THE IMPACT OF THE EXCHANGE RATE UNIFICATION ON TRADE BALANCE IN MYANMAR

By

WIN, Zar Kyi

THESIS

Submitted to

KDI School of Public Policy and Management

In Partial Fulfillment of the Requirements

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Committee in charge:

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ABSTRACT

This study analyzes the impacts of the exchange rate unification on the trade balance in Myanmar based on Autoregressive Distributed Lag (ARDL) Model. This paper's main objective is to determine whether the exchange rate has positive or negative effects on the trade balance. This study has discovered that the exchange rate unification has a positive effect on the trade balance in the long run. Additionally, this study finds that Exchange Rate and Foreign Direct Investment have positive effects on the trade balance while GDP growth rate and Inflation has negative impact in the long run. As a policy implication, this study suggests that the government should focus on economic stability and effective monetary policies within the country. Moreover, Myanmar's new exchange rate system should align with the market speculators without priority of either exporters or importers.

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LIST OF ACRONYMS

ADF	:	Augmented Dickey-Fuller
ARD	:	Autoregressive Distributed Lag
FESR	:	Framework for Economic and Social Reforms
GDP	:	Gross Domestic Product
IMF	:	International Monetary Fund
LDCs	:	less developed countries

SDR : Special Drawing Rights

CHAPTER I

1.1 Introduction

Exchange rate reform is one of the key factors for the economic development (David 2011). The exchange rate arrangement is important for economic growth, trade, investment flows, and inflation and influences the flow of goods and services in a country. The choosing of the exchange rate system in developing countries is essential to strengthen economic fundaments and financial systems in these countries. Moreover, an appropriate exchange rate regime achieves sustainable economic growth through facilitating trade and foreign direct investment.

Many countries around the world should choose the best exchange regime related to their economic and development policies. For the developing countries, the exchange rate systems must be under the typical rationale that is to remove inefficiencies and corruption due to the International Monetary Fund (IMF) recommendations. The IMF also recommends that Myanmar change its complex exchange rate system with black markets.

1.2 Background of Exchange Rate System in Myanmar

In Myanmar, the official exchange rate was pegged to the special drawing rights (SDR) of IMF since 1977. Under this system, 1 SDR was around 8.50 kyat because the official exchange rate was applied only for public sector and the parallel market developed in the private sector. Therefore, the foreign exchange market segmented between the public sector and private sectors. The parallel market exchange rate (black market) depreciated from around 30 kyats per USD to 1300 kyats per USD in 1978- 2006.

Since 2008, Myanmar has been committed to democratic reform. Under the reform, the government approved a multiple exchange rate system consisting of an official rate (fixed rate) and an unofficial rate (floating rate). The official exchange rate was used in the public sector, while the private sector used the unofficial exchange rate. While the official rate was 5.57 kyats per dollar, the unofficial average rate was 1300 kyats per dollar in 2007(Dapice, 2012). The Myanmar kyat was overvalued against the dollar by using this official rate. As such, it is unrelated with the Asian development experience following 1945.The rapid growth of the economies of Singapore, the Republic of Korea, Taiwan, China and Vietnam were accompanied by measures to ensure undervalued exchange rates. Moreover, the political leaders from Tokyo to Singapore have recognized that the overvalued currencies were not a component of national economic strength since 1945 (Dapice, Vallely, Wilkinson & Malcolm, 2011).

The multiple exchange rate system had many impacts on the Myanmar economic growth. One was that the military and a few cronies could only use this official rate and thus restricted for ordinary people. This rate was used to pay transactions related to foreign trade and the most important business which are dominated by military. Civilians could only use the unofficial rate, which is unstable and weaker. The unofficial rate is determined by the currency market performance, which reflects the supply and demand of the Kyat against other currencies. Normally, the multiple exchange rate regimes are used to enhance economic growth.

However, in the case of Myanmar, this system gave a big opportunity for few crony businessmen and also military elites to monopolize currency market. These cronies imported foreign products by using an official rate and then exported by using unofficial rate. Moreover, the cronies got more benefits from the margins between official rate and unofficial rate. These circumstances have given rise to currency black market and other chaotic economic situations

such as inflation, slow economic growth, difficulties to export and unemployment and reduced confidence and trust on government policies. Myanmar's multiple exchange rates is the source of the country's macroeconomic malaise.

The second is the multiple exchange rate system that takes the dual foreign exchange market which is effectively segmented for public and private sector external transactions. Myanmar's Kyat is overvalued towards the dollar. While the official rate is 6 Kyat per dollar, the unofficial rate is 850 per dollar. In the public sector, the official rate is used for accounting purposes and the external transactions. The public exporters, which are obligated to surrender 100 % of their export proceeds to the government, therefore select their export volume given the level of the official exchange rate. On the other side, the import demand of the public sector is much larger than foreign exchange available because of the official rate is overvalued. The export earnings of the public sector were used only for public sector imports and the reserve. There has been no foreign exchange surrender necessity on private sector exporters since 1990s. Some public sector agents procured imported goods through private imports by using the market determined exchange rate.

In the private sector, the exporters were allowed to retain all export earnings; they couldn't acquire foreign currencies from other except their export receipts. Because of this, there is no legal way for private imports to get foreign currencies. As a result, Myanmar has lost national income from international trading since the multiple exchange rate practiced. The currency exchange rate system plays a key role in determining most of the GDP in which trade becomes the vital point. According to an IMF report in 2012 on key policy issues and recommendations, IMF has suggested that Myanmar needs to change the complex exchange rate system with black markets and the elimination of the official exchange rate in the public sector.

To implement the modernizing of Myanmar economy, there need to be removal of impediments on growth by encouraging financial sector development, enhancing the business and investment, and further liberalizing trade and foreign direct investment (FDI). In Myanmar, the multiple currency system practices (MPC) and exchange restrictions are distortionary, discourage FDI and foreign trade, increase transactions costs, and are also exacerbating the exchange rate appreciation pressures. [1]

Consequently, there has been a long-felt need to reform the exchange rate regime. The was an overvalued exchange rate system need to change the unification of exchange rates and the abolition of the official exchange rate in Myanmar. Finally, the government revised multiple exchange rate regime to change to a single exchange rate system which is the floating rate.

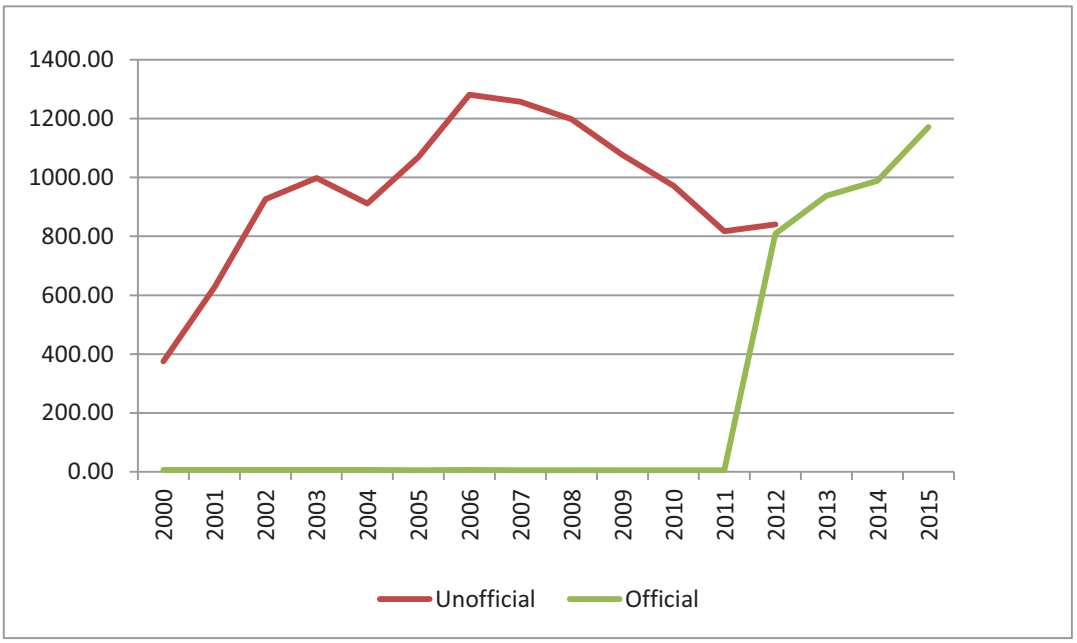
Myanmar's priorities are established in the market infrastructure for the planned change to a managed float, and monetary and foreign exchange policy capacity to complement plans to unify the exchange rates after changing the new government. Unifying the currency exchange rate system becomes its first step towards economic reform process in Myanmar. Moreover, the Central Bank of Myanmar has begun to independently lay down policies since 2010 and needs to enact monetary policy independently to control the stable price in domestic market and to preserve the internal and external value of the Myanmar currency the kyat.

In April 2012**,** Myanmar's new government implemented the foreign exchange policy reforms and moved to a managed floating regime from the de facto multiple exchange rate system. After that, the country began unifying the official rate and unofficial rate to produce a unique and also practical exchange rate for the domestic currency. Because the previous system made the official exchange rates more than 100 times higher than the unofficial exchange rates

[1] IMF Country Report No.12/104, Myanmar 2011 article IV consultation.

of around 800 kyats per dollar. The gap is high between the official exchange rate and the unofficial exchange rate during the time 2000-2015 (see Figure 1).

Figure 1: Official Exchange Rate and Unofficial Exchange Rate in Myanmar (2000-2015)



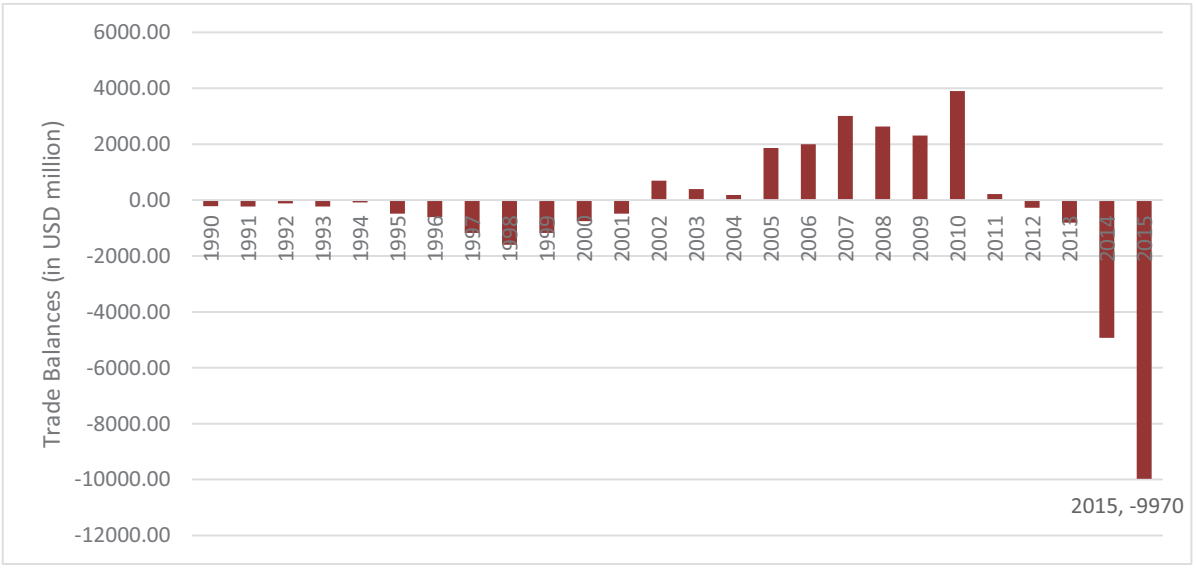
Source: Central Statistical Organization

On the other hand, the exchange rate market relative to the rapid growth in exports and imports. Myanmar's average exports were USD 9244.3 million and imports were USD 7373.2 million for the period of 2001-2011. After changing the new exchange rate system, the total foreign trade of Myanmar amounted to 72166.3 million US$, with export was 32704.7 million US$, while import was valued at 39461.6 million US$ from 2012 to 2015. The trade balance was a deficit of 6756.9 million US$ in 2012-2015. Figure 2 summarizes the trend in exports and imports 2012-2015.

Figure 2: Export and Import in 2012-2015

Source: Central Statistical Organization

Figure 4: Trade Balances of Myanmar (in USD million)

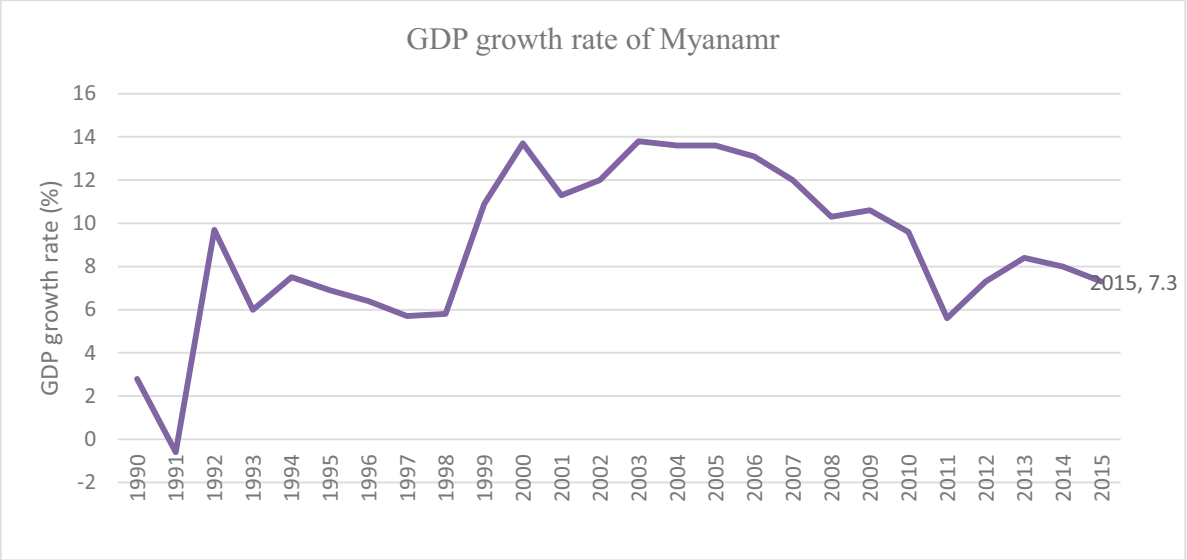


Source: Central Statistical Organization

During 2002-2011, it was the only period that Myanmar had trade surplus due to the Oil and Gas sector development. Especially in 2010, the FDI flows to Oil and Gas sector mainly from China contributed a lot to the Oil and Gas sector development and thus exports of oil and natural gas became accelerated and there was a biggest surplus in 2010 through the time from

1990 to 2015. As for the other periods, there were trade deficits. During 2011-2015, the trade deficits became larger due to the transition period and the country was in reconstruction phase, therefore need a lot of imports from the other countries for the development process of the country.

However, the country's economic growth rate had positive trend and there was a sharp decline in 2011 due to the political transition period and regained the growth rate of 7.3% in 2015 due to Myanmar's positive political developments and economic reforms which boost revitalizing economic growth and investment in Myanmar.



Source: Central Statistical Organization

Myanmar's export policy is mainly imposed for all exportable surpluses to export and to penetrate international markets and promote diversified traditional and value added products by utilizing natural and human resources. Export promotion is the main concern for export policy of Myanmar by allowing private sector to participate in external trade activities with proper guidance, rule and regulation. All commodities are permitted to export except some restricted commodities (e.g. rice and rice products, other products under the sole production of State-

owned Enterprises for the concern of food security). All exports from private sector are subject to licensing.

Myanmar's import policy is primarily set to import for priority commodities such as capital goods for the state, primary raw materials for manufacturing and production, and certain type of goods to support public health and export promotion. Import substitution is the main concern for import policy of Myanmar in order to produce value added products for natural resource based industries. All imports of private sector are subject to licensing. However, the private sector requires to import specified ratio of priority items.

1.3 Problem Statement

After implementing the new exchange rate system, Myanmar has begun to experience a faster flow of foreign trade and investment. In 2013, Dimas Fauzi studied that Myanmar's new exchange rate policy is the most beneficial and less-risky to be implemented by the Myanmar's government. Even though there is a little risk that might occur after implementation of this policy, but until now, Myanmar does not experience any negative effect from this policy.[2] Otherwise, Myanmar even experiences many benefits after this policy is implemented.

The new exchange rate policy is expected to facilitate trade in the private sector (KUBO, 2013).The import licenses become obtainable with any foreign exchange of any source deposited at authorized dealer banks. Moreover, these banks give movement to imports for more convenient foreign trade settlement services and alleviate the appreciation of the kyats.[3]

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[2] Dimas Fauzi (2013), Myanmar's New Exchange rate Policy: Rational Calculations on Economic Reform

[3] IDE Discussion Paper No.388, Source of Fluctuation in Parallel Exchange Rates and Policy Reform in Myanmar

However, following the enactment of a new exchange rate policy in April,2012, trade restrictive measures were removed and private investment and trade flourished. The new exchange rate has not only overcome the negative economic shocks previously experienced, but also encouraged citizen participation in key commercial activities. Both exports and imports were increasing since 2012. The export was 32704.7 million US$ and import was valued at 39461.6 million US$ from 2012 to 2015.

Previous studies on the new exchange rate system in Myanmar have tried to investigate the rational calculations on economic reforms, and fluctuations in parallel exchange rates. There are no well-known positive or negative effects on trade balance after changing to this new exchange rate system. Proper research must be conducted in order to analyze the impact of the exchange rate regime on the trade balance. Thus, this paper will explore the impacts of the foreign exchange rate unification on trade balance in Myanmar for the purposes of creating appropriate policy recommendations on this topic.

1.4 Research Objectives and Research Questions

The main objective of the study is to explore the impacts of the foreign exchange rate unification and macroeconomic factors on trade balance in Myanmar and hence, to make appropriate policy recommendations for that. In this paper, the author aims to answer the research questions surrounding the significant impacts of the exchange rate unification system on trade balance in Myanmar.

Based on research objectives, research questions are: What is the significant effect of the exchange rate unification on the trade balance in Myanmar? What is the significant effect of the GDP growth rate on trade balance in Myanmar? What is the significant effect of foreign direct

investment inflows on trade balance in Myanmar? What is the significant effect of inflation rate on trade balance in Myanmar?

1.5 Hypothesis (or Claim)

1) The exchange rate unification system will have positive effects on trade balance.

2) GDP growth rate will have positive effects on trade balance.

3) Foreign Direct Investment inflows will have positive effects on trade balance.

4) Inflation rate will have negative effect on trade balance.

1.6 Organization of the Paper

This study is structured into 5 chapters, chapter one is about the introduction and background of the study. Chapter two will reviews a brief on both theoretical and empirical literature. Chapter three will explain the empirical analysis of the exchange rate and trade balance. Chapter four will describe results and discussion. Chapter five will concludes summary, conclusions and policy recommendation.

CHAPTER II

Literature Review

The exchange rate is one of the key factors for economic development as it the main sector involved in trade and investment flows and influences the flow of goods and services, the capital flow in a country (David, 2011). Before the reform process, Myanmar implemented multiple exchange rates which allowed the Kyat to have two rates: the fixed and floating exchange rates. Under the currency exchange rate system, Myanmar faces a rise in the currency black market and detrimental economic situations such as unemployment rate, inflation and economic slowdown. Therefore, this multiple exchange rate regime in Myanmar is needed to change the national economic performance.

In 2012, a new currency exchange program was announced in Myanmar. The Central Bank of Myanmar has implemented the managed floating exchange system. Since then, Myanmar has begun to experience a faster flow of foreign trade and investment after implementing the new exchange rate system. This paper contributes to the theories explaining how the exchange rate effects trade balance. Moreover, many scholars' studies concerned with the impact of the exchange rates on trade balance will be reviewed.

2.1 Theoretical reviews

The exchange rate plays a key role in trade performance of the country (Nicita,2013).The fact that the exchange rate as a monetary variable should affect long-run growth is seen as somewhat confusing, especially the negative effect (Miles, 2006). Standard trade theory relates trade in goods with the real exchange rate (Zhang, 2008). According to the standard trade theory,

the exchange rate can affect exports and imports and also the exchange rate fluctuation can effect on both trade volume and value according to theory. [4]

The typical trade theory was extended by accounting for demand price elasticity of imports and exports as instrumental elements in measuring the effect of real exchange rate variations on trade balance (Lerner,1994). He points out that if the an increase in exports and a decrease in imports according to depreciation in the real exchange rate do not necessarily mean a modification of the trade balance deficit.

The J-curve reflects how the depreciation of a country's exchange rate affects on its balance of trade and when the demand patterns change to the new exchange rate system, the trade balance will start to improve (Mackintosh, Brown, Costello, Dawson, Tompson & Trigg,1996). According to J-curve, a currency depreciation worsens the trade balance of a country in the short run, but it improves in the long run. The rationale behind the J-curve is that import prices respond quickly to exchange rate changes, while the volumes of import and export adjust slowly to the movements in relative prices. The trade balance will increase when import and export volumes change to the higher (lower) import (export) prices in the long run.

2.2 Empirical Reviews

There are a range scholarly studies that cover the exchange rate unification effect on trade balance.

A study by Zhaoyong Zhan (1999) on the Foreign Exchange Rate Reform and the Balance of Trade and Economic Growth on China found that exchange rate unification has a positive effect on the trade balance and there was a 1% level significance for estimation

[4] Andersson & Styf (2010) How Does a Depreciation in the Exchange Rate Affect Trade Over Time?pp.9

excluding foreign income variable. According to this study, the exchange rate is more stabilized and the current account has been strengthened but China's monetary policy has become more sensitive to external conditions.

Safdari and Mehdi (2011) found that exchange rate unification policy is one of the key components of a country's economy and it is important to facilitate an improved performance in various sectors including international trade and employment. The authors argued that exchange rate unification is based on supply and demand and that if supply or demand changes then the exchange rate will consequently change as well. According to the interaction of the market, imported goods are more expensive than domestic goods and thus it decreases the import amount and domestic production which is necessary to improve the balance of trade, increase foreign exchange resources and create employment. Bidish and Razzaque (2012) concluded that in the long run, a 10% depreciation of the real exchange rate is associated with a 3.2% rise in aggregate output.

Kazerooni and Fesha (2009), the authors indicated that unified exchange rate has a positive effect on the domestic price and it leads to an increased export and decrease import because of domestic currency depreciation. The finding shows that depreciation of the Iranian currency, which was due to unification of exchange rate, is likely to boost exports, while on the other hand it could encourage domestic production which automatically stabilizes domestic prices.

In another dimension, Khalighi and Mohsen (2014) undertook a study on the effects of exchange rate and foreign policies on Iranian date exports. Their findings showed that the exchange rate unification policies prove to have negative effect on the dates export. Hence from

their study, they recommend exchange rate stabilization which is believed to motivate larger number of exporters as well as producers for export.

According to a study by Bhattarai and Armah (2005), the trade balance of Ghana improved in the short run after changing policy rules in the foreign exchange market. The exchange rate could significantly effect on the trade in the short run. However, only the real exchange rate could effects on the trade balance in the long run. They recommended that the trade balance of Ghana would not improve in the short run if the government did not adopt policy rules in the foreign exchange market.

Omojimite and Akpokodi (2010) studied the impact of performance in Nigeria during the period 1986-2007.They found that the exchange rate reform effects a small positive on non-oil exports due to the depreciation of the value of the country's currency and the structure of imports is pro-consumer good remained unchanged even though exchange rate reforms adopted. These exchange rate reforms were found not to constrain imports. The main policy is the exchange rate reforms are not adequate to diversify the economy and change the imports structure. They suggested that there should be an appropriate policy mix that ensures a real exchange rate but also a conducive atmosphere for production.

According to empirical studies on the impact of exchange rate fluctuation on trade in Vietnam by Tuyet (2012), the study used a model developed previously by Tihomir Stucka (2004). The variables considered included the real exchange rate, domestic GDP and foreign GDP. The result from the study between 2000 and 2010 indicated a positive relation between the real exchange rate and trade balance. As a result, depreciation of a currency tends to increase trade balance. Moreover, the exchange rate has a positive impact on trade balance in the long run.

On the other hand, foreign GDP and trade balance also have a positive relationship, meaning with the rise in foreign income, demands for export will also increase.

Further studies show that exchange rate depreciation leads to an increase in inflow FDI (2009, Tokunbo S. and Lloyd A.). The authors recommend that if the exchange rate is stable, it will boost domestic production, increase real inflow FDI and maintain internal and external balance. Another popular case showing the role of trade and exchange rate policy is the Korean case is by Chong-Hyun Nam (1995) who wrote about the relation between trade, exchange rate, and growth. Before 1960, Korea had multiple exchange rates, however in early 1960, the exchange rate was unified and in 1964 again the exchange rate was unified at floating rates. The impact of this unification was that Korea experienced a quick increase in trade followed by rapid economic growth.

In finishing this chapter based on different studies, whether theoretical or empirical, they have argued differently. Some studies showed that exchange rate unification does have positive effects on economic performances such as international trade, GDP growth and foreign direct investment (FDI) from both theoretical and empirical view. Additionally, the literatures continue to indicate that countries are practicing different exchange rate systems depending on their economic situations. Therefore, this study came to build on previous studies to examine the effect of the unifying exchange rate in Myanmar.

In Myanmar, the restrictions of the previous multiple exchange rate system distort foreign trade and discourage FDI and increase transactions costs. The exchange rate unification regime is a new concept, the exchange rate floating mode was introduced in 2012, hence, very few studies have been undertaken to look at the effect of exchange rate unification on economic performance in Myanmar. This study will explore empirical evidence on the exchange rate effect on the trade balance.

CHAPTER III

Empirical Analysis of the Exchange Rate Unification

3.1 On the Empirical Analysis of the Exchange Rate Unification

To find that the effects of exchange rate unification system we have to see if there is a structural break after the unification. However, since we have very a few data after the changing the unification system, it is partially impossible. The unification exchange rate regime took placed in 2012 and after that we have only three years data. Therefore, it is difficult to show these changes due to lack of data within this period. Instead, we look at the effect of exchange rate on trade balance. Under the multiple exchange rate system, the official rate was very highly overvalued. Hence, the multiple exchange rate system had the effect of devaluation and improving international competitiveness. By analyzing the effect of the exchange rate on trade balance, we can indirectly assess the impact of the exchange rate unification on the trade balance.

3.2 Theoretical Framework

The exchange rate plays an important role in a country's trade performance. The policy makers need to pay attention to the exchange rates system of their countries. The effect of the exchange rate on the trade balance can be explained by several alternative theories. According to Poter's theory, the exchange rate is one of the most important determinants of competitiveness. When the market forces create the higher exchange rate, the government needs to resist the temptation to push the rate back down. Mordi (2006) argued that the exchange rate movements have an effect on the competitiveness of exports and price incentives. Based on economic theory, the fact that the exchange rate is a monetary variable should affect long run growth is seen as somewhat confusing, especially the negative effects (Miles, 2006). As found in most recent

literature, two channels have been recommended through which the exchange rate (common currencies) could positively affect growth: (1) A common currency lowers currency risks and interest rates, thus spurring investment and growth; and (2) A common currency could impact growth through lowering the transaction costs associated with international trade(Dornbusch, 2001; Miles, 2006). However, Slaughter (2001) and Miles (2006) state that trade increases sometimes but not always.[5]

The J-Curve Theory reflects how the depreciation of a country's exchange rate effects on its balance of trade and when the demand patterns change to the new exchange rate system, the trade balance will start to improve (Mackintosh et al. 1996). According to J-Curve Theory, currency depreciation worsens the trade balance of a country in the short run, but it improves it in the long run. The rationale behind the J-curve is that import prices respond quickly to exchange rate changes, while the volumes of import and export adjust slowly to the movements in relative prices. The trade balance will increase when import and export volumes change to the higher (lower) import (export) prices in the long run.

Overall, it can be concluded that the exchange rate is one of the determinants of economic development, especially for developing the country. The aforementioned theoretical literature suggests important implications of exchange rate and trade balance on the economic performance of a country. However, the short and long run effect of the exchange rate on the trade balance is an empirical question and needs to be investigated by conducting empirical investigations. Within this framework, the specification of the theoretical model on the impact of exchange rate unification on trade balance of Myanmar can be identified according to the Autoregressive Distributed Lag (ARDL) Model.

[5] Kogid and Asid (2012) : The effect of exchange rate on economic growth

3.3 Empirical strategy

This study will use a Autoregressive Distributed Lag (ARDL) Model which is based on cointegration techniques introduced by Pesaran and Shin (1999), and Pesaran et.al (2001). The comparative advantage ARDL has over other empirical models is that it explores long-term relationships in levels between the variable of interest. Similarly, it has advantage over the previous methods introduced by Engel and Granger (1987), Phillips and Oularis (1990), Johansen (1995), Park (1990), Shin (1994), and Stock and Watson (1988) which were based on ways where variables are integrated of order one i.e. I (1). However, this new technique can be used for testing the cointegration between variables regardless of their order of integration i.e. either I(0), I(1) or both, but not I(2) because in this case, the ARDL model produces varying results (Ouattara, 2004). Furthermore, this technique can be applied in cases where the numbers of observations are limited e.g. between 30-80 observations. It is given by:

$$TB = \beta_0 + \beta_1 MER_{t-1} + \beta_2 GDPGR_{t-1} + \beta_3 FDI_{t-1} + INF_{t-1} + \ldots\ldots\ldots + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

3.3.1 Stationarity Test

A stationary time series is probability distributions that are stable over time.[6] If a model contains non-stationary variables in the data, it may produce varying regression results. These results may explain the existence of the statistically significant relationship between variables with a high R-squared among others. According to these incorrect results, it may be wrong to make conclusions and economic policy. Therefore, trended data has differenced a minimum of time to generate a stationary series.[7] A series is intergraded of order one, I (1), if it is stationary after differencing it once. To test stationary, the Augmented Dickey-Fuller (ADF) test takes into

[6] M. Wooldridge J.M (2013) Introductory Economics 5th ed
[7] Guijarati Basic Econometrics,2009

account any autocorrelation that may still exist in the inclusion of lagged observation of the endogenous variable in the regression.

3.3.2 Cointegration

In economic theory, cointegration defined a long-term relationship of variables that are linked to form an equilibrium relationship when the individual series are nonstationary in levels but become stationary after differencing. Two series are said to be cointegrated if they have comparable long- run properties. Individual series may be unstable and diverge from each other over a shorter period, but converge towards equilibrium over the long run.[8] Cointegration, therefore, highlights the existence of a long- run equilibrium to which the system converges overtime. [9]

We use the two stage cointegration test investigate the possibility of cointegration. This was proposed by Engle and Granger in 1987. If there exists a cointegrated relationship between a set of economic variables, a statistical basis for the use of the Error Correction Model (ECM), therefore reveals itself. The ECM clearly differentiates between long run and short run parameters. The error correction model is given as below:

$$\Delta TB = \beta_0 + \Sigma \beta_1 \Delta MER_{t-1} + \Sigma \beta_2 \Delta GDPGR_{t-1} + \Sigma \beta 3 \Delta FDI_{t-1} + \Sigma \beta 4 \Delta INF_{t-1} + \ldots\ldots\ldots + \varepsilon_t \quad \ldots.(2)$$

3.4 Data and Variable Description

3.4.1 Data

This study employed the secondary data from the Central Statistical Organization (CSO) in Myanmar, International Monetary Fund (IMF) and International Financial Statistics database

[8] Green R.Econometrics,2003
[9] Gujarati Basic Econometrics, 2009

covering the period from 1990 to 2015. The study includes 25 observations, and the exchange rate data are obtained from the Central Bank of the Union of Myanmar. The foreign trade investment data are taken from Central Statistical Organization (CSO) and the trade balance data, and GDP growth rate data are obtained from International Monetary Financial Statistics database.

3.4.2 Variable Description

Table 1: below summarizes the variable description and Expected Signs of their coefficient

Variables	Description	Expected sign
TB	Trade balance	
MER	Official Exchange Rate	Either Positive or Negative
GDPGR	GDP Growth Rate	Either Positive or Negative
FDI	Foreign Direct Investment	Positive
INF	Inflation rate	Negative

The expected sings are based on economic theory and they provide the relationship between dependent variable and independent variables. The exchange rate fluctuations are a powerful impact on export and import and trade balance (Valentino Piana, 2001). It plays a vital role in a country's level of trade that is critical to most every free market economy in the world. When the exchange rate appreciation or exchange rate is greater than domestic currency, it is likely export will increase. If the exchange rate depreciates or exchange rate is less than domestic currency, it is likely the import will increase. The exchange rate was expected to have a positive or negative correlation on the trade. Therefore, the sign of the $\beta 1$ is expected to be positive or negative.

GDP is direct relationship trade balance because GDP equal to consumption plus government expenditure plus export minus import. If the export is greater than import, the GDP

will increase. If import is greater than export, the GDP will decrease. GDP growth rate also increases or decreases depend on GDP increase or decrease. Thus, the GDP growth rate was expected to have positive or negative correlation.

Foreign Direct Investment (FDI) is a powerful instrument of economic development, especially for developing the country. It is also important for the export subsector. Moreover, the inward FDI can stimulate exports from domestic sectors through an industrial linkage as well as FDI can enhance export-oriented productivity that increases export performance. Expanding FDI in the recipient country can have a positive effect for export promotion. On the other hand, the effect of FDI on imports is limited due to FDI's initial investment and operation phases increasing imports for the recipient country. If FDI uses local raw materials and inputs for production, it cannot have significant adverse effect on imports. Moreover, the FDI will have a positive effect on the trade if the export volume is greater than import volume. Thus, FDI was expected to have positive effects.

The inflation has negatively effect on the economic growth.[10] High inflation has tendency to lower growth and lower export (David Flokerts-Landau, 1997). When inflation rate is high, it will effect negatively on the trade balance .Thus, the sign of inflation is expected to be negative on the trade balance.

CHAPTER IV

Results and Discussion

[10] 2013, Interdisciplinary Journal of Contemporary Research in Business, Vol 5, No.3

4.1 Unit Root Tests Results

In this paper, the author applied trade balance (in USD mil) as dependent variable and GDP growth rate (%), market exchange rate (%), inflation rate (%) and foreign direct investment inflows (in USD mil) as independent variables. First of all, the author used unit root tests to test the variables' stationary levels. Then, Autoregressive distributed lag (ARDL) Bound Test to test for the long run relationships of the variables whether the equation is co-integrating or not and after bound test, ECM, error correction model is applied to check the relationships of the variables in the short run. The author applied long-run diagnostic tests, Q-statistic test & LM test to check serial correlation after the above mentioned tests were tested. Then, the author tested the heteroscedasticity test, and the normality test. Finally, the author checked the stability of the model by using CUSUM.

4.1.1 Augmented Dickey-Fuller Unit Root Test

The author first applied ADF unit root test to check the stationary levels of all dependent and independent variables. To confirm the stationary levels of the data, the author checked the p-value of the test results of the data, test statistics and critical values of the data. If the 10% critical value is larger than test statistics, the null hypothesis is failed to reject. This means that the time series of the data is not stationary (has unit root). If the 10% critical value is smaller than test statistics, the null hypothesis is rejected. This means that the time series of the data is stationary (has no unit root).

Table 0.1 Summary of ADF Unit Root Test Results

Variables	Level	Test	P-value	Result

TB	Level	Intercept	-2.822009* (0.0730)	Stationary
MER	Level	Intercept	-3.334591* (0.0893)	Stationary
GDPGR	Level	Intercept	-2.517346 (0.1235)	Non-Stationary
	1st Difference		-7.092089*** (0.000)	Stationary
FDI	Level	Intercept	-3.627529** (0.0125)	Stationary
INF	Level	Intercept	-1.860778 (0.3436)	Non-Stationary
	1st Difference		-4.533912*** (0.0020)	Stationary

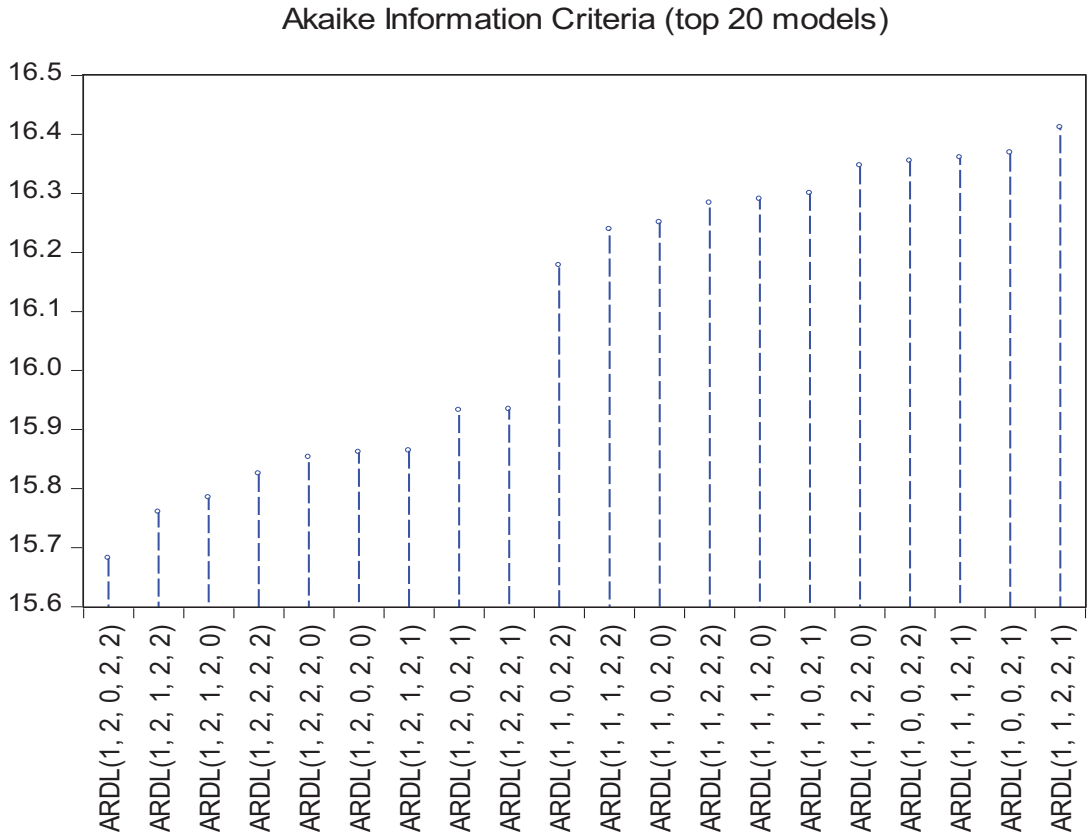
Source: Own Illustration

Note: ***,**, * represents 1%, 5% and 10% significant levels

ADF tests results showed that the variables are stationary at mixed levels which are I(0) and I(1). TB, MER and FDI are stationary at I (0). As for GDPGR and INF, they are non-stationary at level I(0). Therefore, the author checked them at I(1) and found that they are stationary at I (1). So, we can conclude that time series data of both dependent and independent variables are stationary at mixed levels. In view of these facts, the author applied ARDL approach to co-integration method in this study which is the most suitable method for this type of data set.

4.2 ARDL Bound Testing Approach to Co-integration

After testing the variables' stationary levels, the author used ARDL bound test to test for long-run co-integration. According to the unit root test results, the results suggested that the variables are stationary at mixed levels. First of all, the author checked optimal lag length of the model before applying ARDL bound test. In order to choose the lag length, the author chose AIC method (Akaike Information Criterion) and found that the optimal lag length was at (1,2,0,2,2) as shown in the below figure.



Source: Author's Calculations

The ARDL method is primarily based on the ordinary least square method and it suggested that $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$, parameters are short run multipliers, $\delta_1, \delta_2, \delta_3, \delta_4, \delta_5$ are meant for long run, α_0 is constant term and μ_0 is error term. The null hypothesis H_0 of the ARDL regression analysis is that all long run multipliers' values are equal to zero, $\delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = 0$ which indicates that there is no long-run relationship between dependent and independent variables. The alternative H_a is that long run multipliers' values are different and not equal to zero, $\delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq \delta_5 \neq 0$ which means that there is long-run relationship between dependent and independent variables.

Bound test results of F statistics values are the key to make decision of whether it is larger or smaller than the critical values of upper bond. If the null hypothesis of bound test is

failed to accept, there is long run co-integration, which means that F statistic is larger than the critical values of the upper bound. If F statistic is smaller than the critical values of the upper bound, there is no long-run co-integration and thus accepts the null hypothesis.

Table 0.2 ARDL Bound Test Results

Model	F-Statistics	Upper Bound	Lower Bound	Result
F(TB, MER, GDPGR, FDI, INF)	6.316837	2.2*	3.09*	Rejects null hypothesis (Therefore, Co-integration exits)
		2.56**	3.49**	
		3.29***	4.37***	

Source: Author's Illustration

Note: ***, **, * means that the 1%, 5% and 10% significant level.

F statistics is 6.316837 which is higher than the critical values of both lower bound and upper bound. The null hypothesis H_0 is failed to accept at 1% significance level, and thus, co-integration exists for this equation. Therefore, there is long run co-integrated relationship between dependent variable (TB) and independent variables (MER, GDPGR, FDI, INF).

4.2.1 ARDL Long-run Coefficients Estimations

After bound test's results confirmed that there is long run co-integration relationship between trade balance and its determinants factors, market exchange rate, GDP growth rate, foreign direct investment inflows and the inflation rate with the optimal lag structure of the variables (1,2,0,2,2). The following table showed the results for ARDL long run coefficients.

Table 0.3 Long Run Coefficients Estimation with lag (1,2,0,2,2) by ARDL

Dependent Variable	TB			
Independent Variables	Coefficient	Standard Error	t-statistics	Probability
MER	5.194382	1.209401	4.295003	0.0010***
GDPGR	-929.5443689	270.490632	-3.436510	0.0049***
FDI	0.590282	0.220181	-2.680890	0.0200**

INF	-195.916547	65.468796	-2.992518	0.0112**

Note: R^2 = 0.796315

Adjusted R^2 =0.639634

F-statistic =5.082398

Pro (F-stat) =0.003947

Durbin-Watson=1.694366

*, **, *** indicates 10%, 5%, 1% significance levels

Source: Author's Illustration

The results of long run estimation indicates that all independents variables have significant long run relationship with trade balance in Myanmar. Market exchange rate has a positive significant relationship with trade balance at 1% significance level. The result suggested that exchange rate depreciation has positive impact on trade balance in Myanmar. GDPGR has negative significant relationship with trade balance in the long run while FDI has positive significant relationship with trade balance and both are significant at 1% and 5% respectively. INF represents a country's economic instability. INF has negative significant relationship at 5% significance level which means that when the country's economic conditions are stable, it is likely to have increase in trade balance.

Based on the long run results, the estimation results confirmed that Myanmar trade sector is mainly relied on the exchange rate fluctuations, country's economic growth, foreign direct investments and inflation rate in the long run. Since the country's trade balance is showing negative which means less exports and more imports in the country, the government should enhance and promote export sector by improving trade related policies, liberalize the sector and encourage local production firms to produce export quality products. Moreover, the government should also maintain the stability of the economy by applying effective fiscal policies and

monetary policies. Money exchange market still need stability measures in order to protect the trade agents, investors and businesses to have a better safe business environment. Trade deficit gap should be close and local production needs to accelerate to substitute the imports from other countries.

4.2.2 ARDL Short Run Coefficients Estimations by using Error Correction Model

ECM term has to be negative and significant to confirm the long run and short run relationships of the variables. ECM term in the model is the speed of adjustment term converging towards the long run equilibrium and having negative sign means that converge to the equilibrium. The results showed that ECM term is negative 1.128016 and significant at 1% significant level. Therefore, the study can conclude that there has both long run and short run relationship in the estimated model for this study.

Table 0.4 Short Run Results Estimation by using ECM

Dependent Variable	TB			
Independent Variable	Coefficient	Standard Error	t-Statistics	P-value
D(MER)	3.050731	1.296021	2.353921	0.0365**
D(MER(-1))	-8.294710	1.321383	-6.277292	0.0000***

D(GDPGR)	400.944511	60.492054	6.628053	0.0000***
D(FDI)	0.197673	0.026961	7.331867	0.0000***
D(FDI(-1))	-0.243389	0.029197	-8.336014	0.0000***
D(INF)	74.213141	11.064316	6.707432	0.0000***
D(INF(-1))	0.500615	0.044956	11.135594	0.0000***
CointEq(-1)	-1.128016	0.235644	-9.188765	0.0027**
Cointeq=TB-(5.1944*MER-929.5437*GDPGR+0.5903*FDI-195.9165*INF+11174.6892)				

Note: *, **, *** indicates that 10%,5% and 1% significant level of the short run parameters.

Source: Author's Calculation

In the above table, short run results provide that market exchange rate in the current year has positive significant relative while MER in the last year have negative short run significant relationship with the current year trade balance, TB in Myanmar at both 5% and 1% significance level accordingly. If last year MER appreciates, this year TB can be decreased while current year MER depreciation has positive impact on TB in Myanmar. The results suggested that MER fluctuations has both long run and short run impact on trade balances in Myanmar. Currency depreciation accelerates the exports and thus reduce the trade deficit gap. Higher exports values can lead to increase the GDP income of the country and achieve economic growth.

Moreover, GDPGR has significant short run positive relationship with trade balance as shown in Figure. Economic growth of Myanmar can increase the trade balance in the short run while long run result showed negative relationship. This is due to the trade deficit situations in Myanmar. If this problem persists till in the long run, it can have negative impact on the whole economy of Myanmar. Therefore, the result turned out to show that negative relationship in the long run between TB and GDPGR. Exchange rate fluctuations can sometimes be given benefits for the economy and can sometimes be given burdens. Too much fluctuations is not a good sign for a country as it showed the country's economic situations are unstable.

As for the FDI, this year FDI value has positive short run significant relationship while last year FDI value has negative significant relationship in the short run. This provided that FDI inflows to Myanmar normally oriented to fulfil the local consumption because Myanmar is such a big market with around 54 million population rather than to export. Therefore, inflows of FDI caused higher local consumption and usage for their productions which leads to decrease export values to other countries.

INF showed positive significant relationship in the short run, both in current year and last year. This result suggested that inflation rate in Myanmar is having an upward trend along the way. Therefore, no matter the trade processes are accelerated or not, inflation rate will always be up and thus this caused positive relationship between trade balance and inflation rate in the short run. But for the long run, INF shows the country's economic instability. Thus, the long run results showed negative relationship with trade balances which means having high inflation can deteriorate the trade processes. High inflation caused low exports because domestic goods are more expensive to foreigners where there has a high inflation. In this regard, mild inflation tend to be good for export and economy, high inflation negatively affects export and economy growth.

Based on the long run and short run results of the study, Myanmar's trade imbalances are partly caused by the exchange rate fluctuations. Even though the government set a new exchange rate unification system, the country is in need of capital goods required for the state development and for industries to produce value added products. This becomes the main cause of imbalances of export and import in Myanmar. Imports of these goods are currently in high demand and on the other side, export tends to be low compared to import values.

Depreciation of exchange rate has positive impact on exports by raising the profitability of traded goods sectors which in turn promotes private investments and support emerging new

potential exportable products. Contrary to the above facts, depreciation of the exchange rate leads the cost of imported goods to increase. In Myanmar, large portions of capital goods are imported and investment degrades the effects of depreciation leading to low growth.

4.3 Diagnostics Tests

In this research, the author applied diagnostics tests to check the model's stability, heteroskedasticity, normality and serial correlation. LM test is to check serial correlation of the residuals in the model and heteroskedasticity test is for checking heteroskedastic problem of the model and CUSUM tests was used to test model's stability. The results of these tests are as followed.

Table 0.5 Diagnostics Tests Results

Diagnostic tests	F-Statistics	Prob
Breusch-Godfrey LM test	0.457211	1.000***
Heteroskedasticity test	0.122028	0.7513***

Note: *** provides that the 5% significant level

Source: Author's illustration

LM test' null hypothesis H_0 is there is no serial correlation among variables' error terms. LM test result gives out p value of 1.000, therefore H_0 is failed to reject so there is no serial correlation. Heteroskedasticity test's null hypothesis H_0 is that the there is no heteroskedasticity problem. In order to determine that, p value of it is 0.9710 so it is not significant and H_0 is failed to reject. Therefore, there is no heteroskedastic problems. Normality test result and CUSUM result are also fit with the model and their results was showed in the appendix.

CHAPTER V

Summary, Conclusions and Policy Recommendations

5.1 Summary and Conclusions

This study explored the impact of the exchange rate unification on the trade balance based on Autoregressive Distributed Lag (ARDL) model with time series data from 1990 to 2015. The results show that the model can explain the impact of the exchange rate unification on the trade balance. This study has been able to meet its objectives, which are: to determine the effects of coefficient of the exchange rate variable for trade balance given that it can have positive effects on trade balance in the long run; to determine the effects of the coefficients of GDP growth rate on the trade balance given that it can have negative effect in the long run; to determine the effects of the coefficient of the foreign direct investment variable for the trade balance given that it can also have positive effects; to determine the effects of the coefficient of the inflation rate on trade balance given that it can have negative effect in the long run.

The paper employs the Error Correction technique to analyze short run relationships of the variables. ARDL approach to co-integration test is used to determine whether a long-run relationship exists. The test uses checks for stationary of the residuals by using Augmented Dickey-Fuller Test (ADF). The author found that the time series data of the variables are stationary at mixed level I(0) and I(1), therefore the model is valid to apply ARDL and the sign of the error correction term showed negative so that there also has short run relationship among the dependent and independent variables. The study finds that the exchange rate unification, GDP growth rate, foreign direct investment and inflation rate affect the trade balance both in the long and short run.

The results indicate that exchange rate fluctuations has impacts on the trade balances and when Myanmar currency appreciates, it turned to cause less exports. However, when the

currency depreciates, it turned to cause higher exports and thus smaller trade deficit. The coefficient for exchange rate showed as a significantly positive effect on the balance of trade in the long-run. However, the exchange rate negatively affects the balance of trade within the short run. Generally, when the domestic currency depreciates, exports increase. However, this effect is not observed in the findings during the short run. In Myanmar's case, after changing to a new exchange rate system, the domestic currency depreciated which resulted in the increase in the volume of total trade.

GDP growth rate has negative impact on the trade balance in the long run. This is mainly because of the larger trade deficit amount in Myanmar. Since the country is now in transition period and establishing economic and political reforms, the country needs a lot of investments for all around development of the country and thus this caused higher imports from the other countries especially for the big machinery, equipment, high tech products and many more. Trade volume recently has increased compared to the period before government reforms. However, this increase is associated with unbalance of international trade due to increasing imports. On another hand, in the long run, if the trade will increase and expand with at least the same pace, it will have a stronger effect on the country's economic growth. In addition to this finding, the current deficit in trade will have a stronger effect on growth if the imports are more focused on capital investment than consumed goods. If this conditions tend to continues in the long run, it can has negative impact on the economy because higher imports showed the country's consumption is much relied on the other countries' production rather than local production. Therefore, the government should encourage local investors and firms to produce export quality products, should promote them to export more in the future and should support them to be able to operate without relying much on the foreign imports.

According to this thesis' research findings, the coefficient for foreign direct investment also shows significantly positive effects in the long-run. There are also negative effects in the short-run. Due to the new exchange rate system, Myanmar can attract more FDI into the country. As a result, FDI can increase initial investment as well support the import of capital necessary for growth. Therefore, FDI causes problems in the trade balance, especially in the short-run. However, in the long-run, FDI can result in more production which can lead to increases in exports. This long-run result is the same result as most of the scholars discussed.

5.2 Policy Recommendations

Although foreign exchange policy reforms , there are few market instruments for the central bank to sterilize the changes in money supply from foreign exchange market interventions. As a developing country, the central bank of Myanmar should not manipulate the exchange rate and can take impartially supply and demand among them because of lack of foreign reserve and lack of the lack of experts that specialize in the exchange rate system.

Moreover, the government can increase the trade balance by liberalizing the export and import policies. For the export policy, the product patterns should be changed in line with international market. And the local firms in Myanmar should produce from primary goods to value added goods as well as the government need to find the market by producing more agricultural products like organic goods. As for the import policy, the government should consider the import items with customer behaviors based on the needs of the country.

To gain growth in Myanmar, the government should consider the other factors such as incentives of new investment law, stability of both economic and political environments and to become more open economy. All these factors are important for the country for accelerating international trade, attracting more foreign capital inflows and outflows together gaining

economic growth in Myanmar. In addition, adjustment of the exchange rate system should occur alongside the consideration of domestic supply and demand conditions for exports and imports. This, however, cannot overcome without consideration of the foreign reserves because limited supply and lack of experts that specialize in the exchange rate system.

Myanmar's government should continue enhancing the capacity of experts as well as improving foreign reserves. They need to focus on the trade balance as the basis for exchange rate growth which also will avoid exchange rate manipulation. The exchange rate system should be in line with market speculators who do not prioritize either exporters or importers in order to increase foreign reserve, since Myanmar needs to increase foreign reserves to strengthening its national economic growth.

To sum up, policy makers should set up stable and effective macroeconomic policies and should have continuous follow ups on taking corrective actions for the fluctuations of inflation rate and exchange rate in Myanmar. The role of Central Bank Myanmar is very important and it needs to practice decentralization with full autonomy in setting Monetary Policies and other related issues.

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APPENDIX

Null Hypothesis: TB has a unit root
Exogenous: Constant
Lag Length: 5 (Automatic - based on SIC, maxlag=5)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.822009	0.0730
Test critical values:	1% level	-3.808546	
	5% level	-3.020686	
	10% level	-2.650413	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TB)
Method: Least Squares
Date: 10/07/16 Time: 22:30
Sample (adjusted): 1996 2015
Included observations: 20 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TB(-1)	-0.884091	0.313284	-2.822009	0.0144
D(TB(-1))	0.569413	0.324584	1.754286	0.1029
D(TB(-2))	0.720853	0.287694	2.505621	0.0263
D(TB(-3))	1.632471	0.353285	4.620839	0.0005
D(TB(-4))	1.452299	0.529190	2.744382	0.0167
D(TB(-5))	0.934254	0.633940	1.473726	0.1644
C	-311.1901	297.0896	-1.047462	0.3140

R-squared	0.685766	Mean dependent var	-474.3310
Adjusted R-squared	0.540735	S.D. dependent var	1793.000
S.E. of regression	1215.100	Akaike info criterion	17.31226
Sum squared resid	19194069	Schwarz criterion	17.66076
Log likelihood	-166.1226	Hannan-Quinn criter.	17.38029
F-statistic	4.728411	Durbin-Watson stat	1.806256
Prob(F-statistic)	0.009132		

Null Hypothesis: MER has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 5 (Automatic - based on SIC, maxlag=5)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.334591	0.0893
Test critical values:	1% level	-4.498307	
	5% level	-3.658446	
	10% level	-3.268973	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MER)
Method: Least Squares
Date: 10/07/16 Time: 22:31
Sample (adjusted): 1996 2015
Included observations: 20 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MER(-1)	-0.731342	0.219320	-3.334591	0.0059
D(MER(-1))	0.461908	0.218280	2.116126	0.0559
D(MER(-2))	0.505645	0.260924	1.937904	0.0765
D(MER(-3))	0.313465	0.266027	1.178318	0.2615
D(MER(-4))	0.710146	0.223350	3.179516	0.0079
D(MER(-5))	0.590839	0.306880	1.925306	0.0782

C	-123.2594	105.6314	-1.166882	0.2659
@TREND("1990")	40.83752	14.51714	2.813056	0.0157

R-squared	0.629777	Mean dependent var	48.98000
Adjusted R-squared	0.413814	S.D. dependent var	122.7431
S.E. of regression	93.97552	Akaike info criterion	12.21312
Sum squared resid	105976.8	Schwarz criterion	12.61141
Log likelihood	-114.1312	Hannan-Quinn criter.	12.29087
F-statistic	2.916130	Durbin-Watson stat	2.044668
Prob(F-statistic)	0.049855		

Null Hypothesis: GDPGR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=5)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.517346	0.1235
Test critical values:	1% level	-3.724070	
	5% level	-2.986225	
	10% level	-2.632604	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDPGR)
Method: Least Squares
Date: 10/07/16 Time: 22:32
Sample (adjusted): 1991 2015
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDPGR(-1)	-0.367067	0.145815	-2.517346	0.0192
C	3.468923	1.408674	2.462544	0.0217

R-squared	0.216008	Mean dependent var	0.180000
Adjusted R-squared	0.181921	S.D. dependent var	2.911615
S.E. of regression	2.633489	Akaike info criterion	4.851114
Sum squared resid	159.5110	Schwarz criterion	4.948624
Log likelihood	-58.63893	Hannan-Quinn criter.	4.878160
F-statistic	6.337030	Durbin-Watson stat	2.284870
Prob(F-statistic)	0.019243		

Null Hypothesis: D(GDPGR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=5)

	t-Statistic	Prob.*

Augmented Dickey-Fuller test statistic		-7.092089	0.0000
Test critical values:	1% level	-3.737853	
	5% level	-2.991878	
	10% level	-2.635542	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDPGR,2)
Method: Least Squares
Date: 10/07/16 Time: 22:33
Sample (adjusted): 1992 2015
Included observations: 24 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDPGR(-1))	-1.359736	0.191726	-7.092089	0.0000
C	0.407109	0.558670	0.728712	0.4739

R-squared	0.695703	Mean dependent var	0.112500
Adjusted R-squared	0.681871	S.D. dependent var	4.839000
S.E. of regression	2.729338	Akaike info criterion	4.925650
Sum squared resid	163.8842	Schwarz criterion	5.023821
Log likelihood	-57.10780	Hannan-Quinn criter.	4.951695
F-statistic	50.29772	Durbin-Watson stat	1.228125
Prob(F-statistic)	0.000000		

Null Hypothesis: FDI has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=5)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.627529	0.0125
Test critical values:	1% level	-3.724070	
	5% level	-2.986225	
	10% level	-2.632604	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FDI)

Method: Least Squares
Date: 10/07/16 Time: 22:34
Sample (adjusted): 1991 2015
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDI(-1)	-0.777781	0.214411	-3.627529	0.0014
C	2041.396	1009.835	2.021513	0.0550

R-squared	0.363920	Mean dependent var	368.0281
Adjusted R-squared	0.336264	S.D. dependent var	5513.175
S.E. of regression	4491.583	Akaike info criterion	19.73442
Sum squared resid	4.64E+08	Schwarz criterion	19.83193
Log likelihood	-244.6802	Hannan-Quinn criter.	19.76146
F-statistic	13.15896	Durbin-Watson stat	1.935966
Prob(F-statistic)	0.001412		

Null Hypothesis: INF has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=5)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.860778	0.3436
Test critical values:	1% level	-3.752946	
	5% level	-2.998064	
	10% level	-2.638752	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INF)
Method: Least Squares
Date: 10/07/16 Time: 22:35
Sample (adjusted): 1993 2015
Included observations: 23 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF(-1)	-0.556060	0.298832	-1.860778	0.0783
D(INF(-1))	0.294285	0.219382	1.341430	0.1956
D(INF(-2))	-0.360540	0.218182	-1.652476	0.1149
C	10.69345	6.750579	1.584078	0.1297

R-squared	0.522751	Mean dependent var	-0.483183
Adjusted R-squared	0.447396	S.D. dependent var	17.44084
S.E. of regression	12.96506	Akaike info criterion	8.119163
Sum squared resid	3193.761	Schwarz criterion	8.316641
Log likelihood	-89.37038	Hannan-Quinn criter.	8.168828
F-statistic	6.937173	Durbin-Watson stat	2.031630
Prob(F-statistic)	0.002415		

Null Hypothesis: D(INF) has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on SIC, maxlag=5)

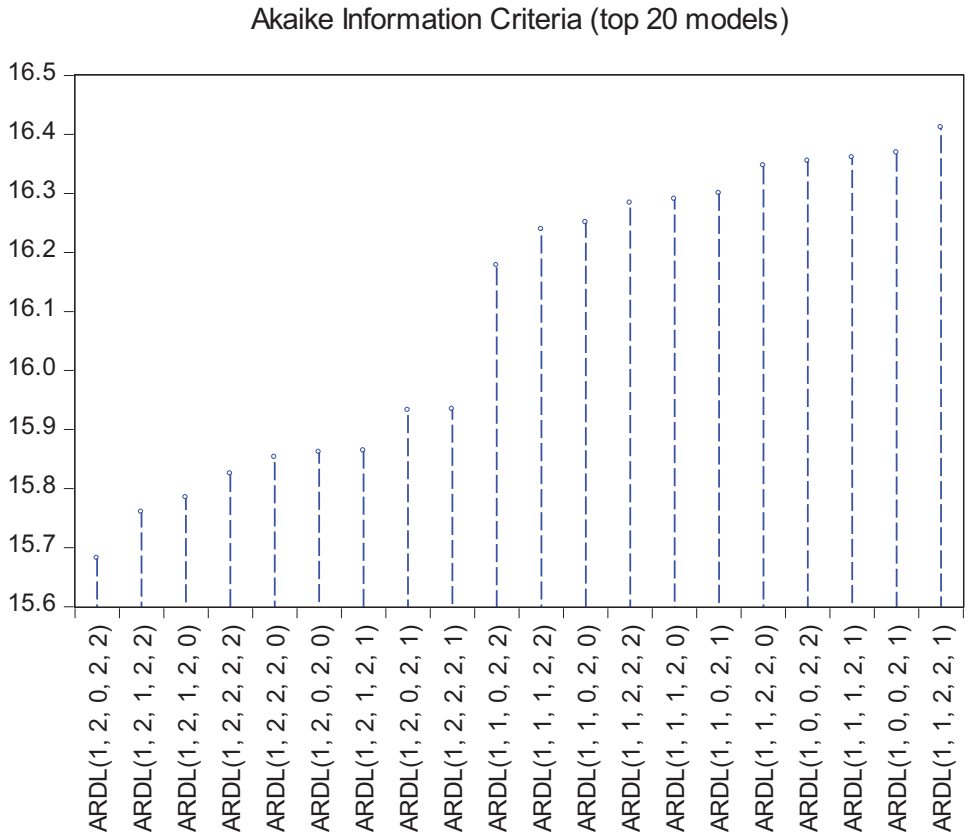
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.533912	0.0020
Test critical values:	1% level	-3.788030	
	5% level	-3.012363	
	10% level	-2.646119	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INF,2)
Method: Least Squares
Date: 10/07/16 Time: 22:35
Sample (adjusted): 1995 2015
Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INF(-1))	-3.145158	0.693696	-4.533912	0.0003
D(INF(-1),2)	1.736879	0.509859	3.406590	0.0036
D(INF(-2),2)	0.841589	0.365316	2.303728	0.0350
D(INF(-3),2)	0.297314	0.219317	1.355636	0.1940
C	-2.821263	2.689100	-1.049148	0.3097

R-squared	0.820349	Mean dependent var	0.621826
Adjusted R-squared	0.775436	S.D. dependent var	25.00852
S.E. of regression	11.85108	Akaike info criterion	7.986971
Sum squared resid	2247.168	Schwarz criterion	8.235667
Log likelihood	-78.86320	Hannan-Quinn criter.	8.040944
F-statistic	18.26541	Durbin-Watson stat	2.004664
Prob(F-statistic)	0.000008		



Dependent Variable: TB
Method: ARDL
Date: 10/04/16 Time: 23:00
Sample (adjusted): 1992 2015

Included observations: 24 after adjustments
Maximum dependent lags: 1 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): MER GDPGR FDI INF

Fixed regressors: C
Number of models evalulated: 81
Selected Model: ARDL(1, 2, 0, 2, 2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
TB(-1)	1.513685	0.088634	17.07800	0.0000
MER	1.662908	1.908297	0.871409	0.4006
MER(-1)	-10.71159	2.699369	-3.968181	0.0019
MER(-2)	6.380400	2.078980	3.069005	0.0097
GDPGR	477.4930	91.47703	5.219813	0.0002
FDI	0.165498	0.042128	3.928468	0.0020
FDI(-1)	-0.095457	0.044225	-2.158441	0.0519
FDI(-2)	0.233178	0.044183	5.277497	0.0002
INF	80.38689	18.17308	4.423404	0.0008
INF(-1)	-7.097720	12.99912	-0.546016	0.5951
INF(-2)	27.35029	12.53910	2.181201	0.0498
C	-5740.274	1108.943	-5.176347	0.0002

R-squared	0.980869	Mean dependent var	-229.3275
Adjusted R-squared	0.963332	S.D. dependent var	2755.726
S.E. of regression	527.6922	Akaike info criterion	15.68176
Sum squared resid	3341509.	Schwarz criterion	16.27078
Log likelihood	-176.1811	Hannan-Quinn criter.	15.83803
F-statistic	55.93153	Durbin-Watson stat	1.679927
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

ARDL Bounds Test
Date: 10/04/16 Time: 23:01
Sample: 1992 2015
Included observations: 24

Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	6.316837	4

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.2	3.09
5%	2.56	3.49
2.5%	2.88	3.87
1%	3.29	4.37

Test Equation:
Dependent Variable: D(TB)
Method: Least Squares
Date: 10/04/16 Time: 23:01
Sample: 1992 2015
Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(MER)	5.002729	3.038211	1.646604	0.1236
D(MER(-1))	-0.999277	3.401824	-0.293747	0.7736
D(FDI)	0.094027	0.077916	1.206774	0.2490
D(FDI(-1))	-0.161475	0.084736	-1.905637	0.0791
D(INF)	-19.80201	26.11464	-0.758272	0.4618
C	-1070.927	1468.578	-0.729227	0.4788
MER(-1)	-1.874741	0.907524	-2.065777	0.0594
GDPGR(-1)	130.3557	103.8114	1.255697	0.2313
FDI(-1)	-0.022916	0.165907	-0.138125	0.8923
INF	25.15608	36.78339	0.683898	0.5060
TB(-1)	0.613425	0.161747	3.792490	0.0022

R-squared	0.796315	Mean dependent var	-405.9708
Adjusted R-squared	0.639634	S.D. dependent var	1639.541
S.E. of regression	984.2248	Akaike info criterion	16.92515
Sum squared resid	12593081	Schwarz criterion	17.46509
Log likelihood	-192.1018	Hannan-Quinn criter.	17.06839
F-statistic	5.082398	Durbin-Watson stat	1.694366
Prob(F-statistic)	0.003947		

ARDL Cointegrating And Long Run Form
Dependent Variable: TB
Selected Model: ARDL(1, 2, 0, 2, 2)
Date: 10/04/16 Time: 22:59

Sample: 1990 2015
Included observations: 24

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(MER)	3.050731	1.296021	2.353921	0.0365
D(MER(-1))	-8.294710	1.321383	-6.277292	0.0000
D(GDPGR)	400.944511	60.492054	6.628053	0.0000
D(FDI)	0.197673	0.026961	7.331867	0.0000
D(FDI(-1))	-0.243389	0.029197	-8.336014	0.0000
D(INF)	74.213141	11.064316	6.707432	0.0000
D(INF(-1))	0.500615	0.044956	11.135594	0.0000
CointEq(-1)	-1.128016	0.235644	-9.188765	0.0027

Cointeq = TB - (5.1944*MER -929.5437*GDPGR +0.5903*FDI -195.9165 *INF + 11174.6892)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MER	5.194382	1.209401	4.295003	0.0010
GDPGR	-929.543689	270.490632	-3.436510	0.0049
FDI	0.590282	0.220181	-2.680890	0.0200
INF	-195.916547	65.468796	-2.992518	0.0112
C	11174.68916	3237.743289	3.451382	0.0048

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.457211	Prob. F(11,12)	0.8973
Obs*R-squared	7.087996	Prob. Chi-Square(11)	0.7919
Scaled explained SS	0.867993	Prob. Chi-Square(11)	1.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 10/04/16 Time: 23:05
Sample: 1992 2015
Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9184.503	343801.9	0.026715	0.9791
TB(-1)	-2.341176	27.47879	-0.085199	0.9335
MER	318.6862	591.6229	0.538664	0.6000
MER(-1)	-1074.425	836.8763	-1.283852	0.2234
MER(-2)	726.4664	644.5393	1.127110	0.2817
GDPGR	17942.69	28360.32	0.632669	0.5388
FDI	4.925892	13.06077	0.377152	0.7126
FDI(-1)	-10.31934	13.71091	-0.752637	0.4662
FDI(-2)	3.219334	13.69805	0.235021	0.8182

INF	792.1715	5634.140	0.140602	0.8905
INF(-1)	1247.908	4030.072	0.309649	0.7621
INF(-2)	-2061.858	3887.455	-0.530388	0.6055

R-squared	0.295333	Mean dependent var	139229.6
Adjusted R-squared	-0.350611	S.D. dependent var	140771.4
S.E. of regression	163598.7	Akaike info criterion	27.15507
Sum squared resid	3.21E+11	Schwarz criterion	27.74410
Log likelihood	-313.8609	Hannan-Quinn criter.	27.31134
F-statistic	0.457211	Durbin-Watson stat	2.621948
Prob(F-statistic)	0.897251		

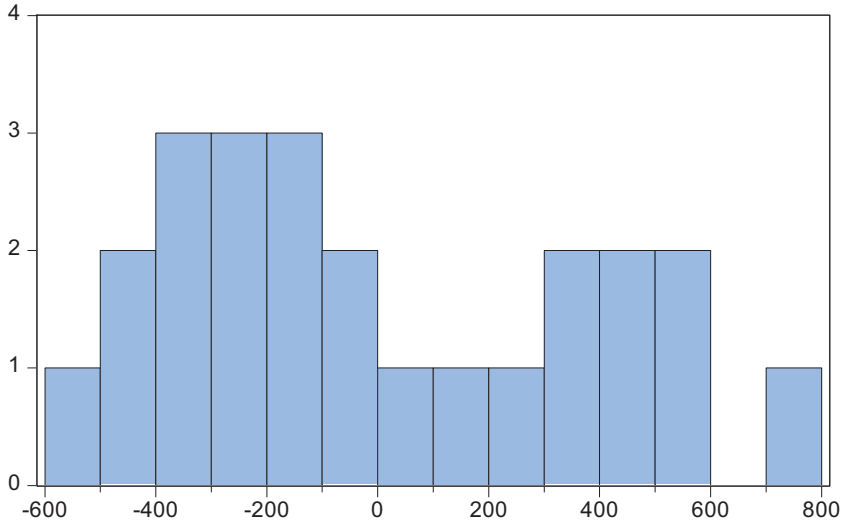
Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.122028	Prob. F(2,10)	0.8864
Obs*R-squared	0.571779	Prob. Chi-Square(2)	0.7513

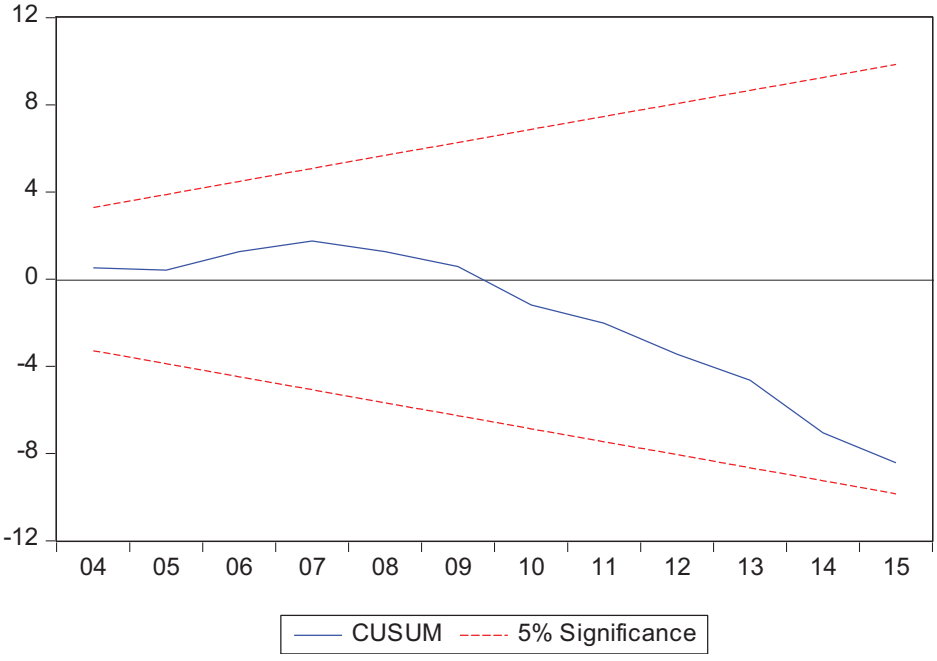
Test Equation:
Dependent Variable: RESID
Method: ARDL
Date: 10/04/16 Time: 23:06
Sample: 1992 2015
Included observations: 24
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TB(-1)	0.008029	0.109350	0.073428	0.9429
MER	0.386186	2.339602	0.165065	0.8722
MER(-1)	-0.587400	3.156323	-0.186102	0.8561
MER(-2)	0.184368	2.414659	0.076354	0.9406
GDPGR	-1.701995	100.1400	-0.016996	0.9868
FDI	0.013805	0.054390	0.253821	0.8048
FDI(-1)	0.001120	0.048784	0.022957	0.9821
FDI(-2)	0.007801	0.050781	0.153612	0.8810
INF	1.245559	21.03719	0.059207	0.9540
INF(-1)	3.027602	16.06184	0.188497	0.8543
INF(-2)	1.148456	13.89521	0.082651	0.9358
C	-148.7473	1240.724	-0.119888	0.9069
RESID(-1)	0.184920	0.376331	0.491377	0.6338
RESID(-2)	0.022578	0.420086	0.053745	0.9582

R-squared	0.023824	Mean dependent var	-7.96E-13
Adjusted R-squared	-1.245205	S.D. dependent var	381.1601
S.E. of regression	571.1305	Akaike info criterion	15.82431
Sum squared resid	3261901.	Schwarz criterion	16.51151
Log likelihood	-175.8917	Hannan-Quinn criter.	16.00662
F-statistic	0.018774	Durbin-Watson stat	1.969783
Prob(F-statistic)	1.000000		



Series: Residuals	
Sample 1992 2015	
Observations 24	
Mean	-7.96e-13
Median	-114.0901
Maximum	767.1197
Minimum	-568.7100
Std. Dev.	381.1601
Skewness	0.434239
Kurtosis	1.979677
Jarque-Bera	1.795313
Probability	0.407524




Gradients of the Objective Function
TB(-1)
MER
MER(-1)
MER(-2)
GDPGR
FDI
FDI(-1)
FDI(-2)
INF
INF(-1)
INF(-2)
C