



Adama Science and Technology University
School of Business and Economics
Department of Economics

**The Impact of Effective Real Exchange Rate on Economic
Growth:**

By
YonasMasresha

June, 2015
Adama, Ethiopia

**The Impact of Effective Real Exchange Rate on Economic Growth
in Ethiopia:**

**By
YonasMasresha**

**A Thesis Submitted to Adama Science and Technology University,
School of Business and Economics, Economics Department in
partial fulfillment of the Requirements for Masters of Science in
Developmental Economics**

**June, 2015
Adama, Ethiopia**

Adama Science and Technology University

School of Business and Economics

Department of Economics

**The Impact of Effective Real Exchange Rate on Economic
Growth in Ethiopia:**

By

YonasMasresha

Approval Board

Chairman, Signature
Graduate studies

Date

GutuTesso (PhD)

Advisor Signature

Date

Examiner

Signature

Date

Examiner

Signature

Date

Certificate

This is to certify that this Thesis work, “The Impact of Real Effective Exchange Rate on Economic Growth in Ethiopia: Post (1974/75)”, undertaken by YonasMasresha for the partial fulfillment of Masters of Science in Developmental Economics (MSC) at Adama Science and Technology University is an original work and not submitted earlier for any degree either at this University or any other University.

Research Advisor

Declaration

I, YonasMasresha declare that this entitled “The Impact of Real Effective Exchange Rate on Economic Growth in Ethiopia: Post (1974/75)”, is the outcome of my own effort and study and that all sources of materials used for the study have been duly acknowledged. I have produced it independently except for the guidance and suggestion of the Research Advisor.

This study has not been submitted for any degree in this University or any other University. It is offered for the partial fulfillment of the degree Masters of Science in Developmental Economics (MSC).

By: YonasMasresha

Signature_____

Date_____

Advisor: GutuTesso (PhD)

Signature_____

Date_____

Acknowledgement

The completion of this research would have not been realized without the help of others and I would like to take this opportunity to thank everyone who assisted me with this research. First, I would like to express my thanks and appreciation to my Advisor GutuTesso (PhD), for his guidance, continual advice, patience, vast knowledge, and critical review of the research proposal. Subsequently, my sincere thanks go to our branch manager, staffs and employee of National Bank of Ethiopia (NBE), Ministry of Finance and Economic Development (MoFED) and Central Statics' Agency (CSA), who has volunteer to provide row data of Macro-variables. My thanks also extend to my family.

At the end, I would like to tanks all my friends who had direct or indirect valuable involvement in my academic progress.

YonasMasresha

June, 2015

Acronyms

ADF: Augmented Dickey-Fuller

AR: Auto regression

CPI: Consumer Price Index

CSA: Central Statistics Authority

DF: Dickey-Fuller

DSP: Differenced stationary process

ECA: Economic Commission for Africa

ECM: Error Correction Mechanism

EEA: Ethiopian Economic Association

EPRDF: Ethiopian People's Revolutionary Democratic Front

FDR: Foreign Direct Investment

GDP: Gross Domestic Product

IFS: International Financial Statistics

IMF: International Monetary Fund

MoFED: Ministry of Finance and Economic Development

NBE: National Bank of Ethiopia

PP: Phillips-Perron

PPP: Purchasing Power Parity

REER: Real Effective Exchange Rate

RER: Real Exchange Rate

RGDP: Real Gross Domestic Product

TFP: Total Factor Productivity

TSP: Trend stationary process

USD: United States dollar

VAR: Vector Auto regression

VECM: Vector Error Correction Model

VIF: Variance Inflation Factor

WB: World Bank

Table of Contents

Certificate-----	iii
Declaration -----	iv
Acknowledgments-----	v
Acronyms -----	vi
Table of Contents-----	vii
List of Tables -----	x
List of Figures -----	x
List of Appendices -----	x
Abstracts -----	xii

CHAPTER ONE

Introduction -----	1
1.1. Background of the Study -----	1
1.2. Statement of the Problem -----	3
1.3. Objective of the Study -----	5
1.4. Significance of the Study -----	6
1.5.Hypothesis -----	6
1.6. Scope of the Study -----	6
1.7.Limitation of the Study -----	6
1.8.Organization of the Study -----	7

CHAPTER TWO

Review of the Related Literature -----	8
2.1.Discussion on Basic Concept -----	8
2.1.1. Definition of Exchange Rate -----	8
2.1.1. Determination of Exchange Rate -----	9
2.2. Theoretical Literature-----	10
2.2.1.Theories of Economic Growth -----	10
2.2.2. The Relationship between Exchange Rate and Economic Growth -----	17
2.2.3. Exchange Rate, Its Impact on Foreign Trade and Economic Growth-----	19
2.2.4.Contractionary Effects of Exchange Rate on Economic Growth -----	20
2.2.5. History of Exchange Rate Regime in Ethiopia -----	22

2.3. Empirical Literature	26
2.3.1.The Impact of Exchange Rate on Economic Growth: Empirical Evidence	26
2.3.2.Impact of Real Effective Exchange Rate on International Trade Performance of Ethiopia	30
CHAPTER THREE	
Methodology and Data Analysis	32
3.1. Type of Data and Data Source	32
3.2. Data Analysis	32
3.3. Model Specification and Theoretical Frame-Work	32
3.4. Estimation Techniques	39
3.4.1. Test for Stationarity	39
3.4.2.The Granger Causality Test	42
3.4.3. Co-Integration Test	43
3.5. Error Correlation Mechanism (ECM)	44
3.6. Impulse Response and Variance Decomposition	45
CHAPTER FOUR	
Empirical Analysis and Interpretation.....	48
4.1. Descriptive Analysis.....	48
4.1.1.Assessments of the Data Set	48
4.1.2. The Relationship between Selected Variables and Economic Growth in Ethiopia	49
4.2. Empirical Analyses	56
4.2.1.Summary Statics and Multi-Collinearity Test.....	56
4.2.2.Unit Root Tests	59
4.2.3.Granger Causality Test	62
4.2.4. Determination of Optimal Lag Length	63
4.2.5.Tests for Co-integration	64
4.2.6.Diagnostic Tests on the Residual of the Vector Error Correction Model	66
4.2.7.Estimation Results and Interpretation Vector Error Correlation Model	67
4.2.8.Impulse Response Functions and Variance Decomposition	72

CHAPTER SIX

Conclusions and Recommendations -----	74
6.1.Conclusions-----	74
6.2.Recommendations -----	76
References-----	79
Appendices-----	84

List of Tables

Table 4.1: Summary statistics	57
Table 4.2: Correlation matrix between the independent variables	57
Table 4.3: Variance Inflation factors of a full and reduced model	58
Table 4.4: Augmented Dickey-Fuller and Phillips-Perron unit root tests	60
Table 4.5: Clemente-Montanes-Rayes unit root test	61
Table 4.6: Chi-square statistics and respective p-value for Granger Causality Test	62
Table 4.7: Lag-order Selection criteria	63
Table 4.8: Wald Lag-Exclusion statistics	63
Table 4.9: Co-integrating Equations under different Assumptions	64
Table 4.10: Co-integration Rank test	65
Table 4.11: Co-integrating Coefficients	67
Table 4.12: Short-Run coefficients	70
Table 4.13: Response of LRGDP to one standard deviation	73
Table 4.14: Variance Decomposition of LRGDP	73

List of Figures

Fig. 4.1 Real effective exchange rate and economic growth	49
Fig. 4.2 Real Interest rate and economic growth	50
Fig. 4.3 Government Expenditures and economic growth	51
Fig. 4.4 Openness index and Economic growth	53
Fig. 4.5 Broad money supply and economic growth	54
Fig. 4.6 Financial institution development Government Expenditures and economic growth	56

List of Appendices

Appendix A: VEC Residual Normality Tests	84
Appendix B: VEC Residual Serial Correlation LM Tests	84
Appendix C: VEC Residual Heteroskedasticity Tests	85
Appendix D: Roots of Characteristic Polynomial	85
Appendix E: Test for Exogeneity	86

Abstract

This study analyzes long run and short run impact of real effective exchange rate on the Ethiopian economy using annual time series data for the period 1974/75-2013/14. By using co-integration and vector error correction analysis, the study found that impact of real effective exchange rate on economic growth works through the aggregate demand channel in the short-run and the aggregate supply channel in the long-run i.e. decrease/depreciation in the value of the domestic currency promotes economic growth only in the short-run. In the long-run, it discourages economic growth. In addition to short run and long run effect of Real Effective exchange rate this study found key role of government expenditure on brining economic growth in Ethiopia. Government expenditure is found to be statistically significant to explain economic growth in Ethiopia. Variables like financial institutions development (financial deepening) openness index and real interest rate are also found to be statistically significant with the expected sign in explaining economic growth in the long-run. And also the finding approves, in order to get long-term economic growth the country must appreciation real effective exchange rate and increasing public expenditure are the most important tools for sustained increase in Real Gross Domestic Product.

Key words: Economic Growth (Measured in Real Gross Domestic Product) and Real Effective Exchange Rate.

CHAPTER ONE

INTRODUCTIONS

1.1. Background of the Study

One of the major considerations to be taken in to account in the decision where to engage or not to engage in external trade is the value of the products of the country with other country to be traded with and can obtained by trying to value the currencies of both countries with respect to each other (exchange rate). In the contemporary world- where international trade plays a crucial role for development, countries more often depreciate or devalue their currency to be more competitive and grasp the fruit of bilateral and multilateral trade with their partners. Therefore, it is important to look exchange rate effect on economic growth, since exchange rate is one of the instruments applied to observe countries competitiveness in world market.

International trade has also played a crucial role in the historical development of the third world. In the second half of the 20th century, the tremendous economic performance of the "four tigers"- South Korea, Taiwan, Hong Kong and Singapore has been largely attributed to high performance of the external sector (export). Strong political commitment towards export promotion and tender of appropriate policies together with efficient institutional mechanisms leads those countries to attain higher growth rate of exports and stable exchange rate and hence economic growth.

The issue of accelerated economic growth with balanced trade has been the main agenda in economic policy formulation for most of the Sub-Saharan Africa (SSA) since the early 1970's. The per capita income of most of these countries has registered a low growth rate during the past three decades owing to the sluggish economic performance coupled with the startling population growth. The records of the economic performance of most SSA counties exhibit that they had been performing better before their colonial independence than today (Rodney, 1982). Hence, considerable attention has been paid by a number of development economists and government policy makers to review those countries exchange rate situation towards promoting economic growth and improving their living standards and getting positive trade balance.

Many less developed countries adopted import substitution strategies to promote domestic economic development. Ethiopia was one of these during Derge regime. As such Ethiopia's trade policy has long been characterized by controlled systems of foreign exchange allocation, import quotas, high tariffs, state-controlled marketing of exports, export prohibitions and export taxes.

This trade policy became increasingly inconsistent with some of the macroeconomic policies followed by the Derge regime. The restrictive trade policy followed by the Derge (which was accompanied by the over-valuation of the official exchange rate and deteriorating terms of trade) led to generally falling real official export earnings which registered an average annual growth rate of negative 4.43%. Export tax followed the route of official merchandise exports mainly due to smuggling. However, real official imports and import trade tax have generally risen at a fast rate despite progressively more restrictive trade policies against imports. This is due to the import dependent nature of the economy. The widening gap between foreign exchange earnings and financing imports led to deteriorating international reserves and escalating external debt of the country. Although gradual trade liberalization reforms have been undertaken since the overthrow of the Derge regime in 1991, the dramatic increase in international reserves is not due to the performance of the export sector. Rather, it is largely attributed to the inflow of foreign loans and grants in support of the structural adjustment program (Abebaw, 2010).

LDC's like Ethiopia need to make their moves very consciously and carefully so as not to be trapped and be swallowed in the face of international trade by lions of the markets. This means governments of LDC's need to expand their provisions of public goods and continue on regulation of their markets for the benefits of their large population. Ethiopia started to implement a comprehensive program of macroeconomic adjustment and structural reforms since the beginning of 1990s. This helped the country to restore macroeconomic stability and achieving economic growth. Observed economic growth patterns are assumed to be the results of the comprehensive macroeconomic policy reforms and interventions implemented by the government. The economic reform packages include trade liberalization, privatization of public institution and relative liberalization of interest rates and foreign exchange rates. For example, the 'birr' was devalued by 242% in 1994 and a bi-weekly foreign exchange was introduced as a major tool for bringing about economic growth and stability in Ethiopia (Bacry, 2008).

According to Cottani (2004) as cited in Moya (2009), Since, Ethiopia is a small country in terms of the size of its GDP; stabilization of the real exchange rate may help to improve economic performance in such a small and less developed country. This directs that there may be a relationship between economic growth and exchange rate in some way. Thus, a study on such topic may be helpful to know how can exchange rate used as a policy instrument for economic activities in the country.

1.2.Statement of the Problem

Many LDCs depend on primary products for majorities of their export with the notable exception of petroleum exports and few needed minerals such as gold, diamond and platinum. Primary product exports have grown more slowly than total world trade and also challenged by different factors (Todaro, 2009).

Nations have four major objectives to be achieved. These are internal balance, external balance, economic growth and equitable distribution of income. Internal balance refers to full employment and stable price whereas external balance refers to equilibrium in the balance of payments. Economic growth is one of the main goals of a nation. This objective partly depends on the second objective which incorporates international trade because the capacity of international trade to affect economic growth, on the other hand, depends on the international competitiveness of a country (Mayer, 1972).

The international competitiveness of a country is partly determined by the relative strength of its currency. This means, when we compare to foreign currency, the higher the value of domestic currency, the lower the competitiveness of a country. The World Economic Forum in its Global Competitiveness Reports of 2009 shows that Ethiopia's exports are among the least competitive in the world (118th) as well as African (21st) standard. The study by Pherson (2007) supports that persistent real overvaluation is believed to seriously erode business and consumer confidence, thereby lowering the rate of savings and investment. Therefore, there is a need to reduce the value of the domestic currency to improve the competitiveness of a country and to promote economic growth. This calls for adjustment on the exchange rate system. All these imply that change in exchange rate may affect economic growth.

Most of Ethiopian Exports have to be paid in dollar and pound sterling. This simple operation involves a number of complicated problems. The first one is the method by which we can ascertain the value of birr in terms of dollar and pound sterling. Then the problem of finding out ways and means to settle transactions under the gold standard system, because transaction can be settled easily and easy to find out the gold contents of each currency. But with suspension of the gold standard finding out common medium of exchange and the rate at which one currency can be converted in to another, the country began to face such problems as artificial restrictions imposed in the exports, imports and the arbitrary fixation rate of exchange.

The problem of finding out a common medium of exchange and the rate at which one currency can be converted into another were solving at least partially. This doesn't mean that trade between countries flows smoothly. It has been widely recognized that a country should conserve its foreign exchange reserves. It's more important in the case of developing countries like Ethiopia. Since foreign currency is required for the purpose of importing essential capital and consumer goods from other countries. Thus countries have to resort to a number of artificial restrictions in the realm of dealing in foreign currency.

Studies show that a monetary policy cannot directly achieve its objective without an intermediate monetary target between the instrument and ultimate goals. For example, a monetary policy that aims at achieving a higher rate of economic growth through monetary instruments such as bank rate requires such variables as exchange rate, domestic credit, nominal income, money supply and others as intermediate targets. The importance of each intermediate target differs from country to country (Thapa, 2002).

In this study, the focus rests on exchange rate. It assumes that monetary authorities may use exchange rate as an intermediary target to affect its instruments and then achieve their objectives. Given this, the focus is on to what extent exchange rate affects the instruments that impact economic activities in Ethiopia. The importance of foreign balance of trade denotes the imports and exports of commodities of the country specially, what concerns mostly is the question that in what ways does exchange rate affect the export sector of Ethiopian economy. In other words, to what extent do the change in exchange rate accounts for the overall growth of economy?

This research identifies two channels of transmission for the real exchange rate impact on economic activities, those are: the aggregate demand channel (depreciation of real exchange rate enhances the international competitiveness of a country and enlarges its GDP) and aggregate supply channel (depreciation of the real exchange rate increases the cost of production and helps to redistribute income in favor of the rich but reduces economic growth). Those channels work through the aggregate demand channel and aggregate supply channel respectively. The latter view can be supported by a statement from the findings of the World Bank (Watundu, 2009), that a real depreciation by itself cannot provide incentives and cannot stimulate the supply response unless it is complemented by price and market liberalization. This means change in exchange rate can bring about two opposite results; one, promoting growth and the other, discouraging growth. If exchange rate is found to have a negative relationship with GDP, it is said to work

through the aggregate demand channel. If exchange rate is found to have a positive relationship with GDP, it is said to work through the aggregate supply channel (Thapa, 2002).

The determination of this study is thus to identify which of these two channels functions in Ethiopia. In other word, if exchange rate is found to have a negative relationship with GDP, it is said to work through the aggregate demand channel and promotes growth and also, if exchange rate is found to have a positive relationship with GDP, it is said to work through the aggregate supply channel and discouraging growth. By considering financial deepening and openness index as an additional augmenting factor of production, this study suggests some measures that may ensure the sustainability of the current economic growth in Ethiopia.

Studies done so far and referred by the researcher are found to focus on either major determinants of economic growth or exchange rate (Andualem. W (2012), Equare D. (2001), Eshetu A. (2011), Addisalem. M (2010), Sintayehu W.(2012), Tamiru (2013), Tsega H. (2008), Zewdie A. (2009)). Economic growth and exchange rate have been studied together in some of the papers as one being the determinant of the other. But emphasis was not placed on how the latter affect the former or vice versa. The emphasis was put on how the other variables included, such as inflation, money supply, government expenditure etc affect economic growth or exchange rate. The objective of this study is to determine the impact of real effective exchange rate on economic growth.

1.3.Objective of the Study

The main objective of the study is to assess channel of transmission through which the real effective exchange rate impacts economic growth in Ethiopia. More specifically the study focuses on:

- Identifying major short-run and long-run determinants of real growth of domestic product and real gross domestic product (RGDP) degree of responses on innovation of those determinants.

1.4. Significance of the Study

The importance of the study extends from first drawing a clear demarcation line on what portion the changes in real domestic product due to the change in exchange rate, and secondly giving the general growth trends of real GDP due to change in exchange rate. The researcher believes that such a study on current economic issue/problem is believed to be worth to all stockholders; such as the government, financial institutions and other economic agents. This finding helps policy makers to recognize the way the variables relate and to determine the way to use exchange rate as a policy variable. In doing so, the findings serve as an information tool and also acts as a spring board for other valuable economic studies which will be carried out in the future.

1.5. Hypothesis

Long run and short run significant impact of real effective exchange rate on growth of real gross domestic product (RGDP) in Ethiopia.

1.6. Scope of the Study

This study focuses on the impact assessment of change in exchange rates on economic growth. The time coverage of the data analysis extends from 1974/75-2013/14. It covers two extreme exchange rate regimes. The first regime is characterized by a fixed exchange rate system and ranges between 1974/75 and 1991/92. The second regime is assumed to be characterized by a relatively flexible exchange rate system and ranges between 1992/93 and 2013/14.

This study uses the classification that represents the *de jure* (publicly stated commitment of the central bank) even though the *de facto* (observed behavior of the exchange rate) may be different. The authorities of the current Ethiopian regime describe their *de jure* exchange rate regime as a managed float with no predetermined path for the exchange rate. However, in light of the relative stability in the rate as well as the authorities' intervention policy, the exchange rate regime has *de facto* been akin to a conventional peg, although recently exchange rate flexibility has increased to some extent (IMF, 2011).

1.7. Limitation of the Study

Constraints faced on doing this study include, Lack/unavailability of data, Shortage of finance and detail studies done on this area in Ethiopia, chronic problem related to the reliability of data on Ethiopian economy, and provision of significantly different data on the same variable by

different institutions with their poor record keeping. The major difference is between the data provided by governmental and nongovernmental/international organizations. The reason may be the use of different methods and assumptions in the preparation of the macro-variables.

In order to eliminate this problem, the researcher used only governmental sources of data such as the Ministry of Finance and Economic Development and the National Bank of Ethiopia to reduce the variations as the raw data mainly originate from these offices.

1.8. Organization of the Study

This study is organized by five major chapters. The first chapter assesses the issues to be investigated, the problem to be addressed, driving force behind making a study and the overall standpoint of the study on the topic concerned. Theoretical and empirical literatures addressed on second chapter. This chapter primary part discusses the concepts of exchange rate, economic growth, and other major ideas. The theoretical framework cornered on major theories of Economic Growth, exchange rate impact on economic activities and foreign trade, contractionary impact of exchange rate, and also history of exchange rate regime in Ethiopia. Under the empirical literature; empirical evidences for the impact of exchange rate on economic growth and international trade are discussed.

Methodology and theoretical model specification of this study organized under chapter three. On this chapter, the data type and sources as well as the methods of analysis are presented; pre-estimation tests and post-estimation diagnosis are also conducted, the co-integration and vector error correction mechanisms (VECM) model set up put in to show the long-run and short-run relationship between real effective exchange rate and economic growth in Ethiopia, and also the impulse response function and variance decomposition are addressed.

Chapter four designed to address empirical analysis and interpretation of the finding. This chapter primarily addresses assessment (explanations) of data sets. On parts of assessment of data set, this study put each variables relationship with growth of real gross domestic product (RGDP), like the trend of economic growth with respect to exchange rate, real interest rate, government expenditures, Openness index, financial deepening and broad money supply. This study empirical analysis present under the next part of this Chapter. Finally, conclusions of the findings and policy recommendations from chapter four stated under chapter Five.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1. Discussion of Basic Concepts

“In the first half of the 1980’s the dollar amazed everybody. Nobody thought that so major currency would rise more than 50% in value within five years’ time. No other exchange rates movement in mode in history has been more explained in its effects on the world economy. The rise of the dollar is particularly that has become increasingly common since 1971” (Applayared, 2006). Such a big change in the value of the currency of large countries like America raises a lot of questions. This is because it has drastically affected the competitiveness of firms in the world markets for their dollar has turned out to be too expensive for foreigners to engage in trade with Americans.

2.1.1. Definition of Exchange Rate

“Exchange rate is the rate at which the Central Bank of nation is prepared to purchase foreign currencies” (Todaro, 2009). This is the simple definition, the countries of the world also use official exchange rate. “Official exchange rate is the rate at which its central bank is prepared to exchanges of its local currency for other currencies in approved for exchange markets” (Ibid).

Pilbeam (1998) defined exchange rate as “the price of one currency in terms of another”. For this study, exchange rate is defined in terms of units of foreign currency per unit of domestic currency. Thus, an increase in the exchange rate refers to the appreciation/revaluation of the domestic currency and reflects an increase in the value of the domestic currency. Exchange rate can be nominal or real each with its own relevance for economic analysis. “The exchange rate that prevails at a given date is known as nominal exchange rate”. For these latter uses, “The real exchange rate is the nominal exchange rate adjusted for relative prices changes between the countries under consideration”. Real exchange rate is the nominal exchange rate in index form times the ratio between indices of domestic and foreign price levels respectively. This definition shows in both sides (external and internal terms). “(a) in external terms, the nominal exchange rate is adjusted for price level differences between countries (that is, as the ratio of the aggregate home price level to the foreign country’s aggregate price level or cost level measured in common currency), or (b) in internal terms, the ratio of domestic price of non-tradable to tradable goods are considered within a country (Ibid).

The real exchange rate is defined in external terms for this study. This method is chosen for the reason that it may include the second definition. This is possible when the domestic price level is heavily weighted by non-tradable (if it is measured by the index of consumer price) and the foreign price level is heavily weighted by tradable goods (if it is measured by the index of wholesale price (Herberger, 2003).

The above definition shows relative value of two currencies, but in reality a country usually trades with more than one country. So, the rate of exchange with all other currencies should be considered to determine the relative position of the home economy. The rate of exchange that accounts for the relative importance of all trading partners is called Multilateral (Effective exchange rate). The relative importance of trading partners weighted by size of imports from them, exports to them or average of the two (Ibid).

“Real Effective Exchange Rate is a measure of whether or not currency appreciating or depreciating against a weighted basket of foreign currencies” (Pilbeam, 1998). Therefore, the REER can be determined either from the real exchange rate or the NEER. The REER is derived from real exchange rate as a weighted average of currencies of all trading partners of country by using geometric averaging method. In all cases, it has been shown that prices have to be expressed in terms of indices. Identified five types of price indices that can potentially be used to convert NEER to REER. These are Consumer price index, Index of wholesale price, Cost index, Index of export unit values and GDP deflator index. This study considers the consumer price index as it is used by the National Bank of Ethiopia to calculate the real effective exchange rate. Thus, on this study, REER defined as a function of price indices, exchange rate and trade weight. A small country like Ethiopia may be unable to affect foreign prices and/or trade weight. But it may affect the REER by manipulating the nominal exchange rate as its upper and lower limits are determined by the central bank in the inter-bank exchange rate system (Ibid).

2.1.2.Determination of Exchange Rate

Generally, there are two important theories in the determination exchange rate (Todaro, 2009). First, Purchasing power parity theory; which was introduced first by Gustav Cassel, accordingly, the rate of exchange between two currencies in the long run will be determined by their respective purchasing powers. Under this we have two types, first absolute PPP theory, which closely related to the law of one price which proposes that the price of the product measured in domestic currency will be equated to the price of the product measured in the foreign currency

times the current spot exchange rate. Second, relative purchasing power parity theory, which states that the percentage change in the bilateral exchange rate is equal to the difference in the percentage change in the national price levels over any given period of time. It is a statement about price and exchange rate changes over time (Ibid).

Second, balance of payments theory; stated that exchange rate is determined by the conditions of demand and supply in the foreign exchange market. Based up on the currency's supply in the foreign exchange market, appreciation of the currency occurs when the demand for it increases and depreciation results falling on demand for it. In the foreign exchange market, there will be three situations. First, when the balance of payment is in equilibrium, the supply of and demand for the currency are equal. Second, when there is a deficit in the balance of payments, the supply of the currency exceeds its demand and causes a fall in the external value of the currency. Finally, when there is a surplus, demand exceeds supply and causes arise in the external value of the currency. The other point is that the demand for foreign exchange arise from demand for foreign goods, services, financial assets etc. and supply of foreign exchange is due to the foreign demand for the home country's goods, services and financial assets (Todaro, 2009).

2.2. Theoretical Literature

2.2.1. Theories of Economic Growth

“Economic Growth is defined as a long term rise in the capacity of a country to supply increasing and diverse economic goods to its population; this growing capacity being based on advancing technology and institutional and ideological adjustments that it demands” (Thirlwall, 2004). In simple terms, it can be equivalently expressed as growth in the national income of a given nation. Growth in national income is usually measured by a percentage change in the real gross domestic product which takes change in price levels in to account. On doing this, we have five major types of economic theory:

A, Classical Theory of Economic Growth:

Classical economists centered their attention on the economic growth of nations which is explained by the theory based on the class structure of the capitalist. They identify three classes with their own specific role: namely workers, capitalists and land owners. Workers own labor and sell it on the labor market (subsistence wage). Land owners rent their land to capitalists to obtain rent. Capitalists own and organize production by employing labor and land, they earn profits. Those all agents governed by their attempt to get more as much as possible from the

resources they own and assumes from those groups only capitalists save from what they earn (Salvadori, 2003).

The allocation of income is not determined by preferences or by the type of income earned but mainly by the social group to which those who receive the income belong. The mechanism by which savings are transformed into investment can be direct, if the savers are entrepreneurs, or indirect, through the capital market, if the savers are not entrepreneurs. This means all savings are transformed into investment. However, it is difficult to say that they share neoclassical view that the means of equalization between savings and investment is interest rate. For classical economists, adjustment on the capital market between savings and investments occurs mainly through adjustments in the labor market. Moreover, unlike neoclassical growth theory, the rate of growth of the economy is determined by the interplay between savings and population growth rate, the former being completely employed in investment and the latter being endogenously given as an increasing function of the real wage rate (Ibid).

Adam Smith showed that the level of output basically depends on three factors of production (labor, capital and land). Adam Smith implicitly discussed the importance of their productivity (technology) as supporting element of growth. He also explained the importance of non-economic factors such as political stability, the security of private property, and the role of laws and institutions in facilitating economic growth. Smithian growth model can be defined as a function of three components; factor inputs, technology and non-economic factors. An economy will transfer to a higher level if some of or all these factors are increased. By this, the economy will move from one static equilibrium position. However, it is shown that this process has a limit where increase in input use may not necessarily bring increase in output (Rostow, 1990).

The Smithian growth model started with the assumption that there are only two inputs (factor production function), labor and capital, without technological progress and with constant return to scale. Factor rewards are assumed to be related to factor inputs through the marginal productivity relationship in the form of wage and interest rate respectively. The capital accumulation relationships of Smith growth model consider annual depreciation, rate of saving of owners of capital, the rate of return gross investment. This relationship represents the growth rate of capital stock and states that it depends on the rate of return to capital given the rates of saving and depreciation. This implies that if the rate of return to capital exceeds the ratio of depreciation to saving rates, then the capital stock increases and vice versa. Similarly, the growth rate of

labor depends on the wage rate. If the wage rate is above the subsistence level, then the labor force grows and vice versa. Smith concludes that, there are no growths of capital and labor if the rate of return equal to annual depreciation over the rate of saving of owners of capital and wage rate equal with subsistence level respectively. If the capital growth level is above the labor growth level, then the economy will grow.

In general, the Classical economists suggested a number of factors that promote economic growth in explaining the theories of economic growth. They started from the basic factors of production such as labor, capital, land and technology and continued to the non-economic factors such as political stability, the security of private property, the role of laws and institutions, the expansion of towns and growth of population; and non-market variables such as education and customs. Most of these variables are also considered as the factors of production and are used to explain growth in the modern theories of economic growth.

B. The Keynesian Theory of Economic Growth:

The Keynesian theory of economic growth assumes households save constant proportion of their income and producers convert these savings into investment. However, unlike other theories of economic growth, the Keynesian theory of economic growth noted that not all savings are transferred into investment. Thus, it is not the level of saving rather level of investment that determines growth. In a special case where all savings are converted into investment, the economy is said to be in the steady state (Salvadori, 2003).

Accordingly, Harrod and Domar were among the first economists to develop macroeconomic model to formally analyze the problem of growth in the Keynesian framework. They emphasized the relationship between consumption and saving by households and investment decision by entrepreneurs. The consumption-saving decision is defined by an exogenously given propensity to consume while the investment decision is defined by the accelerator principle. Production is obtained only by means of physical capital and labor. Given the Keynesian assumption of fixed prices, firms choose the best technique at the given prices. Thus, there is only one cost minimizing technique which implies that the capital-labor ratio and the capital-output ratio are uniquely determined. They focus only on the equilibrium of the goods market because of the assumption that the market mechanism is not able to attain full employment of labor. The goods market is said to be in equilibrium when savings are equal to the desired investment.

An economy growing along a path with equilibrium on the goods market is said to be on its warranted growth path. Along this path warranted rate of growth of income equals with the ratio between rate of saving and capital-output ratio. The behavioral hypothesis on producers and Keynesian multiplier yield, if the warranted growth path also ensures full employment of labor (a rare case), then the economy is said to be golden age growth path. At a later, Kaldor held that it is not saving, investment, technical progress and population growth that are the causes of growth-these being the features of growth-but the attitude of investing by the society (particularly entrepreneurs). He follows the Keynesian approach in conceiving growth is different from the classical expansion of the economy as driven by psychological and social factors like human attitude to risk taking and money making (Salvadori, 2003).

C. Neoclassical Growth Theories:

The neoclassical theory of economic growth in the sense that the former produces rising wage and constant long run returns to land and other natural resources while the latter assumes constant real wages and growing land and other natural resources. Robert Solow was the first economist to develop a model that represents the neoclassical theory of economic growth. Later on, his model was further developed by Trevor Swan (Agenor and Montiel, 1996).

The Solow-Swan model is built up on aggregate constant return to scale production function that combines labor and capital (diminishing marginal returns) in the production of output. Production is distributed between savings and consumption on the basis of the Keynesian saving rule. Savings are assumed to be a fixed fraction of output, and technology improves at an exogenous rate. If savings are equal to the level of investment, the economy is said to be in the steady state. The convergence process towards the steady state is ensured by the assuming decreasing productivity of capital. The model attempted show stable full-employment by assuming a neoclassical production function that allows for flexible coefficients of production (Salvadori, 2003).

The fundamental differential equation (FDE) of Solow Swan growth model writing in per capital form at equilibrium assumed that savings equal investment. The equality between them represents per capita saving and replacement capital respectively. Thus implies that countries with similar production technologies as well as comparable saving and population growth should converge to similar steady state levels of output. This convergence property-known as Absolute Convergence Hypothesis- means that poor countries starting with a relatively low standard of

living and a lower capital-labor ratio should grow faster during the transition as they catch up with the rich countries, but ultimately both groups arrive at the same level of per capita income (Agenor and Montiel, 1996).

Later on, other economists developed an alternative hypothesis that states rich countries grow faster than poor countries. This hypothesis is known as Conditional Convergence Hypothesis; Ramsey had also developed a model that further explains the neoclassical theory of economic Growth by making the saving rate of households endogenous. He replaced the saving/consumption function by forward looking theory based on utility maximization. The Ramsy model yields very similar growth predictions as the Solow-Swan does. However, unlike the Solow-Swan model, it features the Ricardian equivalence (i.e. the argument that the particular method used to finance government spending does not matter in affecting consumption, investment and output or in short government debt and tax have equivalent impact on macroeconomic variables) and rules out over-saving (Heijdra and Ploeg, 2006).

D. Endogenous Growth Theories:

Unlike the traditional growth theories which view economic growth as a result of exogenous factors, Paul Romer, Robert E. Lucas and Robert J. Barro came up with a new type of growth theory which endogenizes technology in the eve of 1990s (Endogenous Growth Theory), this theory stressed the importance of innovation, human capital accumulation, the development of technologies and financial intermediation as important determinants of economic growth. It agreed that government intervention aimed at removing obstacles to market mechanisms or other sources of market failures is not harmful to growth (Agenor and Montiel, 1996).

The aim of the endogenous growth theory is twofold. First, to overcome the short comings of the neoclassical growth theory which does not explain sustained growth, and second, to provide a rigorous model in which all variables crucial for growth such as savings, investment and technology are the outcome of rational decisions. Since the main objective of the endogenous growth theory is to develop economically meaningful accumulated factors, then the rate of interest should never be driven too low. This is considered as a necessary condition for perpetual growth. The accumulation of factors can be facilitated either by removing the scarcity of natural resources or by introducing technical progress. As far as the former is concerned, for example, labor has been straight forwardly transformed into a fully reproducible resource, human capital. As for technical progress, one of the main features of the endogenous growth theory is the

capacity to endogenize the investment decision yielding technological progress which consists mainly in the introduction of new intermediate and/or final goods (Salvadori, 2003).

Heijdra and Ploeg (2006) show, modes developed by economists to explain the endogenous growth theory follow three approaches. These are Capital Fundamentalist approach, Human Capital Formation approach and Endogenous Technology approach. The first approach generates perpetual growth by abandoning the neoclassical assumption that the average product of capital goes to zero as the capital stock get very large. The second approach emphasizes the purposeful accumulation of human capital as an engine of growth. The third approach consists of group of studies based on the notion that research and development (R&D) activities by firms constitute the engine of growth in the economy.

Those approaches are discussed with the help of the well-known AK model. The first approach was proposed by Rebelo (1991). It eliminates labor from the production function altogether and assumes constant return to scale on a broad measure of capital. It considers all production inputs as some form of reproducible capital to relax the assumption of diminishing returns to capital imposed in the basic neoclassical growth model. Within this model, it is possible to obtain a constant positive rate of growth of the per capita consumption along the optimal path. This path can be rationalized as the outcome of a decentralized perfectly competitive economy. The AK growth model is given by composite measure of physical and human capital stock. The steady state growth per capita (constant return to scale) defined by saving times technology minus depreciation of capital (Salvadori, 2003).

This implies that the growth rate is positive for steady state growth per capita and that the level of income per capita rises without bound. Unlike the neoclassical model, an increase in the saving rate raises the growth rate per capita. This model also shows that poor countries with the same degree of technological sophistication as other nations always grow at the same rate (not at faster rate as stated in the neoclassical model) as rich countries, regardless of the initial level of income. The only problem with the AK model is that it does not predict convergence even if countries share the same technology and are characterized by the same pattern of saving rate. To obtain a positive growth requires only that there exists a subset of capital whose production takes place under constant returns to scale and does not require the use of non-reproducible inputs. Barro (1990) also further developed the AK model by incorporating productive government

spending to see its impact on economic growth. He found a significant impact on economic growth by government spending.

Again Lucas incorporate variable that represent human capital in the AK model in the Human capital approach. He introduced positive externality to relax the assumption of diminishing returns to scale of capital imposed in the basic neoclassical growth model. The existence of externalities is associated with increasing returns to scale because the equilibrium growth rate depends on the rate of investment in human capital; the externality implies that growth would be higher with more investment in human capital. This leads to the conclusion that government policies are necessary to increase the equilibrium growth rate up to the level of the optimal growth rate (Agenor and Montiel, 1996).

Similar to the Harrod-Domar model, along the optimal path the rate of saving is constant in the Lucas model. However, unlike the Harrod-Domar model, it is determined endogenously by the maximizing behavior of the planner. On the other hand, the AK model, unlike the Keynesian models follow the classical and neoclassical tradition in conceiving investment as induced by savings, rather than the other way round (Salvadori, 2003).

Endogenous technology approach introduced technology in to the basic AK-model. It assumes that technology can be created or improved through Research and Development (R&D) activities and thus used as a source of growth. Research and Development activities provide some new and cheap type of technique of production which is exclusive for the inventor. In this case, even in the absence of physical and human capital, there can be growth (Heijdra and Ploeg, 2006). The model considers three types of productive sectors each with its own technology and pricing decision (final goods sector, Intermediate goods sector and Research and Development sectors).

In general, it has been shown that there is continuity from classical to endogenous growth theories, partly through Keynesian theory concerning the fact that the steady state is conceived as endogenously determined by the model. By contrast, neoclassical economists see it as exogenously determined by factors considered outside the realm of economic explanation. There is also continuity between classical, neoclassical and endogenous growth theory as opposed to Keynesian theory, in terms of saving-investment relationship. While the former theories conceive saving as wholly transformed into investment, and therefore, growth being determined

by saving itself, Keynesian theory conceived investment as the source of growth and no relationship between the former and the latter variable necessarily exists (Salvadori. 2003).

2.2.2. Relationship between Exchange Rate and Economic Growth

In almost all theories discussed under different schools, exchange rate was not explicitly proposed as a factor that directly determines output or growth. They illustrated many factors that determine economic growth. However, exchange rate is not among the list of these factors. In the words of Eichengreen, (2007), “When asked about the fundamental determinants of growth, economists tend to focus on education and training, savings and investment... technological knowledge etc... However, a stable and competitive real exchange rate can be thought of as a facilitating condition for economic growth... Keeping it at appropriate levels and avoiding excessive volatility enable a country to exploit its capacity for growth and capitalize on the aforementioned fundamentals” (Ibid).

Accordingly, the ignorance of exchange rate as a determinant of economic growth may be associated with different reasons. For the classical and neoclassical growth theories in particular, a good reason is that they were formulated for closed economies where foreign trade and exchange rate had no roles to play. Even for the latter theories of economic growth, exchange rate was not a choice variable. It was considered as a given variable until the breakdown of the Bretton Woods system (i.e. the gold standard). But this does not mean that the relevance of exchange rate was not recognized at all. But Economists had implicitly talked about the relevance of exchange rate since the Mercantilist period (Ibid).

For a home economy, the balance between what is taken and given basically depends on the rate of exchange of goods and services between the home economy and the rest of the world. This means, exports can be defined, among others, as a function of exchange rate. Exchange rate determines the gain from foreign trade which is used to finance domestic investment that contributes for growth. Therefore, through the net export component, exchange rate may affect economic growth. Endogenous growth theory also suggested government policy as one factor that influences economic growth. In line with this proposition, exchange rate may be considered as one policy variable that determines economic growth. Though it is not under direct control of the monetary authorities, it can be influenced by government policies. The government can use fiscal and monetary policies to influence the level of exchange rate. Based on all these

facts, this study incorporates real effective exchange rate into a growth model to determine its impact on the growth of real GDP in Ethiopia.

Trade theories also states that there may be some type of relationship between exchange rate and economic growth. From the trade theory of absolute advantage by Adam Smith to the modern theories of international trade, an economy with trade has been advocated to be better off than an economy without trade (autarky). Trade helps a country to exploit increasing return to scale, technology and know-how from a foreign country. If trade has the power to impact a country's economy, any factor that affects international trade such as exchange rate, also affects the well-being of a country (Todaro, 2009).

Exchange rate affects an economy through two channels. These are: trade and investment channels. Through the trade channel, exchange rate has two types of effects on growth through its level and volatility. Traditional open economy macroeconomic models suggest that there is positive relationship between the level of exchange rate and economic growth in general. But this is possible only if the impact of change in exchange rate on the export sector is stronger than the impact it has on the import sector. Decrease in the exchange rate (depreciation of the domestic currency) reduces the foreign price, increases their demand and encourages domestic producers. However, depreciation of the domestic currency has also cost in terms of increasing prices of imported raw materials and decreasing real income of consumers (Donald, 2012).

Volatility of exchange rate depends on the nature of exchange rate regime a country follows. Flexible exchange rate is said to be more volatile than a fixed one, hence it increases risk and reduce probability of earning profit. This may lead to a conclusion that a relatively fixed exchange rate regime promotes growth. However, empirical evidences on the impact of exchange rate regime on economic growth provide mixed results. Some suggested fixed, others flexible exchange rate and the remaining indifferent. Moreover, he concluded that the removal of a number of separate currencies and their replacement with a single currency stimulates trade and growth. Other relation of exchange rate with economic growth is through investment channel. Investment here refers to foreign direct investment which influenced by exchange rate. Appropriate policies may be important to attract foreign direct investment. However, investment decision is not merely dependent on domestic policies. As long as foreign investors invest in the home country for export, the same issue of exchange rate can be raised (Ibid).

2.2.3. Exchange Rate, Its Impact on Foreign Trade and Economic Growth

As long as an economy is open to international trade where foreign investment finances domestic production, it may be possible to find certain relationship between exchange rate, trade volume and economic growth. Change in exchange rate affects the prices of exportable goods, and thus the allocation of resources to production of these goods. The positive impact of this process may lead to increase volume of trade and growth in the economy.

According to Eichengreen (2007), “If technology transfer is relatively rapid in sectors producing for export, then there will be additional stimulus to the overall rate of growth”. He mentioned countries like Japan, Hong Kong, Singapore, S-Korea, Taiwan and china succeeded by making real exchange rate a ‘development-relevant policy tool’ to increase their volume of trade.

The impacts of exchange rate on export depend on the nature of the exchange rate regime adopted. Pilbeam, (1998) identified three basic types of exchange rate regimes; fixed, managed floating or intermediate and freely floating exchange rate regimes. A fixed exchange rate regime is “systems where governments determine exchange rates and make necessary adjustments maintain those rates” (Ibid). This system promotes international trade and investment; well macroeconomic performance; and international cooperation.

In a freely floating exchange rate system, “the demand for and the supply of foreign currency determine exchange rate and no government intervention is found” (Ibid). Advantages of a flexible exchange rate includes ensuring balance of payment equilibrium, monetary autonomy, insulates domestic economies from foreign price shocks and also characterized by automatic adjustment against economic shocks. In Managed floating exchange rate system, “exchange rates among the major currencies are free to float to their equilibrium market levels, but nations occasionally use currency interventions in the foreign exchange market to stabilize or alter market exchange rates”(Ibid). This regime helps monetary authorities to set the rate in line with the economic fundamentals, and interventions help to reduce the costs of exchange rate.

Each regime has merits as well as demerits on encouraging or discouraging economic activities. Even with in the same type of exchange rate regime, the change in the level of exchange rate may have positive impact on economic growth in one country and negative impact on the other. This depends on the nature and structure of the economy (Ibid).

2.2.4. Contractionary Effects of Exchange rate on Economic Growth

The traditional argument in favor of a negative effect of real exchange rate appreciation on the size of the tradable sector is based on the assumption that real exchange rate appreciation causes deterioration in the international competitiveness of domestic enterprises relative to their foreign competitors and leads to a reduction in exports. This deterioration reduces the profits of the export sector (services and agriculture), which are largely protected from foreign competition. It decreases industrial self-financing and the will to invest in the industrial sector, and more generally in the tradable goods sector. If the tradable goods sector is the most efficient and innovative sector, real exchange rate appreciation may affect growth negatively, in addition to its impact on exports-led firms. Real exchange rate appreciation is particularly bad for growth in LDCs, because it does not allow promotion of their small and inefficient tradable sectors, which suffer disproportionately from institutional and market failures (Rodrik, 2008).

Agenor and Montiel (1996) showed that, exchange rate is said to have contractionary effect on output through demand and supply channels. In a small open economy producing traded and non-traded goods, the aggregate demand for non-traded goods consists of domestic consumption, investment and government demand for such goods. This means the impact of exchange rate on the demand for non-traded goods depends on the relationship between exchange rate and these variables (consumption, investment and government expenditure). The consumption of non-tradable goods depends on relative prices or exchange rate, net real factor income, real interest rate and real financial wealth.

Accordingly, exchange rate directly affects the consumption of non-tradable goods. Exchange rate also affects the other variables that affect consumption of non-tradable goods (net real factor income, real interest rate and real financial wealth). This means through the variables determining consumption, exchange rate also affects the demand for non-traded goods again. Change in exchange rate brings about changes in relative prices of non-tradable that affect the demand for domestically produced goods. The overall total demand for domestically produced traded goods is assumed to be perfectly elastic and therefore is not affected by relative price changes. This means change in exchange rate of the home economy affects only the price of non-tradable. Therefore, changes in the relative prices that affect the domestic demand for non-traded goods affects the total domestic demand for these goods. Example, real depreciation of the domestic currency, with real income held constant, increases the demand for non-traded goods and vice versa assuming that the impact works through the aggregate demand channel (Ibid).

Change in exchange rate can also affect the demand for domestically produced goods through its effects on real wealth because increase in wealth can be expected to increase household consumption. Change in exchange rate affects the price level and thus changes the real value of wealth. This change in the real value of wealth has two types of effects, both tending to affect absorption: a direct effect, when individuals change their expenditure in order to maintain their real money holdings to the desired level; and an indirect effect, when individuals try to shift their portfolios from other assets into money or vice versa. If change in exchange rate reduces the real value of wealth thereby reducing the consumption of non-traded goods, it is said to have contractionary effect on demand (Ibid).

Exchange rate also affects the supply of domestically produced goods in addition to their demand. The production cost of those goods in domestic currency is likely to change as the prices of the factors of production change in response to change in exchange rate. It is well known that the supply curve is inversely related to a cost function. Decrease in the cost function means an upward shift in the supply curve for those goods. Exchange rate affects the supply of goods through three separate channels; nominal wages, imported inputs and working capital. If change in exchange rate increases the nominal wage, the price of imported inputs and the cost of working capital, it is said to have contractionary effect on the supply of these goods (Ibid).

The negative effect of REER on the size of tradable sector is also seen in the decrease in foreign direct investments (FDI). In China, as in other developing countries, foreign investments are concentrated in the tradable goods sector. Foreign firms bring technological improvements and their knowhow to China. This positive action occurs through the creation of foreign companies or joint-ventures which are more productive than domestic firms, suppliers or customers of the foreign enterprises. And also real appreciation exerts a negative impact on the size of the tradable sector by increasing the relative importance of state-owned enterprises, which are mainly heavy industry and public services, and due to being protected from outside competition mainly produce non-tradable goods (Sun, 2008).

Change in exchange rate also produces changes in real income that affect the demand for domestically produced goods. For an economy producing both traded and non-traded goods, real income is derived from the production of both sectors. As such change in exchange rate affects the production of non-traded and traded goods in different ways. Change in exchange rate, changes the relative importance of the goods for the domestic producers depending on the

direction of the change (increase or decrease). For example, depreciation of the domestic currency makes tradable cheaper to foreigners and may increase demand for these goods. If the assumption that the production of traded goods requires imported inputs holds true and production of traded goods decreases, then the production of non-traded goods increases. If the decrease in production of traded goods is greater than the increase in production of non-traded goods, exchange rate is said to have contractionary effect on income and thereby on demand and output. Therefore, the net effect of change in exchange rate on output may be positive (increase) or negative (decrease). If the net impact of change in exchange rate on output is positive/negative, this in turn increases/decreases the demand for non-tradable goods (Ibid).

This analysis on effect of change in exchange rate on interest rate mainly depends on the economy's financial structure and it assumes that domestic residents hold financial assets in the form of domestic currency, domestic and foreign interest-bearing assets. It also assumes that expected inflation is exogenous and thus makes analysis of the impact of change in exchange rate on nominal interest rate. If domestic and foreign assets are imperfect substitutes, the effect of unanticipated exchange rate change on domestic interest rate depends on the composition of household financial wealth. Change in exchange rate has opposite effect on the stock of real money and on the value of real foreign assets (Donald, 2012),

The effect of exchange rate on private demand for non-traded goods also depends on investment demand for this category of goods emanating from both the traded and non-traded goods sectors, since a substantial portion of any new investment in developing countries is likely to consist of imported capital goods, change in exchange rate affects the price of capital in terms of home goods. If change in exchange rate discourages new investment, it is said to have contractionary effect on aggregate demand. Exchange rate also affects the foreign earnings from exports to the government. Government expenditure partly depends on foreign earnings as the latter is used to finance domestic expenditure. If change in exchange rate reduces foreign earnings, then it reduces government expenditure and said to have contractionary effects on output (Ibid).

2.2.5. History of Exchange Rate Regime in Ethiopia

In order to have brief understanding on exchange rate regime in Ethiopia, the history of exchange rate policy in Ethiopia can be classified in to two major periods, those are:

A, Fixed Exchange Rate Regime (Pre-1991):

During this regime, the exchange rate policy and exchange rate were left in fact, as were the systems and institutions governing exports and imports. The trade policy was also one of protectionism, based at first on and driving from a purely economic rationale but later expanded to include ideological objectives. The trade policy of the Imperial regime was the classical goals of mobilizing government revenue by imposing taxes on imports and exports (Befikadu, 2006).

For nearly half a century up until October 1992, the exchange rate of Ethiopian currency was fixed to its reference or reserve currency, the US dollar except minor changes in 1964, 1971 and 1973. Abebaw Lemma (2010) pointed out the following reasons for Ethiopian authorities to maintain fixed exchange rate for such a long period.

- The authorities were genuinely committed to the Bretton Woods agreements which had advocated fixed exchange rate up to the collapse of the system in 1973.
- The maintenance of a fixed rate was believed to inspire confidence in the national currency and an official devaluation was seen as a failure despite external and internal pressures to do so.
- There was a constant fear that devaluation would entail inflation.

During Derg regime, it was characterized by continuous fall in real official exchange rate and steadily rising real parallel exchange rates which signifies the over valuation of the currency. Under this phenomenon, exports have been stagnating while imports have been rising overtime since 1975/76. In effect, among the factors that underlie the poor performance of the Ethiopian economy in general and export sector in particular, the overvalued exchange rate of birr is considered to play a significant role. In addition to, misallocation of resources in production and promotion of investment of resources in rent-seeking and socially unproductive but privately profitable activities and, reduction in the growth rate of output are the results of an over valuation of exchange rate and it reduce the competitiveness of legal exports (Alemayehu, 2008).

Generally, exchange rate policy before 1992 characterized by a breakdown of financial discipline in Ethiopia, particularly, under the military rule. Derg was characterized by over expansionary domestic policies especially through its military public expenditures. Moreover, appreciation in the real exchange rate of Birr, increase in the current account deficit, depletion of foreign exchange reserves and increase in foreign debt.

B, Flexible Exchange Rate Regime (Post-1991):

The Transitional Government of Ethiopia (TGE) in changed the situation practiced before to more relaxed and liberalized policy. By realizing the negative effect of an over valuation of the birr on the country's trade balance, and hence, on balance of payments, TGE devalued the birr with an official exchange rate from 2.07 to reach 5.00 birr per US Dollar in the late 1993 (GebreEgziabher, 2003). The reason behind the intensive devaluation rate includes:

- To stabilize the economy and attain economic growth.
- To narrow the gap in the current account deficit by increasing the profitability of exports and at the same time, to increase the local cost of imports.
- To enable exporters to offer a competitive price to the coffee producers.
- To reduce external imbalance and promote the use of under-utilized labour or excess capacity.
- To improve the government budget by increasing the taxes revenue from imports and exports.
- To reduce the parallel market premium and improve efficiency in resource allocation.

According to Dereje (2004), after intensive devaluation the adoption of auction system (period from 1993-1998) comes to attract foreign exchange and strengthen official reserves. This system was mainly derived from Dutch auction system of exchange rate determination with the following objectives:

- To allow the exchange rate to respond to changes in the demand for and supply of foreign exchange markets.
- To ensure prompt and timely provision of foreign exchange to effect essential transactions.
- To minimize the use of administrative mechanism in the allocation of foreign exchange,
- To prompt trade liberalization through easing and finally, eliminate controls on exports and foreign payments and thereby enhance the volume of external trade.

As mentioned by Alemayehu, in 2008, after auction exchange rate system, the National Bank of Ethiopia (NBE) took the following measures in order to further liberalize current external transactions and decentralize import and export licensing procedures by establishing wholesale foreign exchange auction in 1998. This procedure includes:

- The commercial banks were empowered to handle the licensing of foreign exchange for merchandise imports and the issuance of export permits with the exception of that for coffee, which remains with the NBE.
- There was automatic provision of foreign exchange for merchandise imports by commercial banks for an amount not exceeding \$500,000 US dollars.
- The surrender of foreign exchange proceeds from exports to commercial banks was subject to the following procedures: 10% of export proceeds may be indefinitely retained in the exporter's own foreign currency account in a domestic bank while the remaining 90% may be converted into local currency at any legal exchange deemed favorable by the exporter within a period of 28 days.
- With the exception of a US\$1,200 limit on the purchase of foreign exchange for holiday travel abroad, clients might purchase any amount of foreign exchange at the foreign exchange bureaus for educational, medical, business travel and other similar expenses abroad.
- Foreign employees working in Ethiopia might transfer abroad any amount of foreign exchange up to an individual's net salary earnings.
- The weekly retail foreign exchange auction was replaced by the weekly wholesale foreign exchange auction for participants bidding not less than US\$500,000.

Auction system did not satisfy the commercial banks' demand for foreign currency as the request by their customers for foreign currency became beyond the amount of foreign currency (bought from NBE) which lead to modern development in the liberalization of exchange rate system in Ethiopia by establishing of an inter-bank exchange rate determination system. Inter-bank exchange rate system determined by negotiations between banks and their clients and transactions between the banks. The exchange rate is free to vary from hour to hour and day to day. However, to ensure the competitive operation of the market, the NBE imposed maximum and minimum limits of foreign exchange holdings regulations on commercial banks of the country (Befikadu, 2006).

In this regime, there were also extensive changes in trade policy like reduction of imports quota, elimination of export taxes except tax imposed on coffee, etc. The major purpose behind the reform were ideas generated by both the IMF and the World Bank where by an open economy helps to increase and diversify export, renders the domestic economy more efficient and competitive, and results in sustained growth (Ayele, 2006).

2.3. Empirical Literature

2.3.1. The Impact of Exchange Rate on Economic Growth: Empirical Evidences

Marshall (1985), argue that growth in real exports due to change in REER tends to cause growth in real GNP for three reasons. First, export growth may represent an increase in the demand for the country's output and thus serve to increase real GNP. Second, an increase in exports may loosen a binding foreign exchange constraint and allow increases in productive intermediate imports and hence result in the growth of output. Third, export growth may result in enhanced efficiency and thus may lead to greater output.

More recent studies, however, suggest a less clear conclusion and raise a number of questions about the effect of export due to change in REER on economic growth. Econometric studies of individual countries over time (time –series analysis) and groups of countries at a point in time (cross –sectional analysis) between exports and income growth. In number of cases, particularly for middle income countries, there appears to be a strong positive relationship between trade and growth through the direct effect of export earnings on GNP and the indirect effect (balance of payments effects) associated with the increased income leads to greater imports and increased efficiency leads to greater exports; thus the causality may run from growth to trade rather than from trade to growth (Appleyard, 2006).

Since the devaluation of country's currency is the most influential aspect of the economy, many African countries have applied it as an instrument of adjustment particularly aimed at improving their balance of payments situation. The assessments of the consequences of devaluation are however difficult because such a measure is generally applied in conjunction with other instruments of economic stabilization. Export-import responses to devaluation, experience of the non-industrial five African countries (Egypt, Ghana, Mali, Tunisia, and Zaire) indicate that four out of those five countries attain good situations in their export growth in response to devaluation of exchange rate. However, Tunisia experienced a slight decrease in her growth rate of exports. With Regard to Growth rate of import, except Tunisia the rest countries devolution policy enhances the growth rate of their imports (Fantahun, 2011). It is this crucial policy of most developing countries which make me ready to investigate the exchange rate impact on Ethiopia's economy.

The study that made by Kenyanstry to identify relationship between exchange rate and economic growth. They used time series data for the period 1970-2006 to analyze the relationship between exchange rate and economic growth on the Kenyan economy. They try to employ three types of approaches in there study; single equation regression, system of simultaneous equations and vector autoregressive models. The first approach was used to investigate the effects of money supply, inflation and exchange rate including their lags on real GDP. Only inflation was found to be statistically significant in explaining real GDP. Using the second approach, the authors defined the functions of all variables in their study. From these estimations, the direct and indirect relationships between exchange rate and economic growth were found to be insignificant. In the third approach, the Johnson method was used to test for the long run relationship between exchange rate and economic growth and found no relationship. Thus, they concluded that there is no direct relationship between exchange rate and economic growth. But there could be indirect relationship between them through money supply, import and aid (Pherson, 2007).

On the other hand Moya M. and Watundu S. (2009) analyzed the impact of real effective exchange rate on the GDP of Uganda using a time series data for the period 1975-2007. They adapted the model developed by Thapa N.B. (2002). They added two more variables namely real exchange rate and Price. They estimated the demand and supply side impacts of exchange rate on real GDP separately and finally estimated all together to see the net effects. In estimating the impact of real effective exchange rate on RGDP, they considered a regression of RGDP on money supply (narrow) and real effective exchange rate on the demand side. They found positive and statistically significant coefficients for both variables and concluded that depreciation increases the international competitiveness of a country and promotes growth. These variables together explain about 69% of the variation in real GDP. They excluded government expenditure from this side for the reason that it was highly correlated with money supply.

In estimating the impact of real effective exchange rate on RGDP, they considered a regression of RGDP on population growth rate, real effective exchange rate and real exchange rate on supply side. They did not include any variable that represent expenditure on factors of production and instead included population growth rate which became statistically insignificant. Real exchange rate was found to be positively and statistically significant in determining real GDP. However, REER and RGDP were negatively related in the supply side i.e. increase in real effective exchange rate (depreciation in their model) decreases RGDP. This is because it

increases the cost of imported raw materials. All the variables together explain about 45% of the variation in real GDP. To determine the net effect, they defined log of real GDP as a function of log of Money supply (M_1), log of population growth rate (POPNGR), log of real effective exchange rate (REER) and log of real exchange rate (RER).

Both supply and demand side total regression on Uganda LR GDP show that change in narrow money, population growth rate, real effective exchange rate and real exchange rate explain about 73% of the variation in real GDP. Narrow money and population growth rate were statistically significant and positively related to real GDP. Real effective exchange rate was statistically significant and positively related to real GDP. Real exchange rate was not statistically significant in determining real GDP. Regarding this model weakness, the absence of a variable representing cost of production can be raised against this model. Unlike Kenyans, they found that permanent changes in narrow money significantly and positively affect the value of Gross Domestic Product. Thus, an increase in the amount of money in circulation plus private demand deposits leads to an improvement in GDP. This could be because an increase in the amount of money in circulation leads to a reduction in interest rates which improves private consumption and subsequent investments thereby increasing output.

Population growth rate has a significant positive effect on Uganda's GDP possibly because an increase in the population growth rate leads to an increase in potential private consumption and increased demand which stimulates production. The results on the net effect of Real Effective Exchange Rate on Gross domestic product of Uganda show that depreciation of the domestic currency does not improve the country's export competitiveness among its trading and investing partners. This brings about unfavorable terms of trade since most of Uganda's industries rely on imported raw and semi-finished goods for production. The depreciation of the domestic currency, therefore, leads to higher costs of importation which eventually affects production costs and private consumption, hence a reduction in aggregate supply.

The real exchange rate has a negative but insignificant effect on GDP of Uganda. This could be, according to the authors, because the Ugandan market is import based and reliance on importation, even if the Uganda domestic currency depreciates with respect to the individual trading patterns, more is imported compared to exports. This effect may also not be significant given the fact that Uganda exports more of raw materials and it does not play a significant role in determining the prices of its own exports on the international market, so depreciation of the

domestic currency does not enhance production. This means, the REER impacts economic growth through the aggregate supply channel for Ugandan economy i.e. depreciation of the domestic currency does not promote growth in Uganda.

Analyzing the impact of devaluation on the price and supply of coffee in Ethiopia using panel data by Abebaw, (2010) describe, the Ethiopian currency (Birr) as overvalued and cause of budget deficit. He found that the effect of devaluation on the supply of coffee is positive and significant. Some economists argue that the risk averse nature of farmers in developing countries make them not responsive to changes in prices in the long run. He found that farmers in Ethiopia respond positively to devaluation. The study use primary and secondary sources of data. The secondary source provides data for coffee production, acreage, domestic consumption and export which used to provide some indication on the past and current situation of the coffee sector and its importance on the Ethiopian economy.

To empirically implement a reduced form model, Abebaw collected farm level data by administering a questionnaire designed for this purpose. The questionnaire is used to measure the variables that are necessary for estimating supply response equations. The survey sample size was four hundred households, from which three hundred responses were found to be fit for analysis. The method of sampling was both purposive and scientific. First, he identified regions that are fair representatives of the coffee farming areas of the country. Thus, the first stage is purposive. Once the regions were identified, Abebaw choose households that represented various demographic and socioeconomic categories such as small, medium and large size households. A proportional sampling method was adopted in the second stage. He used descriptive as well as econometric methods of data analysis.

From the descriptive statistics as well as the econometric findings, Abebaw, (2010) noted that farmers do indeed respond positively to devaluation. Both the short-run and long-run supply responses were significant. At the end of his study, he suggested that the real exchange rate should be considered as one of the major policy variables for restructuring the economy. According to him, issues such as monetary, fiscal and commercial policies must be made consistent with the process of real exchange rate realignment. In general, the results showed that depreciation has expansionary effect while appreciation had contractionary effect for the period under his study in Ethiopia.

2.3.2.Impact of Real Effective Exchange Rate on Foreign Trade Performance of Ethiopia

Now a time, Ethiopia follows an open economy and engages in international trade with the rest of the world. Current government follows Agricultural led development strategy (ADLI) and free market system to improve country's competitiveness in the world.

Ethiopia experienced the fluctuation in exchange rate value which affects the countries competitive position in international trade because trend of REER shows: depreciation through 1987/88, appreciation from 1988/89 through 1991/92, depreciation from 1992/93 through 1996/97, an appreciation in 1997/98 and depreciation thereafter are observed. The depreciation of exchange rate increases Ethiopians competitiveness in trade (Melesse, 2004). He concludes concerning the pattern and reality of the exchange rate (i.e. REER) and its impact. "Despite the fact that the depreciation of the real exchange rate index since 1998/99 should have helped to improve the competitiveness of Ethiopia's exports in the international market and increase volume of export, the later has been deteriorating. This shows the marked discrepancy between neo-classical prediction and the reality in Ethiopia. The depreciation of the real exchange rate index may, rather, indicate the increase in the domestic cost of production, as production in Ethiopia is largely dependent on nature"(Ibid).

The exchange rate developments of Ethiopia after the reform period allowed depreciating against the USD in nominal and real effective terms after the economic reform in 1992. From the trend, after the reform period (1992), the real exchange rate has been above the nominal showing that the birr was overvalued. But its overvaluation becomes reduced, for instance, the birr was overvalued on average by about 95% in nominal terms between 1970/71-1990/91 but this over valuation declined to about 16 % on average after 1992. Realizing the negative effect of over valuation of the Birr on the country's economy, the Ethiopian government adopted discretionary devaluation of the currency, which led to subsequent and gradual depreciation. The trust of the successive devaluation of the currency and the adoption of the auction system was to encourage exports and strengthen official reserves (Equar, 1994).

Investigations on the role of money market to determine the balance of payments deficits using Johansen maximum likelihood vector error correction modeling technique, data covered the period between 1978 and 2010, suggested that money played a significant role in explaining balance of payments and export volume in Ethiopia. Increasing domestic credit was responsible

for worsening balance of payments. Real exchange rate has significant positive effect in the long run and negative effect in the short run. The writer concluded on his study by suggesting that monetary authorities have to pay attention in controlling domestic credit creation in order to improve external balance and to promote export (Haile, 2011).

Debele(2004), examined the relationship between REER, export and economic growth using different econometrics techniques. He used a single production function framework in which exports enter as an additional input in the production process. Also he used simultaneous equation models of growth of real GDP as a function of growth of real investment, labor and export variables; growth of real investment as a function of per capita income, growth of per capita income, export share to GDP and capital inflow variables; and growth of real export as a function of growth of real GDP, price competitiveness, trade partner growth, trade partner concentration, REER and trade structure composite variables. Finally, he found out that export positively and significantly affects the growth of the Ethiopian economy.

CHAPTER THREE

METHODOLOGY AND DATA ANALYSIS

3.1. Types of Data and Data Sources

This study mainly relies on secondary data, those data collected from annual reports and publications of National Bank of Ethiopia (NBE), Ethiopia Central Statistics Authority (CSA), Ministry of Finance and Economic Development (MoFED), and Ethiopian Economic Association (EEA) as well as various issues and data bases of International Monetary Fund (IMF), International Financial Statistics (IFS) and World Bank (WB). The annual time series data covers the period 1974/75-2013/14 and variables include real GDP (RGDP), real effective exchange rate (REER), Real interest rate (RIR), government expenditure (GOV), active labor force growth (LAPG), broad money supply (MS), exchange rate regime as dummy variable (REG), openness index (OPP) and financial deepening (FID) in the analysis.

3.2. Data Analysis

For this study, quantitative and qualitative methods of data analysis employed. Qualitative data are descriptive by nature and does not require any processing before being entered into the analysis of the study. The quantitative data on the other hand are time series and raw, which needs process to change them in the form that is suitable to fit in the econometrics model. Since the quantitative data is found in raw, it has to be changed in usable manner. This processing of data includes first changing the nominal variables in to real ones so as to consider the effects of changes that occurred in the period. In the quantitative analysis part Econometric method placed to investigate the effects of Exchange Rate on the growth of Real Gross Domestic Product. All the data was analyzed using STATA software.

3.3. Model Specification and Theoretical Framework

The model used in this study was initially derived by Thapa N.B. (2002). Thapa N.B. derived an econometric model from the Keynesian open economy macroeconomic framework for his study of the impact of real effective exchange rate on economic activities in Nepal. But his work doesn't consider the effect of augmenting factor of production on economic growth. Thus, the model in this study set by considering his model and by adding two supply side augmenting factor of production using augmented new classical growth model.

To analyze the impact of real effective exchange rate (REER) on the economic growth of Ethiopia, for convenience, the researcher used one source of data for all variables. To make things simple and taking the prevailing condition, here in the model, no need of restriction on the variable as exogenous and endogenous. Thus, the study merges Johanson (1988) procedure for vector autoregressive model (VAR) specification with co integration and error correction techniques to estimate long-run and short run coefficients, and also the model set from both supply and demand side of the economy by using augmented New-Classical growth model.

There are two major economic agents for a simple economy; namely consumers and producers representing the demand and supply side of the economy. Neoclassical economists initially, assumed that consumers spent their income on consumption and save what are left there after and producers sell part of their produce for consumption and re-invest the remaining (level of saving that determines output). But for the Keynesian economists, it is the level of investment that determines output because all what are saved may not be invested. Moreover, on the demand side countries also make trade among themselves to consume what they can't produce. The net exchange between what they supply and receive is measured by net export (NX). It is equal to exports minus imports (Fischer, 1994). Thus,

$$Y = C + I + G + NX \dots\dots\dots 3.1$$

In the supply side, producers need resources such as labor and capital to produce output. According to neoclassical economists, output is also determined by total factor productivity. Thus, it can be defined as follows (Ibid).

$$Y = f(A, L, K) \dots\dots\dots 3.2$$

Where A represents total factor productivity, L is labor input and K is capital input.

$$Y = A L^{\alpha} K^{\beta} \dots\dots\dots 3.3$$

Log-linearizing both sides, the growth of output can be defined as:

$$y = a + \alpha L + \beta k \dots\dots\dots 3.4$$

The researcher in this study understood that such compilation of factors from the demand as well as supply sides may help policy makers to identify factors from both sides and take measures that can affect either side without affecting the overall performance of the economy. The researcher define the demand as well as the supply side separately and finally put all factors together by augmenting them to determine factors that have net effect on real GDP growth and identify whether real effective exchange rate is among the statistically significant variables or not.

The model in this study may need further modifications by using new-classical augmented growth model up to when appropriate for Ethiopian economy. The standard framework for demand side of a GDP in an open economy is given as:

$$GDP = C + I + G + (X - M) \dots\dots\dots 3.5$$

The term C represents the private sector consumption expenditure. It is a positive function of income and a negative function of real interest rate. The term investment (I) and consumption (C) can be considered as a negative function of real interest rate. Government expenditure (G) is exogenous factor, which depends on government policy. The term NX (X-M), i.e. the external demand for domestic goods and services is postulated as a positive function of real exchange rate. On the basis of these determinants of real GDP,

$$GDP = a - b_1(\gamma) - b_2(q) + b_3(g) + U_t \dots\dots\dots 3.6$$

Where γ refers to real interest rate $= r - p_e$ (r = nominal interest rate and p_e = expected inflation rate), q is real exchange rate, g is government expenditure and U_t is an error term.

Nominal interest rate mainly depend total money supply in the economy. Nominal interest rate is said to be negative function of money supply and GDP is positive function of money supply instead of a negative function of real interest rate. External demand for domestic goods and services is postulated as a positive function of real exchange rate and increase in exchange rate or appreciation of the domestic currency decreases the demand for exports in his model. For this study, by substituted the real interest rate term by money supply term, the researcher define RGDP for the demand side of Ethiopian economy (Thapa, 2002).

On the supply side, Thapa (2002) considered three determinants of real GDP growth; namely labor (L), capital (K) and total factor productivity (TFP),

$$GDP=f(L,K,TFP).....3.7$$

The equation shows that real GDP goes up with the increased use of labor force, capital and increased total factor productivity (TFP). The employment of labor and capital depends on their factor prices, wage and interest rate respectively. Thus, the employment of labor and capital are negatively affected by wage and real interest rate respectively. Thapa (2002) has left out total factor productivity from his analysis for the reason that it is exogenous from the producers' viewpoint.

To understand the impact of real exchange rate augmented Cobb-Douglas production function of real GDP is proposed for supply side determination of the economy. It provides a theoretical explanation for how real exchange rate may have (positive or negative) or multiple effects on economic growth; if real exchange rate appreciation has a negative effect on economic growth by deteriorating international competitiveness in the tradable sector and by causing job losses (following traditional arguments), it may exert a positive effect on economic growth by giving incentives for efficiency improvements *via* workers' motivation and by favoring human capital and capital intensity (Rodrik, 2008). The total effect of real exchange rate on economic growth is theoretically ambiguous, and only an empirical analysis can reveal it.

According to New-classical methodology of growth accounting on supply side, output growth is essentially divided into a component that can be explained by input growth and a 'residual' which captures changes in productivity. Consider the following human capital augmented Cobb-Douglas production function:

$$Y = AK^{\alpha}HL^{1-\alpha}.....3.8$$

Where Y represents real GDP, A is total factor productivity, K is real capital stock, H is human capital stock and L is total employed population. Hence HL is adjusted measure of labor input. By dividing the above function by total population, we get the function of per capita GDP as following:

$$y = AKL^{\alpha}H^{1-\alpha}Em.....3.9$$

Where y represents the real GDP per capita, KL represents capital intensity, and EM represents the share of employed population relative to total population. Thus, the GDP per capita depends on total factor productivity (A), input factors such as capital intensity (KL), human capital (H), and the share of employed population (EM). The main factors which improve total productivity are the size of the tradable sector, such as external openness leading to the development of manufactured exports, the rapid expansion of industry, foreign direct investments, financial institutions development and the promotion of the private sector (Souza, 2007).

The international trade theory (Neoclassical Trade Theory) is based on the principle of comparative advantage of David Ricardo, which states that a country has a comparative advantage in producing a good if the opportunity cost of producing that good, in terms of another good, is lower in that country than it is in other countries. Accordingly, trade can take place due to comparative advantage which is explained through differences in relative factor endowments-factor abundance such that a country will produce and export the good whose production makes intensive use of the relatively abundant factors of production before trade. This country should limit the production and increase the imports of the good whose production makes intensive use of the expensive factor of production before trade (Appleyard, 2006).

A country will gain from trade, whenever its terms of trade (TOT) are different from its own relative prices in autarky. A country with different terms of trade has the advantage of expanding the production of the factor abundant good, exporting the good more acceptable in other countries, and importing the good that is relatively more expensive to produce at home. Countries can achieve better results by specializing themselves in the productive activities in which they are relatively more efficient. The central idea is that the higher specialization and the expansion of the markets, through free trade, would increase efficiency and provide economy of scale gains.

It is known that Ethiopia's economy is an agrarian economy where more than 50% of the total annual output is derived from this sector. Most of the population [more than 80%] is employed in this sector. This implies that cost of employment for labor or the wage rate should be mainly determined in a factor market for the agricultural sector. But a related fact shows that farmers in Ethiopia use mainly family labor the employment of which hardly depends on the level of wage rate or its opportunity cost (if he/she employed in other sector). This shows that output in the agricultural sector in particular and the Ethiopian economy in general may not be directly related

to the level of wage rate rather to the level of employment or quantity of labor employed. Therefore, it is better to consider the level of employment for labor rather than the wage rate in this analysis. By adding real effective exchange rate and labor variables (labor force growth rate is a proxy of labor in the model), financial deepening and openness index (proxy for augmenting additional factor of production), removing wage rate and maintaining real interest rate the researcher develop RGDP model from supply side.

Thus, given that Ethiopia possess an abundant endowment of low qualification labor force; the specialization of the economy in the production of primary products for export combined with the import of manufactured products from the developed countries became a widespread strategy in the country. The basic idea is that the technical progress generated in the developed countries would reach these countries, through reduction of the prices of industrialized goods. Moreover, the lower incorporation of technology in the production of primary products and the increasing demand from the developed countries would contribute to the rise of the prices of these products (Souza, 2007).

As a result of Neoclassical Growth Theory's predictions, the terms of trade Improvement had been occurred and would have catalyzed the development of the country. Nevertheless, owing to its adequacy in explaining what governs movement of goods across countries, it fails to predict deterioration in terms of trade of primary commodities exporting countries and factors that determine movement in terms of trade. Besides the impact of REER to RGDP growth, it is important to look for the role of commercial policy as embodying technological transfer and financial institutions for mobilizing domestic resources. New classical economic theory says that capital and labor have positive effects on overall output due to their externalities of openness index and financial deepening which may have a positive or a negative effect on GDP.

In supply side theoretical specification, the impacts of REER on economic growth examined based on Cobb-Douglas production function by adding openness and financial deepening as additional factors of production. Openness and financial deepening are included as policy and institutional variables affecting the two variables (labor and capital) as capturing international technology diffusion and domestic financial investment environment respectively since,

Trade liberalization: eliminates distortions and leads to a better allocation of the resources; tends to facilitate acquisition of inputs, intermediary products and new technologies; will increase the supply of foreign capital and may raise the domestic welfare; and, if the country was already rich, it allows the countries to explore increasing returns to scale in the R&D sector and will raise terms of trade simply through the expansion of the market (Harrison, 1995).

Financial systems: facilitate the trading, hedging, diversifying, and pooling of risk; allocate resources; monitor managers and exert corporation control; mobilize saving; and facilitate the exchange of goods and services (Wong, 2010). The increased availability of financial instruments and institutions reduces transaction and information costs in an economy.

For this research, by combining those two demand and supply side variables and adding Openness and financial deepening (augmenting factor of production), and exchange rate regime (dummy) variables, the following LOG model is used to determine the net effect of REER on the RGDP growth in Ethiopia.

$$\text{LogRGDP}_t = \alpha + \beta_1 \text{Log(RGDP)}_{t-1} + \beta_2 \text{Log(REER)}_t + \beta_3 \text{Log(MS)}_t + \beta_4 \text{Log(GOV)}_t + \beta_5 (\text{RIR})_t + \beta_6 (\text{APG})_t + \beta_7 \text{Log(OPP)}_t + \beta_8 (\text{FID})_t + U_t \dots \dots \dots 3.10$$

RGDP_t represents real income or real gross domestic product, which refers to the value of all final goods and services produced within the territory of a given country in a given period, usually a year. It will calculate at constant price (Appleyard, 2006).

REER_t represents real effective exchange rate and is expected to have significant and positive/negative coefficient. Increase/decrease in exchange rate is defined as appreciation/depreciation of the domestic currency. It measures the price of the country's goods related to the price of its trading partner. It is a quantitative indicator to assess the competitiveness of country's export to the rest of the world (Bacry, 2008).

MS_t represents broad money (M_2) that refers to "the sum of all currency in the hand of non-bank, public, all deposits subject to check, and all outstanding travellers check" (Pilbeam, 1998). It is assumed to have positive effect on real GDP.

GOV_t represents total (current + capital) government expenditure. It is assumed to have positive and significant effect on real gross domestic product since it is expenditure by the government that may increase aggregate demand initially and boost aggregate supply finally (Appleyard, 2006).

RIR_t represents real interest rate. Increase in interest rate reduces the availability of money and discourages investment and production. Hence, it reduces growth (Marshall, 1985). This means, it is expected to have a negative sign and statistically significant magnitude.

APG_t represents the growth rate of the active labor force in the economy. It is expected to have positive and significant coefficient.

OPP_t refers openness index which measured by amount of exports and imports of goods and services as a percentage of GDP. It shows the relative importance of external trade in a country's economy. Openness affects RGDP growth positively because of the reason that open economy is better to promote external trade than the closed economy through adoption of international technological diffusion (Fugazza, 2004)

FID_t refers share of domestic credit to the private sector as percentage of GDP, as proxy for financial deepening which helps to consider institutional effects on RGDP growth and used as a tool for mobilizing domestic resources and expected to have positive or negative effect on RGDP, and also it used as an augmenting factor (Ibid).

REG_t refers to a dummy variable representing exchange rate regime. It takes a value of one for fixed exchange rate regime during the period 1974-1991 and a value of zero for flexible exchange rate regime during the period 1992-2014.

3.4. Estimation Techniques

3.4.1. Tests for Stationarity

Gujarati (2004), shows that it is possible to use informal (graphical analysis and correlograms) as well as formal methods for a test of stationarity. A graphical method is an informal method used to suspect whether a time series exhibit stationarity or not. This can be done by plotting all the variables against a time period. Such a plot gives an initial clue about the likely nature of the time series. If the trend shows steadily increases or decreases, then one can suspect there will

the possibility of nonstationarity. This shows that the mean increases or decreases overtime. But it can't be a proof of non-stationarity. For this research three formal tests are employed for stationarity; namely the Augmented Dickey-Fuller test, the Phillips-Perron test and the Clemente-Montanes-Rayes test.

A, Augmented Dickey Fuller (ADF) Test:

For this growth model Augmented Dickey Fuller (ADF) test was employed to evaluate the time series characteristics of variables. This test is useful to ascertain the number of times a variable has to be differenced to arrive at stationary. It consists of estimating the following regression:

$$\Delta Y_t = \beta_1 + \beta_2 t + \sigma Y_{t-1} + \sum_{i=1}^m \alpha_i \Delta Y_{t-i} + e_t \dots \dots \dots 3.12$$

Where e_t = pure white noise error terms

Where, $i = 1, 2, 3, \dots, k$

The number of lagged difference terms to include will be determined empirically, the idea being to indicate enough so that the error term in the equilibrium is serially uncorrelated. Stochastic process (time series) said to be stationary if its mean and variance are constant over time and the value of covariance between the two time periods depends only on the distance or gap or lag between the two time periods and not the actual time at which the covariance is computed. While a non-stationary time series have a time-varying mean or a time-varying variance or both.

ADF test is used to identify the existence of the unit root and the order of integration of a variable. A series is said to be integrated of order K if it becomes stationary after differencing it K times. Those Economic variables are stationary called I(0) series and that have to be differenced once stationary are called I(1) series (Gujarati, 2004). This test helps to show both the long run and short run trends in the model. While performing the long run model, if the variables are non-stationary, short run (Error-correction) model will be applied.

B, The Phillips-Perron Unit Root Test:

In the DF test, the error terms u_t is assumed to be independently and identically distributed. The ADF test later on adjusts the DF test to take care of possible serial correlation in the error terms by adding the lagged difference terms of the regressor (Gujarati 2004). Phillips and Perron, on the other hand, proposed a nonparametric method of controlling for serial correlation when testing for a unit root. The PP method estimates the non-augmented DF test equation and modifies the t-ratio of α coefficient, so that serial correlation does not affect the asymptotic distribution of the test statistic. A test of unit root using the Phillips-Perron approach does not require a lag length

determination (Waheed, 2006). The test regression for the PP tests is given by the following equation in Zhijie Xiao and Peter C.B. Phillips (1998).

$$\Delta Y_t = c + \alpha Y_{t-1} + e_t \dots \dots \dots 3.13$$

Where e_t is $I(0)$ and may be heteroskedastic. The PP tests correct for any serial correlation and heteroskedasticity in the errors U_t of the test regression by directly modifying the test statistics. These tests are known as Phillips Z_α and Z_t tests. The Z_t tests allow for a wide class of time series with heterogeneously and serially correlated errors.

C, Unit Root Test that Accounts for Structural Breaks:

According to Christopher (2001), a well-known weakness of the “Dickey–Fuller” style unit root test with $I(1)$ as a null hypothesis is its potential confusion of structural breaks in the series as evidence of non-stationarity. Many econometricians have attempted to deal with this confusion by devising unit root tests that allow for some sort of structural instability in an otherwise deterministic model.

Clemente, (1998), proposed tests that would allow for two events within the observed history of a time series, either additive outliers (the AO model, which captures a sudden change in a series) or innovational outliers (the IO model, allowing for a gradual shift in the mean of the series). The AO model is given as follows.

$$Y_t = \mu + \delta_1 DU_{1t} + \delta_2 DU_{2t} + \hat{y}_t \dots \dots \dots 3.14$$

Where $DU_{mt} = 1$ for $t > T_{bm}$ and 0 otherwise, for $m = 1, 2$. T_{b1} and T_{b2} are the breakpoints, to be located by grid search. The residuals from this regression, $\hat{y}_t$, are then the dependent variable in the equation to be estimated. They are regressed on their lagged values, a number of lagged differences and a set of dummy variables needed to make the distribution of the test statistic tractable. Then after, by regressing $\hat{y}_t$ as dependent variable and others as an independent variable leads. $DT_{bm,t} = 1$ for $t = T_{bm+1}$ and 0 otherwise, for $m = 1, 2$. No intercept is necessary as $\hat{y}_t$ is mean zero. This regression is then estimated over feasible pairs of T_{b1} and T_{b2} , searching for the minimal t -ratio for the hypothesis $\alpha = 1$ which is coefficient of $\hat{y}_{t-1}$; that is, the strongest rejection of the unit root null hypothesis. The value of this minimal t -ratio is compared with

critical values provided by Perron and Vogelsang, as they do not follow the standard “Dickey–Fuller” distribution.

According to Feridun (2009), if the estimates of the Clemente-Montanes-Reyes unit root tests provide evidence of significant additive or innovational outliers in the time series, the results derived from ADF and PP tests are doubtful, as this is evidence that the model excluding structural breaks is misspecified. Therefore, in applying unit root tests in time series that exhibit structural breaks, only the results from the Clemente-Montanes-Reyes unit root tests shall be considered if the two structural breaks indicated by the respective tests are statistically significant.

3.4.2. The Granger Causality Test

Although regression analysis deals with the dependence of one variable on other variables, it does not necessarily imply causation. In other words, the existence of a relationship between variables does not prove causality or the direction of influence. The Granger causality test assumes that the information relevant to the prediction of the respective variables, let it be Y_t and X_t , is contained solely in the time series data on these variables. The test involves estimating the following pair of regressions (Gujarati, 2004):

$$Y_t = \sum_{i=1}^n (\alpha_i X_{t-i}) + \sum_{j=1}^n (\beta_j Y_{t-j}) + \mu_{1t} \dots \dots \dots 3.20$$

$$X_t = \sum_{i=1}^n (\gamma_i X_{t-i}) + \sum_{j=1}^n (\delta_j Y_{t-j}) + \mu_{2t} \dots \dots \dots 3.21$$

Where, it is assumed that the disturbances e_{1t} and e_{2t} are uncorrelated, the nature of causality for two variables is known as bilateral causality. It can be extended to multivariable causality through the technique of vector auto-regression (VAR). The first equation postulates that Y_t is related to past values of itself as well as that of X_t , and the second equation postulates a similar behavior for X_t . Four cases of causality can be identified; unidirectional causality from X_t to Y_t exists if $\sum \alpha_i \neq 0$ in (3.20) and $\sum \delta_j = 0$ in (3.21), unidirectional causality from Y_t to X_t exists if $\sum \alpha_i = 0$ in (3.20) and $\sum \delta_j \neq 0$ in (3.21), feedback, or bilateral causality, is suggested when the sets of Y_t and X_t coefficients are statistically significantly different from zero in both regressions, and independence is suggested when the sets of X_t and Y_t coefficients are not statistically significant in both regressions.

3.4.3. Co-integration Test

Co-integration means that though the variables are individually non-stationary, a linear combination of two or more times series can be stationary. It shows that there is a long run, or equilibrium relationship between the variables. Thus, two types of co integration tests were employed.

First, co- integration test was carried out by using Engle-Granger two-step procedure. The procedure is done as follows. Run OLS regression in level and then save the residual and test whether it has unit root based on ADF test. If the error term is stationary, then we say that the variables are co-integrated. Once it is asserted that the variables are co-integrated, the error term relationship will be used to construct a dynamic error correction model which captures the long run and short run dynamics of the model (Maddala, 1992).

Second, co- integration test implement by using Johansen Maximum Likelihood Method. It applies the maximum likelihood procedure to determine the presence of co-integrating vectors in a vector autoregressive system. Johansen's methodology is given by the following vector autoregressive (VAR) of order p form

$$Y_t = \mu + A_1 Y_{t-1} + \dots + A_p Y_{t-p} + \varepsilon_t \dots \dots \dots 3.15$$

Where Y_t is an $n \times 1$ vector of variables that are integrated of order one $[I(1)]$, μ is a vector of constant, ε_t is an $n \times 1$ vector and $A_1, A_2, \dots, A_p$ are $P \times P$ matrices of estimable parameters. In the original work of Johansen (1990), the model incorporates a vector of non-stochastic variables (D_t) orthogonal to the constant term such as seasonal dummies, 'dummy type' variables and/or stochastic 'weekly exogenous' variables. Thus, the model can also be given as:

$$Y_t = \mu + A_1 Y_{t-1} + \dots + A_p Y_{t-p} + \Phi D_t + e_t \dots \dots \dots 3.16$$

In general, time series are economic variable are non-stationary processes and the above VAR model is expressed in its first differenced form in Erik (2007) as follows.

$$\Delta Y_t = \Pi Y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta \sum_{j=1}^n (\beta_j Y_{t-j}) + \gamma_t - 1 + \mu + \Phi D_t + e_t \dots \dots \dots 3.17$$

$$\text{Where: } \Pi = \sum_{i=1}^p (A_i - 1) \text{ and } \Gamma_i = \sum_{j=i+1}^p (A_j)$$

Γ and Π represent short run adjustment and long run relationship among the y_t variables respectively. The rank of Π shows the number of linear combinations of the y_t variables that are stationary.

According to Johansen, (1990), there are three possibilities regarding the rank of the coefficient matrix Π . These are:

If $\text{Rank}(\Pi) \approx n$, i.e. the matrix Π has full rank, then it indicates that the vector process X_t is stationary. It means that there is co-integration.

If $\text{Rank}(\Pi) \approx 0$, i.e. the matrix Π has no rank, then the model in equation (3.17) corresponds to a traditional differenced vector time series model. It means that there is no co-integration among the variables.

If $0 < \text{rank}(\Pi) \approx r < n$, then it implies that there are $n \times r$ matrices α and β such that $\Pi = \alpha\beta'$ and $\beta'y_t$ is stationary.

ris the number of co-integrating relationships, the elements of α are known as the adjustment parameters in the vector error correction model and each column of β is a co-integrating vector. It can be shown that for a given r , the maximum likelihood estimator of β defines the combination of y_{t-1} that yields the r largest canonical correlations of Δy_t with y_{t-1} after correcting for lagged differences and deterministic variables when present. Johansen proposes two different likelihood ratio tests of the significance of these canonical correlations and there by the reduced rank of the Π matrix: the trace test and maximum eigen value test, shown below (Erik, 2007).

$$J_{\text{trace}} = -T \sum_{j=r+1}^n \ln(1 - \lambda_j) \dots \dots \dots 3.18$$

$$J_{\text{max}} = T \ln(1 + \lambda_{r+1}) \dots \dots \dots 3.19$$

Where T is the number of realization and λ_i is the i^{th} largest canonical correlation. The trace test tests the null hypothesis of r co-integrating vectors against the alternative hypothesis of n co-integrating vectors where n is the number of endogenous variables, for $r=0,1,2,\dots,n-1$. The maximum eigen value test, on the other hand, tests the null hypothesis of r co-integrating vectors against the alternative hypothesis of $r + 1$ co-integrating vectors. Neither of these test statistics follows a chi square distribution in general; asymptotic critical values are given by Johansen, (1990).

3.5. Error Correction Mechanism (ECM)

If two variables are not co-integrated or proved to have no long run relationship, the testing procedure will stop there and one will not go for the construction of an error correction model. But if they are co-integrated or proved to have a long run relationship one needs to go for an error correction mechanism. The error correction mechanism (ECM) is a mechanism used to correct any short run deviation of the variables from their long run equilibrium.

The error correction mechanism (ECM) first used by Sargan and later popularized by Engle and Granger corrects for disequilibrium. An important theorem, known as the Granger representation theorem, states that if two variables Y and X are co-integrated, then the long term or equilibrium relationship that exists between the two can be expressed as ECM (Gujarati, 2004). This means one shall go for the construction of an error correction model if and only if the two variables are co-integrated. The ECM can be given

$$\Delta Y_t = \alpha_0 + \alpha_1 \Delta X_t + \alpha_2 u_{t-1} + \varepsilon_t \dots \dots \dots 3.22$$

Where, Δ denotes the first difference operator, ε_t is a random error term, and $u_{t-1} = (Y_{t-1} - \beta_1 - \beta_2 X_{t-1})$, that is, the one-period lagged value of the error term from the co-integrating regression.

This ECM equation states that ΔY_t depends on ΔX_t and also on the equilibrium error term. If the latter [error term] is non-zero, the model is out of equilibrium. Suppose ΔX_t is zero and u_{t-1} is positive. This means Y_{t-1} is too high [above] to be in equilibrium. Since α_2 is expected to be negative, the term $\alpha_2 u_{t-1}$ is negative and, therefore, ΔY_t will be negative to restore the equilibrium. That is, if Y_t is above its equilibrium value, it will start falling in the next period to correct the equilibrium error; hence the name ECM. By the same token, if u_{t-1} is negative (i.e., Y_t is below its equilibrium value), $\alpha_2 u_{t-1}$ will be positive, which will cause ΔY_t to be positive, leading Y_t to rise in period t . The absolute value of α_2 determines how quickly the equilibrium is restored (Gujarati, 2004).

3.6. Impulse Response and Variance Decomposition

The Impulse Response Function is effect of a shock of size δ hitting a system at time t on the state of the system at time $t+n$, given that no other shocks hit the system. More formally, the path followed by the variable $y_{m,t}$ in response to a one time change in $y_{j,t}$, holding the other variables constant at all times t , is called Impulse Response Function. The Impulse Response Function

analysis is used in dynamic models such as a VAR to describe the impact of an exogenous innovation in one variable on the other variables of the system. If the innovations to ε_t are contemporaneously uncorrelated, interpretation of the impulse response is straightforward. The i^{th} innovation $\varepsilon_{i,t}$ is simply a shock to the i^{th} endogenous variable $y_{i,t}$. Innovations, however, are usually correlated, and may be viewed as having a common component which cannot be associated with a specific variable (Polasek, 2003).

While impulse response functions trace the effects of a shock to one endogenous variable on the other variables in the VAR, variance decomposition separates the variation in an endogenous variable into the component shocks and provides information about the relative importance of each random innovation in affecting the variables in the VAR. To show how the explanatory variables affect dependent variable in the short-run and long-run for a given period, Presenting final results on interaction between dependent and independent variables needed. However, both the short-run and long-run analyses do not present how the adjustments are made each time and the final results are reached (Ibid). Consider a VAR of order P :

$$y_t = \beta x_t + A_1 y_{t-1} + \dots + A_p y_{t-p} + \varepsilon_t \dots \dots \dots 3.23$$

Where y_t is a k vector of endogenous variables, x_t is a d vector of exogenous variables, and ε_t is a vector of innovations with variance matrix in Ω . Assuming the VAR is invertible, the moving average representation is given as follows:

$$\begin{aligned} \tilde{y}_t &= A_1 \tilde{y}_{t-1} + \dots + A_p \tilde{y}_{t-p} + \varepsilon_t \\ &= (I - A_1 L - \dots - A_p L^p)^{-1} \varepsilon_t \\ &= (I + \psi_1 L + \psi_2 L^2 + \dots) \varepsilon_t \dots \dots \dots 3.24 \end{aligned}$$

Where, $\tilde{y}$ is the residual from regressing y on the exogenous variables x . The coefficients ψ of the moving average representation are obtained as follows. The VAR coefficients A and the moving average coefficients ψ must satisfy the relation:

$$\begin{aligned} (I - A_1 L - \dots - A_p L^p)(I + \psi_1 L + \psi_2 L^2 + \dots) &= I \\ (I + C_1 L + C_2 L^2 + \dots) &= I \end{aligned}$$

Where, $C_1 = C_2 = \dots = 0$. These conditions on C s recursively define the moving average coefficients:

$$\psi_1 = A_1$$

$$\psi_2 = A_1\psi_1 + A_2$$

$$\psi_s = A_1\psi_{s-1} + A_2\psi_{s-2} + \dots + A_p\psi_{s-p}$$

The orthogonalized impulse response at lag s is given by $\psi_s P$ where P is a $k \times k$ lower triangular matrix with the standard deviation of ε along the main diagonal such that $PP' = \Omega$. The row i and column j element of $\psi_s P$ is the effect of a one standard deviation orthogonalized shock to y_{ij} on $y_{i(t+s)}$, holding all other shocks at all dates constant.

The variance is decomposed with the s -period ahead forecast error from a VAR as follows.

$$\varepsilon_{t+s}\psi_1\varepsilon_{t+s-1}\psi_2\varepsilon_{t+s-2} + \dots + \psi_{s-1}\varepsilon_{t+1} \dots \dots \dots 3.25$$

With mean squared errors:

$$\begin{aligned} &= (\Omega + \psi_1\Omega\psi_1' + \dots + \psi_{s-1}\Omega\psi_{s-1}') \\ &= (PP' + \psi_1PP'\psi_1' + \dots + \psi_{s-1}PP'\psi_{s-1}') \\ &= \sum_{k=0}^n (P_j P_j' + \psi_1 P_j P_j' \psi_1' + \dots + \psi_{s-1} P_j P_j' \psi_{s-1}'). \dots \dots \dots 3.26 \end{aligned}$$

Where, p_j is the j th column of P . The expression in parentheses is the contribution of the j th orthogonalized innovation to the mean squared error of the s -period ahead forecast.

Generally, the impulse response functions and the variance decomposition show how the importance of each independent variable changes during the period in affecting the dependent variable. An impulse response function traces the effect of a one standard deviation shock to one of the exogenous variables on the current and future values of the endogenous variable. A shock to the i^{th} variable directly affects the i^{th} variable and then transmitted to all of the endogenous variables through a dynamic structure of the VAR. Variance decomposition provides a different method of depicting the system dynamics. It decomposes variation in an endogenous variable into the component shocks to the endogenous variables in the VAR. It gives information about the relative importance of each random change in the explanatory variables in the VAR.

CHAPTER FOUR

EMPERICAL ANALYSIS AND INTRPRETETION

4.1. Descriptive Analysis

4.1.1. Assessment of the Data Set

Constraints for empirical studies in Ethiopia are regarding the consistency and reliability of time series data provided by different institutions. For the same variable significantly different data are provided by different organizations. There is significant disparity between the data set provided by governmental organizations themselves. Like, National Bank of Ethiopia (NBE), Central Statistics Authority (CSA) and Ministry of Finance and Economic Development (MoFED) sometimes provide different data for the same macro variable.

However, compared to the data provided by a group of international organizations such as the International Financial Statistics (IFS) or World Bank/International Monetary Fund (IMF), the disparity among the data provided by the group of governmental organizations is less significant. The problem may arise due to the use of different methods or the inclusion of different components by different organizations for the collection or calculation of the same macro variables. To reduce the extent of the problem and maintain the consistency of the data set, the researcher prefers to use data provided by governmental organizations namely; the National Bank of Ethiopia (NBE), Ministry of Finance and Economic Development (MoFED) and Central Statistics Authority (CSA).

The growth rate of real GDP for whole period was calculated from its main raw data source (Ministry of Finance and Economic Development (MoFED)). There is no consensus has yet emerged on how to measure economic openness. The most obvious indicator is the sum of exports and imports divided by GDP. It is used to measure the level of a country's integration in the world economy. This approach is simple and still popular in a variety context and also it applied for this research.

To assess the development of the financial sector a number of indicators are considered to find the relationship between financial development and economic growth. Among those, share of domestic credit to the private sector as percentage of GDP considered as an indicator of financial deepening for this research. Domestic credit issued to the private sector refers to the financial

resources provided to the private sector, such as through loans, purchase of non-equity securities and trade credit and other account receivables, that establish a claim for repayment.

4.1.2. Relationship between Exchange rateand Economic Growth

A,Exchange Rate and Economic Growth:

Real effective exchange rate is defined as a composite of nominal exchange rate, price indices (foreign and domestic) and trade weights. Any change in either price indices and/or trade weights of trading partners has the power to change the real effective exchange rate. Changes in one of these factors could be the reason for the variation of real effective exchange rate for the period prior to 1992 though the nominal exchange rate was fixed. After reform period, the nominal exchange rate is partly determined by the demand for and supply of foreign exchange among commercial banks. Therefore, any change in demand for and supply of foreign exchange of the inter-banks market, also affects the real effective exchange rate during this period.

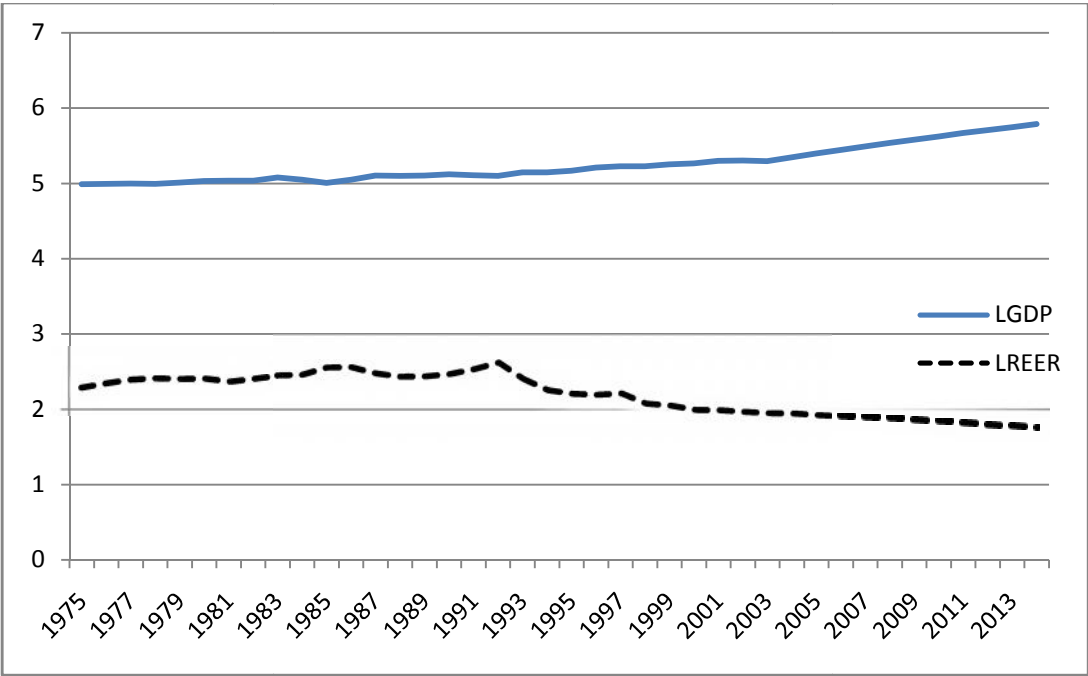


Fig. 4.1 Real effective exchange rate and economic growth

Decrease/increase in REER represents depreciation/appreciation of the domestic currency in this study. From Fig. 4.1 except for few years, a decrease/depreciation of the real effective exchange rate is accompanied by an increase in the real gross domestic product. For the first few years (up to 1983s) the real effective exchange rate rises while, real gross domestic product decline. For the next four years (up to 1989s), the real effective exchange rate decrease/depreciate with minor

fluctuations and reaches its minimum on that regime, while the real gross domestic product increase and reaches its maximum point in the same year. Then, the real effective exchange rate rises/appreciates suddenly for some years until the reform period up to the reform period (1992). After the reform period, the real effective exchange rate declines/depreciates rapidly and keeps a downward trend (with only minor peak in the 1997s) until the early years of 2014s. The real gross domestic product increases/decreases in the period the real effective exchange rate shows depreciation/appreciation until the year-2014s. For the post reform period, the real gross domestic product grows steadily and the real effective exchange rate depreciates continuously. However, recent year steady growth of real gross domestic product not only gains by continues devaluation real effective exchange rate but also increasing contribution of the service sector and industrial sector to on economic activities of Ethiopia.

B.Real Interest Rate and Economic Growth:

Real interest rate is among the factors that affect the growth of real gross domestic product i.e. the net impact of change in real interest rate on GDP can be positive or negative. Decrease in real interest rate encourages investment and increases output. However, it may discourage saving and result in short of supply of funds for the investors. Therefore, decrease in real interest rate encourages investment and increases output only if it is not lowered to the extent that discourage suppliers of this fund for the borrowers. If it is lowered below the level that interests the lenders, the investors cannot get sufficient funds for investment. In this case, decrease in real interest rate may reduce economic growth.

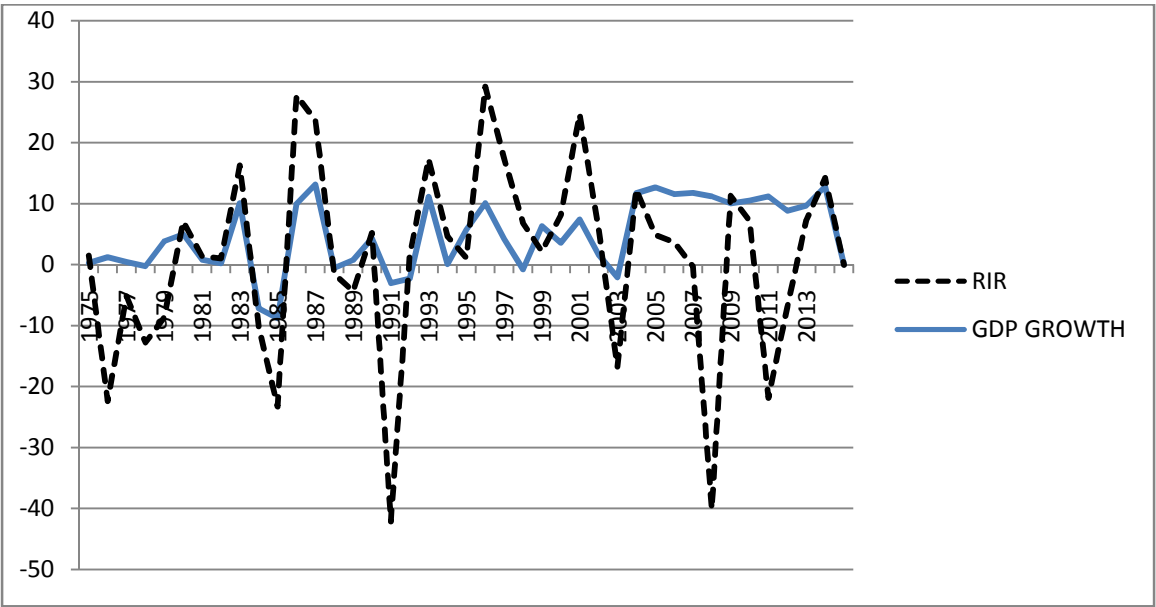


Fig. 4.2 Real Interest rate and economic growth

In Ethiopia those two variables almost follow the same fluctuating trend (up and down). Economic growth is almost negative in those periods when the real interest rate touches lowest value. Fig.4.2 shows only exception when economic growth become positive in 1976, 1977 and from 2005 up to 2012 even though the real interest rate set on minimum point. In the remaining period, it seems true that the two series follow similar trend.

C, Government Expenditures and Economic Growth:

In Ethiopia, public spending increases at a fasterrate than the growth rate of real GDP in the period under consideration. This show, higher growth rate of public expenditure may be associated with key role government plays in the economy. In a developing country like Ethiopia, governments must have significantshare in the employment and investment sector.

In broader terms, government expenditure has two components, recurrent and capitalexpenditure. Capital expenditure mayloosely to be taken to mean government expenditure for economic and socialdevelopment expressed in financial terms. On the other hand, recurrent expenditure (RE)is related to financial out lays by the government to run state administration of government defense (security), and provision of social and economic services. Unlikecapital expenditures (CE), recurrent expenditures are mainly for governmentconsumption.

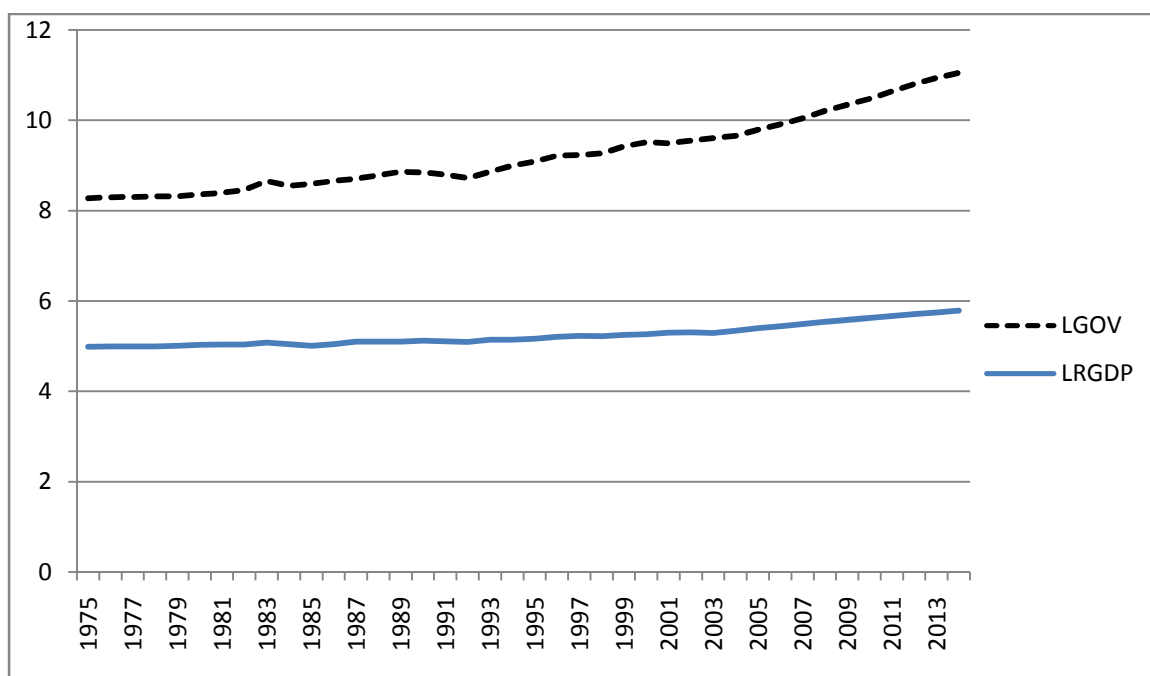


Fig. 4.3 Government Expenditures and economic growth

During those three regimes, the share of recurrent expenditure to GDP was higher than that of capital expenditure. The share of recurrent expenditure to Total Government Expenditure is decreasing sharply from the Imperial period to Military regime and then EPRDF but the percentage share of capital expenditure to total government expenditure is increasing at an increasing rate. The behavior of government expenditure during the Imperial period emphasis was given for recurrent expenditure while public investment was minimal, since recurrent expenditure for the year 1960/61 was 100% of total government expenditure and also there was no capital expenditure till 1964/65 which leads to lower contribution on rate of growth of RGDP.

At the end of the military regime's period (1990/91) government increased expenditure on General services (defense) results a negative impact by decreasing Real gross domestic product (RGDP) of the country. The share of government expenditure observed a growth rate as high as in the year 1982/83 from the preceding year 1981/82. In general, during this period increment in recurrent expenditure was very fast as compared to capital expenditure and this can be attributed to the case of Somalia and civil war and also have a cause for dawn fall of national income.

On current regime, government expenditure follows four patterns; for the period 1992/93-1997/98 which the share of recurrent and capital expenditure is nearly the same, in 1991/92, more than half of total government expenditure was recurrent expenditure. The trend increases at a decreasing rate and in 1997/98 reached lower share of the total expenditure of the year.

However, during the Ethio-Eritrea war (1998/99 and 1999/00) the share of recurrent expenditure took the highest, showing that most of the government budget was allocated for defense. During 2000/01-2003/04 the share of recurrent expenditure was more than half of the total government expenditure. Again during 2004/05-2006/07 the share of recurrent and capital expenditure from the total spending was nearly equal. On the last pattern, at the end of the year 2007/08 there was dynamic change in budget allocation that is capital budget allocation more than half of total government expenditure and reached its maximum the end of the year 2010/11. This was a new history for budget allocation during the three regimes and indicates government policy shift of budget allocation for investment to reduce poverty and promotes growth in the country. As we have seen from the Fig. 4.3 all those current regimes capital expenditures moves RGDP of the country on the upward direction of the graph especially from 2005/2006 onwards.

To sum up, throughout the Imperial period the ratio of government spending and grows by more than one hundred percent in the Dergue regime. In the Derg regime government spending show a tremendous fluctuation ranging from a high in 1988/89 and cause for lowerrate GDP growth in 1974/75. On average, government spending on capital creation was lower over the seventeen years of the regime. The share of government spending on average increases from time to time,especially on capital creation from the year 2000/01 up to now which goes hand in hand with Growth of RGDP.

D,Trade Openness and Economic Growth:

Openness indicates the situation in which the country become more open for trade with the rest of the world. It covers trade liberalization like exchange rate determination, imposing quota, tariffs and other restrictions which have impact on the overall trade of Ethiopia. Regarding the degree of openness, which usually computed by the simple ratio of the value of the country’s foreign trade (composite) to its total domestic product (GDP), the trend in the level of openness has shown a general improvement, compared with the previous situation of the country.

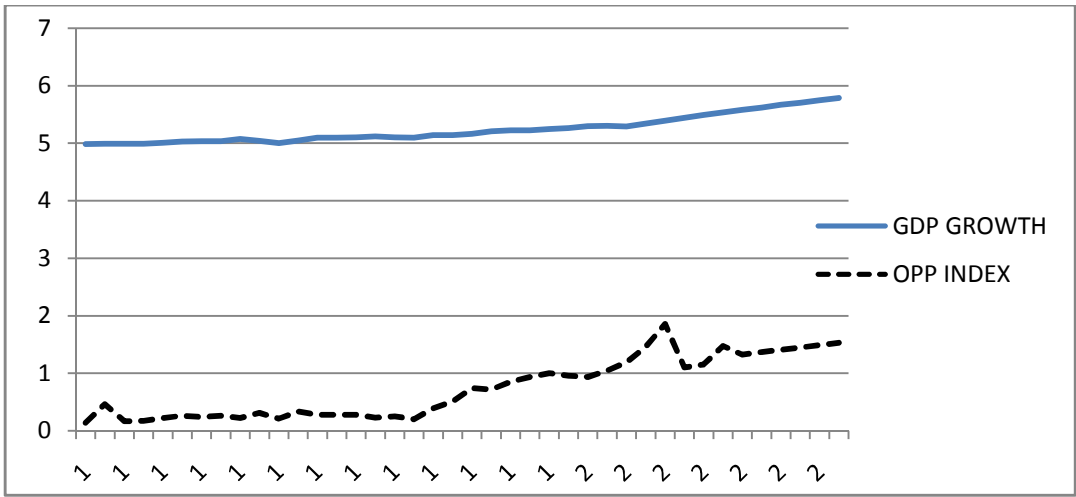


Fig. 4.4 Openness index and Economic growth

Now a day Ethiopia follows an open economy. This can be evidenced from the fact that has been undertaken since 1992/93, which has resulted in a significant reduction in both nominal tariff levels and dispersion. For example, the tariff rates of 0-230% during the per-reform period have narrowed down to 0-80% in 1995 and, then, to 0-35% in 2002, and also the average (un-weighted tariff rate) have also declined from 28.9% in 1995 to 17.5% in 2002. As we have seen from the Fig 4.4, due to redactions of tariff for those year the relationship between OPP index and Growth of GDP have the same upward trend except the year 2006.

In Ethiopia, totally import- substitution strategy is largely disastrous. This does not mean however, that the country should necessarily abandon all forms of protection in favor of free trade, which is theoretically, designed to increase the efficiency of national industries through competition with the outside world. The openness (trade liberalization) is looked from the managed floating exchange rate situation, trade policy (import-substitution or other trade restriction policies). The effect of liberalization in Ethiopia is that it improved economic growth (measured by real GDP) and result an export boom relative to its previous position.

E, Broad Money Supply and Economic Growth:

Broad money consists of both narrow money and quasi-money, where narrow money contains currency outside the bank and net demand deposits and quasi-money includes both saving and time deposits. It indicates the degree of monetization with respect to the real economy. Basically, broad money can be determined by net foreign assets and domestic credit. A higher MS/GDP ratio suggests that a larger greater financial intermediary development. During the Derg period, foreign reserve accounted for less percent of the monetary base, and growth in broad money supply was largely determined by domestic credit mainly to the government.

As we have seen from the Fig 4.5, between 1981/82 and 1985/86, money supply increased and further to higher percentage by 1989/90. During the last two years of Derg, broad money supply further expanded due to the growth in the net claims of banks on the central government. After the economic reform, efforts have been made to make growth of broad money supply in line with nominal GDP growth.

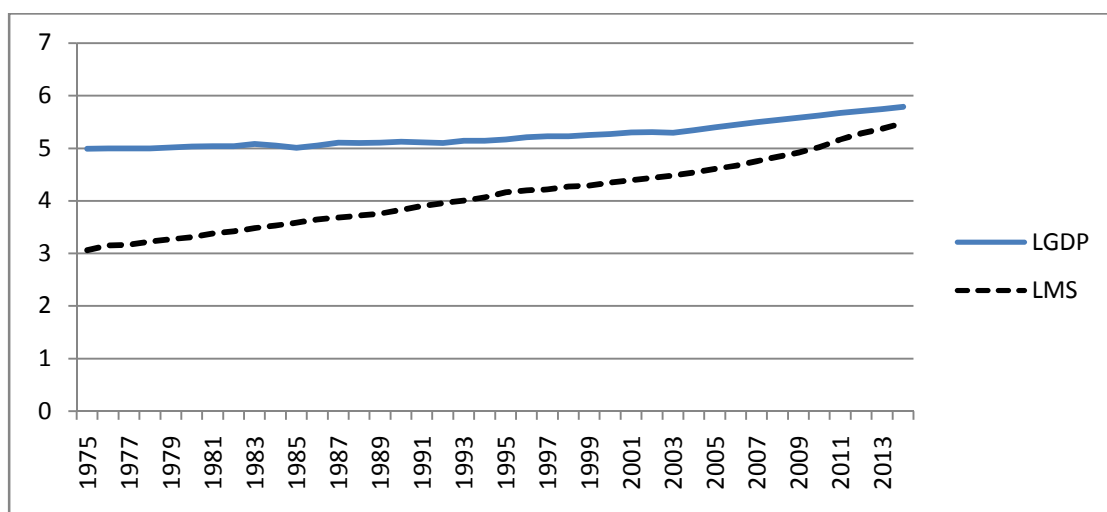


Fig. 4.5 Broad money supply and economic growth

A relatively faster growth in broad money has been witnessed in 1992/93 since the beginning of the reform. This has been partly justified by substantial increase in credit expansion to the private sector during the period. Broad money supply increase continuously onward from 2006/07 up to now, which was due from increase in net foreign asset and domestic credit in the country leads to increase in RGDP.

F, Financial Institution Development and Economic Growth:

Mostly the financial sector during 1974-1990 served the state and the development of the socialized sector. Financial intermediation and the development of the financial sector were affected due to poor resource utilization of the public sector on the one hand and the performance of this sector at the expense of the private sector. Commercial bank of Ethiopia was the dominant bank accounting for almost all of the total deposits mobilized in the country during pre-reform period. The government on the other hand controlled the financial sector using direct financial instruments such as lowering the interest rate and discriminating the allocation of foreign exchange and credit. The foreign exchange earnings were surrendered to the NBE and the credit policy also favored the expansion of the socialized sector.

Domestic credit issued to the private sector refers to the financial resources provided to the private sector, such as through loans, purchase of non-equity securities and trade credit and other account receivables, that establish claim for repayment. During the Derg regime, from Fig 4.6 total domestic credit growth was accounted almost all to central government during the period 1980/81-1990/91. On the other hand, bank credit to the private sector grew slowly because of the restriction imposed on the economic activities of the private sector.

After the reform, the Transitional Government of Ethiopia (TGE) took over and restructured the system to a market-based economy. It reformed the financial sector by granting power to the NBE and strengthening its capacity, granting commercial banks with adequate autonomy to operate within the general financial policy framework provided by the NBE and introduce a competitive bank and non-bank financial sector by allowing private sector participation in the sector. In 1994 the private sector was allowed to engage in the banking and insurance business. Accordingly, during the fiscal year 2013/14 the number of banks operating in the country reached 15 with 1100 branches. These banks play a major role in the development of the financial sector. The efficiency of these banks in turn defines the strength of the economy.

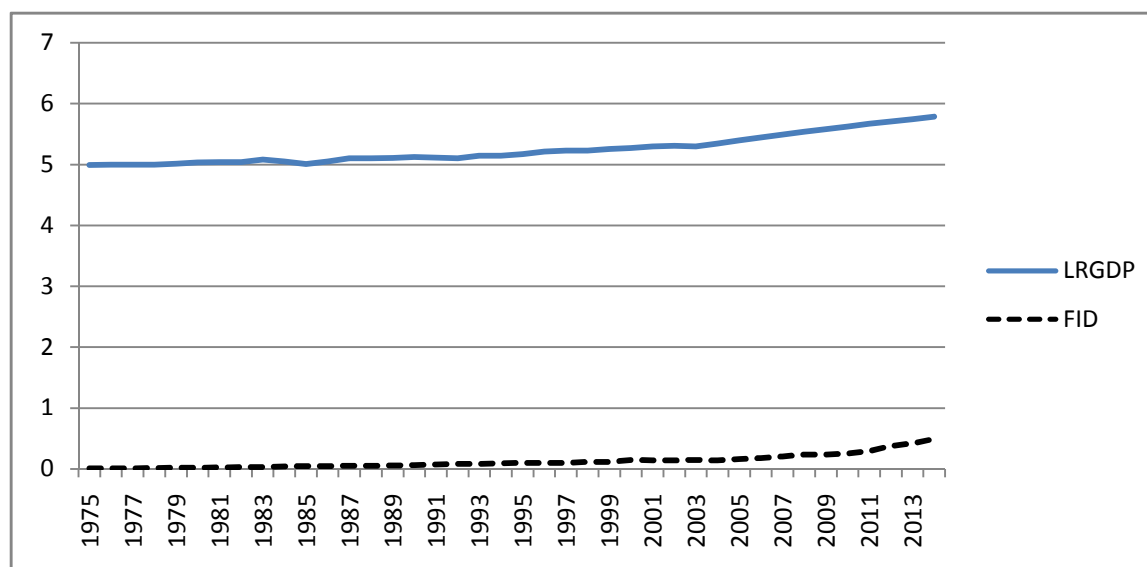


Fig. 4.6 Financial institution development Government Expenditures and economic growth

Unlike the Derg period, bank credit to the private sector became a major determinant for the expansion of the monetary base. As we have seen from the Fig, 4.6, credit disbursed to non-government borrowers (private domestic credit supply) accounted for much higher than prior to 1991/92 before the reform period. Since, the introduction of private banks in the country gradually led to improved banking services, including features as longer banking hours, ATMs, electronic banking and improved facilities. These private banks in turn focused on fast growing sectors in order to promote economic growth. But the Ethiopian banking industry is still small despite the increase in the capital base when compared to other countries. Although bank branches are not expanding at a fast pace and are not still accessible to most of the rural area. This can be justified by the low geographic as well as demographic penetration.

4.2. Empirical Analyses

4.2.1. Summery Statistics and Multi-Collinearity Test

This research empirical analysis started by presenting summary statistics of variables that used to define real GDP growth. It shows the number of observations, means, standard deviations, variance, minimum and maximum values of each variable. All the variables have 40 observations except active labor force growth. As we have seen from table 5.1, almost all variables have minimal standard deviations. The maximum and the minimum values show that the range is small and almost similar over all variables except real interest rate (RIR) and active population growth (LAPG).

Table 4.1: Summary statistics

Variable	N	Max	Min	Sd	Variance	Mean	Range
LRGDP	40	4.8662	3.9184	0.0183	0.05474	4.6493	35.1338
RIR	40	22	-46	12.6732	54.4384	-3.6683	18
LFID	40	-0.5997	-2.9778	0.6392	0.4849	-1.5383	40.5997
LOPP	40	0.5748	-0.5731	0.6362	0.8494	-0.5383	39.4252
LAPG	39	22.7874	-5.684	5.7355	34.6747	3.6464	16.2126
LREER	40	2.8504	0.6484	0.3278	0.7926	2.6648	37.1496
LGOV	40	3.7649	2.7963	0.5289	0.0648	3.0436	36.2351
REG	40	1	0	0.6392	0.7492	0.575	1
LMS	40	5.8764	3.0037	0.6892	0.7493	4.4272	34.1236

Next to summery statistics setting correlation matrix may give a clue on identifying variables to be considered in the main analysis. It shows whether the degree of correlation between any two explanatory variables is high or low. If two explanatory variables are highly (perfectly) correlated, it would be difficult to identify the independent impact of each explanatory variable on the dependentvariable. The correlation matrix suggests the need for exclusion of one or more of the variables with the highest value in the matrix.Table 4.2 test of correlation matrix propose exclusionof log of broad money supply (LMS) whichhas the highest score with at least two variables in the matrix. However, the correlation matrix provides only a clue.

Table 4.2: Correlation matrix between the independent variables

Variable	RIR	LFID	LOPP	LAPG	LREER	LGOV	LMS	LLRGD
RIR	1.0000							
LFID	-0.0170	1.0000						
LOPP	-0.1000	0.0677	1.0000					
LAPG	0.1430	0.0016	-0.0568	1.0000				
LREER	-0.1691	-0.1934	-0.1543	-0.1574	1.0000			
LGOV	-0.0493	0.0149	0.7439	-0.1764	-0.2708	1.0000		
LMS	-0.1568	0.9245	0.9862	-0.0864	-0.1705	0.5898	1.0000	

Consequently,this test of multi-collinearity givessuggestionfor those variables which need further investigation with VIF value of greater than ten. The level oftolerance defined as $1/VIF$ is also used to check the degree of collinearity among the independent variables. A variable with tolerance value lower than 10 percentconsidered as linear combinationof other independent variables. On the basis of this test, one variables excluded from the analysis. To maintain the validity ofthe model with representative variables, the exclusion of one variable is made by taking in toaccount the presence of another variable representing itsbehavior in the model. This

means the exclusion of money supply variable (LMS) in the first step does not affect the validity of the model as long as real interest rate is maintained in the model.

With the help of the VIF criteria, one variable namely money supply (LMS) is excluded from the model. This improves the overall performance of the model from a VIF value of 22.01 in the presence of the above variables to a VIF value 3.19 in their absence. The exclusion of one variable changes the order of importance of each variable in the exclusion process. Finally, the variables which remain in the system are found to have an average tolerance value of greater than 20 percent (VIF value less than 5).

Table 4.3: Variance Inflation factors of a full and reduced model

Full Model			Reduced Model		
Variable	VIF	1/VIF	Variable	VIF	1/VIF
LMS	120.9	0.0083	LOPP	4.70	0.2128
LFID	49.76	0.0201	REG	4.68	0.2137
LOPP	12.65	0.0791	LGOV	4.61	0.2169
REG	5.77	0.1733	LFID	3.67	0.2725
LGOV	4.91	0.2037	REAL	2.34	0.4274
RIR	1.23	0.8130	LREER	1.22	0.8197
LREER	1.78	0.5618	LAPG	1.09	0.9174
LAPG	1.1	0.9081	Mean VIF	3.19	
Mean VIF	22.01				

4.2.2. Unit Root Tests

While working with time series data, testing for stationarity is a prerequisite. Unit root tests are used to test whether a series is stationary or not. If a series is not stationary, it is said to have a unit root. For a series to be stationary, its mean and variance have to be constant over time. According to Gujarati (2004), a study on the stationarity of variables is relevant for the reason that it incorporates important behavior for these variables. A time series is required to be stationary to make easier the study of the behavior of variables in the long run. If a time series is non-stationary, the behavior of the series can be studied only for the time period under consideration. As a consequence, it is not possible to generalize it to other time periods. Therefore, for the purpose of forecasting, non-stationary time series are of little practical value. These call for the need to test for stationarity of the series prior to detail analysis of the variables.

To examine the behavior of the series, this study uses Augmented Dickey-Fuller test (ADF), the Phillips-Perron test (PP) and the Clemente-Montanes-Rayes test. The first two tests allow for three options in the conduct of the tests; without intercept and trend, with only intercept and with both intercept and trend. The Clemente-Montanes-Rayes does not allow for such options and conducts the test only at 5% level of significance.

As we have seen from Table 4.4 below, the Augmented Dickey-Fuller and the Phillips-Perron tests provide identical results for all variables. According to these tests, all variables are integrated of order one $I(1)$ except real interest rate (LRIR) and openness index (LOPP) which are integrated at $I(0)$. They show that all variables are non-stationary at levels except real interest rate and openness index (stationary at level). The result of the test for real interest rate and openness index needs some differencing in the process of deriving the variable.

Augmented Dickey-Fuller and the Phillips-Perron of unit roots had better to be supplemented by other tests as they did not account for structural breaks. The tests confuse structural breaks with non-stationarity. This means a truly stationary variable with some structural breaks may be labeled as non-stationary. Among the test of unit root that account for structural breaks the Clemente-Montanes-Rayes test is used in this study.

In the Clemente-Montanes-Rayes test of unit root the null hypothesis is (unit root) the same as the Augmented Dickey-Fuller and the Phillips-Perron tests provide. The null hypothesis is rejected if the calculated t-statistics is greater than (in absolute value) the 5% critical value given by the test. The test allows for two types of causes of structural breaks known as additive outliers (which capture sudden changes in the mean of a series) and innovative outliers (which capture gradual shift in the mean of a series). The results derived from ADF and PP tests are doubtful if the estimates of Clemente-Montanes-Rayes test provide evidence of significant additive and/or innovative outliers in the series. However, the results of this test are valid if both structural breaks are significant under at least one of the alternatives.

Clemente-Montanes-Rayes test shows that the test is not applicable for three variables namely; real effective exchange rate (LREER), financial deepening (LFID) and active labor force growth (LAPG) as one or more of the structural breaks are not significant.

Table 4.4: Augmented Dickey-Fuller and Phillips-Perron unit root tests

Variables	Specification	ADF statistics	PP statistic	Order of
LRGDP	Without C and T	2.159	2.151	I(1)
	With C	1.052	1.028	
	With C and T	-1.246	-1.284	
DLRGDP	Without C and T	3.172**	2.859**	
	With C	3.915**	2.962*	
	With C and T	4.287**	3.590*	
RIR	Without C and T	-4.997**	-4.997**	I(0)
	With C	-5.248**	-5.248**	
	With C and T	-5.260**	-5.260**	
LGOV	Without C and T	2.273	2.273*	I(1)
	With C	0.186	0.186	
	With C and T	-1.859	-1.859	
DLGOV	Without C and T	2.931**	2,468*	
	With C	3.756**	3.338*	
	With C and T	4.305*	3.806**	
LREER	Without C and T	-0.623	-0.623	I(1)
	With C	-1.586	-1.551	
	With C and T	-1.85	-1.821	
DLREER	Without C and T	-3.357**	-3.433**	
	With C	-3.906**	-5.684**	
	With C and T	-4.073*	-5.850**	
LFID	Without C and T	-1.574	-1.876	I(1)
	With C	-1.748	-1.765	
	With C and T	-2.746	-2.657	
DLFID	Without C and T	4.620**	8.854**	
	With C	-3.868**	-7.115**	
	With C and T	4.620**	5.706**	
LAPG	Without C and T	-1.765	-1.765	I(1)
	With C	-1,657	-1.657	
	With C and T	-1.878	-2.158	
DLAPG	Without C and T	-3.120**	-5.763**	
	With C	-4.928**	-7.878**	
	With C and T	-4.918**	-7.814**	
LOPP	Without C and T	-2.650**	-2.657**	I(0)
	With C	-3.765**	-2.992*	
	With C and T	-4.199**	-3.601*	
		1% Critical value	5% Critical value	
Critical value at level	Without C and T	-2.618	-1.949	
	With C	-3.593	-2.932	
	With C and T	-4.19	-3.519	
Critical value at first difference	Without C and T	-2.62	-1.949	
	With C	-3.597	-2.934	
	With C and T	-4.196	-3.522	

*and** indicates the rejection of the null hypothesis (unit root) at 5% and 1% respectively.

For the remaining variables the test provides the same result as the ADF and PP tests except for openness index (LOPP) and real interest rate (RIR). Accordingly, ADF and PP test for openness index (LOPP) and real interest rate (RIR) is stationary at level while in the Clemente-Montanes-Rayes test, it is non-stationary at level. The Clemente-Montanes-Rayes test shows that the four variables (LRGDP, LOPP, LRIR and LGOV) for which the test is applicable are non-stationary. The ADF and PP tests showed that the other variables for which Clemente-Montanes-Rayes test is not applicable (LREER, LAPG and LFID) are also non-stationary. Therefore, combining the results of the three tests, all the variables are (non-stationary) integrated of order one $I(0)$.

Table 4.5: Clemente-Montanes-Rayes unit root test

Variables	Additive Outliers		t-statistics	Innovative Outliers		t-statistics	Order of integration
	TB1	TB2		TB1	TB2		
LRGDP	1999**	2006**	3.5682	1995**	2005**	2.5733	I(1)
DLRGDP			6.8654**			6.8659**	
RIR	1993**	2005**	4.8925	1989**	2007**	5.3482	I(1)
DRIR			8.9654**			7.7658**	
REER	1982	1995**	5.5878**	1978	1991**	6.7767**	
FID	1984	2007**	4.6576	1983	1995**	5.7764**	
LAPG	1995	2004**	2.7469	1997**	2007	2.2451	
DLAPG			0.6869			-0.7631	
LGOP	1985**	1995**	1.6656	1995**	2003**	2.5355	
DLGOP			6.7565**			5.6589**	I(1)
LOPP	1985**	1994**	4.1236	1993**	2007**	-5.4216	
DLOPP			6.8743**			-6.5139**	I(1)

** indicates significance at 5% for both structural breaks and t-statistics. A critical value at 5% is -5.490. TB1 and TB2 are the breakpoints.

There are two possibilities to deal with non-stationary variables in a given model. One is, to continue the analysis with first differenced (stationary) variables. This is used only for the analysis of a short run relationship. Second is, to continue with the non-stationary variables if their linear combination is stationary. This helps for the analysis of a long run (equilibrium) relationship if it exists. The first alternative is considered only if the second fails. But to proceed with the second, it is necessary to establish that the variables are co-integrated. Running a regression of non-stationary variable over another non-stationary variable may lead to meaningless results (spurious regression). However, if the two series are co-integrated, the problem of spurious regression is solved.

Next to unit root test, co-integration concept can be analyzed with the help of a VAR model. A vector autoregressive model is commonly used for forecasting systems of interrelated time series and for analyzing the dynamic impact of random disturbances on the system of variables. But first, we need to do tests of granger causality and optimal lag length determination.

4.2.3. Granger Causality Test

Granger causality test is used to examine the relationship between the variables included in and the relevance of using a VAR model. If the variables are endogenously related to each other in the system, the use of a VAR model is valid. The test shows whether any variable granger causes the other variable in the system. As we have seen from Table 5.6, granger causes all variables in the VAR system. There is bidirectional causation among real GDP (LRGDP) and Government expenditure (LGOV), real effective exchange rate (LREER) and real interest rate (RIR), and Government expenditure (LGOV) and financial deepening (LFID).

A Change in real effective exchange rate (LREER) and Government expenditure (LGOV) may be caused by (same variable) change in real interest rate (RIR). Active labor force growth (LAPG) and financial deepening (LFID) also granger causes by variables like real GDP (LRGDP), real interest rate (RIR) and openness index (LOPP). Real effective exchange rate (LREER) and openness index (LOPP) each granger causes change in real interest rate (RIR) while the latter granger causes active labor force growth (LAPG).

Table 4.6: Chi-square statistics and respective p-value for Granger Causality Test

variables	LRGDP	RIR	LFID	LOPP	LGOV	LREER	LAPG	ALL
LRGDP		6.636 0.084*	0.890 0.021**	25.312 0.000**	7.092 0.069*	14.145 0.003**	1.357 0.716	53.795 0.000**
RIR	3.709 0.295		17.259 0.001**	44.008 0.000**	7.893 0.048*	12.943 0.005**	16.980 0.000**	109.540 0.000**
LFID	16.683 0.001**	5.890 0.117		2.565 0.464	3.262 0.353	8.299 0.040**	2.635 0.451	54.234 0.000**
LOPP	16.228 0.001**	10.995 0.012**	13.277 0.004**		20.940 0.000*	30.746 0.000**	12.207 0.007**	84.798 0.000**
LAPG	13.959 0.003**	24.225 0.000**	32.063 0.000**	17.499 0.001**		15.499 0.001**	19.810 0.000**	76.654 0.000**
LREER	3.120 0.373	10.811 0.013*	1.292 0.731	3.868 0.276*	0.811 0.847		1.466 0.690	26.923 0.080*
LGOV	68.144 0.000**	8.962 0.029**	13.474 0.004**	13.413 0.004**	5.492 0.139	19.762 0.000**		148.070 0.000**

* and ** indicates the rejection of the null hypothesis (x does not granger cause y) at 5% and 1% respectively.

The Granger-causality test shows that real GDP is not exogenous. Change in real GDP can be caused by at least four variables in the system; namely real interest rate (RIR), real effective exchange rate (LREER), openness index (LOPP) and government expenditure (LGOV).

4.2.4. Determination of Optimal Lag Length

The Johansen is usually preceded by a test of optimal lag length as the result of the test is affected by the number of lags included in the VAR model. The sequential modified Likelihood Ratio test (LR), the Final Prediction Error test (FPE), the Akaike information criteria (AIC), the Schwarz information criteria (SIC) and the Hannan-Quinn information criteria (HIC) are used to determine the optimal lag length of the VAR model for cointegration test. Table 4.7 shows a lag length of one at 5% level of significance and this lag length is used in this study.

Table 4.7: Lag-order Selection criteria

Endogenous: LRGDP LREER RIR LGOV LAPG LFID LOPP

Exogenous: _cons REG

Sample: 1979 - 2014 Number of obs.=36

lag	LL	LR	FPE	AIC	HQIC	SIC
0	-86.7699	NA	2.42e-01	3.6565	5.4553	4.6657
1	97.676	283.566**	3.43e-09**	-2.676**	-0.3934**	-1.9644**
2	144.686	44.5665	5.23e-01	-1.6767	1.5686	

** indicates lag order selected by the criterion

Even if the lag order selection criteria chose one lags to be included in the model, it may also be possible for some of the lags that are chosen as optimal to have insignificant contribution in the model. Therefore, it should be checked whether the second and third lags (chosen as optimal) of all variables are jointly important and hence should be included in the estimation of the VAR model if it needed.

Table 4.8 Wald Lag-Exclusion statistics

Variables	Lag	df	Chi2	Prob.>Chi2
LRGDP	1	7	66.5557	0.0000**
RIR	1	7	24.6788	0.0000**
LFID	1	7	19.6788	0.0002*
LOPP	1	7	58.6688	0.0000**
LAPG	1	7	36.8799	0.0009*
LREER	1	7	78.6876	0.0000**
LGOV	1	7	62.7768	0.0000**
ALL	1	49	347.926	0.0000**

*and ** indicates lag order failed to be excluded at 5% and 1% respectively.

To confirm relevance of the chosen optimal lag length for all variables, a test of lag exclusion (Wald lag exclusion test) is conducted. Table 4.8, shows that the inclusion of a single lag length for each variable individually and for all the system jointly is significant for all variables at 1% and for financial deepening (LFID) and active population growth (APG) at 5% level of significance. The lag exclusion test also approves the inclusion of two lags in the model because it shows that the first and second lags of all the variables are jointly significant.

4.2.5. Tests for Co-integration

The results of unit root tests show that almost all the variables are not level stationary except openness index and real interest rate. Theories state that econometric analysis with non-stationary variables makes no sense. The only exception, if their linear combination results in a stationary series. The test of co-integration shows the existence of such a relationship among the non-stationary variables for this study.

Many macro time series may contain a unit root has spurred the development of the theory of non-stationary time series analysis. A linear combination of two or more non-stationary series may be stationary. If such a stationary linear combination exists, the non-stationary time series is said to be co-integrated. The stationary linear combination is called long-run equilibrium relationship (co-integrating equation) between the variables (Engle and Granger, 1987).

Table4.9: Co-integrating Equations under different Assumptions

Sample: 1979 – 2014Included observations: 36
Series: LRGDP LREER LGOV RIR LFID LAPG LOPP
Exogenous series: REGLags interval: 1 to 2

Data Trend	None	None	Linear	Linear	Quadratic
Test Type	No Intercept No Trend	Intercept No Trend	Intercept No Trend	Intercept Trend	Intercept Trend
Trace	4	3	3	3	2
Max-Eig	3	3	1	3	2

5% Critical values based on MacKinnon-Haug-Michelis (1999)

Result which comes from test of co-integration is affected by the assumption made regarding a trend. The decision to include/exclude a trend is made on the basis of the nature of the series

included in the VAR model. In this study, almost all variables do not show any clear trend as checked through the ADF and PP unit root tests. Thus, the co-integration test is made with the assumption of no trend as presented on Table 4.9.

Stationarity test results presented previously indicate that except two variables the rest of all are not level stationary. This suggests that regression based on the level variables may produce an unreliable outcome. However, the Granger representation theorem states that it is possible for non-stationary variables to produce a stationary relationship (meaningful long run relationship) if they are co-integrated. Thus, the presence and the number of such co-integrating relationships are checked using the trace and the maximum eigen value methods. As we know Johansen method is used for the test of co-integration as it is superior over the Engle-Granger method in allowing for the test of more than one co-integrating vectors.

For k -endogenous variables each with a single unit root, there is a possibility to find from zero to $k-1$ linearly independent co-integrating relations. Two types of test statistics are used to determine the rank of the model in this study; namely the trace test and the maximum eigen/likelihood ratio test. The trace test tests the null hypothesis of r co-integrating vectors against the alternative hypothesis of k co-integrating vectors, where k is the number of endogenous variables, for $r=0,1,2,\dots,k-1$. The maximum eigen-value test, on the other hand, tests the null hypothesis of r co-integrating vectors against the alternative hypothesis of $r+1$ co-integrating vectors.

Table 4.10: Co-integration Rank test

Series: LRGDP LREER LGOV RIR LFID LAPG LOPP

Included Observations: 36 Exogenous series: REG

Null	Alternative	Eigen Value	statistics	5% critical	Prob.	Hypothesized No.of(CE)s
Trace test						
$r = 0$	$r \geq 0$	0.97447	150.9364	94.15	0.0000	None **
$r \leq 1$	$r \geq 1$	0.89884	72.6464	68.52	0.0023	At most 1 **
$r \leq 2$	$r \geq 2$	0.57347	49.5684	47.21	0.0162	At most 2 **
$r \leq 3$	$r \geq 3$	0.38589	20.5575	29.68	0.1431	At most 3
Max eigen test						
$r = 0$	$r = 1$	0.97447	84.6575	39.37	0.0001	None **
$r = 1$	$r = 2$	0.89884	36.6574	33.46	0.0043	At most 1 **
$r = 2$	$r = 3$	0.57347	27.5649	27.07	0.0381	At most 2 **
$r = 3$	$r = 4$	0.38589	12.6895	20.97	0.1534	At most 3

** denotes rejection of the null hypothesis at 5% significance level.

Trace statistics and the maximum eigen/likelihood ratio test results three co-integrating equations at 5% level of significance for this study under the no trend assumptions. The trace test shows that the null hypothesis of $r \leq 2$ co-integrating relation is rejected and the alternative $r \geq 2$ co-integrating equations are accepted. This means that there are three co-integrating equations because the null hypothesis of $r \leq 3$ could not be rejected in the next step. The maximum eigen/likelihood ratio test confirms the same result. It shows that the null hypothesis of $r=2$ co-integrating relation is rejected in favor of the alternative $r=3$.

4.2.6. Diagnostic Tests on the Residual of the Vector Error Correction Model

Normality, autocorrelation, heteroskedasticity and exogeneity tests on the residuals of the vector error correction models are conducted with the help of Lagrange-multiplier test, Jarque-Beta test and Breusch-Pagan and RMSE tests respectively. Those tests confirm the assumptions regarding the residual and the validity of the results. The Jarque-Bera normality test is used to see whether the regression errors are normally distributed or not. From the tests, it was found that the null-hypothesis that the residuals are normal is not rejected in this study at 5% level of significance (see appendix A).

Serial correlation test helps to identify the relationship that may exist between the current value of the regression residuals and lagged values. Null-hypothesis of the Lagrange-multiplier (LM) test that the residuals are not serially correlated is accepted at 5% level of significance (see appendix B).

Heteroscedasticity test helps to identify whether the variance of the errors in the model are constant or not. The null-hypothesis of the test is that the errors are homoscedastic and independent of the regressors (no problem of misspecification), thus, the null-hypothesis that the residuals are homoscedastic is accepted at 5% significance level (see appendix C).

Stability of the VAR model and the results of the post estimation diagnostics could affect the validity and robustness of the results of the impulse response functions and other diagnostics. As a result, first we have tested for VAR stability by using inverse root of autoregressive characteristic polynomial. The result shows that all roots of characteristic polynomial lie inside the unit circle which suggests that the VAR is stable. Stability of the system confirms that impulse response functions can be used in our analysis (see appendix D).

To identify variables that are endogenously determined and conditional up on the other variables in the VAR, the test for weak exogeneity is conducted. This requires imposition of zero restriction on the first column of coefficient. The result using RMSE test confirms that only the dependent variable real GDP rejects the null hypothesis of weak exogeneity at 5% level of significant. All explanatory variables did not reject, therefore, other than RGDP all explanatory variables are not endogenous to the system (See appendix E).

4.2.7. Estimation Results and Interpretation of Vector Error Correction Model

Vector error correction model is a restricted VAR model that has co-integration restrictions built in to the specification. It is designed for use with non-stationary series that are known to be co-integrated. The vector error correction specification restricts the long-run behavior of the endogenous variables to converge to their co-integrating relationships while allowing a wide range of short-run dynamics. The co-integrating term (the error correction term) corrects the deviation from long-run equilibrium gradually through a series of partial short run adjustments.

A) Long-Run Relationships:

Our co-integration rank test suggests three co-integrating equations that define real GDP, real effective exchange rate and government expenditure as dependent variables. This study considers only the first co-integrating equation that relate real GDP to other variables as the focus is to examine the impact of other variables (and real effective exchange rate in particular) on real GDP growth. After imposing this normalization restriction by the Johansen method, the co-integrating equation for real GDP growth is estimated. The result of the estimation is given as:

Table 4.11: Co-integrating Coefficients

Identification: beta is exactly identified

Johansen normalization restriction imposed

Beta	Coef.	Std. Err.	t- value
LRGDP	1	.	.
LREER	-0.2365	0.7649	-8.770**
LGOV	-0.326	0.0043	-13.870**
RIR	0.07234	0.0003	-3.360**
LFID	-0.0865	0.0116	-10.330**
LOPP	-0.1642	0.0257	11.960**
LAPG	0.0144	2.6769	1.24
_cons	-3.8961		

**denotes significance at 1%.

All the variables which expected to explain real GDP (LRGDP) growth are significant except active labor growth (LAPG). The real effective exchange rate has positive sign and is statistically significant in explaining the economic growth in the long run. Increase/appreciation of real effective exchange rate by one unit increases economic growth by 23.65%. The finding of this study shows that decrease in real effective exchange rate (depreciation) does not promote economic growth in the long run. Since, Depreciation may encourage exports and increase the foreign earnings of the country for the time being, but it hurt the economy in the long-run as the cost of imported raw materials increase continuously.

The positive sign of real effective exchange rate shows that the impact work through the aggregate supply channel in the long-run. This is in line with modern view; depreciation of the domestic currency has a net effect of decreasing the real GDP in the long run. Those viewers show, the impact of exchange rate on economic growth work through the aggregate supply channel i.e. developing countries are dependent on foreign capital for investment and the demand for their export elasticity is low. Thus, its impact on increasing the costs of imported raw materials is much stronger than the positive effect it has on competitiveness.

On the other hand, government expenditure (LGOV) is statistically significant and positively related to explain economic growth in the long run. Governments play major roles in the investment sector of LDCs, Public spending maybe helpful in complementing private investment if it is productive. The government of Ethiopia may increase economic growth by 3.260% if it can increase its expenditure by 10%.

The relationship between Real interest rate (RINT) and real GDP growth is found to be negative but significant. Reducing interest rate by one unit may increase economic growth by 7.234% in Ethiopia. The relationship between the two is similar to what investment theories state. Thus, in order to encourage private investment the real interest rate has to be reduced.

The other significant factor is openness index (LOPP) which used as proxy for adoption of international technology and it affects economic growth positively. If a reduction of trade barriers by 10% and removal of trade restriction leads the economy to grow by 1.642%. This in turn, as the real GDP increases, the domestic producers efficiency in competition also increases, which, in turn encourages export. The openness in the long run shows that it reduce export duties, taxes and other restrictions so as to make the country more beneficiary in trade. This is expected and

consistent with previous results such as those Liu (2004) who found a positive relationship between trade openness and economic growth in China. This result indicates the importance of variations in export and import prices on per capita GDP growth. These variations are a major source of economic instability in less developed countries, especially in Ethiopia, where the majority of export earnings is from primary commodities.

Financial deepening (LFID) which used as proxy for financial development(private domestic credit supplyover RGDP) is statisticallysignificant to explain economic growth in the long run. In this connection a one unitgrowth in domestic credit supply leads to increase real GDP by 8.65%. As indicted on Haile Kibret and Kassahun (2011) less effect of financial development on Ethiopia economy is due to delayed effect of financial reform and presence of financial constraints that are imposed on the financial sector in Ethiopia. And also, the existence of incomplete financial markets and the lack of financial skills of bankers due to lack of training and or corruption may lead to the dependence of the financial system on the real side of the economy making the contribution of the financial sector to economic growth less.

In general, from all variables derived from the demand side, government expenditure is foundto be the most significant variable in the long-run. This shows that public spending can be used asa main engine of growth in Ethiopia. Nowadays, the construction of roads (seasonal and allweathered) has made the supply of commodities easy and quick. This has improved themarketability of the commodities and the income of the farmers. And also both augmenting factors ofproduction (financial deepening (FID) and openness index(OPP) have significant role in the long run economic growth since increased availability of financial instruments and institutions reduces transaction and information costs in an economy, and for adoptions of those technologies from external market respectively leads to higher growth of RGDP. This has, contributed to the next five-to-six years of sustained growth in Ethiopia. Among thefactors in the supply side, on the other hand, real interest rate is found to highly determine thesupply of capital for investment in the economy.

B) Short-Run Relationships:

Changes in real GDPgrowth can be motivated by activating two period lagged real effective exchange rates, openness indexandrealinterest rate. The growth rate of current real GDP is affected bychanges in real effective exchange rate, openness index and real interest rate made before two years and also ayear before the latter. Openness to trade has a negative and significant

coefficient indicating that it has distortionary short run impact in Ethiopia economy. Those variables, however, have opposite signs compared to their long-run-relationship with real GDP growth. The adjusted R-square shows that 67.86% of the variation in real GDP growth is explained by the combined effects of all the determinants of real GDP in the short-run.

Real effective exchange rate is negatively related to real GDP in the short-run. This implies that depreciation of the domestic currency in the short-run promotes economic growth as it encourages exports. However, this contradicts the finding for the long-run relationship between the two variables. A two period lagged relationship between real effective exchange rate and real GDP growth shows that a change in the former variable has some impact on the production of some exportable items up to a period of two years. Most of the exports are primary commodities produced by the agricultural sector in Ethiopia. It is true that the production/supply of agriculture sector is not elastic in responding to changes in exchange rate as it takes some time to produce the commodities. Production does not respond immediately to changes in REER.

Table 4.12: Short-Run coefficients

Sample (adjusted): 1979-2014

Included observations: 36 after adjusting end points

Variables		Coef.	Std. Err.	t- value
_ce1		-0.3673	0.1175	-1.8000**
LRGDP	LD.	0.2472	0.2473	2.95
	L ₂ D.	-0.0567	0.2513	-2.18
RIR	LD.	0.0028	0.0013	-2.0800**
	L ₂ D.	0.0021	0.0018	-2.4000**
LFID	LD.	0.0362	0.1832	1.23
	L ₂ D.	0.0742	0.1992	1.4
LOPP	LD.	-0.0298	0.0032	-1.8900**
	L ₂ D.	-0.0278	0.0284	-2.6800**
LAPG	LD.	0.0053	1.7764	0.94
	L ₂ D.	0.0081	1.6589	0.06
LREER	LD.	0.0673	0.1279	-1.2600**
	L ₂ D.	-0.0851	0.1171	2.7300**
LGOV	LD.	0.2514	0.1144	1.98
	L ₂ D.	0.0648	0.1267	1.68
REG		-0.0714	0.0477	-1.5
_cons		0.0307	0.0183	1.68
R-squared		0.7685		
Adj. R-squared		0.6786		
Sum sq. residues.		-0.0865	F-statistic	5.12442

Real interest rate is positively related to economic growth in the short-run. This does not confirm what economic theories on investment state. However, the Mackinnon-Shaw hypothesis states that there is a possibility for real interest rate to positively affect economic growth. In this case, increase in real interest rate (lending rate) does not discourage investment/production as long as the nominal interest rate remains below expected price/inflation. For not less than half of the years under the study period, real interest rate is lower which means that the general price level (inflation) is higher than nominal interest rate. If this so, increase in real interest rate a year or two years before may increase economic growth in the current period. In the long-run, monetary authorities will get time to take measures that curve inflation and the negative relationship between real interest rate and economic growth may be maintained.

The insignificant coefficient of financial deepening in the short-run might be due to the time lag of the contribution of the private sector to economic growth showing the underdevelopment of the financial sector in the short-run. The financial sector of Ethiopia is characterized by the dominance of state ownership, slow development process and also dominated by the banking system. Financial development indicators such as the ratio of private credit to GDP further indicate the underdevelopment of the financial sector. Moreover, a substantial gap between saving and investment, which the Ethiopian financial sector is unable to bridge, has led to foreign borrowing to finance investments. But from the long-run point of view, FID is highly significant indicating the importance of financial development for long-run economic growth.

The error correction term has important implication in linking the short-run periods to the long-run period. It represents the adjustment of the short-run disequilibrium to achieve a long-run equilibrium. Its coefficient is negative and statistically less than one in absolute value. This is the expected sign for the stability of a long-run relationship. A stable co-integrating relationship adjusts the short-run deviations by the extent of the error correcting term. The finding VECM shows that the actual real GDP growth adjusts itself by 36.73% each year to its equilibrium value and is expected to achieve equilibrium after (almost) three years.

In general, the study found varied results on the relationship between real effective exchange rate and economic growth in the short-run and long-run. The results of the econometric analysis identify direction of REER influences on growth of RGDP. Thus, it holds traditional view (the aggregate demand channel) and the modern view (the aggregate supply channel) in the short-run and long run respectively. Depreciation of the domestic currency promotes exports and increases

economic growth in the short-run. But it may not be used as a long-lasting strategy. In the long run, it may not be a good strategy as it hurts the long-run growth by increasing the cost of imported materials in the country.

Depreciation of the domestic currency may increase the foreign exchange earnings in the short-run. This may help the growth of some sectors in the economy. As the depreciation process continues, the foreign earnings from the export sector would not be large enough to cover the cost of imported materials for the country. The final result of the process would be to reduce economic growth unless a limit is put up on the period to depreciate the currency and revert to the other option. By the time of reversion, the dependency of the economy on imported raw materials should decrease so that the impact can be surrendered.

4.2.8. Impulse Response Functions and Variance Decomposition

A) Impulse Response Functions:

Our empirical results show how the explanatory variables affect real GDP in the short-run and long-run for a given period under consideration. This presents the final results of the interaction between the dependent and independent variables. However, both the short-run and long-run analyses do not present how the adjustments are made each time and the final results are reached. The impulse response functions and the variance decomposition show the situation before the final result or the process to reach the final result. They show how the importance of each independent variable changes during each year in affecting the real GDP.

Impulse response function traces the effect of a one standard deviation shock to one of the exogenous variables on the current and future values of the endogenous variable. A shock to the i^{th} variable directly affects the i^{th} variable and is also transmitted to all of the endogenous variables through a dynamic structure of the VAR. As we have seen from table 4.13, real GDP responds only to itself in the first period. After the first period, it directly and significantly responds to financial deepening and government expenditure, and also negatively and significantly to real effective exchange rate. In the long-run, real GDP responds more significantly to change in government expenditure and financial deepening than changes in other variables.

Table 4.13: Response of LR GDP to one standard deviation

PERIOD	LR GDP	LFID	LOPP	LAPG	LREER	LGOV	RIR
1	0.05863	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
2	0.05466	0.04565	0.00408	-0.00128	-0.01552	0.09883	-0.00017
3	0.05069	0.03865	-0.00262	-0.00038	-0.01768	0.08557	-0.00014
4	0.04672	0.05699	-0.01372	-0.00009	-0.01575	0.06434	-0.00020
5	0.04275	0.04612	0.00171	-0.00103	-0.01167	0.05633	-0.00042
6	0.03878	0.06766	-0.00114	-0.00116	-0.01554	0.02565	-0.00033
7	0.03481	0.02310	-0.02298	-0.00058	-0.01662	0.02767	-0.00043
8	0.03084	0.02466	-0.00237	-0.00040	-0.01674	0.09767	-0.00088
9	0.02687	0.31832	0.00160	-0.00094	-0.01556	0.07557	-0.00043
10	0.02290	0.21197	-0.00107	-0.00100	-0.01767	0.06455	-0.00043

B) Variance decomposition of LR GDP

Variance decomposition provides a different method of depicting the system dynamics. It decomposes variation in an endogenous variable into the component shocks to the endogenous variables in the VAR. It gives information about the relative importance of each random change in the explanatory variables in the VAR. Table 4.14 shows that the variation in the growth of real GDP is explained only by its lagged value in the first period. After the first period, the variation in real GDP growth can be explained by a group of other endogenous variables in the system. After the fourth period more than 50% of the variation in real GDP growth is explained by other variables. In the long-run the most significant variation in real GDP growth is explained by government expenditure followed by financial deepening, openness index, real interest rate and real effective exchange rate in their order of importance. Any action of the government that affects its expenditure may easily impact on economic growth. In general, the government may play an active role in promoting economic growth in Ethiopia.

Table 4.14: Variance Decomposition of LR GDP

	S.E	LR GDP	LFID	LOPP	LAPG	LREER	LGOV	RIR
1	0.0143	100.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0265	88.6564	3.4566	2.4777	0.5788	0.0983	10.6657	1.5524
3	0.0366	58.7846	6.4474	3.5657	1.5584	0.7545	13.4354	1.9554
4	0.0400	49.7767	9.5784	3.8434	1.8653	1.8554	13.5783	1.9941
5	0.0755	44.6569	10.6761	4.1211	2.6207	1.5343	15.7766	2.0328
6	0.0853	40.2135	10.5784	4.3988	3.2639	1.8656	17.2329	2.0715
7	0.1129	28.2193	10.6761	4.6765	3.9072	1.7619	18.7805	2.1102
8	0.1305	16.2135	11.5784	4.9542	4.5504	1.7670	20.3280	2.1489
9	0.1511	12.0786	10.6761	5.2319	5.1937	1.7720	21.8756	2.1876
10	0.1557	17.7924	12.5784	5.5096	5.8369	1.7771	23.4231	2.2263

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusions

With the help of co-integration and vector error correction analysis, the impact of real effective exchange rate on real gross domestic product growth was assessed in the long-run as well as in the short-run and also study analyzes the impact of real effective exchange rate on the Ethiopian economy using annual time series data for the period 1979-2014. The empirical results shows that the direction and impact of real effective exchange rate on economic growth works through the aggregate demand channel (traditional view) in the short-run and the aggregate supply channel (modern view) in the long-run i.e. decrease/depreciation in the value of the domestic currency promotes economic growth only in the short-run. In the long-run, it discourages economic growth in Ethiopia.

This study found that government expenditure; openness index and financial institution development have key factors to promote economic growth in Ethiopia and may stay to play its major role in the future. The study found negative relationship between real effective exchange rate and economic growth in the short run but positive relationship in the long run. It may be the case that in the short run the economy's primary exports can be promoted through depreciation of the economy and this does not much affect the economy through the import sector as the economy does not much depend on foreign capital for investment. However, as it continues to grow foreign investors may be attracted by the domestic economy and in that case depreciation may make the transfer of capital easier and cheaper to the domestic economy.

Long run negative impact of depreciation on economic growth supported through different reasons. The modern view states that developing economies depend on foreign capital for investment and the demand for their export elasticity is low. Depreciation increases the cost of importing this capital thereby reduces economic growth. The other argument is in terms of increase in the cost of imported raw materials due to depreciation. The major imported items in Ethiopia are petroleum products which absorbs more than half of its foreign earnings. As the country depreciates its currency, it means that the price of oil increases. In this case, the government cannot allocate more of its foreign earnings to productive investments. It also increases the cost of production in the domestic economy. This may cause inflation and reduce aggregate demand. In both cases, the results would be decline in economic growth.

As per the empirical analysis, the financial development indicator (LFID) has a positive and significant relationship with economic growth in the long-run. The increase in financial development in the long-run has a considerable effect causing an increase in economic growth. This can be explained by the significant growth in the financial sector of Ethiopia over the past year. The Impulse response and the variance decomposition results are also in line with the above findings that financial development has a long-run impact on economic growth.

Real interest rate also show mixed results in the short run and in the long run. In the short run, increase in real interest rate (lending rate) promotes economic growth and the reverse is true in the long run. Though the rate is determined by a competition among the commercial banks, the NBE may influence the rate by changing the discount rate, reserve requirement ratio or/and inter-bank rate; it may increase these rates/ratio for increase in the lending rate and decrease these rates for decrease in the lending rate.

Openness to trade was found to contribute negatively to real GDP in the short run. It has also confirmed that trade liberalization positively contributes to real GDP growth in the long run. The error correction estimates gave evidence that the Error-Correction Term is statistically significant and has a negative sign, which confirms that there isn't any problem in the long-run equilibrium relation.

To sum up, significant determinants of long run economic growth in Ethiopia are government expenditure and real effective exchange rate from the demand side and real interest rate from the supply side; the second and the third in the short run as well. And also financial deepening and Openness index are significant augmenting factor of production in the long run, and openness index have significant influence in the short run. Active labor force is found to be insignificant. The choice of exchange rate regime does not matter for economic growth in Ethiopia in the short-run.

5.2. Recommendations

Based on our empirical finding and the given conclusion, the researcher recommends the following measures for the government policy makers, and National Bank of Ethiopia. This recommendation stated on time horizon empirical finding, the short-run and long-run.

In the short-run, the study shows that real effective exchange rate, openness index and real interest rate significantly affect economic growth. Therefore, the government and National Bank of Ethiopia may use these variables in the following manner to affect economic growth.

- Real effective exchange rate and real GDP growth are negatively related in the short-run i.e. decrease/depreciation in real effective exchange rate increases real GDP growth. Therefore, a smooth and periodical depreciation of the 'birr' may be helpful to promote economic growth in the short run. Depreciation of the domestic currency encourages foreign demand for exports as the price of the exportable items become cheaper in foreign currency for foreigners. Increase in foreign demand for exports encourages domestic producers of the same items. The results of these would be increase in foreign earnings of the economy and hence economic growth.
- Openness index and RGDP growth have negative short run relationship. As a result the government should adjust the degree of openness on trade in the short-run with reference to the domestic production of the country. Since more trade liberalization could result in the deterioration of the economy as the producers of the country cannot compete and export in the international market. And also, Real interest rate is positively related to economic growth in the short-run. As long as the inflation rate remains high, it is recommended that the NBE may help the rate to move upward by increasing the discount rate, reserve requirement ratio or/and interbank rate. The short-run result shows that the Ethiopian economy will not be worse off with a higher real interest rate. It shows that increase in real interest rate today may increase economic growth a year or two years later.

In the long-run, the study shows that real effective exchange rate, real interest rate, government expenditure, openness index and financial deepening significantly affect economic growth. Therefore, the measures are:

- The long-run result shows that there is a positive relationship between real effective exchange rate and real GDP growth. It has been recommended above that the real effective exchange rate should be kept low (depreciate) in the short run. However, it does not mean that it shall remain low all the time. The long-run result shows that after a periodical depreciation of the 'birr' for some time, it may be helpful to change the policy as the direction of the relationship changes. If the exchange rate variable is to be used as a policy variable in the long-run, it is appreciation of the domestic currency that promotes economic growth. This is, however, recommended on the basis of the assumption that the country's current account deficit problem would be resolved by the foreign earning derived through the depreciation of the domestic currency in the short run.
- Government expenditure positively and significantly affects economic growth in Ethiopia. The finding shows that the government of Ethiopia may increase economic growth significantly by increasing its expenditure. The government is found to be the main factor that may generate economic growth in Ethiopia. The government may play its major role in investing in infrastructure that complements private investments. In the absence of significant private investment in a developing country like Ethiopia, public investments may be used as engine of growth. This is to say that fiscal policy in general is more helpful than monetary policy for long run growth in Ethiopia.
- Based on the empirical analysis, it is observed that the financial deepening (FID) has a long-run impact on the economic growth of Ethiopia. Since Ethiopia is dominated by the non-banking system, the financial sector has to deepen by strengthening the banking sector so as to maintain a sustainable economic growth. Banking development can be strengthened by having a strong regulatory system that strengthens the private sector as it is the engine of economic growth. Credit to the private sector has to be given high emphasis in order to boost investment there by reducing foreign borrowing. Financial constraints that are imposed on the private sector should be relaxed and more focus should be on ways to promote private sector development. Since financial development has an insignificant effect on economic growth of Ethiopia in the short-run, policy

makers should focus on long-run policies such as improving the financial markets and introducing capital markets. In the long-run, these policies will have a significant effect on economic growth. In addition, strategies that enable a strong economic growth should be implemented as the growth of an economy would have effects on the development of the financial system.

- Openness index and real GDP growth have positive relation in the long run. Since it put exposure to effective competition on an even playing field is an important incentive for foreign and domestic companies to upgrade their management and technology. Existence of significant market power may result in reducing the incentives of foreign investors to improve productivity and to exploit consumers or workers in the markets. Free entry will also encourage the establishment of effective linkages between foreign investors and domestic buyers or suppliers so that best practice can be diffused in the economy.

Moreover, the use of the financial development indicator, that is, ratio of private credit to GDP, may not fully capture the concept of financial development. Hence, the study can be extended through the use of more diversified financial development indicators and by expanding the data set. This study shows that appreciation of the real effective exchange rate increases the rate of growth for the Ethiopian economy in the long-run. If a study in the suggested area shows that increase in economic growth results in the appreciation of the domestic currency, it means that monetary authorities need not allow the appreciation of the domestic currency (as suggested by this study) to promote economic growth as the increase in economic growth by itself may appreciate the real effective exchange rate in the long-run.

References

- Abebaw Lemma. (2010), Impact of devaluation on the price and supply of coffee in Ethiopia, Master's Thesis, Addis Ababa University.
- Alemayehu G. and Kibrom T. (2008), Galloping inflation in Ethiopia: Addis Ababa University, Ethiopia.
- Agenor and Montiel, (1996), Development macroeconomics: Princeton University press, Princeton, New Jersey, USA.
- Ayele Kuris, (2006), The Ethiopian Economy principles and practice, 2thed.
- Bacry Yusuf (2008), How to optimize advantages of accession to the world trade organization and measures to be taken to meet possible challenges, PSD-HUB publication, Addis Ababa.
- Befekadu Degefe (2006), The Ethiopian Economic Association, Annual report on the Ethiopian Economy, Addis Abeba, United Printers
- Buffie, E.F. (1986), Financial Repression: the New Structuralist and Stabilization Policy in Semi-Industrialized Economies, Journal of Development Economics.
- Calderon, C. and Liu, L. (2003), The Direction of Causality between Financial Development and Economic Growth, Journal of Development Economics.
- Christopher F. Baum (2001), Stata: The language of choice for time series analysis? The Stata Journal, Boston College
- Debellegemechu (2004), Export and Economic growth in Ethiopia: an Empirical investigation, Master's Thesis, Addis Ababa University.
- Dereje G. (2004), Exchange rate policy and External sector in Ethiopia: Addis Ababa University, Ethiopia.

DerresseDegefa,(2001),The parallel Foreign Exchange Market and Macroeconomic performance in Ethiopia, African economic research consortium paper, Nairobi.

Dennis R.Applayerd, (2006),International Economics, 5thed

Donald R. (2012), The Role of Exchange Rate in Economic Growth: A Euro Zone Perspective, National Bank of England, England.

Dornbusch R. and Fischer S. (1994), Macroeconomics:International edition, 6th edition, McGraw-Hill Inc. publishing enterprise, USA.

Engle and Granger (1987), Cointegration and Error Correction Representation: Estimation and Testing, Econometrica.

Eichengreen B. (2007), Real Exchange Rate and Economic Growth:University of California, USA.

EquarDesta, (1994), Feature Article On, Exchange rare policies and market in Ethiopia, (NBE)

Erik Hjalmarsson and Par Osterholm (2007), Testing for Cointegration Using the Johansen Methodology when Variables are Near-Integrated, IMF Working Paper, Western Hemisphere Division

EyobTefaye (2001), Exchange Rate Regimes and Policies: With Particular Reference to the Ethiopian Experience, National Bank of Ethiopia, Addis Ababa, Ethiopia.

Fantahun D, (2011),Currency Evaluation in Africa with five selected countries: Frame work of Analysis and Experience, Addis AbebaUniversity.

Feridun M., Sawhney B. and Jalil A. (2009),Stock Market and Investment In Turkey: Evidence From Cointegration And Causality Tests.

Fugazza (2004),Study on Performance of Export Determinant, UNCTAD

GebreegziabherTefamariam, (2003),The empirical Analysis of the determinants of Current account in Ethiopia (1961/62-1999/00), Addis Abeba.

Gujarati (2004), Basic Econometrics: Fourth Edition the McGraw–Hill Companies.

Haile KibretFantaye and KassahunAberra (2011), Linkage between Financial market Development and Economic Growth in Ethiopia. Paper Presented at the 9th International Conference of EEA/EEPRI.

Harrison, (1995), Using Co-integration Analysis in Econometric Modeling. London.

Heijdra B.J. and Ploeg F. (2006), Foundations of Modern Macroeconomics: Theories of Economic Growth.

Herberger A.C. (2003), Economic growth and The Real Exchange Rate: Revising the Balassa-Samualson Effect, Moscow, Russia.

IMF (2011), Annual Report on Exchange Arrangements and Exchange Restrictions: Washington D.C, USA.

Johansen S. and Juselius (1990), Maximum Likelihood Estimation and Inference on Cointegration with Application to the Demand for Money, Oxford Bulletin of Economics and Statistics, Oxford University, England

Jung, W.S. and Marshall, P.J. (1985), Exports, growth and causality in developing countries:Journal of Development Economics.

Maddala, G.S.(1992),Introduction to Econometrics ,2nd ed.

MelesseMinale, (2004),Ethiopian Economic Association, V.2

Montiel P.J. and Hinkle L.E. (1999), Exchange Rate Misalignment: Oxford University Press, Washington DC, USA.

Moya M. and Watundu S.(2009),Econometric Analysis of Real Effective Exchange Rate On Gross Domestic product of Uganda,E-Journal of Business And Economic Issues, Volume Iv Issue II.

National Bank of Ethiopia (1980-2013). Annual and Quarterly reports, various issues

N.GregoryMankiw(1997),Principle of Macroeconomics, Dryden, Philadelphia

PanagiotidisPelloni and Polasek (2003),Macroeconomic Effects of Reallocation Shocks: A generalised impulse response function analysis for three European countries.

Pherson D. (2007), Exchange Rates and Economic Growth in Kenya: An Econometric Analysis, Development Discussion Paper, California University, USA.

Pilbeam K. (1992), International Finance, Macmillan Publishing Enterprise, London

Rodrik, Dani. (2008),The Real Exchange Rate and Economic Growth,Brookings Papers on Economic Activity.

Rostow W.W. (1990), Theorists of Economic Growth From David Hume To The Present,With A Perspective On The Next Century, New York, Oxford University Press.

Rodney, W. (1982), How Europe under Developed Africa?Howard University Press; Washington, D.C.

Rowan D.C. and Mayer T. (1972),Intermediate Macroeconomics;Output, inflation and growth New York.

Salvadori N. (2003), The Theory of Economic Growth, A Classic Perspective, Edward Elgar Publishing Limited, UK.

Souza M. (2007),Structural breaks and unit root: evidence from Pakistani macroeconomic time series, State Bank of Pakistan.

Sun, Haishun(2008), Foreign Investment and Economic Development in China 1989-2006,Ashgate.

Taylor, L. (1978),Structural Macroeconomics, Applicable Models for the Third World, New York, Basic Books.

Thapa N.B. (2002),Econometric Analysis of the Impact of Real Effective Exchange Rate onEconomic Activities in Nepal,Research Department, Nepal Rastra Bank, Nepal.

Thirwall A.P (2004),Trade, Trade Liberalization and Economic Growth: Theory and Evidence for Africa, African Development Bank working paper.

Todaro M. (2009),Economic development, International Trade and development strategy

Waheed (2006),Structural breaks and unit root: evidence from Pakistani macroeconomic time series, State Bank of Pakistan.

Wong, (2010), Source of China's Economic Growth, 1952-2009, Incorporating Human Capital Accumulation and Financial Institution Development, China Economic Review.

World Book, Encyclopedia,2001: V.19

World Economic Forum (2009),The Global Competitiveness Report, World Bank.

Zhijie Xiao and Peter C.B. Phillips (1998),An ADF coefficient test for a unit root in ARMA models of unknown order with empirical applications to the US economy, USA.

Appendices

Appendix A: VEC Residual Normality Tests

Orthogonalization: Cholesky (Lutkepohl)

Null Hypothesis: residuals are multivariate normal

Sample: 1979 2014

Included observations: 36

Equation	Skewness	chi2	df	Prob> chi2	Kurtosis	chi2	df	Prob> chi2
LRGDP	-0.09241	0.053	1	0.81849	4.1114	1.904	1	0.1676
RIR	-0.80083	3.955	1	0.04674	3.5687	0.499	1	0.48014
LGOV	-0.66688	2.743	1	0.09771	4.7322	4.626	1	0.03149
FID	0.87895	4.764	1	0.02906	5.8312	12.357	1	0.00044
LREER	-2.5152	39.011	1	0.00000	12.562	140.961	1	0.00000
LAPG	0.52228	1.682	1	0.19464	5.1823	7.342	1	0.00674
LOPP	0.65104	2.614	1	0.10594	3.4328	0.289	1	0.59101
ALL		54.821	7	0		167.978	7	0

Jarque-Bera

Equation	chi2	df	Prob> chi2
LRGDP	1.957	2	0.37588
RIR	4.453	2	0.10788
LGOV	7.369	2	0.02512
FID	17.121	2	0.00019
LREER	179.972	2	0.00000
LAPG	9.024	2	0.01098
LOPP	2.903	2	0.23427
ALL	222.799	14	0.00000

Appendix B: VEC Residual Serial Correlation LM Tests

Null Hypothesis: No Serial Correlation at lag order

Sample: 1979 2014

Included observations: 36

Lags	LM-Stat	Prob
1	61.6979	0.10525

Probs from chi-square with 49 df.

Appendix C: VEC Residual Heteroskedasticity Tests

Sample: 1979 2014

Included observations: 36

Joint test:

Chi-sq	df	Prob.
549.0211	343	0.4145

Appendix D: Roots of Characteristic Polynomial

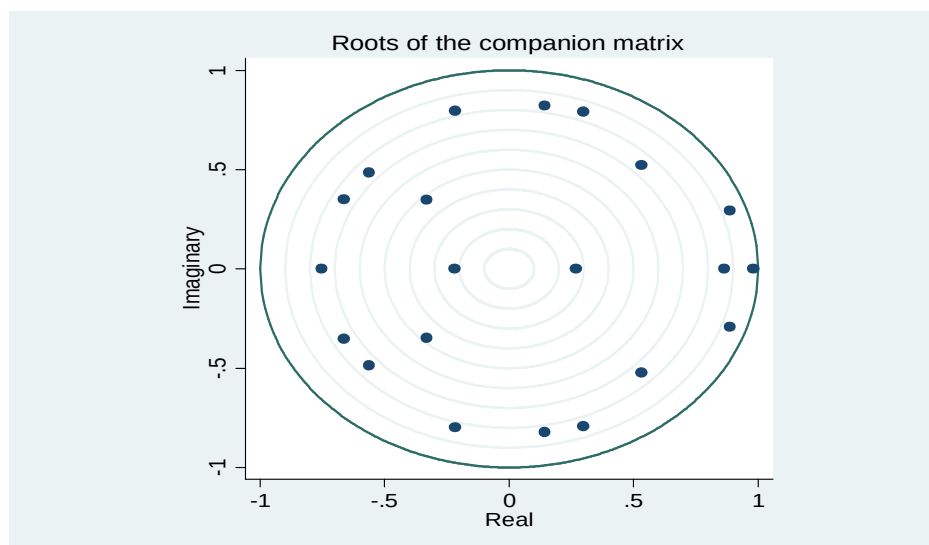
Endogenous variables: LRGDP LREER LGOV RIR LFID LAPG LOPP

Exogenous variables: C REG, Lag specification: 1-2

Eigenvalue	Modulus
0.93209	0.93209
.93209 - 0.03258468i	0.932659
-.04973823 + 0.6892181i	0.691011
-.04973823 - 0.6892181i	0.691011
0.6334869	0.633487
-.4948435 + 0.3695011i	0.617577
-.4948435 - 0.3695011i	0.617577
.3135317 + 0.4297135i	0.531936
.3135317 - 0.4297135i	0.531936
-.118497 + 0.4289538i	0.44502
-.118497 - 0.4289538i	0.44502
.06421768 + 0.2128856i	0.222361
.06421768 - 0.2128856i	0.222361
-0.01380797	-0.01381

No root lies outside the unit circle.

VAR satisfies the stability condition.



Inverse Roots of AR Characteristic Polynomial

Appendix E: Test for Exogeneity

Null Hypothesis: weak exogeneity

Sample: 1979 2014

Included observations: 36

Coefficien	Chi^2	Probability value
LRGDP	6.7683	0.0167*
RIR	0.4724	0.4801
LGOV	0.0658	0.7849
FID	0.0553	0.7437
LREER	0.1038	0.2397
LAPG	0.7293	0.1367
LOPP	0.4284	0.3845

*weak exogeneity at 5% level of significant