CHAPTER 4

Empirical Analysis

The impact of exchange rate fluctuation on trade balance will be investigated into two separate ways in this chapter: exploratory data analysis and descriptive analysis. In the first section, the running of the data and analyzing of the data is presented by using Simple Switching Regression model to find out the result of the impact of currency appreciation and depreciation on trade balance. Moreover, the facts of how exchange rate affected the trade balance, how currency appreciation influences the trade balance and how currency depreciation forces the trade balances of Myanmar will be examined based with the empirical results. In the second part of the section, the impact of exchange rate policy change by government on trade balance of the country will be illustrated by using descriptive statistics.

4.1 Exploratory data analysis

The exploratory data analysis is operated in two steps. In first step of the study, the Augmented Dickey-Fuller (ADF) unit root test is used to verify the stationary condition of the data set. In order to use Switching Regression estimation, all the time-series data have to be stationary. After analyzing all the data that used in the study is stationary, Switching Regression estimation is operated as the second step of the analysis.

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4.1.1 Augmented Dickey-Fuller Unit Root Tests

In order to use Switching Regression estimation and to become aware of the impact between the four variables, GTB, GMER, GEX and GIM, it is needed to verify whether all the data used in the study are stationary or not. Accordingly, the stationary qualities of the time series variables are checked by using Augmented Dickey-Fuller unit root test. In this analyzing, the null hypothesis for that time-series is not stationary. If the test statistics is less than five percent, the null hypothesis can be accepted, which means that the time-series stationary, and if the test statistics is greater than five percent,

the null hypothesis cannot be accepted. In the following Table 4.1 the ADF unit root tests are illustrated.

Table 4.1 Augmented Dickey-Fuller unit root tests results

Variable	ADF Test statistics	Critical value at 5%	Critical value at 10%	Deterministic Regressors	Lag	Results
GTB	-4.913946	-2.971853	-2.625121	intercept	6	Stationary
GMER	-4.077696	-2.971853	-2.625121	intercept	6	Stationary
GEX	-5.506281	-2.971853	-2.625121	intercept	6	Stationary
GIM	-6.783139	-2.971853	-2.625121	intercept	6	Stationary

Source: Calculation, at level

According to the tested data result, as shown in Table 4.1, all variables, GTB, GMER, GEX, GIM are stationary at level in testing with intercept. The Null hypothesis can be rejected for all three time-series; this means that all the variables are stationary at level when testing with either intercept or trend. The time-series data of all the variables are significance at five percent critical level.

4.1.2 Switching Regression Estimation (Simple)

After verifying that all the variables are stationary, Switching analysis can be continued to analyze. In this model, a switching regression equation sorts individuals over two different states, one for depreciation and another for appreciation When the independent variables in the regressions are identical and there is only one dependent variable, only one equation required to be specified. Additionally, both equations must be specified when the set of exogenous variables in the first regression is not the same as the set of exogenous variables in the second regression.

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Table 4.2 Switching Regression Model estimation results

		Coef.	Std.err	z-test	P-Value
Regime 1	GMER	-26.40294	6.023651	-4.383213	0.0000
	GEX	26.53337	3.515041	7.548524	0.0000
	GIM	2.040663	1.756246	1.161946	0.2453
	Constant	-4.512489	1.247411	-3.617483	0.0003
Regime 2	GMER	-0.782448	0.729458	-1.072644	0.2834
	GEX	-2.186205	0.916216	-2.386123	0.0170
	GIM	4.133699	0.824671	5.012546	0.0000
	Constant	0.232435	0.227835	1.020191	0.3076
Common	LOG(SIGMA)	-0.271772	0.164038	-1.656765	0.0976
Probabilities Parameters	P1-DUM	-1.905686	0.770833	-2.472242	0.0134

Source: Calculation

In table 4.2, Region 1 described the result of currency appreciation impact on trade balance. According from those empirical results it can be seen that when market exchange increases 1 %, the trade balance of the country will reduce with 26.40%. Moreover, to be explained clearly, among 29 observations, the country faced currency appreciation such as year of 2012. In one year, currency may fluctuate month to month or day to day, but in the sum of the year currency appreciated. For that year, when the growth rate of the market exchange increased (case of currency appreciation), 1 % the trade balance reduced by the amount of 26.40 %. In region 1, the market exchange rate is significant. This means that the hypothesis cannot be rejected and the currency appreciation can reduce the trade balance of the country. When the export increases by

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1 %, the trade balance of the country increases by 26.53 % and when the import is increases by 1 % the trade balance will increase by 2.04 %.

In the case of Region 2, there is described the result of currency depreciation impact on trade balances. According from those tested result, it can be seen that when market exchange increases by 1 % the trade balance of the country, Myanmar, will reduce with 0.78 % instead of improve the balance of trade. Additionally, to be explained more clearly, the country faced currency depreciation, such as the year of 2013. In one year, currency may depreciate or appreciate over the time, but in the sum of the year the currency depreciate. For that year, when the growth rate of the market exchange increased by 1 % the growth rate of trade balance reduced by the rate of 0.78 % instead of improve trade balance. In region 2, the market exchange rate in not significant. This means that the hypothesis of the study can be rejected and the currency depreciation may not improve the trade balance of the country. When the export increases by 1 % the trade balance is reduced by 2.19%.

4.2 Descriptive analysis

This descriptive study analyzes the trade balance and exchange rate of Myanmar during the period of 1986 to 2015. The study period can be separated into two circumstances; (i) exchange rate before 2011, under military government and (ii) exchange rate after 2012, under new democratic government. In this part of analysis, the above two circumstances of Myanmar descriptive statistic of exchange rate and trade balance is discussed with some government reforms which adopted in each period.

4.2.1 Foreign Exchange Market before 2011

In 1988, after abolishment of the socialist economic system, the market oriented economic system was adopted in the country. In Myanmar, the multiple exchange rate system took place over the last several years because the fixed exchange rate system of government policy was not activated in the private sectors. Foreign exchange transaction was controlled by the government. Under that control the exchange rate regime of the country was separated into two regimes: official rate and market rate. Among these two kinds of exchange rate, the official exchange rate determined by the government was activated only on the public sectors like state

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economic enterprises. The state economic enterprises were obligated to hand over all of that at the official rate. On the other hand, the imports of state economic enterprises were managed by the foreign exchange budget of the central government. Therefore permission from the Ministry of Finance and Revenue was required for expenditure on foreign trade.

In the private sector, no importers used the official exchange rate in conducting the economic activities which is seriously overvaluing against the U.S dollar. This is the main reason why the black foreign exchange market arose in Myanmar. According to the government regulation, in private sectors the Myanmar citizens were prohibited from holding foreign currency. Instead of it they can withdraw only the foreign exchange certificates in the form of foreign currency deposits.

According this circumstance, the market of foreign exchange was separated between the private and public sectors. There was no foreign exchange flowed from public sector to private sector, whereas the public sector could deviate private sector foreign currency deposit to its budget. This incentive gave the government control on the private sector. The segmented foreign exchange market structure expressed that the parallel market exchange rate was influenced by the supply and demand of the private sector.

In 1997, the export first and import later was adopted and the private sector was significantly controlled by the government. Therefore, all the export and import by the private sector had needed licenses. The government issued the import licenses, and license applicants have adequate export tax subtracted export earnings to cover the import bill. In 2002, the rigorous practice of the export first policy, if there was without foreign currency deposits the import impossible.

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In the parallel market, there were two typical types of foreign exchange. The first one is the export earnings in the form of foreign currency deposits with verification of export tax payment. The other is informally held foreign exchange, in the case of illegal export revenues and informal payments.

The trade statistics and the market and official exchange rate of Myanmar are shown in the following table.

Table 4.3 Official and Market Exchange Rate with Percentage of Change before 2012

Year	OER	MER	Percent of change	TB
1995	5.62	120.40		-483.383
1996	5.91	159.10	32.14	-611.749
1997	6.39	340.00	113.70	-1171.02
1998	6.39	343.20	0.94	-1600.58
1999	6.39	348.00	1.40	-1175.53
2000	6.39	376.42	8.17	-750.72
2001	6.39	616.07	63.67	-491.25
2002	6.39	921.14	49.52	690.88
2003	6.39	966.57	4.93	388.67
2004	6.39	988.57	2.28	181.55
Year	OER	MER	Percent of change	TB
2005	6.39	1060.27	7.25	1868.32
2006	6.39	1270.38	19.80	2000.91
2007	5.74	1272.17	0.17	3006.08
2008	5.48	1045.00	-17.87	2625.96
2009	5.45	1063.60	1.78	2313.92
2010	5.54	973.40	-8.48	3901.42
2011	5.39	980.00	0.68	219.07

Source: Central Statistical Organization and International Monetary Fund

In the above table 4.5, the official exchange rate and market exchange rate before 2012 was show in terms of domestic currency per dollar. The percentage of change of market exchange rate was also depicted. The official exchange rate fixed by the government did not fluctuate much and that rate was differenced from over 200 times when compared with the market exchange rate in 2007. It means Myanmar official exchange rate was over valued than actually conducted market exchange rate.

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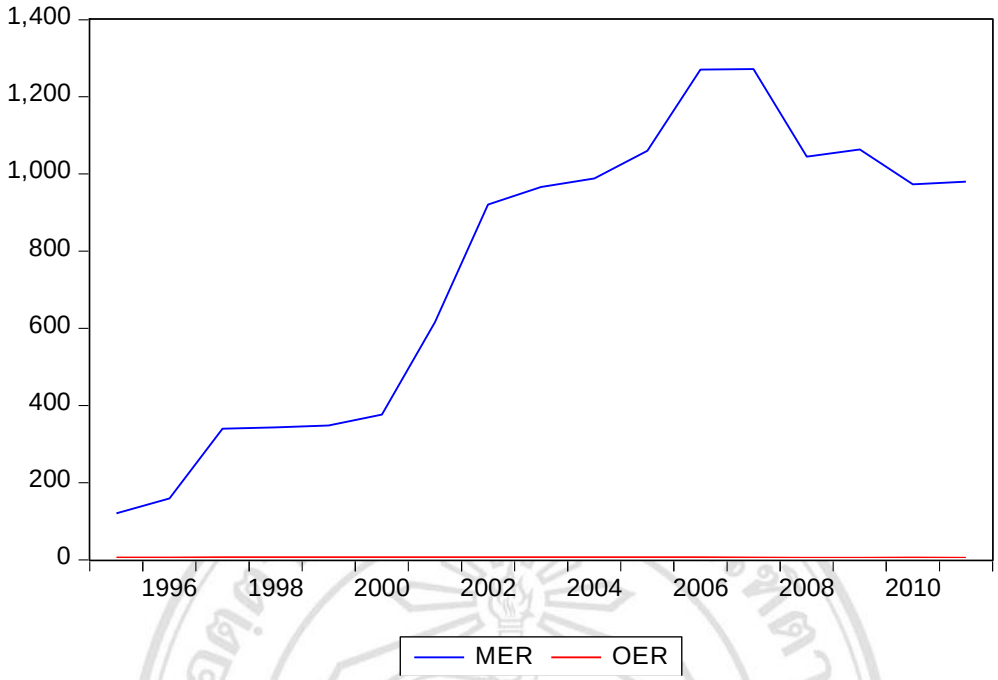

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Figure 4.1 Market and official Exchange Rate of Myanmar before 2012

In figure 4.2, it can be seen the significant difference of the official exchange rate and market exchange rate. The market exchange rate fluctuates over time as a result of market force outcome and the official exchange rate is nearly striate line which means it does not fluctuate and is stable at the rate between 5 to 8 kyats per dollar. As a result of being under government, that rate was only operated at public sectors like state owned economic enterprises. Therefore, in the Myanmar exchange rate market, the black exchange market problem appeared in last decades and it hurt economy's economic conditions worse.

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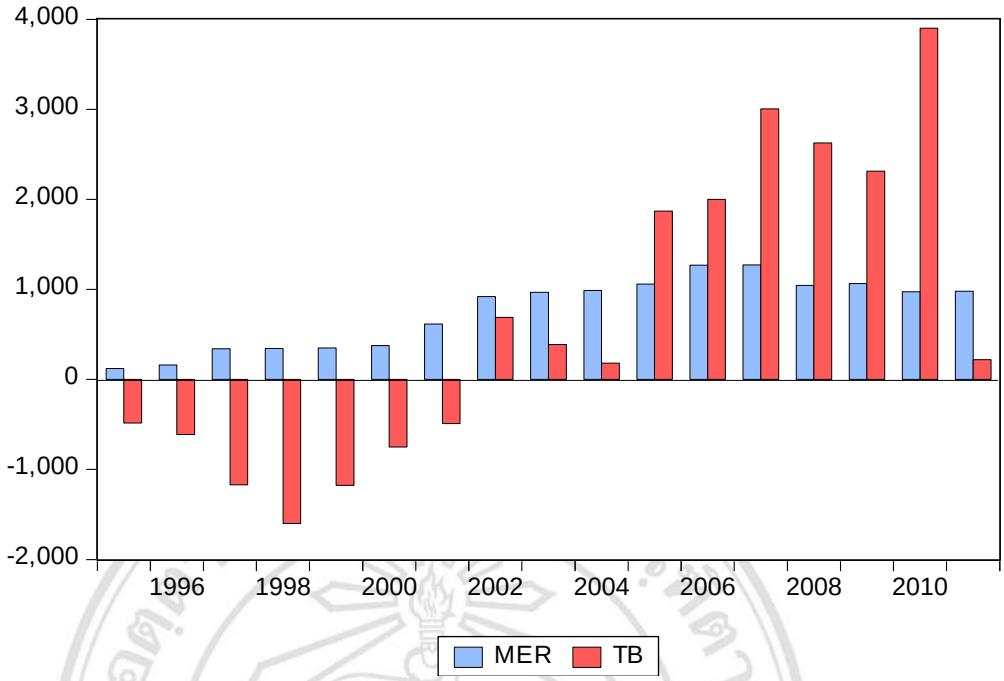

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Figure 4.2 Market Exchange Rate Trade Balance of Myanmar before 2012

In figure 4.3, the market exchange rate and trade balance of Myanmar before 2012 was illustrated. The MER is stand for market exchange rate and TB is for trade balance of the country. The market exchange rate of the country depreciated most of the year. The trade balance of the country faced deficit in the early years until 2002 and it was worse around 1997 and 1998 which may have been caused the impact of Asian crisis. After 2002 until 2012 the trade balance faced surplus which may cause by the export of natural gas in the country. According these facts, it can be considered the trade balance can be impacted by not only exchange rate system but also the other factors.

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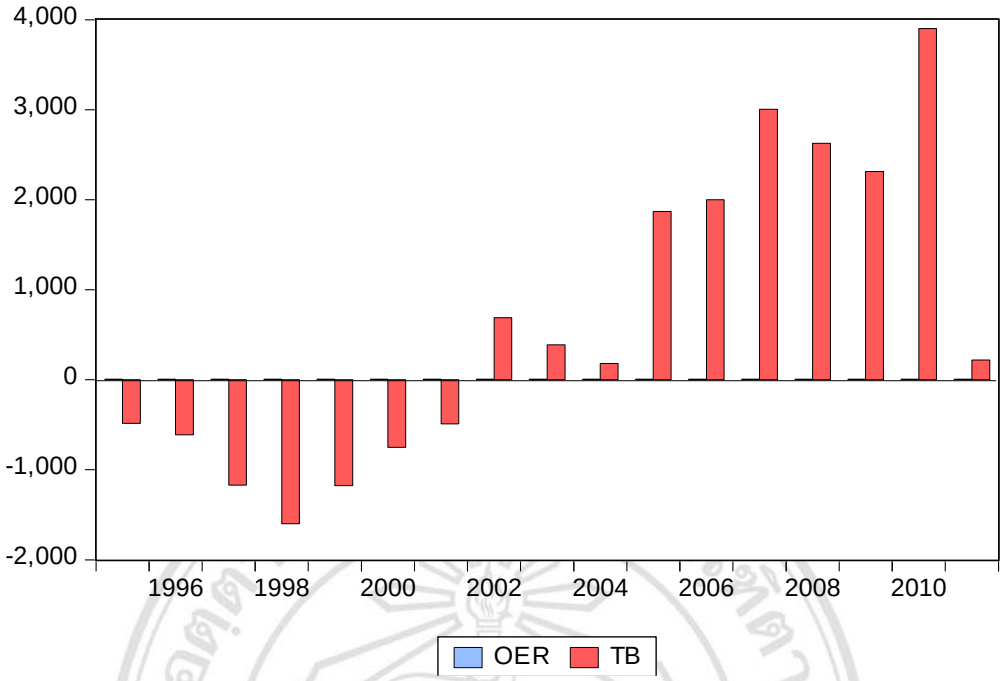

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Figure 4.3 Official Exchange Rate Trade Balance of Myanmar before 2012

The official exchange rate and trade balance of Myanmar before 2012 was compared in the figure. In the figure the official exchange rate is a very low amount to influence the trade balance of the country. The official exchange rate was fixed around 6 to 8 kyats per dollar in the first part of analysis year of 1986 to 2011. Although exchange rate was fixed, the country's trades balance deficit and surplus by the time as a result of other economic outcomes.

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4.2.2 The Reforms on Exchange Rate after 2011 (Under New Government)

The series of reforms on exchange rate policy was operated under the new government starting in late 2011. In this reform, the Central Bank allowed some private commercial banks to operate legalized foreign exchange counters. At that counters retail customers of foreign exchange could purchase and sell foreign exchange with these licensed banks. However, there were unexpressed dominance by the Central Bank of Myanmar in purchasing and selling rate, and there were some notice on the foreign exchange counters. Moreover, another important case is the Central Bank placed limits

on the amount of foreign exchange which a customer could sell and purchase at the counters. Above the amount of limits, a customer has to exhibit a document verifying the source of selling foreign exchange or the purposed use of buying foreign exchange. The transactions at the foreign exchange counters include kyats and cash of US dollars. The amounts of transactions are inescapably limited by the availability of cash of the counters.

4.2.2.1Unification of Foreign Exchange Rates

Before this reform program was conducted, the local currency kyat was pegged to the special drawing right at the rate of 8.51 kyat per special drawing right. This had been overvalued unrealistically. Under that foreign exchange regime of Myanmar, the domestic foreign exchange market had occurred at the different exchange rates regime. This malpractice of exchange rate has stimulated price distortions, inefficient allocation of resources, and risks to macroeconomic stability and economic development.

In April 2012, the government affected certain reform steps to unify the multiple exchange rates into a single rate in the country by replacing the official fixed exchange rate with a managed float through foreign exchange auction market under supervision of the Central Bank of Myanmar. Under the foreign exchange regime, the reference rate deliberated in the auction mechanism. The Central Bank of Myanmar released licenses to perform international balking to a number of private banks. Consequently, the variation between the reference rate and the informal market rate decreased significantly.

On the one hand, the CBM was declaring the reference exchange rate to the public, and on the other hand was the auction of foreign exchange with private commercial banks. The selling and purchasing rates at the legal foreign exchange counters have to be within a mandated band from the reference rate.

Another important development in 2012 is that the Central Bank planned to open up private banks the license to receive foreign currency deposits and to perform foreign exchange operations such as remittances and settlements of foreign trade. In the early decades, the foreign exchange operations were controlled by state banks. This policy change is expected to ease the trade of the private sector.

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The new government has enforced a stepwise reduction of the limitations on imports since 2010. Moreover, the export first policy was abrogated in April 2012. Import licenses are now procurable with non-export earning US dollar lifted at the foreign exchange counters of with the informally held foreign exchange

To clarify what has changed and what has not changed after the series of policy reforms, in the case of changed, firstly, the official exchange rate in the public sector have been devalued to the central bank reference rate. Regarding in the case of unchanged, the mass of foreign exchange transactions in the private sector are still negotiated transactions between buyers and sellers, and they are yet to be replaced with bank intermediation. Export earnings mostly persist as the assets of exporters. They are not sold to the banks; therefore, the central bank cannot absorb foreign exchange from that source. The central bank auction and the open market of the private sector are still fragmented.

Moreover, a new Foreign Exchange Management Law was passed by the parliament in August 2012. By this law, all restrictions on current payments and transfers for foreign transactions were clearly lifted. The CBM also declared a redemption plan for the foreign exchange certificates which were generated as a temporary vehicle for the accessible use of foreign currency under previous strict control mechanism.

According to these reform steps, the pressure on appreciation of exchange rate is now constrained and the market exchange rate has been stable around the reference rate. The central bank will perform additional steps to facilitate the smooth functioning of the formal foreign exchange markets and entitling private banks to extend foreign exchange operations and services at per state banks. Although the central bank is endeavoring for establishing an interbank foreign exchange market, the market is too little for the market intervention to be impressively performed.

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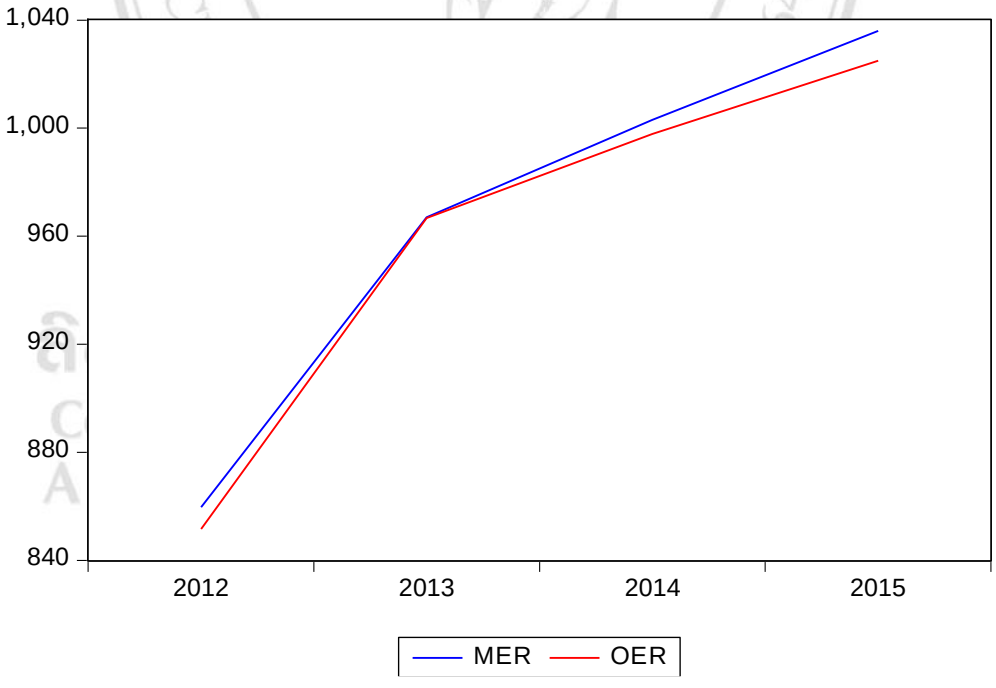
Table4.4 Official and Market Exchange Rate with Percentage of Change after 2012

Year	OER	MER	Percent of change	TB
2012	851.58	859.66	-	-304.49
2013	966.75	967.00	12.49	-809.70
2014	997.83	1003.08	3.810	-2555.50
2015	1,025.00	1251.02	24.72	-4109.50

Source: Central Statistical Organization and International Monetary Fund

In table 4.4, the official exchange rate and market exchange rate of Myanmar was illustrated in the terms domestic currency per dollar after 2012. From that figure of the data we can find out these two official and market exchange rates are not so different as a result of new government reforms of exchange rate policy by using unification of exchange rate system, which means that both private and public sector operate with the rate between the ranges of which the central bank conducted



Source: drawing by author

Figure 4.4 Market and official Exchange Rate of Myanmar after 2012

In figure 4.4, it can be seen the smooth trend of the two exchange rates are near the same after 2012 according to the reform by the government. It is significantly different from the condition of market and official exchange rate of before government reforms. These two exchanges rates, official and market rate, can be seen as depreciated during most of the year. In the previous years, the official rate was overvalued over 200 times when compared with the market exchange rate. But under the new government, the gap between two exchanges was narrowed and there is not so much difference between these two types of exchange rate.

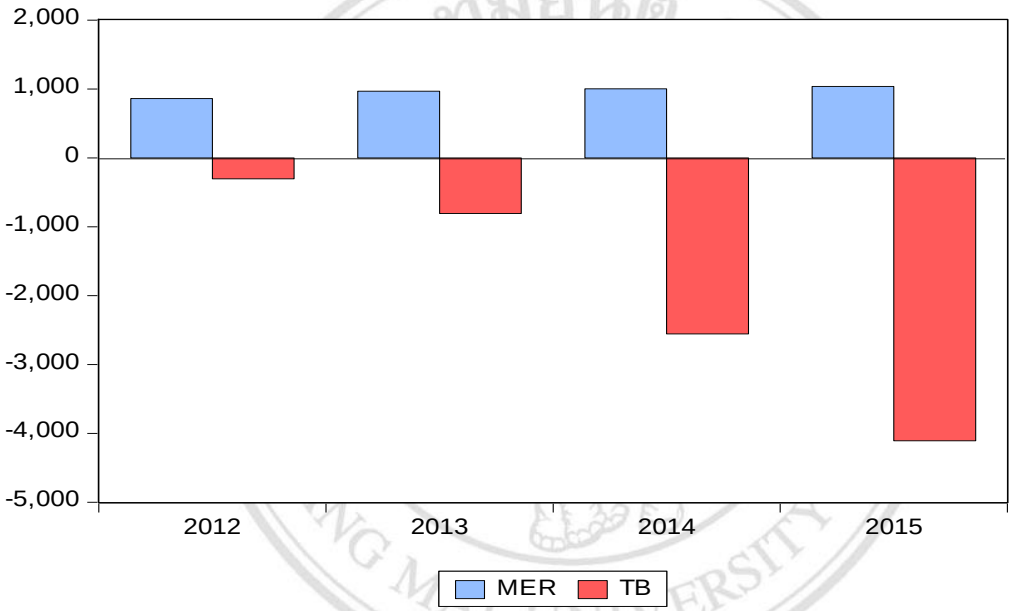


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Figure 4.5 Market Exchange Rate Trade Balance of Myanmar after 2012

Figure 4.5 shows the market exchange rate and trade balance of Myanmar after 2012 especially under new government. The market exchange rate depreciated slightly year by year. According the theory, if the currency depreciates, the trade balance will be improved, but in the case of Myanmar although the currency is depreciated over time the trade balance reduced year by year.

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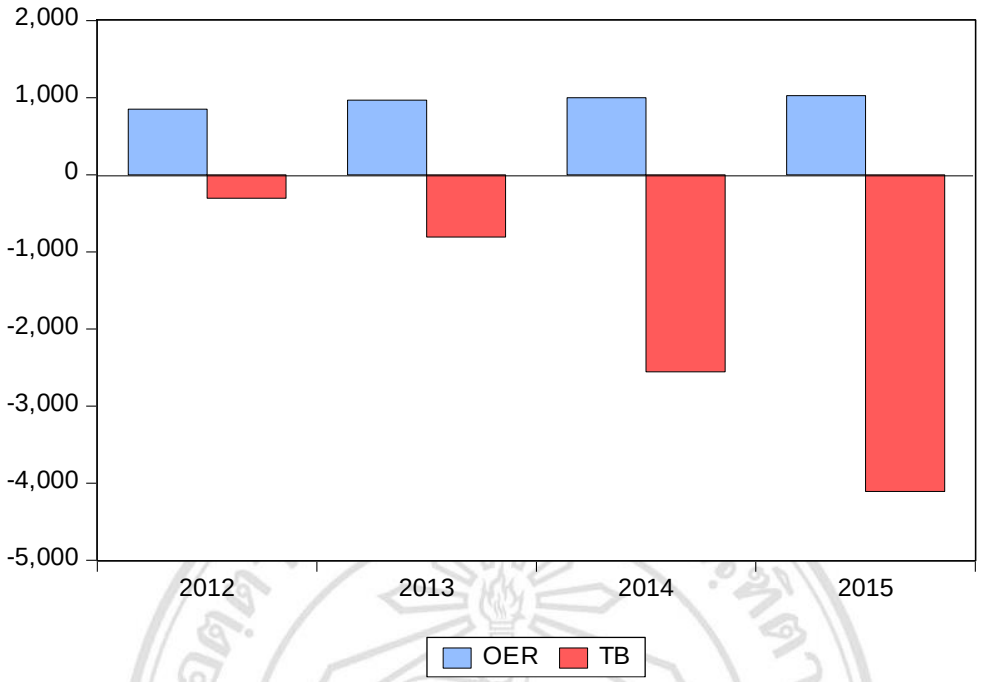

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Figure 4.6 Official Exchange Rate Trade Balance of Myanmar after 2012

Figure 4.6 the official exchange rate and trade balance of Myanmar after 2012 is illustrated. Under new government reform, especially of the unification of the exchange rate policy by changing exchange rate system from fixed to manage folate exchange rate, the two exchange rates were nearly the same.

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