govrevt = government revenue period t

b. The X value is assumed to be non-stochastic, meaning that the X value is assumed to be fixed in repeated samples.
c. The average value of error is zero, or E (ui / Xi) = 0
d. Homoscedasticity, meaning the variance of error is the same for every period (Homo = same, Skedastisitas = distribution) and expressed in mathematical form Var (ui / Xi) = σ^2.
e. There is no autocorrelation between errors (between ui and uj no correlation) or mathematically Cov (ui, uj / Xi, Xj) = 0.
f. Between ui and Xi are mutually free, so Cov (ui / Xi) = 0.
g. The number of observations, n, should be greater than the estimated number of parameters (the number of independent variables).
h. The existence of variability in the value of X, meaning the value of X should be different.
i. The regression model has been correctly specified. In other words, there is no bias (error) specification in the model used in empirical analysis.
j. There is no perfect multicollinearity between independent variables.

2. Assess the goodness of fit of a model.

The accuracy of the sample regression function in estimating the actual value can be measured from the Goodness of fit. Statistically, at least this

can be measured from the coefficient of determination, the value of statistic F and the statistical value t. such statistical calculations are statistically significant if their statistical test scores are in a critical area (where H0 is rejected). Conversely, it is not significant if the value of the statistical test is located

a. The coefficient of determination (R^2).

The coefficient of determination (R^2) essentially measures how far the model's ability to explain the variation of the dependent variable. The coefficient of determination is between zero and one. The small value of R^2 means that the ability of independent variables to explain the dependent variable variation is very limited. A value close to one means the independent variables provide almost all the information needed to predict the variation of the dependent variable.

The basic weakness of the use of the coefficient of determination is the bias against the number of independent variables, then R^2 must increase regardless of whether the variable significantly affects the dependent variable. Therefore many researchers advocate using adjusted values of R^2 to evaluate which regression model is best. Unlike R^2, adjusted values of R^2 can rise or fall when one independent variable is added to the model (Ghozali, 2013). According to Ghozali (2013), adjusted R^2 is used in multiple linear regression whereas R^2 is used in simple regression analysis.

b. Simultaneous significance test (Test statistic F).

Explained in Ghozali (2013) that the F statistic test basically shows whether all independent or independent variables included in the model have a mutual influence on the dependent/bound variable. To test this hypothesis used the following hypothesis (Basuki, 2015):

H0: all independent variables have no significant effect on the dependent variable.

H1: all independent variables simultaneously have a significant effect on the dependent variable.

Testing criteria are:

1) If the value of significance> 0.05 then the decision is accepting H0 or independent variables simultaneously no significant effect on the dependent variable.
2) If the value of significance <0.05 then the decision is rejecting H0 or dependent variable simultaneously have a significant effect on the dependent variable.

According to Ghozali (2013), to test this hypothesis used statistic F with the following decision-making criteria:

1) Quick look: if value F> 4 then H0 can be rejected at 5% confidence degree. In other words, we accept the alternative hypothesis, which states that all independent variables independently and significantly influence the dependent variable.

2) Compare the calculated F value with the value of F according to the table. If the value of F arithmetic> F table value, then H0 rejected and accept H1.

c. Test the significance of individual parameters (Test statistic t)

The statistical test t essentially indicates how far the influence of an individual explanatory/independent variable in explaining the variation of the dependent variable. The null hypothesis (H0) to be tested is whether a parameter (b1) is equal to zero, or:

H0: bi = 0

This means whether an independent variable is not a significant explanation of the dependent variable. The alternative hypothesis (H1) parameter of a variable is not equal to zero, or:

H1: ≠ 0

This means that the variable is a significant explanation of the dependent variable.

How to test t is as follows:

a. Quick look: if the number of degrees of freedom (df) is 20 or more, and the degree of confidence is 5%, then H0 denoting bi = 0 can be rejected if value t> 2 in absolute value). In other words, we all accept the alternative hypothesis, which states that an independent variable individually affects the dependent variable.

b. Compare the statistical value t with the tipping point according to the table. If the statistical value of t calculated> value t table, we accept

an alternative hypothesis which states that an independent variable individually affects the dependent variable.

c. Classical Assumption Test.

Classical assumption test is used to see the short-term stability of the results of research processing. Tests for violations of these classical assumptions include multicollinearity, heteroscedasticity, autocorrelation and normality tests.

1) Multicollinearity Test.

Ajija at al (2011) said that in Multicollinearity is a linear relationship between independent variables in the regression model. To examine the presence or absence of multicollinearity in the model, the researchers used partial methods among independent variables. The rule of thumb of this method is if the correlation coefficient is high enough above 0.85 then there is supposedly multicollinearity in the model. Conversely, if the correlation coefficient is relatively low then it is assumed that the model does not contain multicollinearity (Basuki, 2015). Some rules to test the presence or absence of multicollinearity in an empirical model is as follows:

a) The R^2 value generated in the estimation of the empirical model is very high, but the significant level of independent variables based on the t-statistic test is very small.

b) *Tolerance and Variance Inflation* (VIF). VIF tries to see how the variant of an estimate increases if there is multicollinearity in an empirical model. Let R^2 of the regression estimation be partially close to one, then vif will have an infinite value. Thus the value of collinearity increases then the variant of the estimate will increase within the limit of infinity.

2) Heteroskedasticity.

One of the important assumptions of the classical linear regression model is to have the same variant (homoscedasticity). The homoscedasticity formula is as follows:

$$E(ui^2) = \sigma^2, i = 1,2, \dots N$$

Information:
Ui = element of disturbance
σ^2 = value of variance

In Basuki (2015),it is explained that if the above regression is problematic because the interference factor does not have the same variant or the variant is not constant. This will bring up a variety of problems: the biased OLS estimator, the variant of the OLS coefficients will be wrong. The consequences of heteroscedasticity are the prediction (the value of Y for a given x) with the estimator of the actual data will have a high variance so that the prediction becomes inefficient. The test can be performed to detect whether the data analyzed has heteroscedasticity or not by White-

Heteroskedasticity test. If the probability value of Obs * R-squared is less than t-count which means that there are symptoms of heteroscedasticity in the model and vice versa.

3) Autocorrelation Test.

Autocorrelation is defined as the correlation between members of a series of observations sorted by space and time (Gujarati, 2003). Autocorrelation indicates a correlation between members of a series of observations. If the model has a correlation, the estimated parameter becomes biased and the variation is no longer the minimum and the model becomes inefficient (Basuki, 2015).

Basuki (2015) explains that to know whether there is autocorrelation in the model used Lagrange Multiplier test (LM). LM testing procedure is if the value of Obs * R-Squared is smaller than the value of the table then the model can be said to contain no autocorrelation. It can also be seen from the probability of chisquares, if the probability value is greater than the value of α selected then there is no autocorrelation problem. While the way to overcome the autocorrelation is to add Auto Regressive (AR) variable.

4) Normality Test.

The normality test is performed to check whether the error term approaches the normal distribution or not. If this assumption is not met then the test procedure using t-statistic becomes invalid. The

error term normality test is a Jarque-Bera test whose test is based on error and least squares estimator. The test procedure is:

H0 = Error term is normally distributed

H1 = Error term not normally distributed

If the probability Obs*R-squared is greater than the real level then the error term is normally distributed.