

## CHAPTER 3

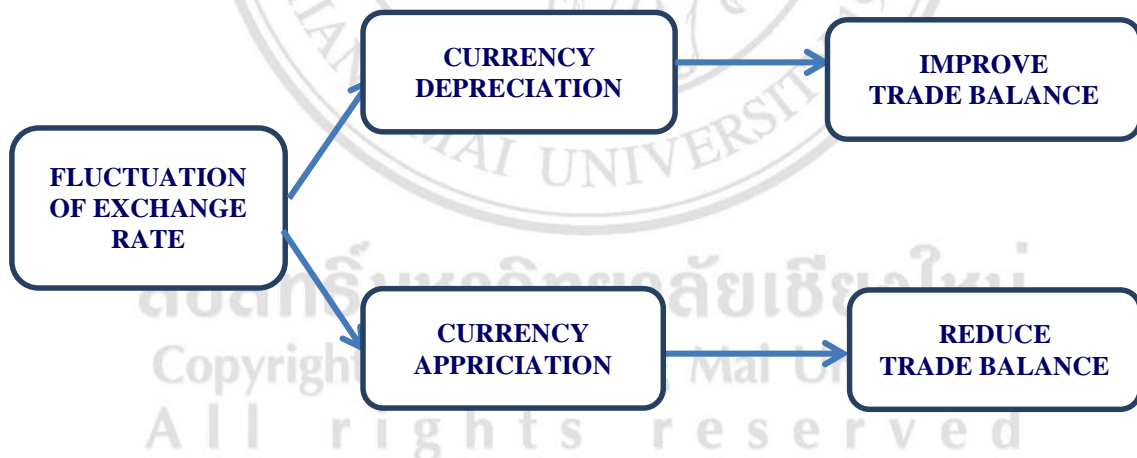
### Methodology

#### 3.1 Conceptual Framework

From analyzing models which are relevant to the relationship between exchange rate and trade balance of the country, this paper studies the relationship by using Switching Regression model. Theoretical framework for the function of trade balance and exchange rate of Myanmar can be depicted as the following:

$$TB = f(MER, GEX, GIM) \quad (3.1)$$

The conceptual framework of the study is that the trade balance in the equation is the explained variable for the study and which may be affected by the fluctuation in exchange rate. The conceptual framework of the study can be illustrated by the following figure.



**Figure 3.1** The Conceptual Framework of the study

Figure 3.1 illustrates that the conceptual framework of the study. The trade balance in the figure is the regressand variable for the study and which may be affected by the fluctuation in exchange rate. Exchange rate of the country can be fluctuated as either depreciation or appreciation. These two fluctuations may have a different effect on trade balance of the country.

If the country faces currency depreciation, which means that the domestic price of goods and services is cheaper than the price of foreign goods and services, therefore export is greater than import and the trade balance will improve. If in the case of currency depreciation, it may have the opposite effect on trade balance.

The other variable GDP can also affect trade balance by two ways. GDP can also improve and worsen trade balance. If GDP increases, the country's national income increase, therefore the country may import more. If they import more capital goods, the country can improve the productivity and can enhance the export and the trade balance. But if the country imports consumption goods more the import will be greater than export and the trade balance will decline.

### 3.2 Variables Used in the Model

The variables that applied in this study are the Trade Balance, Export value, Import value, market exchange rate, and official exchange rate of Myanmar. The following table illustrates that the delineation of the variables and measurements used in this analysis.

**Table 3.1** Summary Descriptions of the Variables

Variables	Descriptions
GTB	The Growth rate of Balance of Trade
GMER	The Growth rate of Market Exchange Rate
GEX	The Growth rate of Export Value
GIM	The Growth rate of Import Value

**Source:** world trade organization, IMF, Myanmar's Official Data Source

In this study the all variables are used into the form of growth rate as following:

GTB = Trade Balance in term of growth rate

GMER = Market exchange rate in term of growth rate

GEX = Export value in term of growth rate

GIM = Import value in term of growth rate

The growth rates of variables are can be calculated by using growth rate equation as follows:

$$Y = \frac{Y_t - Y_{t-1}}{Y_{t-1}} \times 100 \quad (3.2)$$

By using this growth rate equation , all the variables GTB, GEX, GIM, and GMER was calculate as follow:

$$GTB = \frac{TB_t - TB_{t-1}}{TB_{t-1}} \times 100 \quad (3.3)$$

$$GMER = \frac{MER_t - MER_{t-1}}{MER_{t-1}} \times 100 \quad (3.4)$$

$$GEX = \frac{EX_t - EX_{t-1}}{EX_{t-1}} \times 100 \quad (3.5)$$

$$GIM = \frac{IM_t - IM_{t-1}}{IM_{t-1}} \times 100 \quad (3.6)$$

### 3.3 Hypothesis of the Study

The cardinal purpose of this study is to analyze the important effects of exchange rate fluctuation on trade balance in Myanmar. According to this purpose, two hypotheses can be shown as follows:

Hypothesis 1: currency depreciation will improve trade balance of Myanmar over the period of 1986-2015.

Hypothesis 2: currency appreciation will reduce trade balance of Myanmar over the period of 1986-2015

### 3.4 Research Methodology

#### 3.4.1 Test Unit Root Test (ADF Test)

The study needs to test unit root test first to know if the variables are stationary or nonstationary. Before doing Switching Regression estimation, it should be tested whether variables are stationary or not, because in order to analyze the impact of currency depreciation and appreciation on trade balance, the data has to be stationary. If the test result is not stationary, the data needs to change to stationary by taking log. For testing this, ADF unit root test can be applied as the following:

**Table 3.2** Hypothesis for Unit Root Test with Augmented Dickey-Fuller

Unit Root Test	ADF Unit Root Test
Null Hypothesis: H0	Time-Series is stationary.
Alternative Hypothesis: H1	Time-Series is non stationary.
Statistic test	t-Statistic
Prob. <0.1	0.00 – 0.10

**Source:** Author

$$\Delta GTB_t = \alpha + \beta_t + \theta GTB_{t-1} + \sum_{i=1}^{\rho} \phi_i \Delta GTB_{t-i} + \varepsilon_t \quad (3.7)$$

$$\Delta GMER_t = \alpha + \beta_t + \theta GMER_{t-1} + \sum_{i=1}^{\rho} \phi_i \Delta GMER_{t-i} + \varepsilon_t \quad (3.8)$$

$$\Delta GEX_t = \alpha + \beta_t + \theta GEX_{t-1} + \sum_{i=1}^{\rho} \phi_i \Delta GEX_{t-i} + \varepsilon_t \quad (3.9)$$

$$\Delta GIM_t = \alpha + \beta_t + \theta GIM_{t-1} + \sum_{i=1}^{\rho} \phi_i \Delta GIM_{t-i} + \varepsilon_t \quad (3.10)$$

If the variable is stationary and the probability value of the test is between 0 and 0.05 and the variable's test statistics are less than the critical value, and then the null hypothesis of the study can be rejected. If the variable is nonstationary, if the probability value of the test is greater than 0.05, and the variable's test statistics are

greater than the critical value in absolute terms, then null hypothesis of the study cannot be rejected.

### 3.4.2 Estimation of Switching Regression Model

Switching regression model is a model that consists of two scenarios. Both scenarios are described as the following:

$$\text{Currency Appreciation 1: } GTB_{1i} = \beta_1 GMER_{1i} + u_{1i}, \text{ if } \gamma'z_i \geq u_i \quad (3.11)$$

$$\text{Currency Depreciation 2: } GTB_{2i} = \beta_2 GMER_{2i} + u_{1i}, \text{ if } \gamma'z_i < u_i \quad (3.12)$$

$$u_i \sim (0, \sigma_i^2), u_{1i} \sim (0, \sigma_{1i}^2), u_{2i} \sim (0, \sigma_{2i}^2)$$

where,  $GTB_{1i}$  is trade balance based on the time series data at the currency appreciation.

$GTB_{2i}$  is trade balance based on the time series data at the currency depreciation.

$GMER_{1i}$  is the market exchange rate of time series data at the the currency appreciation.

$GMER_{2i}$  is the market exchange rate of time series data at the currency depreciation..

$\beta_1, \beta_2, \gamma$  is the parameter value.

$u_i, u_{1i}$ , and  $u_{2i}$  are the value of the variable error is random.

The assumption that the  $u_i$  has a relationship with  $u_{1i}$  and  $u_{2i}$ . This model is called the Switching regression models by switching to a group is defined within the structure of the models (regression model with endogenous Switching).

To perform a function Criterion function exerted thus define the variable dummy (Dummy variable):

$$I_i = 1 \text{ if } \gamma' z_i \geq u_i,$$

$$I_i = 0 \text{ Otherwise}$$

In the case of a clear example of discrimination, we can define what  $I_i$  will have a value of 1 or 0. Yet so we can use it as a maximum the Probit maximum likelihood to find  $\gamma$  by  $I_i$  is a variable (the Dependent variable) and  $\gamma$  can be estimated.

$$GTB_{1i} = \beta'_1 GMER_{1i} - \sigma_{1u} GIM_{1i} + \varphi_{1u} GEX_{1i} + \varepsilon_{1i} \text{ for } I_i = 1 \quad (3.13)$$

$$GTB_{2i} = \beta'_2 GMER_{2i} - \sigma_{2u} GIM_{2i} + \varphi_{1u} GEX_{1i} + \varepsilon_{2i} \text{ for } I_i = 0 \quad (3.14)$$

where  $\varepsilon_{1i}$ ,  $\varepsilon_{2i}$  is the new tolerance value that is the average conditional (Conditional Means) is zero.

### 3.5 Descriptive statistics

In this part, the trade balance and exchange rate of the country are analyzed with switching regression approach. According to the government regulation Myanmar face parallel exchange rate system and the separate rate of exchange was conducted between private and public sectors. Additionally, exchange rate of Myanmar under new decreitive government, also included in the descriptive statistics to know the effects of these new government reforms on the exchange rate policy of Myanmar.

### 3.6 Data of the Study

#### 3.6.1 Data Collection

All the data which used in this study's econometric models are extracted from International Monetary Fund (IMF), World Trade Organization (WTO), Central Statistical organization of Myanmar, Central Bank of Myanmar web pages, and official data from Myanmar's Ministry of Commerce for the solidity and validity of the study. They can admit sufficient level of information and data related with trade balance and exchange rate statistics of Myanmar.

Regarding the methodology section, trade balance, market exchange rate, export and import data are needed for doing Switching Regression model estimation. In order to deepen the soundness of this analysis, the time series data on Trade Balance, Market

Exchange Rate, Export and Import are required. For this reason, annual data of Trade Balance, Market Exchange Rate, Export and Import are taken from 1986 to 2015. For running time series data, at least 30 observations are needed, therefore it started collecting from 1986 to 2015. Thus, there are 30 time series data for each variable regarding econometric analysis, three data (GTB, GEX,GIM) used in value in growth rate forms, and one data (GMER) used in kyat per in Switching Regression model estimations.

### 3.6.2 Data Description

The descriptive statistics of the data used in this study are depicted in the following table.

**Table 3.3** Descriptive Statistics of the variables

Variables	Observations	Mean	Standard Deviation	Minimum Value	Maximum Value
GTB	29	0.200388	2.383778	-5.128312	9.290939
GMER	29	0.141473	0.261223	-0.178569	1.137021
GEX	29	0.128484	0.250543	-0.590200	0.603261
GIM	29	0.142439	0.383118	-0.673459	1.392437

**Source:** Calculated result by author

In table 3.2 the descriptive statistics of each variable are depicted. In the study, there were 29 observations after adjustment with growth rate. The mean value is the average value of all observation in the data set, in this study the mean value of GTB is 0.20, GMER is 0.144, GEX is 0.12 and GIM is 0.14 respectively. The standard deviation is a measurement of diversification in the distribution of the data, when tested the data the value of standard deviation of GTB is 2.28, GMER is 0.26, GEX is 0.25 and GIM is 0.38 separately. In the data set of the study, the value which is smallest is called minimum value, in the study the minimum value of GTB is -5.12, GMER is -0.17, GEX is -0.59 and GIM is -0.67. The maximum value in data set is the value which

is largest in the observation and these two numbers, maximum and minimum value, used to calculate of the range of the data.



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