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EFFECTIVENESS OF DEVALUATION IN ACHIEVING INTERNAL AND EXTERNAL BALANCE: THE CASE OF ETHIOPIA

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This is to certify that the thesis prepared by Tamerayehu Gossaye, entitled: *Effectiveness of devaluation in achieving Internal and External balance: The case of Ethiopia* and submitted in partial fulfillment of the requirements for the degree of Master of Science (International Economics) complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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Abstract

Effectiveness of devaluation in achieving Internal and External balance: The case of Ethiopia

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Currency devaluation is a policy instrument that is most accepted and recommended by the World Bank and the International Monetary Fund because it is believed to bring the devaluating country to be able to compute in the international market and achieve trade balance. This study analyzes the effectiveness of devaluation in achieving Internal and External balance in Ethiopia using annual time series data for the external balance from 1974-2014 and for the internal balance from 2006/7-2015. The main focus of the internal balance analysis will be the recent devaluation especially the 2009/10 and 2010/11 devaluations and for both internal and external balance analysis this paper is going to see the effects of devaluation since 1992 up until 2014. This study used VAR and tested the short and long run effects of exchange rate depreciation and devaluation, real GDP and Real Effective Exchange Rate on trade balance. With the second model, impacts of real effective exchange rate on inflation was also tested along with different variables. Internal balance is analyzed by using descriptive technique to show what effect devaluation has on it. This study found that real effective exchange rate has a negative impact on inflationary situations both in the short and long run. In addition devaluation's effect on trade balance or external balance was found to be negatively related in the short run but positive in the long run. But the significance of real effective exchange rate in affecting trade balance is going to be very low in the long run. All in all this study has discovered that devaluation/depreciation is effective in achieving internal balance but might not be effective in achieving external balance.

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Abbreviations and acronyms

ADF: Augmented dickey fuller

CPI: Consumer price index

CSA: Central statistical agency

GDP: Gross domestic product

RGPD: Real Gross Domestic Product

IMF: International monetary fund

LDC: Less developed countries

NBE: National bank of Ethiopia

NER: Nominal Exchange rate

R&D: Research and development

REER: Real effective exchange rate

RER: Real exchange rate

SAP: Structural adjustment program

TB: Trade balance

TOT: Terms of Trade

VAR: Vector autoregressive regression

WB: World Bank

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CHAPTER ONE: INTRODUCTION

1.1 Background of the study

Economic development is one of the most essential prerequisites for a nation's survival. This prerequisite decides on the fates, Positions and capacity of countries to endure to manmade and natural hazards. Hence, Countries aim towards achieving the highest level of development. Economic development includes maintaining or achieving full employment, higher productivity level, low level of inflation, income equality, avoidance of Balance of payment deficit… and many more. These can be generalized in to Internal and external balance. As both the balances are the paths for economic development, countries engage themselves in different economic measures and policies to attain the preset goal. Economic development mostly is the concerning issue for least developed countries because they are the ones struggling to feed their own people (Acar, 2000). Therefore, achieving the internal and external balance highly matters to LDCs.

Throughout the course of history especially in 1970s and 1980s many African countries and other non-African less developed countries balance of payment was highly deteriorated with over-valued currency and highly rate of unemployment was observed (Stambuli, 2006). These nations in order to fix their problem needed financial and non-financial aid from international organizations. But international organizations like the IMF and The World Bank were not to give their money without preconditions. This precondition, with its other name structural adjustment program (SAP), was asked to be implemented. SAP was a program that encouraged finance seeking countries to privatize all publicly owned properties, less government intervention, Devaluation of the over-valued currency, applying "free market economy" and many others were proposed.

Indicated in 1990 a World Bank report: "All over Africa, countries are adopting SAP with the hope of arresting decades of economic deterioration. This deterioration has been attributed, among other things, to in appropriate trade and payment policies, such as overvalued exchange reassess and exchange controls, high tariffs and quantitative restrictions which result in a divergence between world prices and domestic prices leading to policy induced distortion with a considerable macro-economic implications (World Bank, 1990).

In addition, Ethiopia has already applied for the membership of World Trade Organization (WTO) in the year 2003. The World Trade Organization (WTO) deals with the rules of trade between nations at a global or near-global level. The recent history of the organization indicated that the WTO's accession process is quite complex and demands thorough preparation to allow well informed decisions on trade policy reforms that need to be made in-country to meet the requirements of accession. Among the requirements, lowering trade barriers (customs duties or tariffs and measures such as import bans or quotas that restrict quantities selectively), red tape and exchange rate policies along with accepting the patent rights for intellectual and other "economic rights" of member states.

Even though late, Ethiopia is one of the countries who implemented SAP (NBE, 2009). After the fall of Derg in 1991, Transitional government of Ethiopia took control over the whole economy. The government started to accept the aids and supports the financial institutions, who generally were backed by the western ideology, an ideology which was clearly reflected on SAP. SAP included the previously stated measures thus the Ethiopian government is partially or fully implementing the precondition of the World Bank and IMF until the present day. Of all the implemented measures the concern of this paper will only be the currency devaluation. In

previous years (i.e. during the Derg regime) the country used to have a fixed exchange rate with a rate of 2.07 Birr per US dollar. Some researchers held during the 1970 and 1980 the birr was overvalued leading to a trade and also public budget deficit Kidane (1994). said that the overvaluation of currency was the result of the problem in the management. This overvaluation of currency highly discouraged the export as well as domestic production by making the price of imported goods cheap. The devaluation of exchange rate by the government of Ethiopia after the fall of Derg was expected to increase output by encouraging the export sector as well as increase domestic production (Taye, 1999).

After the devaluation in 1992 the exchange rate is changed from fixed to flexible rate in order to control overvaluation through a gradual depreciation of domestic currency every year. The gap between the unofficial and official rate also decreased compared to the period when the exchange rate was fixed. However during the fiscal year 2007/08 the rate of depreciation against other foreign currencies increased compared to the previous years. In the 2009/10 and September 2010/2011 the Ethiopian Birr was depreciated to 23.7% and 16.5% respectively against the US dollar (NBE, 2011).

Since 1991 Ethiopia has devaluated its currency many times with the force of international financial institutions and hoping for equating the internal balance and external balance. This thesis specifically focus on the recent devaluation and its effectiveness in achieving the objective as well as its effect on inflation and employment will be clearly presented.

1.2 Statement of the problem

Ethiopia as one of the poorest nation in the world is in a vicious-circle. High rate of inflation, unemployment, drought and famine, trade deficit, underdeveloped infrastructure and telecommunication services… are very common with in the country (IMF, 2012). To alleviate these and other bottlenecks of growth, the world organizations through SAP suggested Currency devaluation.

Devaluation of currency as proposed by development organizations is a monetary policy which is supposed to bring economic growth to Ethiopia and many other less developed countries (Acar, 2000). Currency devaluation, as believed by many developed world economists, is an instrument that makes exports of the devaluating country to be cheaper in the international market and creates employment opportunities. Besides these, it makes import expensive and so import will decline letting the devaluating country to save more foreign currency. This has been proved to be correct in the developed world but in countries like Ethiopia where the majority of the domestic demand is full filled by importing and where the export is monopolized by primary products make currency devaluation seem not to work (Acar, 2000).On this controversial issue many economic scholars and researchers have put their opinion and their findings.

Genvensi O. said the devaluation of the Naira[1] was thought capable of ensuring stability of the local currency value of exports as well as protecting the local industries from excessive external competition. It soon became clear to the monetary authorities that pegging the naira to the weak

[1] Naira is the official currency of Nigeria

US dollar, especially during the first quarter of 1974, worsened Nigeria's inflationary situation (Genvensi O., 1995).

Krugman & Taylor mentioned devaluation will induce an increase in profits share of GDP having a negative effect on aggregate demand if the saving propensity of firms and capital owners is higher than for wage earners. This shows that it has a negative impact on economic development of a country (Krugman & Taylor, 1978).

Kebede in his thesis found out that "It is usually assumed that real depreciation of exchange rate promotes exports from a country by increasing their competitiveness. However, existing empirical studies provide findings both in favor of and against this expectation." In contrast to Krugman and Taylor, Kebede has found some cons of devaluation in his empirical study in Ethiopia (Kebede, 2011).

Analysis of the Thai example suggests that devaluation may have contributed to capital outflows and that it was the associated loss of liquidity that both directly and indirectly caused recession (Grahamand Ramkishen S., 2000).

On the other hand Paul said "When a currency is devaluated the amount of profit gained by a firm producing in the foreign market increases when converted to the local currency. This 12 increase in profit can be used for the development of the R& D as well as innovations of new technologies (Paul, 2006)." In this regard, the positive impact of devaluation is revealed.

Barbara starts the analysis by saying that devaluation is believed to bring inflation indirectly through the parallel market rate, but no significant direct relation between inflation and the official exchange rate devaluation can be established. Devaluation has been found to have an indirect impact on the general price level through its effect on the parallel exchange rate and the

budget, but this transmission mechanism has been deflationary rather than inflationary (Barbara 1997).

Effectiveness of devaluation is and has been a debatable issue in least developed countries like Ethiopia. As we have noticed form the above reviewed research papers, still its effectiveness has not been proved or even disproved. In addition to this, this thesis, differently from other researches will focus on the effect of devaluation on internal and external balance. Most researches done on this area are strictly confined to finding the effect of devaluation only on trade balance but this paper will add different variables that are affected by devaluation such as inflation and employment. And also it will focus on the recent devaluation by the national bank and reveal what has happened since then and what the future will look like.

1.3 Objectives

General objective of the study:

Devaluation has been proven to be effective in the developed countries and in LDC it is still a controversial. The general objective of this thesis is to know whether devaluation is effective in achieving internal and external balance in Ethiopia or not.

Specific objectives of the study:

- Finding the specific intention of the National Bank of Ethiopia to devaluate the currency
- Finding the long and short run effects of devaluation
- Finding the relationship between real GDP and Trade Balance
- Finding the relationship between Trade Balance and real effective exchange rate
- Finding the trend of inflation, employment and trade balance before the devaluation

1.4 Scope of the study

The concept of currency devaluation is a very broad term and a very controversial issue on the whole continent of Africa and other least developed countries scattered all over the world (Edwards, 1989). Even though its effectiveness is questionable in least developed countries, this study will only try to show the effectiveness of currency devaluation on the Ethiopian economy. Beside its confinement in Ethiopia, the coverage time span of the research will be between the years of 2009/10- 2013 for the descriptive part (For the analysis of effectiveness of devaluation on inflation will use cover the year 2014) and for the quantitative analysis the year 1976-2014 will be used. As this study is to find out the effectiveness of the devaluation, data will be collected some time before the devaluation as it helps us to witness the real impact on the economy.

1.5 Research Question

This paper tries to look at and give answer to the following research questions:

- Was the devaluation effective in achieving the internal and external balance of the country?
- Why did the government devaluate the currency specifically in 2009 and after wards?
- Why is Birr depreciating in an increasing rate?
- What is the relation between Trade Balance and real effective exchange rate?

- What is the relation between Trade Balance and real GDP?
- What are the short and long run effects of currency devaluation?

1.6 Methodology and Data Source

Data sources and method of analysis:

Data source

Data will be collected from government institutions which are responsible for recording data of rate of inflation, trade balance, real GDP, Real effective exchange rate, trade openness and lending interest rate directly from the institutions before and after the year 2009/10 and 2014/15 for the descriptive part of inflation and for the analysis of the effect of devaluation on trade balance this paper uses data from 1976 – 2014. Other data will be collected from publications of IMF and WB reports, African development bank report, reports of NBE, reports of central statistics Authority (CSA) and MOFED.

Method of analysis

This thesis will describe the condition of the internal and external balance of the country due to the changes made. Hence, it uses descriptive method to point out the status quo of the internal and the external balance by breaking down each balances i.e. inflation and trade balance describing the individual effect. And use variance autoregressive regression (VAR) for estimating the short and long run results.

1.7 Significance of the study

The major significance of this study is that it will enable to see whether the currency devaluation is effective in least developed countries like Ethiopian achieving Internal and External balance or not. Beyond the major significance, the study will show the reasons behind the devaluation in the years between 2009/10-2010/11 and give an idea of what are the deference and similarities between devaluation and depreciation (between fixed and floating exchange system) in their effect on the economy. In addition to these, this paper will hopefully be used to draw conclusions about the use of devaluation in LDCs and will help Ethiopian policy makers to take the right decision in deciding whether to devaluate or not.

1.8 Limitations of the Study

The study has faced problems of lack of data. Some of the data of the variables used in the analysis were not available in the country. As a result it was forced to use publications of third parties to complete the analysis. Particularly the data for employment was not complete therefore it was left out the analysis as part of internal balance. In addition to the data problem, time was another factor hindering this thesis from completion but I have tried my best to fully complete it in time. Finding literature reviews of foreign countries specially that of the African countries was even difficult. Though it was hard to find the material, I have used up all my available resources to add the literatures of these African countries.

1.9 Structure of the Study

This study is structured as follows: Chapter one which is the introduction part includes topics from introduction to structure of the study, meanwhile chapter two includes Literature Review. This chapter as a sub topic will include theoretical and empirical literature reviews from the

experience of both the developed and the developing nation. Chapter Three comprises descriptive data analysis. As a sub topic, this chapter will have a descriptive approach to the inflation as well as that of the trade balance effects of devaluation with the use of graphs, tables and a pie chart. The fourth chapter is model specification, methodology and estimation technique. The fifth chapter is going to comprise empirical result and analysis with different tests as a sup topic. The six and final chapter includes Conclusion and Recommendations.

Chapter Two: Literature Review

Exchange rate control includes both devaluation and revaluation of currency (NBE, 2009). Being as one of the exchange rate controls, devaluation is defined as increase in the domestic currency price of foreign exchange (Gazena, 2001). This devaluation is believed to alleviate balance of payments difficulties and accordingly expand output and employment. This will happen through the expenditure switching behavior of devaluation (Tirsit, 2011). Devaluation switches demand from imports to domestically produced goods by increasing the relative prices of imports, and makes export industries more competitive in international markets by stimulating domestic production of tradable goods and inducing domestic industries to use more domestic inputs (Acar, 2000).

Before going to deep about the effect of devaluation, we must be clear about the different exchange rate types and regimes. These are:

2.1 Explanation of related terms

2.1.1 Exchange rate regimes

The exchange rate regime is the way a country manages its currency in respect to foreign currencies and the foreign exchange market. (National Bank of Ethiopia, 2009)

Fixed exchange rate: is the rate at which one currency is exchanged for the other is dictated by the involvement of the national bank. But more acceptably it is defined as the system where the central bank is ready to buy and sell currency at a fixed price in terms of other countries' currencies. (Gazena, 2001)

A fixed exchange rate dedicates a country's monetary policy to the single goal of keeping the exchange rate at the announced level. In other words, the essence of a fixed-exchange-rate system is the commitment of the central bank to allow the money supply to adjust to whatever level will ensure that the equilibrium exchange rate equals the announced exchange rate.

Pegged Floating Exchange Rate: Here, the currency is pegged to some band or value, either fixed or periodically adjusted. (Gazena, 2001)Pegged floats are:

- *Crawling bands*: the rate is allowed to fluctuate in a band around a central value, which is adjusted periodically. This is done at a preannounced rate or in a controlled way following economic indicators.
- *Crawling pegs*: Here, the rate itself is fixed, and adjusted as above.

Pegged with horizontal bands: The currency is allowed to fluctuate in a fixed band (bigger than 1%) around a central rate (Gazena, 2001).

Flexible exchange rate: is determined by the private market through supply and demand. A floating rate is often termed "self-correcting," as any differences in supply and demand will automatically be corrected in the market. (NBE, 2009)

Managed float: The exchange rate that Ethiopia is following now a days is called managed float in which the currency is managed and also allowed to float. Which is, the national bank of Ethiopia will intervene in the exchange rate market if there is a need to intervene and otherwise the exchange rate is left for the market to decide up on it.

2.1.2 Nominal and real exchange rate

Nominal exchange rate is a monetary concept that measures the relative price of two monies (Edwards, 1987) others say Nominal exchange rate is simply the price of one currency in terms of another. Since two currencies are involved in the concept of nominal exchange rate, there are two different ways of giving the quotation of it (Gandolfo, 2002; Keith, 2006):

- ✓ The Price quotation system (American system): In this method nominal exchange rate is defined as domestic currency units per unit of foreign currency.
- ✓ The Volume quotation system (English system): Under this method nominal exchange rate is defined as the number of units of foreign currency per unit of domestic currency. It is obviously the reciprocal of the previous one.

The real exchange rate measures the cost of foreign goods relative to domestic goods. It gives a measure of competitiveness, and it is a useful variable for explaining trade behavior and national income (Barry, 2004). Edwards (1987) defined real exchange rate as the relative price of tradable with respect to non-tradable goods.

$$\text{RER} = \frac{Price\ of\ tradable\ goods}{Price\ of\ non\ tradable\ goods}$$

Edwards also added that RER is a fairly good proxy of a country's degree of international competitiveness. A decline in RER, or a real exchange rate appreciation, reflects the fact that there has been an increase in the domestic cost of producing tradable goods. If there are no changes in the relative prices in the rest of the world, this decline in RER represents a deterioration of the country's degree of international competitiveness. But the above formula

lacks a clear empirical counterpart that means it is difficult to calculate in real life situation (Dessie, 2011). According to Mankiw (2002) the correct formula is:

$$\text{RER} = \frac{E\ P_T^*}{P_N}$$

Where,

E= is the official Nominal exchange rate measured as the amount of domestic currency per unit of foreign currency

P_T^*= Price of Tradable goods

P_N= Price of Non Tradable goods

Tradable goods are those goods that have export or import potential and whose price is determined in the international market. However, non-tradable commodities are goods or services that cannot be transacted among countries because of their intangibility nature and higher transportation cost.

Barry (2004) pointed out what causes changes in Real exchange rate?

1. A change in the demand of the products i.e. the purchasing power of the currency has increased relative to foreign goods (it appreciates).

2. A change in relative output supply i.e. relative productivity growth causes the real exchange rate to appreciate and the real value of the currency to depreciate (the purchasing power declines).

As noted by Weerapana the critical difference between a real exchange rate depreciation and a nominal exchange rate depreciation is that the former refers to an increase in the price of foreign goods in terms of domestic goods whereas the latter refers to an increase in the price of foreign currency in terms of domestic currency (Weerapana, 2009).

2.2 Theoretical Literature

As stated above, devaluation affects the balance of payment. But what is balance of payment? The balance of payments is a bookkeeping system for recording all receipts and payments that have a direct bearing on the movement of funds between a nation (private sector and government) and foreign countries. The current account shows international transactions that involve currently produced goods and services. The difference between merchandise exports and imports, the net receipts from trade, is called the trade balance. When merchandise imports are greater than exports, we have a trade deficit; if exports are greater than imports, we have a trade surplus (Mishkin, 2004).

Paul provided a support for the positive effects of devaluation on economic growth on firms that produce both in the local and foreign market. When a currency is devaluated the amount of profit gained by a firm producing in the foreign market increases when converted to the local currency (Paul, 2006). This increase in profit can be used for the development of the research and

development as well as innovations of new technologies. Finally the improvement and introduction of new technologies through profit will decrease their previous cost used which in turn increase output.

Devaluation has an expansionary effect through its expenditure switching and reducing effect. Through this effect devaluation in the devaluating country, makes the price of imported goods increase whereas the price of domestic goods will decrease which in turn will increase the export of goods. And if the Marshall- Lerner condition is satisfied devaluation of currency can improve the trade balance as well as GDP in the long run (Tirsit, 2011).

The Marshall-Lerner condition is the condition where sum of the elasticities of demand for exports and imports exceed one (in absolute value); that is, $hX + hM > 1$, where hX, hM are the demand elasticities for a country's exports and imports respectively, both defined to be positive for downward sloping demands. Under certain assumptions, this is the condition for a depreciation or a devaluation to improve the trade balance.

According to Mankiw in the Mundell–Fleming model, a devaluation shifts the LM curve to the right; it acts like an increase in the money supply under a floating exchange rate. A devaluation thus expands net exports and raises aggregate income. And other scholars do not support the ideas stated above (Mankiw, 2001). They give their own reason to negate the idea of expansionary effect of devaluation.

The possibility of contractionary devaluation has been studied in seminal papers by Diaz-Alejandro (1963), Cooper (1971), and Krugman and Taylor (1978). A contractionary devaluation may occur from the aggregate demand side: the trade balance may worsen if the price elasticities of export and import demands are too low or if the initial trade balance is in deep deficit. In the

monetary model, devaluation reduces aggregate demand by raising the domestic price level through higher prices of imported goods and thereby lowering the real money balance (Frenkel and Johnson, 1976). Another channel is a redistribution of income from low saving groups (wages) to high saving groups (profits) (Krugman and Taylor, 1978). In addition devaluation is believed to bring an inflation as Ratha, Eungmin , & Mary E. state that a country's aggregate demand may actually contract by following a devaluation of its currency because it makes imports more expensive (Ratha, Eungmin , & Mary E. , 2011). The resulting inflation becomes a natural by-product of the devaluation. If the country's export sector relies heavily on imported inputs, then cost-push inflation will appear in the export sector as well, and to that extent, diminish the competitiveness of a country's exports. If a country's export sector imports the majority of its inputs, a currency devaluation increases production costs and thereby undermines the competitiveness of the exports. Inflation also causes an adverse real balance effect as real wealth drops, leading to a further drop in spending. Likewise, aggregate demand contracts because of:

(i) *A redistribution of income towards entities with a lower marginal propensity to consume,*

(ii) *A decline in investment as imported inputs get more expensive,*

(iii) *higher debt service payments for the country, and*

(iv) *Inflation and the accompanied increase in interest rates*.

On the supply side, devaluation is clearly contractionary. Production suffers because imported inputs get costlier following a real devaluation (Edwards, 1987). Given the inflationary environment, factor prices including wages and interest rates rise and further reduce the aggregate supply.

Many have been said on effects of devaluation theoretically and the theories vary from person to person and from economists to other economists so it is better to see the empirical findings to know the real effect of devaluation.

2.3 Empirical Literature

Devaluation is part of the monetary policy which has a very ambiguous effect to the applying country. Before 1970's, there were no arguments over the effectiveness of devaluation but after the specified year a growing literature questions this view and puts forward a variety of reasons that devaluation could lead to contraction in output (Acar, 2000). In this empirical literature review, we will try to see what impact has devaluing a currency in different parts of the world.

In 1930's there was a global crisis called The Great Depression. This crisis aroused in the United States of America. Even though in the then time the currency system was different it had some similarity with the present system. The Gold standard system was used during that period. It was a rate of exchange between gold and currency. During the difficult times of the world, a few countries such as Denmark, Finland, Norway, Sweden, United States of America and the United

Kingdom reduced the amount of gold they would pay for each unit of currency by about 50 percent. By reducing the gold content of their currencies, these governments devalued their currencies relative to those of other countries (Mankiw, 2002).

Mankiw stated that those counties which devalued their currency recovered faster from the depression they were into. He said that the lower value of the currency raised the money supply, stimulated exports, and expanded production. But those countries that maintained the old exchange rate suffered longer with a depressed level of economic activity (Mankiw, 2001. This devaluation is in the old days. In recent years, because devaluation is part of the fixed exchange rate system, most developed countries do not support the involvement of central bank in deciding the selling and buying of foreign currencies.

Mike and Valerie, in their descriptive study found out that Brazil was in a serious trouble between the years 1998-99. The country was characterized by high level of unemployment, current account deficit and high rate of inflation. Before the year 1998, Brazil's central bank used crawling peg system (Mike and Valerie (2006). But in January 1999, the central bank devalued the Brazilian currency 8% against the US dollar. Following this devaluation in the year 2000, Real GDP increased from $R[2] 692 (bn)[3] in the year 1999 to $R 722 (bn) in 2000. Similarly unemployment declined from 13.3 to 11.3 in 2000. The money market rate dropped from 26.3 to 17.6 in the year 2000. These decline in unemployment and in the money market rate and increase in the real GDP did not stop in 2000 but it continued in the following years. These are not the only thing that happened to the Brazilian economy, the current account deficit was corrected in

[2] Real is the basic monetary unit of brazil since 1994
[3] Billion

the year 2003 and for the first time in Brazil's economic history since the 1990's the current account balance was positive.

But the positive things are not the only thing that happened in Brazil's economy, for example Brazil's sizeable public debt held in U.S. dollars was instantaneously increased with the depreciation. This problem usually lead many East Asian countries in financial sector collapse but Brazil managed to pull through the problem without any financial sector collapse. This was not the only problem, one of the neighboring country of Brazil, which is Argentina, had to have a strain with Brazil because the economy of Argentina was heavily dependent on the economic policy of Brazil, as Brazil is the largest economy in South America.

The research made by Mike and his colleagues stated that there were remarkable changes to the economy. But their research was too narrow to look at what the direct effects of the devaluation were (Mike and Valerie (2006). The above stated positive changes might have happened because of other factors. This is because during the time of Brazil's currency devaluation there were financial crisis in Russia and East Asian countries were in a big trouble. Brazil, before even devaluing the currency, had already increased interest rate that attracted many foreign direct investment (FDI). So the real cause of the positive changes in the Brazilian economy is not clearly identified. But as we can see from their finding, devaluation was effective in Brazil.

Since 1949, the Chinese currency has been renminbi (Yuan). Since that time the currency has not been responding flexibly to the change of price parities between China and the rest of the world, nor make quick adjustment according to the changing supply and demand of foreign exchange

(Zhang, and K. Sato, 2009). In 1994, the official exchange rate of the renminbi experienced a 50% devaluation to 8.70 Yuan to one US dollar. China has accomplished a lot with in a few years and after the devaluation it has lived to witness huge external surplus (Ratha, Eungmin , & Mary E. , 2011). These researchers said that *China is the country where undervalued currency coexists alongside the planet's biggest trade surplus, and the fastest growing economy*. From 1994 until July 2005, China maintained a policy of pegging the RMB to the U.S. dollar at an exchange rate of roughly 8.28 Yuan to one US dollar. The peg appears to have been largely intended to promote a relatively stable environment for foreign trade and investment in China (Wayne and Marc, 2011).

China has had a positive current account after the devaluation said the researchers. In 2001 China's current account balance had a 21 billion dollar surplus and after this year there was only a slight decrease in the rate of increase in 2003 but it has been increasing ever since and in 2008 it has reached at a maximum of 412 billion dollars. The concept of achieving external balance is having neither a deficit nor a surplus. Surplus is not needed because trading partners of the specific country will be disappointed and will want to blame the country for their own internal problem and will ask for help from the country. This is what exactly happening to china.

As Wayne and Marc represented it, because of the devaluation of the Chinese currency their trade balance has gone positive and employment opportunities were created for the larger population of China but because of these the United States of America is having trade deficit and job losses. The devaluation of Yuan has led to the loss or displacement of 2.8 million jobs (of which, 69% were in manufacturing) between 2001 and 2010 in USA. Krugman opposes that the undervalued RMB (Yuan) has become a significant drag on global economic recovery,

estimating that it has lowered global GDP by 1.4%, and has especially hurt poor countries. The influence of USA has forced China to change it exchange rate system and to appreciate the Yuan in 2005. As a result After July 2005, China allowed the RMB to appreciate, but very slowly. From July 21, 2005 to July 21, 2008, the dollar-RMB (Yuan) exchange rate went from 8.11 to 6.83, an appreciation of 18.7%. Even after the appreciation china still is enjoying trade surplus. In general, the devaluation of the Yuan has created job opportunities and brought trade surplus to China.

China devaluated its currency in 1994 but the effect of it is still happening. (Zhang & K. Sato, 2009) used the vector auto regression (VAR) econometrics technique to check whether Chinese economic system has become responsive to the changes in the exchange rate since reform or if the change in economic system is due to other non-exchange rate factors. They constructed a structural VAR model to estimate impulse response functions and variance decompositions for China's output and trade balance. And found out that the results inspire one's expectation that, the dynamic effect of exchange rate on China's trade balance is still very limited, and China's balance of trade is mainly determined by the world demand and its trade performance. These are supported by the results from the impulse analysis, that the trade balance is found to be affected largely by the world demand shock and trade balance shock, and exchange rate shock affects the trade balance with an undetermined pattern. Artatrana R., Eungmin K., and Mary E in 2011 used another technique to estimate the effect of the devaluation to the Chinese trade balance. From their model they found out that there exists a long run relation (cointegration) amongst the variables of the model, viz. China's GDP (*Y*), real effective exchange rate (*REER*). They also find that currency devaluation is contractionary in China – i.e., revaluation of the Yuan will likely boost Chinese growth. An appreciation of Chinese currency may increase its trading

partners' GDP and prices. It is not that China's economy is not growing but the researchers are proposing a revaluation of the currency so that the economy can grow faster.

Even though Africa is the home of large number of developing nations, the actual case of these nations is very different from other non-African developing nations. As the major exports of most African nations is primary products and other non-African developing nations major exports vary from oil exports to light industrial materials. Therefore it is better to divide developing nations into two and see how devaluation works.

2.3.1 Devaluation in some of Africa's developing nations

Some economists argue that the devaluation which is proposed by IMF as a development policy package is beneficiary to the developed world rather than African countries. Declining prices of imports from Africa also aids inflation policies in developed nations. In addition, the fact that deteriorating industry and trade liberalization opens African markets to global enterprise also works to the advantage of their industrial nations (Stambuli, 2006). Stumabuli also believes devaluation also undermines the banks and consequently domestic ownership of privatized assets and performance of the rest of the real economy. Devaluation further hurts firms in trading as well as poor farmers and the urban poor. IMF's conscientious push for contractionary fiscal and monetary policies continues to attract a lot of interest. The stated aim is to control the demand side of the economies of African states with a view to achievement of low inflation and consequently, balance of payments sustainability. The IMF's idea of devaluation working via the

price mechanism to change the vector of relative prices and therefore operating as an expenditure switching device is intellectually logical, but its practical role is that of a *'conveyor belt'* transmitting costs into production structures and driving inflation quicker than the acclaimed price improvements.

Similar to any other developing country in Africa, Sudan, even though very late, has been working with the IMF since 1997 to implement macroeconomic reforms, including a managed float of the exchange rate (IMF, 2010). As the report from the IMF reveals, exchange rate of the Sudanese pound against US dollars has appreciated to about 21% in 2006/07, raising many concerns about the competitiveness of the Sudanese agricultural exports there the sharp drop in oil prices has made the real effective exchange rate overvalued starting in the fourth quarter of 2008. There was a terms of trade shock associated with 2009 lower oil prices has depreciated the equilibrium real exchange rate in Sudan. Thus the IMF saw devaluation of the Sudanese pound as an important means of putting the economy back on the rails.

Khalid prepared a simulation for the Sudanese economy and used a CGE (Computable General Equilibrium) model to find out the effects of a possible devaluation. He used a 5%, 10% and a 15% devaluation of the Sudanese pound against the dollar to estimate the value using the model (Khalid, 2011). What he found was an increase in general export and a decline in the general import. But the GDP calculated by the market price showed a decline on each and every devaluation. On each devaluation level the growth of inflation was very fast. Khalid concludes that devaluation in Sudan would succeed in increasing domestic prices of tradable goods and encourage producers to export. However, this affects domestic consumers negatively because the increase in prices is unaccompanied by similar increases in the households' income. This could

also lead the domestic production to deteriorate at certain time point as the intermediate use cost will also increase especially the imported goods. Therefore, devaluation would encourage producers of some sectors to increase their output and exports, while hindering consumers to enjoy the previously cheaper imported and domestic commodities, as the domestic prices increase.

Sub-Saharan Africa is usually characterized by foreign aid dependence, a large and inefficient public sector, low rates of saving and investment, persistent and relatively large budget deficits and inconsistent macroeconomic policy. And the truth is not far from this for Kenya. In fact these were the exact characteristics of Kenya especially in the 1990's (Malcolm and Tzvetana, 2000). There were a number of factors associated with this unsatisfactory performance. Inflation was relatively high and unpredictable. The real exchange rate has been unstable over the last years. From 1990 to 1996 the average growth rate was only 2.3%, implying that real per capita income declined significantly in the first half of the 1990s. Before the year of 1993, the Kenyan Shilling was allowed do appreciate against the dollar. But in 1993 the Kenyan government devalued the Shilling against the dollar. In 1992, 1$ was 32.2 Shilling and in 1993 after the devaluation 1$ was exchanged for 58.0 Shillings (Malcolm and Tzvetana, 2000).

Maureen, Njuguna S, Alemayehu and Stephen find a result of increase in export and export earnings rose dramatically in the 1990s from 13% of GDP in 1992 to over 20% between 1993 and 1996. However their finding on the devaluation was not the only policy of the Kenyan government that raised the export earnings but also there were some trade liberalization policies, tariffs and trade barriers were lifted (Maureen, Njuguna S., Alemayehu and Stephen (2002). Malcolm F and Tzvetana also found the same result. In addition they also found that import also

has increased. In 1992, the current account balance per percentage of the GDP was -2.2 and after the devaluation in 1993 & 1994 it was 1.2, 1.3 consecutively. But in 1995 it was -4.4 and GDP calculated by the market price only showed a decrease in 1993 but after this year it has been increasing (until the data was taken i.e. 1996). To know whether there is a link between exchange rate and economic growth in Kenya, Malcolm and Tzvetana use a VAR (Vector Auto Regression) technique and found out that there is no significant link between the two variables. And they concluded that improvement in exchange rate management in Kenya can influence the rate of income growth, but only in the context of a broad-based structural adjustment and reform.

Malawi is the next country that will be discussed in this part. The economy of Malawi is predominantly agricultural, with about 90% of the population living in rural areas. Agriculture accounts for 37% of GDP and 85% of export revenues. The government faces strong challenges: to increase exports, to improve educational and health facilities, to face up to environmental problems of deforestation and erosion, and to deal with the rapidly growing problem of HIV/AIDS in Africa according to World Bank report. After its independence from the colony of Britain in 1964, Malawi has faced different socio economic problems. To resolve these problems the government of Malawi has been devaluating its currency (Kwacha) many times throughout the past years (Silimbu, 1995). In November 1967 the Kwacha was devalued 14% against the British Pound. Thus, since then it has been being devaluated against the dollar with different rates (Russell, 2012). While the 1960s up to mid-1970s were characterized by modest import substitution, the latter period (late 1970s to date) has been characterized by the heavy importation of industrial inputs accounting for in excess of 35% of the total import bill. In the year 1990 the Kwacha was devalued 7% and the data collected on the same year showed that there was a 70% increase in the tobacco export (Silumbu, 1995). As Russell shows by his

research, the country's currency has been devaluated by larger percentage rates in recent years. By 2003 and March 2005 the currency has already been devalued by 30% and 35% against the dollar. By the year 2006, the Malawian current account balance had deficit of $209 million. To correct their deficit they continued the devaluation and in May 2012 the Kwacha was devalued by almost 50%. Following this huge devaluation Russell observed that there was a huge inflation in the country. It was more than 16%. This is a huge blow to the Malawian economy unless they can control this inflation because like any African country Malawi owes to different banks and foreign governments a large sum of money so the repayment is going to be very difficult for the Malawian government.

2.3.2 Devaluation in Ethiopia

Ethiopia's economy is based on agriculture, which accounts for 46% of GDP and 85% of total employment. The inflation rate is high (21 percent at end-2011/12), real GDP growth, which is estimated at around 7 percent in 2011/12 (IMF, 2012). Before the liberalization policy of 1990s, the exchange rate in Ethiopia had been fixed at 2.07 Birr against US Dollar for almost two decades. The rate was devalued by 140 percent to 5 Birr per 1 US Dollar in October 1992. Managed floating exchange rate regime is being practiced in Ethiopia since 1992. Recently, in September 2010, the rate was devalued by 20 percent from 13.63 Birr/US Dollar to 16.35 Birr/US Dollar and depreciating ever since i.e. until this thesis is done it has been depreciating at

least from month to month (NBE, 2009). In this section we will see what the results of researches made in Ethiopia are.

Given the fact that the agricultural sector has a significant share in the overall national income as well as being a major source of employment for many LDCs, the link between devaluation, economic growth and agricultural policy is not a puzzle (Acar, 2000). Growth in the agricultural sector contributes considerably to overall economic growth. Devaluation policy changes the relative price of tradable goods to non-tradable goods. As a result of devaluation, therefore, agricultural exports, hence agricultural production, and total export earnings as well as overall output growth will be affected (Acar, 2000).

Tirsit applied a simple regression technique. The objective of the regression was to study the relationship between GDP per capita level and the exchange rate. She used a time series data from 1980 to 2010 and her study has revealed that devaluation has a negative effect on GDP per capita the same year. Whereas the coefficient for the one year lagged exchange-rate was significantly positive thus devaluation has a time varying effect. In her model she used other variables that have impact on the GDP (education, war, drought, openness, private investment, public expenditure, demographic factor) and tested their impact on the GDP along with the exchange rate as an independent variable. *Devaluation according to her study was contractionary only in the year the currency is devalued and it has an expansionary impact on the GDP after a year*. The change in the exchange rate might have a small short term effect and strong long run effect (Tirsit, 2011).

Kebede to investigate the role of real exchange rate in the aggregate exports of Ethiopia, and to examine the extent to which the real exchange rate shapes the commodity specific exports of the

country, he employed a Gravity model. From his analysis he found out that the export of Ethiopia is highly dependent on the economic growth of Ethiopia and the GDP of countries who import Ethiopian products. From the Gravity model the effect of exchange rate was found to be statistically insignificant. Which means the change in exchange rate either it can be devaluation/revaluation or appreciation/depreciation in Ethiopia has no impact on Ethiopia's export. This irresponsiveness of Ethiopia's exports to real exchange rate may be attributed to low price elasticities of domestic export supply and/or low price elasticities of demand for primary commodities in the markets of the trading partners (Kebede, 2011).

Fantahun with the general objective of his study which is to find out the channel of transmission through which the real effective exchange rate impacts economic growth in Ethiopia. He used both descriptive and econometrics technique to analyze the impact of real effective exchange rate. And what the results suggests is that there is 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 (Fantahun, 2011).

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. The reason for a negative relationship in the short run is that 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 development 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. In conclusion he also add that the 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 and exchange rate premium from the supply side; the second and the third in the short run as well. Active labor force is found to be insignificant to affect Ethiopia's economic growth. The choice of exchange rate regime does not matter for economic growth in Ethiopia in the short-run. His findings are similar to that of Tirsit's.

Dan and Claudius discussed that Ethiopia's trade performance has been held back by a combination of factors that are agreeable to policy treatment, including very high trade costs due to poor trade logistics and burdensome official requirements, an unsupportive macroeconomic policy mix, and private sector under-development that is at least partially attributable to weaknesses in the microeconomic framework (Dan C. and Claudius P., 2010). Ethiopia's track record on using trade for development is not exactly encouraging. Different trade strategies have been used in the past, including import replacement/protection for infant industries during the Imperial period, state-managed trade during the military government era, and a more market-oriented liberalized approach supported by much trade-related technical assistance in the most recent period. About the recent devaluation the researchers used a descriptive method and they found exchange rate control has a negative impact on Ethiopia's trade balance and it is inflationary because of the huge part of the economy that is not functioning at market prices. This suggests that the devaluation in part has fuelled some degree of uncertainty among private

sector players as they speculate about the possibility of even further devaluations in the months ahead. The paper written by Dan C. and his fellow researchers argues that the Ethiopian exports are price inelastic and Ethiopia imports goods which do not have domestic substitute, by the condition of Marshall-Lerner for Ethiopia is less than one, so according to the J-curve effect devaluation has a negative effect on Ethiopia's trade balance.

Paul, Sherman and Hashim the objective of their paper is to examine the implications of external shocks and policies, particularly the appreciation of the real exchange rate and the subsequent foreign exchange rationing on the overall economy and household welfare in Ethiopia Paul, Sherman and Hashim (2010). To begin their assessment they first explain the present reality in Ethiopia. Between 2004/05 and 2007/08, Ethiopia successfully accelerated its economic growth through a deliberate policy of expanded domestic credit to finance private investment and increased foreign borrowing to finance public investment. Increased investment implied increased demand for imports (and for foreign exchange) since private (and public) sector investors had access to foreign exchange to finance imported intermediate and capital goods. However, this rapid growth was accompanied by a major appreciation of the real exchange rate (by 34 percent between July 2004 and July 2008) that reduced incentives for domestic production of exportable and non-protected importable. Inflation rose from 11.5 percent in 2004/05 to 64.5 percent in 2007/08.

However, the inflation rate has slowed down a bit as the researchers do state. Ethiopia has like any other developing country a trade deficit and Ethiopia had been increasingly financing its current account deficit through drawdown of official foreign exchange reserves. From end June 2007 to the end of March 2008, foreign exchange reserves fell by $381 million. In conclusion to

their descriptive analysis they said foreign exchange controls reduce economic efficiency so that real incomes from factors of production (land, capital and labor) decline, as do overall household incomes (except for those who gain large rents). Moreover, foreign exchange controls inhibit depreciation of the real exchange rate, and thus slow or prevent reversal of the real exchange rate appreciation, which has resulted in major price disincentives for exports.

Mohammednur wrote about the effect of exchange rate control on inflation in Ethiopia. He begins his assessment by stating about the recent devaluation by the national bank of Ethiopia. The recent sharp devaluation by the central bank aggravates the inflation rate from single inflation rate of 5.3% in August 2010 to 10.6% in October 2010 following only a month after the devaluation occurred and 40.1% in September 2011 after a year. The research made by Mohammednur uses Vector Autoregressive (VAR) analysis to estimate the effect of Exchange Rate Pass-Through on inflation in Ethiopia. And hence the result shows that, on average, a one percent change in exchange rate will increase the consumer price by 4.75 percent in the first year. The exchange rate pass-through to inflation almost dies out after two years of the exchange rate shock (Mohammednur, 2012). According to the findings - inflation is very sensitive to exchange rate movements in Ethiopia. Price expectation also plays its part in propagating the inflation rate in Ethiopia.

The results and findings of these researchers are very important even though the results are different from one another. Some have found that devaluation is contractionary only for a year after the devaluation and it is expansionary after the period of one contractionary year and others have found devaluation to be contractionary, even bring recession to an economy and inflationary. All the researches made in Ethiopia and reviewed in this literature review section

are very recent and yet they differ from one another. Most of the researches made linked devaluation only with trade deficit and few saw its relation with inflation. But my research will go beyond this as it will include correction of trade deficit and inflation after the devaluation and that of continual depreciation of birr. In this thesis two models are going to be used, one for the trade balance and one for the inflation rate and try to explain using VAR analysis and also use a detailed descriptive analysis.

The first model, which is going to use terms of trade to explain trade balance can be depicted as follows:

TOT= *f* (RGDP, REER, INF, i)

The variables real GDP, real effective exchange rate, inflation rate and lending interest rate, are assumed to have a direct impact on TOT variation and hence the result of this will be able to explain.

$$\boldsymbol{TOT_t = p_t^x / p_t^m}$$

The Harberger-Laursen-Metzler (HLM) effect: rising terms of trade should be associated with an improving trade balance. According to Mendoza which supports the idea that this theory also holds true for developing countries, the terms of trade are positively correlated with the trade balance (Mendoza, 1995). His model captured this empirical.

$$y_t = c_t + g_t + i_t + x_t - m_t$$

If $g_t = \bar{g}$ and $i_t = \bar{\imath}$

And $c_t = \bar{c} + \alpha y_t$

$m_t = \mu y_t$

Outputs as well as all components of aggregate demand are expressed in terms of import goods.

$x_t = tot_t q_t$ Quantity of good exported $q_t = \bar{q}$

$$y_t = \frac{\bar{c} + \bar{g} + \bar{\imath} + tot_t\, \bar{q}}{1 + \mu - \alpha}$$

Letting $tb_t \equiv x_t - m_t$, denote the trade balance, we can write

$$tb_t = \frac{1 - \alpha}{1 + \mu - \alpha} tot_t\, \bar{q} - \frac{\mu(\bar{c} + \bar{g} + \bar{\imath})}{1 + \mu - \alpha}$$

As we can see from the above equation, we can clearly see that terms of trade are positively related to trade balance and enabling us to express trade balance from the results of TOT.

And the other model for inflation rate can be found as follows:

INF= *f* (i, REER, RGDP, OP)

Here the explanatory variables are assumed to be lending interest rate, real effective exchange rate, real GDP and trade openness. These variables are assumed to be explanatory in the short and long run variation of inflation. Using VAR the results of the regression are going to be estimated.

Chapter Three: Descriptive Analysis (Approach)

3.1 *Effectiveness of devaluation in achieving Internal Balance (Control Inflation)*

The relationship between inflation and exchange rate is called exchange rate pass-through. It reflects the extent to which exchange rate changes are passed on to the local currency prices of traded goods (Beirne and Bijsterbosch, 2009). Among the exchange rate controls, this research paper deals with devaluation and so the relationship between devaluation and inflation can be shown in the following diagram.

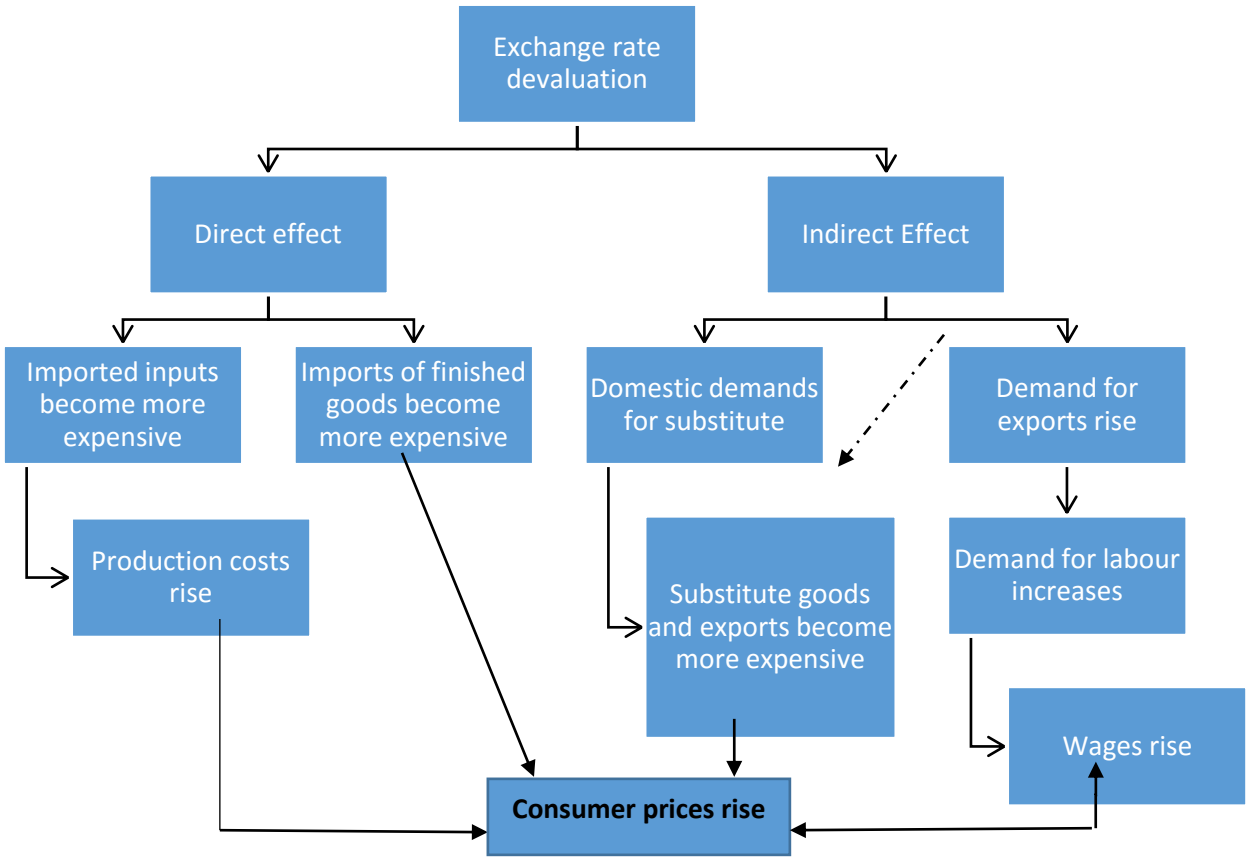


Figure 3.1.1: Exchange rate devaluation/depreciation

Source: Lafleche (1997)

As depicted in the above diagram, exchange rate devaluation has both indirect and direct effects. When a currency is devalued or has depreciated price of imported finished goods rise and also price of imported inputs for production will rise and so all these rise in price will be added to the consumer. On the hand the indirect effect also goes all the way through to the consumer price. This rise in consumer prices will result in a rise in inflation as inflation is defined as a continuous or a sustained rise in the overall price of baskets of goods. To calculate the inflation rate we use consumer price indices. Consumer Price index (CPI) is an index that measures the price the cost of buying a fixed basket of goods and services representative of the purchase of consumers. Consumer price index reflects changes in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly (CSA, 2013). Inflation is measured by measuring the percentage change in the prices of a given basket goods over time as compared to the price in the base year.

According to the IMF report, Ethiopia has been experiencing a fast economic growth. Since 2002, it has been enjoying an enormous economic growth greater than every Sub-Saharan African countries excluding Nigeria and South Africa. Along with this growth was a high rate of inflation. This inflation is before the big devaluation by the government of Ethiopia in 2009/10.

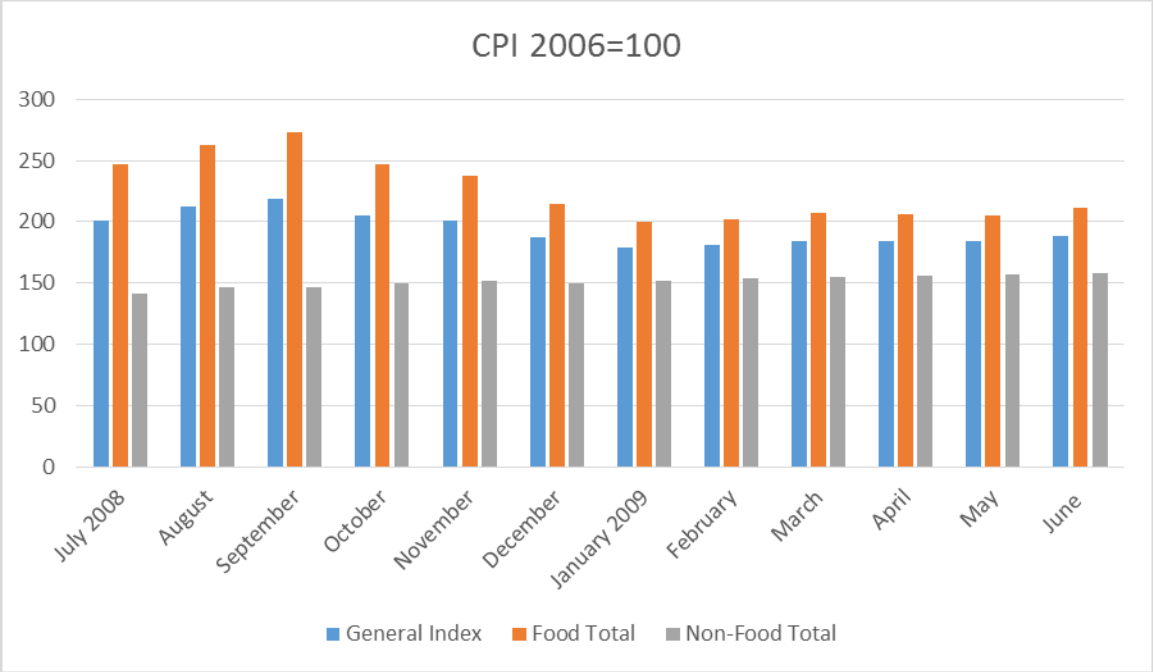
Table 3.1.1: Inflation Rate 2007-2009

	Inflation Rate		
Budget year and month	Overall Inflation Rate	Food Inflation Rate	Non-Food Inflation Rate
Annual Average (September 2007 – June 2008)	18.4	23.6	11.6
Annual Average (September 2008 – June 2009)	40.6	54.1	21.0

Source: NBE

The country's inflation has already reached as high as 40% during 2012/2013. The data from the National bank of Ethiopia shows the consumer price index was 173.1 in 2008/09. In the same year the CPI for the total food was 198.0 and for the non-food total was 140.1. Experiencing an inflation rate as high as 40% is a very shocking macroeconomic imbalance. According to the IMF report in July 2008, the inflation rose up to 64% with food prices rising 92 percent. This high rise in the inflation rate is attributed to (i) high domestic demand, which exceeded the supply capacity of the economy, and (ii) exogenous shocks during 2008–09, with commodity price surges and the global recession as stated by the IMF. Along with the global recession was the rise in the petroleum price has contributed a larger amount to the high inflation as most of Ethiopia's foreign currency is spent on this particular item.

Figure 3.1.2: CPI 2008-2009



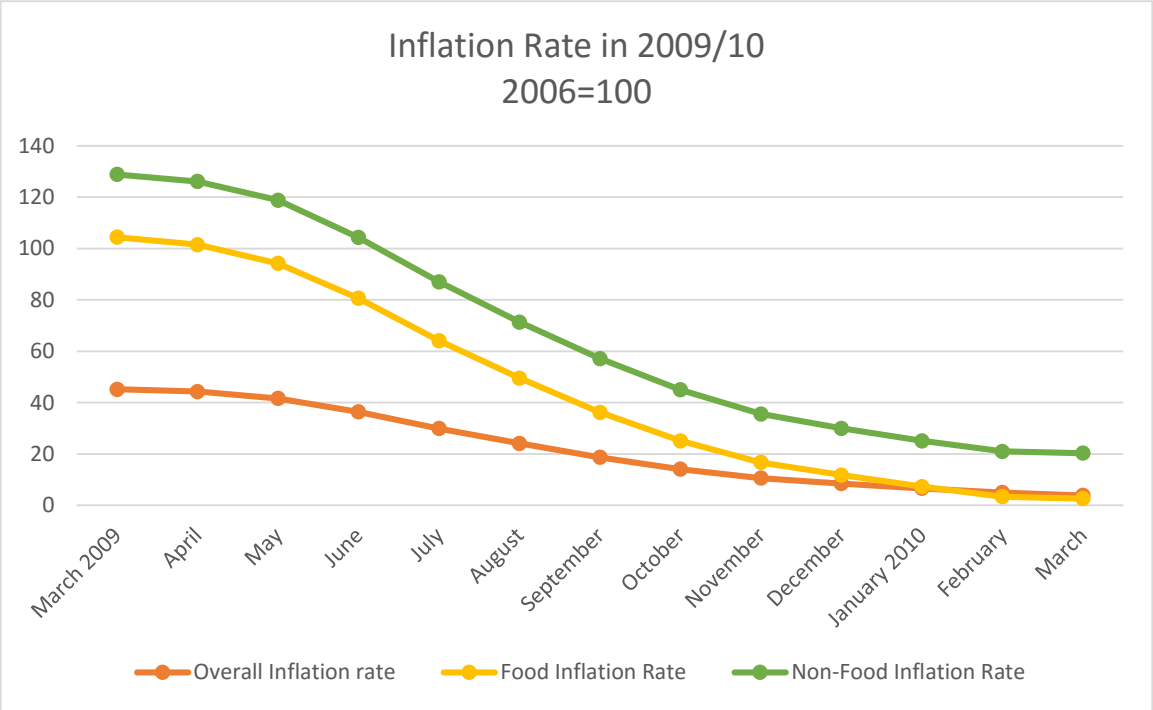
Source: CSA

The above graph shows the trend of the consumer price index from July 2008 to June 2009. As we can see from the graph, around September the index for food item has reached above 250. But gradually we can see that the inflation has eased down a bit because of the measures taken by the national bank. These measures include price ceiling and other tight fiscal policies as stated by the IMF. During these periods the exchange rate was between 9.92 to 9.95 birr per US dollar.

Then comes the central point of this study. In 2009/10 the Ethiopian Birr was devaluated. The NBE made three step devaluations i.e. 10 % in January 2009, 10 % in July 2009 and 5 % in January 2010. A currency which was exchanged 1 US dollar for 9.95 Birr was now exchanged

for 11.01 Birr in January 2009 and in July 12.47 Birr per US dollar was the official exchange rate in every commercial bank in Ethiopia. This was not the last of the devaluation, it continued in January 2010. One US dollar was exchanged for 13.3096 Birr according to the National Bank of Ethiopia.

Figure 3.1.3: Inflation Rate 2009-2010



Source: CSA

As shown in the above graph there was a sharp decline in the food inflation rate and also in the non-food section. As can be seen from the table the March 2010 General year-on-year inflation has increased by 7.4 percent as compared to the one observed in March 2009. The 7.4 percent rise in General inflation rate is due to the fact that the General Consumer Price Index (CPI) of 179.6 percent observed in March 2010 was higher than the corresponding 167.2 percent General

Consumer Price Index (CPI) observed in March 2009. The year-on-year Food inflation decreased by 0.1 percent in March 2010 as compared to the one observed in March 2009.

The reason for the decline in the food Inflation rate was that the 185.6 percent Food Consumer price Index (CPI) observed in March 2010, which was lower than the corresponding 185.9 percent Food Consumer Price Index (CPI) observed in March 2009. However, the Non-Food inflation increased by 20.4 percent in March 2010 as compared to the one observed in March 2009. The rising inflation starts to decline from mid-2009 until September 2010 i.e. kept in single digit. The possible explanation for decline in inflation, according to Access Capital's inflation updater (2009), are large amount of wheat import by the government which not only reduces the price of wheat but also the price of other substitute since food item take the highest share of Ethiopia's consumption which is 57%. Moreover, according to the report, the decline in oil price from 121 US dollar per barrel to 50 US dollar per barrel assisted for the reduction in inflation. The annual average inflation rate for the whole 2009/10 period was 10.8 which showed a large decline from the previous fiscal year. The annual average food inflation was down to 6.4 and the non-food inflation was down to 19.1 when we compare it's result with the food and the overall inflation rate decrease rate, the drop down of non-food inflation was not that much appealing. Even though the Ethiopian birr was devaluated in 2009/10 we are not able to see the effect of it. Because there were many external shocks and other measures taken by the government. A bit increase in the consumer price index was recorded but because of other factors it started to decline and also the inflation rate was brought down. Therefore talking about the effect of exchange rate on inflation at this point is impossible.

In the next fiscal year i.e. 2010/11, again there was a huge devaluation. In September 2010, the national bank of Ethiopia devalued the exchange rate by around 20%. Before the devaluation the currency has depreciated a little to being exchanged for 13.6053 for 1 US dollar. When it seemed like the Ethiopian government had control over the inflation rate the currency was devaluated to be 16.3514 birr per US dollar. Following this devaluation the consumer price index started to show an increase.

Table 3.1.2: Consumer price index (CPI) 2010/11

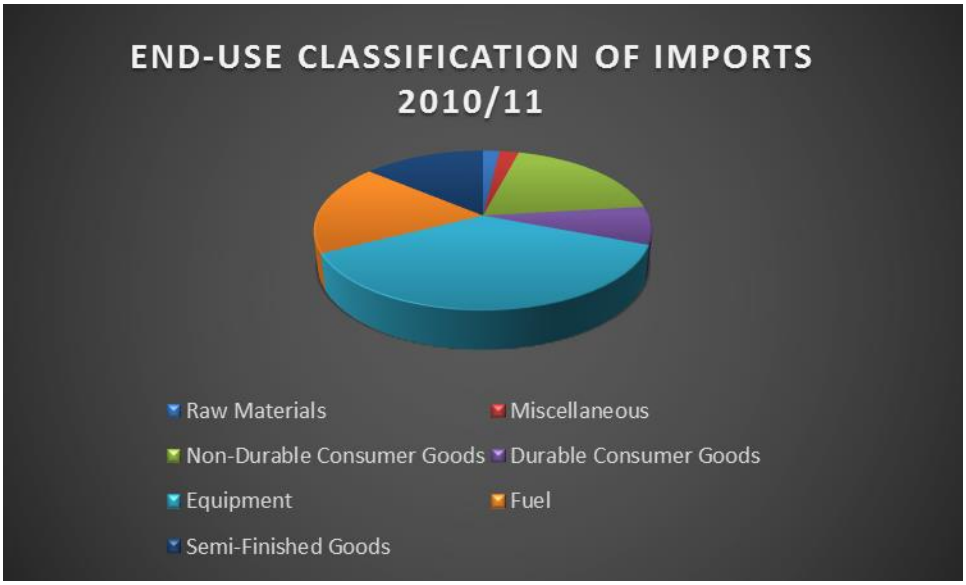
Month and year	**Consumer price index (CPI) 2010/11**		
	General Index	**Food Total**	**Non-Food Total**
April 2010	180.7	186.2	173.3
May 2010	181.2	185.7	175.3
June 2010	183.7	188.6	177.3
July 2010	183.1	186.8	178.3
August 2010	184.3	188.4	178.9
September 2010	189.9	193.2	185.5
October 2010	193.9	197.1	189.8
November 2010	194.1	196.7	190.6
December 2010	202.4	202.1	202.7
January 2011	209.7	211.3	207.7

February 2011	208.7	209.4	207.9
March 2011	224.5	233.0	213.3
April 2011	233.9	246.2	217.6

Source: CSA

The increase in the consumer price index can be clearly seen from the above table. The April 2011 Country Level Consumer Price Index has increased by 29.5 percent as compared to April 2010. The increase in the Food total is greater than the both the General and the Non-Food indices. To see why the consumer price index for food item increased more than the others, we need to identify what are the main imports of Ethiopia. Are Ethiopia's main import food items? The following pie chart will show us what the main imports are.

Figure 3.1.4: Classification of Imports

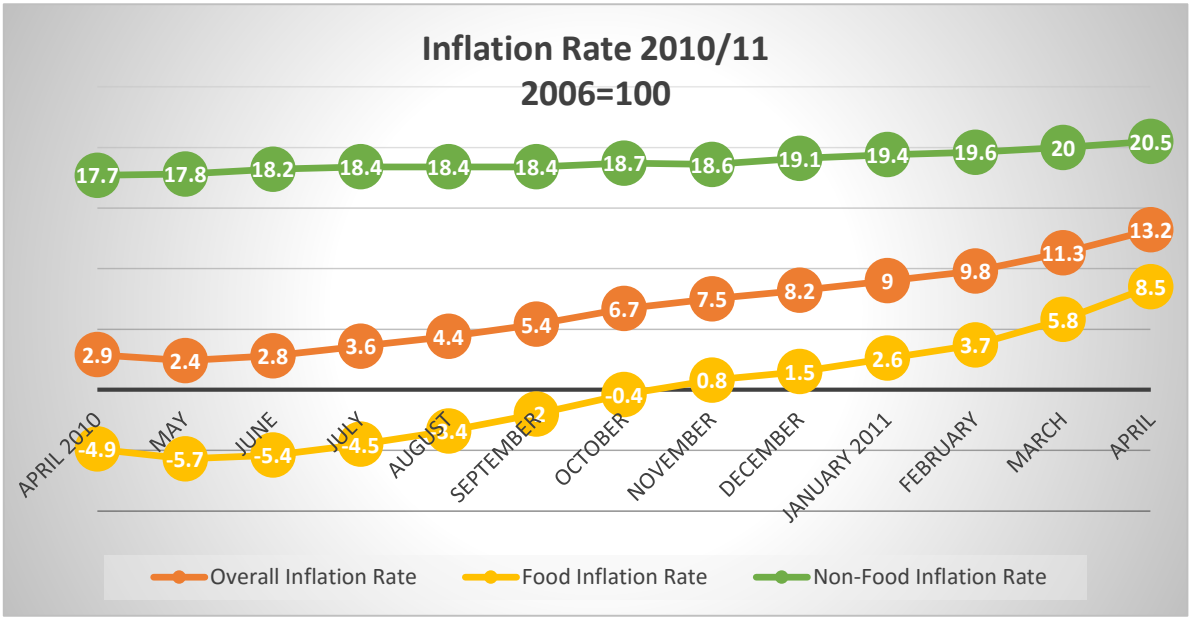


Source: NBE

The chart tells us that food items are not the main imports but Equipment is. Food item under the Non-Durable Consumer Goods has a share of 19% among the whole import. So why there is a high increase in the consumer price index for food items? Before dealing with the inflation rate in Ethiopia, we have seen a diagram that shows the effect of exchange rate on consumer prices. Both the direct and the indirect effects explains the situation here. The direct effect is that since there is a devaluation of the birr, the price of Non-Durable Consumer Goods has risen and so it will directly result in the increase of consumer price index.

And also the Ethiopia is importing raw materials which consists of 1.9% of the overall import and so the devaluation increased the price of these materials which in turn increased the production cost and then all of this costs will be added on the consumer. The indirect effect is that Ethiopia is importing all sorts of products and one of them is fuel which is 18.5% of the overall import. Fuel is an item which has no substitute and it is a very important item for Ethiopia's economy. And so it has contributed to the rise in the food consumer price index. The Non-Food total consumer price index can be explained by the larger share of the Equipment item on the total import of the country. Equipment item has a lion share over the overall import by having 36.7% share. As a result the consumer price index has shown an increase after the 20% devaluation. These are not the only products that resulted in the increase of the consumer price index but all of the products price that Ethiopia import has risen following the devaluation and so we have witnessed a great increase. This huge rise has resulted in the country a high level of inflation.

Figure 3.1.5: Inflation Rate 2010-2011



Source: CSA

From April on wards until October, the Food inflation rate was negative implying there was actually a decrease in the overall price food items. The 20% devaluation has made the Food inflation rate to be 32.2% higher than the previous year when comparing the 2010/11's April with 2009/10's April inflation rate. And the Non-Food inflation rate has increased by 25.6% as compared to the same month the previous year. The rate of increase of the inflation rate for the

Non-Food inflation rate is less than the increase of the Food inflation and less than the overall inflation rate because it was already high by the world is in recession and as we can see from the graph when the Food inflation rate was negative and still declining, the Non-Food inflation rate is was as high as 17.7% and increasing. Still the Non-Food inflation is the highest because Ethiopia's import largely depends on Non-food items including equipment and petroleum and so the effect of exchange rate control expressed by the devaluation of the Ethiopian birr takes the responsibility for the increase. But as we can see the effect of the devaluation reveals its existence through Food inflation. All in all the inflation rate for the year 2010/11 was 9.4% and the average inflation rate for Non-food inflation was 19.4% while the average Food inflation rate was 3.4%.

In the year 2011/12 the consumer price index seems to be increasing again. Even though there were no additional devaluations by the national bank of Ethiopia, the currency was left for the market to float and so the currency depreciated by a large amount as a result 17.6753 Ethiopian birr was exchanged for one US dollar in June 2012. Therefore the consumer price index has shown a great increase which in turn showed one of the highest inflation rate in the country and all of Africa. Both the devaluation and depreciation has the same effect on the currency and so they both affect the import and export sector equally. Their difference is only that devaluation is an intentional involvement of the national bank to correct the exchange rate and it is sudden but depreciation occurs through the market forces of demand and supply. Therefore their effect is more or less similar. The devaluation which occurred in 2010 is still in effect along with the depreciation which occurred during the period 2011/12 have made the consumer price index to even go higher than what it was before in the previous year. The following table depicts the 2011/12 consumer price index.

Table 3.1.3 Consumer price index (CPI) 2011/12

Month and year	Consumer price index (CPI) 2011/12		
	General Index	**Food Total**	**Non-Food Total**
April 2011	233.9	246.1	217.7
May 2011	244.1	261.3	221.2
June 2011	253.6	274.0	226.6
July 2011	254.9	275.4	227.7
August 2011	259.2	282.5	228.2
September 2011	266.0	292.3	231.1
October 2011	271.0	298.9	234.1
November 2011	270.3	295.6	236.8
December 2011	275.0	296.4	246.7
January 2012	276.8	298.7	247.8

February 2012	284.5	308.7	252.5
March 2012	297.6	328.4	256.7
April 2012	303.7	336.4	260.4

Source: CSA

The April 2012 General Consumer Price Index has increased by 29.8 percent as compared to April 2011. The central statistics agency has recorded almost a 30% rise in the consumer price index as compared to the previous year. This rise is one of the highest in the countries since it has been experiencing inflation since 2002. The index shows that Food is the item that its price for consumers has risen faster than the others. To remember the previous year, this was also true for the year 2010/11. Food is an essential item for life so its price elasticity very low i.e. it is almost perfectly inelastic and also majority of the Ethiopian people use few staple food for consumption as a result even if there are substitute goods (food items that can replace the staple food) whose price has not grown up, people tend to stick to the staple food whose price has risen up.

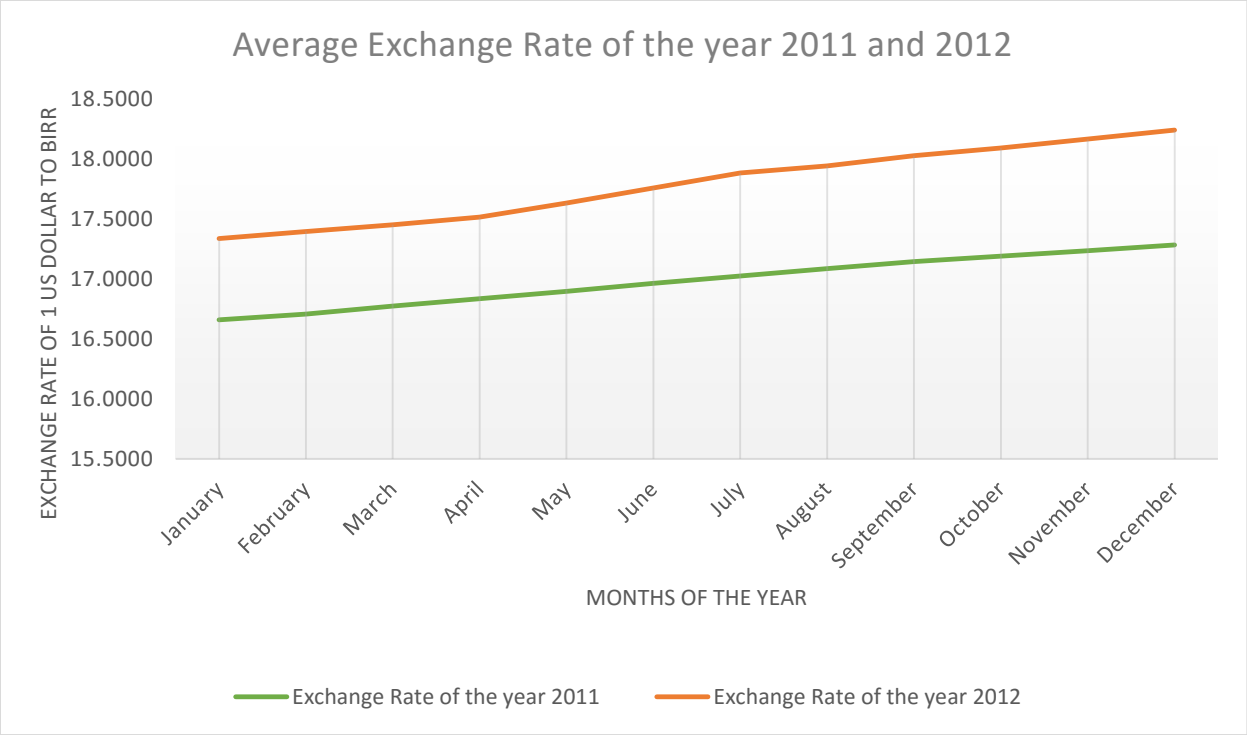
In addition to this, even though no study has been made yet, from observation we can see that when the price of the food item increase, there is a higher demand for that particular item. Because people think its price is going to go even higher and so they want to get hold of that particular food item to be advantageous when its price go higher consequently because of the increase in demand for that item the prices go higher and they do not seem to go down in the recent times.

The above statements are not the only one that explain the high index for food item but also the devaluation along with depreciation has contributed a lot as it is expressed in the previous years. As the currency is devaluated or if it depreciates the prices of imported goods will increased, and so the price of petroleum, fertilizers, agricultural equipment, pesticides and other products which are very important to the agriculture sector go high up. Their increase is compensated by the products produced by the farmers. The other explanation could be again due to the devaluation or the depreciation which will make the products of Ethiopia to be cheaper to the outside world. Due to the low price of the Ethiopian products there will be a higher demand for Ethiopian products, this is a very good news for Ethiopian producers because they want to get higher profit and to get hold of foreign currencies which have higher value than birr. And the next thing they do is they supply more output to the outside world instead of the domestic market, this will create an imbalance between the domestic demand and supply which is one of the known causes of inflation in a given country. This is what actually happened to the market of coffee. Farmers do not want to sell coffee in the domestic market but they want to sell it to the external market and so they sell to the Ethiopian Commodity Exchange (ECX) market and gain a larger profit. Thus the supply of the coffee in the market declined and the price went up high. These are not the only explanations that can explain the higher increase of the food consumer price index but there can be more known and unknown factors that could explain it better. The Non-Food consumer price index has increased by its own rate of increase but it was not as high as the Food item. This can be explained by its necessity of these items.

The Non-Food section according to the classification of the central statistical agency include Beverages; Cigarettes and Tobacco; Clothing and Footwear; House Rent, Construction

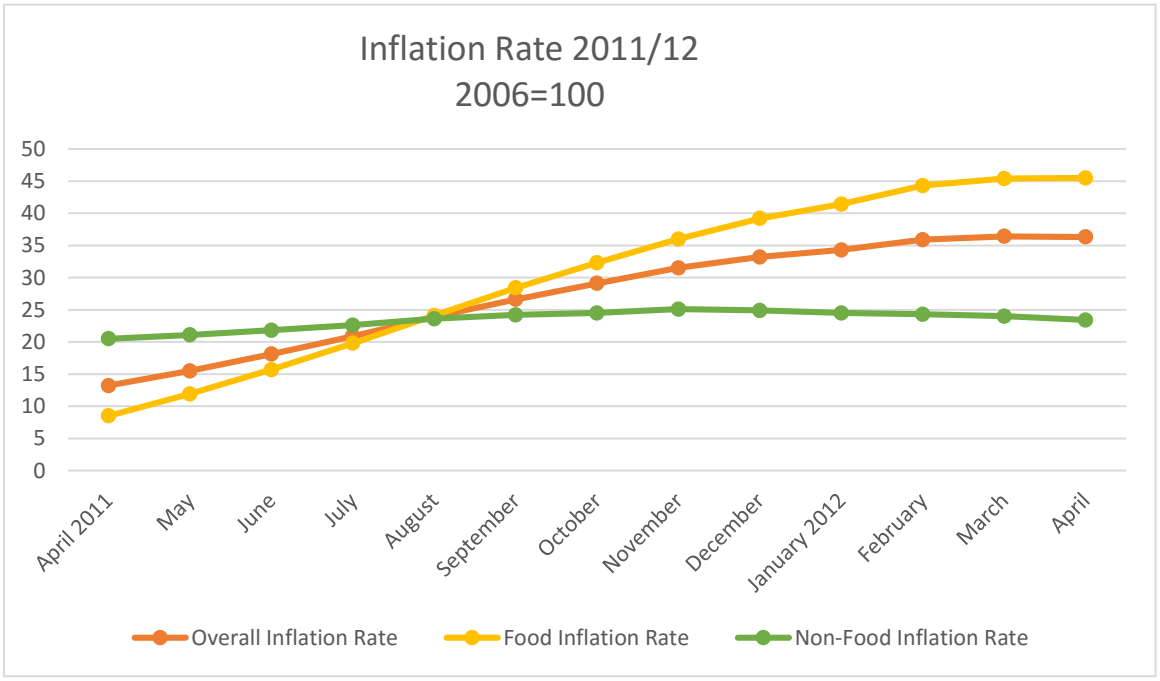
Materials, Water, and Fuel and Power; Furniture, Furnishing, Household Equipment and Operation etc. These products, except Fuel and power, are not highly affected by devaluation or depreciation because these products have local substitute products or are fully supplied from the domestic market. For example Beverages and cigarettes are supplied from the manufacturers that exist in the country that mostly use domestic resources to produce. And Water is fully supplied from the resources that nature gave us. But it does not mean they do not use imported materials to supply these products but their amount is less. Therefore their increase is not as much of the food item. But what we should not forget about the consumer price index for Non-Food item is still very high. The consumer price index is recorded in order to help us find the inflation rate so the following graph shows the inflation rate as a result of the consumer price index rise and for comparison; we are going to see the exchange rate of Birr with Dollar with the help of a graph.

Figure 3.1.6: Average exchange rate of 2011 and 2012



Source: NBE

Figure 3.1.7: Inflation Rate 2011-2012



Source: CSA

Ethiopia's exchange rate has been depreciating and being devalued and thus it has been increasing very fast. As we can see from the above graph the 2011 exchange rate and of the 2012 are completely different and vary in greater amount. In January 2011, 1 US dollar was exchanged for 16.6587 birr in every bank but in October of the same year 1 US dollar was exchanged for 17.1898 birr on average. This shows that how much the currency is depreciating against the dollar and affecting the trade balance and other sectors of Ethiopia. In January 2012 the exchange rate was 17.3369 birr per dollar but by the end of 2012, it was 18.2400 birr per a dollar. As depicted in the graph in both years there is no sign of decline of the exchange rate and hence affecting the consumer price index to increase. The consumer price index increase has led to a very high inflation rate. The Food inflation rate rose to a record high of 45.5% in April 2012. This rate of inflation according to the African Development Bank report is one of the top two rate of inflation recorded in the whole of Africa. This inflation rate tells us that, following bigger devaluation since 2009 there has been an increasing inflation rate for two consecutive years along with other factors that force it to go high. And the depreciation has aggravated the situation and makes it even worse. The difference between this year's inflation rate and the previous one ranged from 25.5% to 51.7% for Food inflation and for Non-Food inflation the range is from 19.2% to 27.9%.

This huge difference between the previous year's month inflation rate and this years has made products so expensive in the country. But as we can see from the graph the rate of increase of the inflation rate has eased down since February 2012. This easing up is attributed to the tight fiscal

policy used by the national government. This policy made the inflation to even decrease by a small amount.

2012/13 is the current and the last year that is going to be discussed in this paper. This is another period that did not introduce a devaluation but it is with a large depreciation as the currency is left to the market. One US dollar is exchanged for 18.5320 birr in March 2013. As we already said this depreciation has more or less the same effect like that of the devaluation except that depreciation happens not because policy makers feel like it but the market forces of demand and supply adjust it to the amount it needs to and so its effect might not be as the same as the devaluation but they are still similar. In 2012/13 the consumer price indexes base year was changed by the central statistical agency.

Until now we have been using the year 2006 as a base year i.e. we were comparing the prices of products with that of the prices of the year 2006. For the base year the consumer price index is made to be equal to 100 to make it suitable for comparison. But for the new data the CSA changed the base year from 2006 to 2011. This is done because the CSA added new divisions. In the 2006 based CPI Recreation, Entertainment and Education; and Transport and Communication were put in the same divisions while the 2011 based CPI separated them as standalone divisions. A new division called Restaurants and Hotels was introduced in the 2011 based CPI by moving the food taken away from home previously categorized with Food to this new division. Non-Alcoholic beverages were taken out of the Non-Food division and moved to the Food division. Another reason is 2012/13 is 6 to 7 years away from the base year and the world has changed a lot since 2006, so to incorporate these changes a new base year was needed. Thus 2011=100 is the new consumer price indexes base year. 2011 being the base year, as we

remember is already a highly inflated year so the new consumer price index only shows the change in the prices of goods since 2011 and that does not reveal the real changes to the consumer indices. However the following is the table that shows the CPI in 2012 and 2013.

Table 3.1.4 Consumer price index (CPI) 2012/13

Month and year	**Consumer price index (CPI) 2012/13**		
	General Index	**Food Total**	**Non-Food Total**
April 2012	110.7	114.6	106.4
May 2012	111.7	115.8	107.1

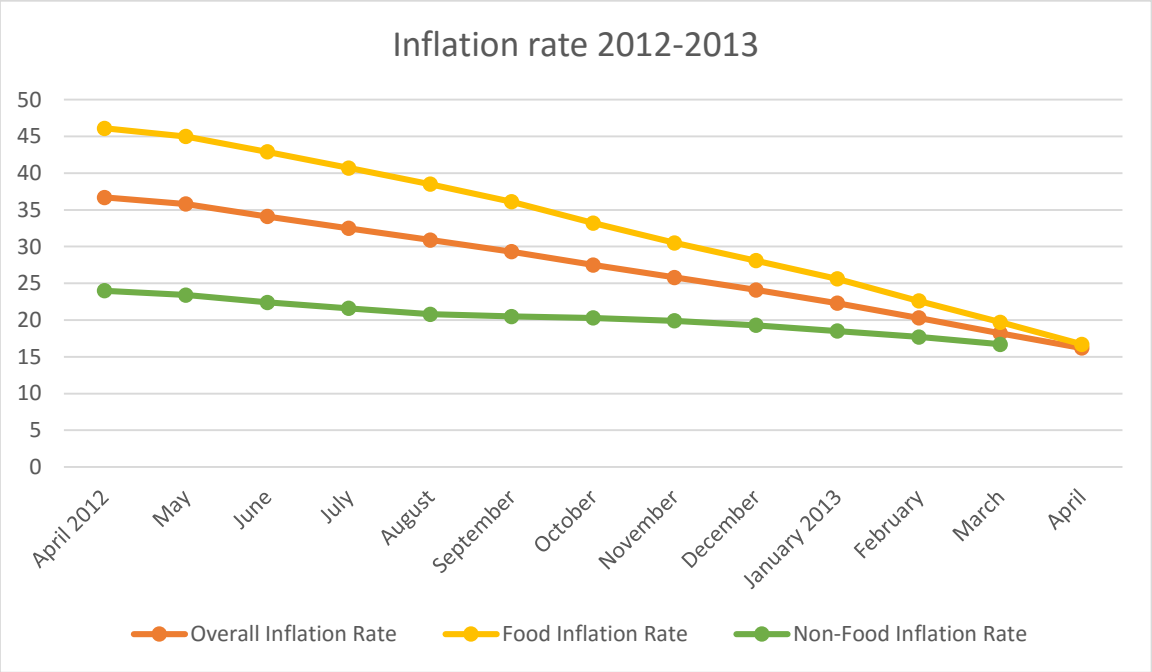
June 2012	111.4	115.9	106.3
July 2012	112.6	116.0	108.7
August 2012	114.6	119.3	109.4
September 2012	117.3	121.2	112.3
October 2012	116.3	118.4	113.9
November 2012	115.9	116.9	114.8
December 2012	114.9	115.2	114.6
January 2013	115.3	115.8	116.7
February 2013	116.0	115.5	116.5
March 2013	116.7	116.7	116.7
April 2013	117.4	116.4	118.6

Source: CSA

Here what we should not forget is that the consumer price index did not decrease from 303.7 to 110.7 in the same year but the second is made by making 2011 base year. For example the January's 2012's CPI was 276.8 calculated at 2006=100 but when we calculate the same month with 2011=100 it becomes 102.3. This hides the real effect of the consumer's price rise. The new CPI shows there is still an increase in the consumer's price index with fluctuations even from the highly inflated base year. This happened because of the depreciation and some other factors. But

Figure 3.1.8: Inflation rate 2012-2013

this time in April 2013 the highest of all the indices is recorded for the Non-Food items. This is the first time since 2009 the Non-Food item placed higher than Food items. This could be explained by the new division created besides to the new base year, have increased the effect of depreciation along with other factors to be hard on the Non-Food item. The following graph will depict the rate of inflation depending on the new base year and it will help us to see the progress.



Source: CSA

There was a consumer price increase but there was a huge decline in the inflation rate in both Food and Non-Food inflation rate. The food inflation has gone down to 16.7% from the highest inflation rate in Africa of 45%. The food inflation is the one with the highest decrease and the Non-Food inflation has also gone down from being 24% to16%. This decrease is, according to the IMF, because of the tight fiscal policies and tight monetary policies implemented. Here what

we need to notice is that, even though inflation rate has decreased, the prices of goods and services remain very high in Ethiopia. Unless the inflation rate is negative the prices of goods and services are still going up high. In 2012 the inflation rate had reached 45% i.e. prices have gone up by this amount and now the inflation rate has declined and it is 16.7% i.e. prices are now going up by this amount. So decline in inflation rate only shows the growth rate of basket of goods. Therefore, although the inflation rate has declined there still exists a high inflation. The Ethiopian government has planned a new 5 year plan recently. This plan is called the Five year Growth and Transformation Plan. This plan has an objective of maintaining a double digit economic growth, a single digit inflation rate, higher employment opportunities and so and so on. The government wanted to restrict the growth of inflation within a single digit number but this has not come in to practice and yet there exists a high inflation in the country following the devaluations and the depreciations of the Ethiopian birr.

Consumer price index of the year 2013/14 showed an even more increase than the previous year even though the World Bank is pushing for more devaluation and/or depreciation of the Ethiopian currency, CPI is showing that it has a direct relation with exchange rate.

Table 3.1.5 Consumer price index (CPI) 2013/14

Month and year	**Consumer price index (CPI) 2013/14**		
	General Index	**Food Total**	**Non-Food Total**

April 2013	117.5	116.4	118.7
May 2013	118.7	119.7	117.5
June 2013	119.6	120.1	118.9
July 2013	121.5	122.8	120.1
August 2013	122.6	123.9	121.2
September 2013	125.4	126.4	124.2
October 2013	126.1	127.6	124.4
November 2013	125.1	124.8	125.4
December 2013	123.8	121.9	125.9
January 2014	124.3	121.7	127.2
February 2014	125.1	120.9	129.9
March 2014	127.0	123.8	130.5
April 2014	128.2	125.8	130.9

Source: CSA

A 9.1 percent increase has been recorded when comparing the April 2013 and the April 2014 consumer price index. And when comparing the months in between the above stated months, we can see that the consumer price index has not shown any improvement from the preceding year.

It has shown a continuous increment each and every month as the exchange rate of Ethiopia is showing the same. According to the data collected by CSA, the food items were the one which showed a higher increase with an 8% increase compared to the previous year. It is only December 2013 that food items and the general consumer price index showed a decline from the preceding month however it is a different story for the non-food items category as it increase when compared to the November 2013's CPI.

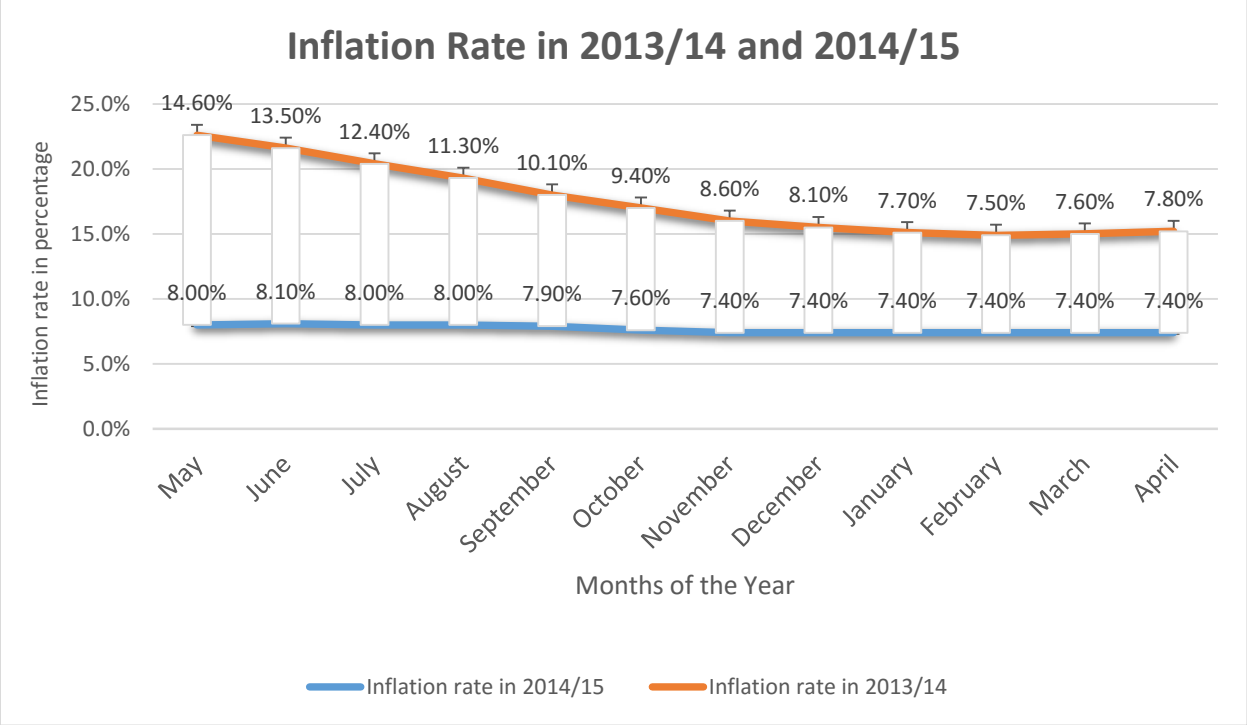
Table 3.1.6 Consumer price index (CPI) 2014/15

Month and year	Consumer price index (CPI) 2014/15		
	General Index	**Food Total**	**Non-Food Total**
April 2014	128.2	125.8	130.9
May 2014	129.1	127.3	131.1
June 2014	129.7	127.6	132.1
July 2014	130.5	129.9	131.0
August 2014	131.4	130.3	132.6
September 2014	132.4	131.1	133.8
October 2014	132.9	131.3	134.7
November 2014	132.5	130.7	134.5
December 2014	132.6	129.8	135.8
January 2015	133.9	130.4	137.7
February 2015	135.4	132.5	138.8
March 2015	137.9	136.3	139.7
April 2015	140.1	139.4	140.9

Source: CSA

The year 2014/2015 indicated that the fast depreciation of the birr against the US dollar has brought about an even higher consumer price index. $1 is being exchanged for 20.86 birr in banks across the country. On average the consumer price index has increased by about 7.59% on each month when paralleled to the previous year. For example the April 2015 has alone increased 9.3 than the April 2014. According to the CSA the Food Total is the category that showed the most increase once again in this year. We can see in the figure depicted below and compare the inflation rate between the year 2013/14 and 2014/15.

Figure 3.1.9: Inflation rate 2013-2015 (2011=100)



Source: CSA

Although inflation needs to be eradicated from the economy to enjoy economic stability, this cannot happen in reality. No country is able to free its economy from the effects of inflation but only minimize it. The data collected by CSA about the inflation rate of the country displays

improvement in comparison to the previous years. Though the country's overall consumer price index showed a continuous increase, the government is able to minimize the inflation rate from as high as of 40% to only a single digit in 2015 reaching a single digit level for the first time since October 2010. Ever since the year 2011 the inflation rate has been going down and this is what we have witnessed here, that the inflation rate has been declining from month to month in 2013/2014. From being as high as 14.6 in May 2013 it went down to be only 7.8 in April 2014, which asserts that the government has paved the path for the inflation to decline by at least 50% within one year. It's a great achievement for the government as it is a hard task to minimize inflation once it goes high. When it comes to the year 2014/2015, the inflation rate is kept in single digit and showed a bit of decrease from 8.0 in May 2014 to 7.4 in November 2014 and it has been at a constant rate ever since. The whole point of this research is finding the impact of devaluation/depreciation on inflation and the Ethiopian currency has been on an unleashed path of depreciation by declining 7% or more yearly. According to the World Bank (The World Bank, 2013), they have acknowledged the government's effort in bringing down the inflation to a single digit and give credit to the government's tight monetary policy for the success. Broad money growth has been kept relatively low since the beginning of 2011/12. A temporary discontinuation of direct financing of the budget by the National Bank of Ethiopia (NBE) and sales of foreign exchange (to reduce domestic liquidity) were the means to achieve this. As a result, the growth in base money has decelerated since June 2011 and contracted by 4.4 percent in 2011/12. In the first half of 2012/13, however, base money growth increased by 17 percent. In addition, the Government has resumed borrowing from NBE in the current fiscal year. Besides the policy, International factors contributed to reduced inflationary pressure. Tradable inflation was generally higher than non-tradable inflation however, this trend reversed, partly as the result

of the slow pace of nominal currency depreciation after 2012. The price of oil in the international market has started to decline in 2014 and continued to go down in 2015. As implicated from our previous pie chart, we have already seen that fuel as an import of the country has an invaluable contribution to the countries trade deficit. In addition policies like reduction of the reserve requirement to 5% contributed to the lowering of the inflation rate. The NBE lowered the reserve requirement ratio in January 2012 from 15% to 10%, and in March 2013 lowered it further to 5% lowering the value of reserve money (the target of monetary policy) without changing the liquidity in the banking system which avoided low nominal deposit rate which in turn could have brought the eroded real value of deposits, discourage savings, and dampen demand for broad money. The price of oil in the international market has started to decline in 2014 and continued to go down in 2015.

In general the effect of devaluation/depreciation on the inflation or the consumer price index is either directly or indirectly. Both of these effects are the reasons that bring a consumer price rise. Since Ethiopia's recent devaluation this is what was witnessed. The year 2009/10, which is the starting year of the recent devaluation started with a big decline in inflation rate until the devaluation takes the effect. With other existing effects, the devaluation took a little longer time to affect the inflation rate but after a while the general inflation rate started to rise since 2009/10. And from that year on the devaluation accompanied by depreciation and some other factors has made inflation in Ethiopia one of the highest in Africa. After high inflations the national bank starts using tighter fiscal policies to control the inflation, it works to decline the inflation rate but still it was still high until 2013/2014. From that year on Ethiopia is able to achieve a more desirable single digit inflation rate. The question here is, did the devaluation/depreciation has brought down the inflation? Or what is the effect of the devaluation/depreciation on the inflation

rate. The answer is the enormous level of inflation that was recorded happened after the high level of devaluation. Though there are other related factors that contributed to increase, devaluation played the big role making imported goods very expensive. Therefore devaluation is the one that brought up the inflation rate. Consequently the effect of devaluation/depreciation can be categorized in to being a pushing factor for the exaggerated inflation rate. As we have witness the past experience of Ethiopia, devaluation/depreciation is inflationary. However, Ethiopia's government took measures to offset the effects of the devaluation which gradually took into effect. But what we must not forget is the previous base year which was 2006 has been changed to the year 2011 an inflated year to compare current price with.

3.2 Effectiveness of devaluation in achieving Trade Balance

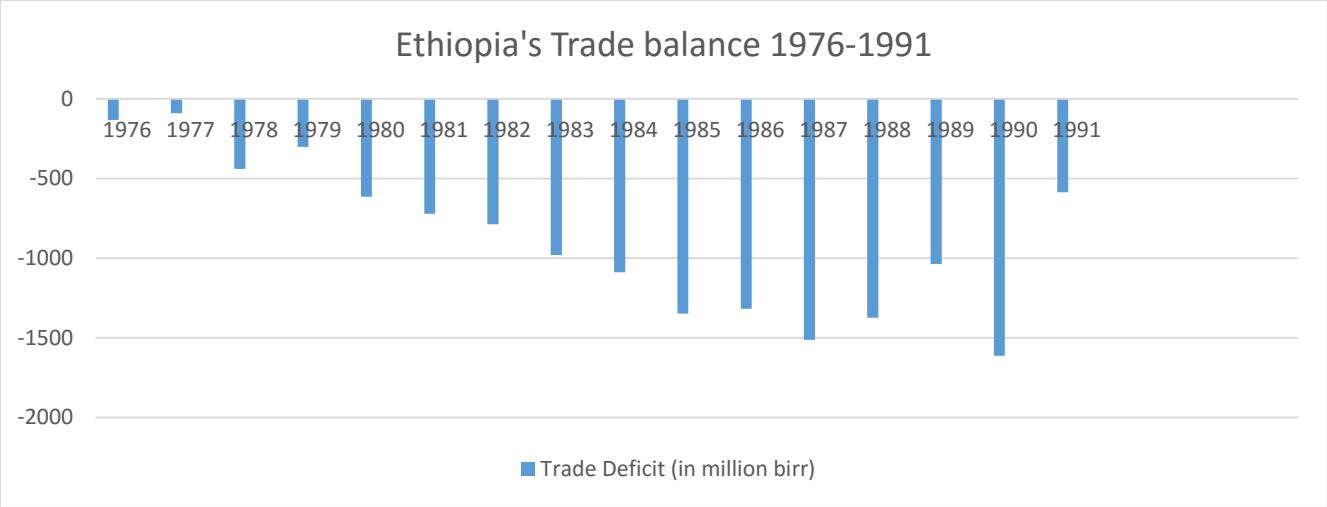
3.2.1 The trend of Trade balance in Ethiopia

Ethiopia's trade balance has been negative for the past 30 years and over. The end of the year 1973 is the only exception for the country in which a trade balance was recorded i.e. there were neither trade surplus no trade deficit. Ethiopia was able to achieve every countries objective which is external balance in the end of the year 1973 (Sewasew, 2002). This great achievement, according to different reports, was able to be witnessed in the country because the then government i.e. the emperor's government has been implementing the different short term plans that constituted manufacturing products which the country imports from other countries and other complementary policies.

This policy which made imported products to be substituted by products which has "Made in Ethiopia" written on them have contributed a lot for the achievement of the external balance (Sewasew, 2002). Nevertheless, after a while the imperial government was overthrown by a military junta and this regime did not continue the policies of the previous government which made what most think is impossible for least developed countries like Ethiopia to be possible. Thus the trade balance did not last long, so the country started to experience trade deficit all over again. The trade deficit started to climb up because the country started to import too many products from countries like Russia and Cuba. The imported materials included heavy machineries and military weapons and on the other hand the country's exports include coffee and hides and skins which have low price in the international market. And frequent drought in the

country caused a loss of lives to the animals in addition drought affected agricultural products too besides this there were frequent civil wars and a war with neighboring nation. As a result the country was unable to achieve the external balance during this period. The following graph shows the trend of trade balance (trade deficit) since 1976 to1991.

Figure 3.2.1: Ethiopia's Trade Balance 1976-1991

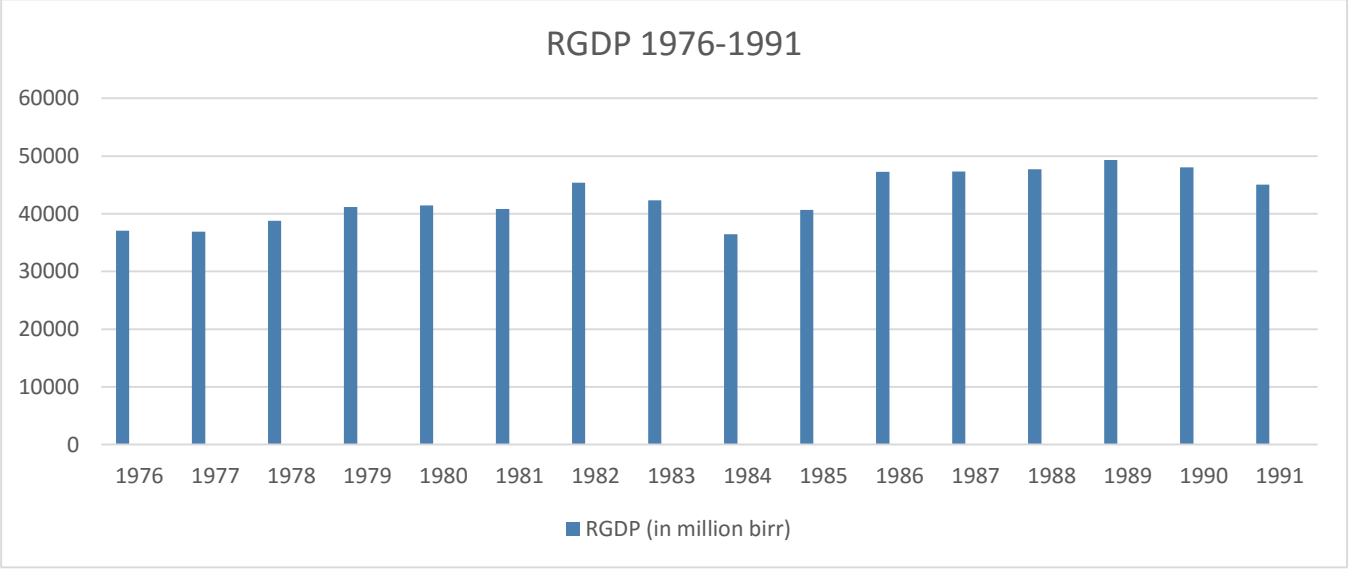


Source: NBE

From 1976 onwards the country's trade deficit has been adding up in a very large amount. There are only a few years that showed a decrease from their preceding year. One of which that showed a decrease is the year 1991. This year's trade deficit is -586.2 and the preceding year's trade deficit was -1613.7 in million birr. The deficit slowed by a large amount because imports declined because of the existing war. 1991 is the year of transition between the military junta and the EPRDF government and so imports declined in large amounts due to the unrest in the country.

During the Derg regime the country's exchange rate was fixed to 2.07 birr per US dollar. So we can't talk about neither the effect of devaluation nor the effect of depreciation on the country's trade balance but what we can talk about is the relationship between the trade balance and Real GDP. The regime followed an economic system called "socialism" that did not support the existence of free market and supported high government intervention (Tirsit, 2011). This intervention includes setting prices for products and supplying necessary commodities to the general public at the local government offices at a very low price. People were able to get necessary products at affordable prices and larger portion of the population were able to feed their family. The other key character during this period was the existence of blocs around the world and Ethiopia was on the East bloc that supported the idea of socialism. This bloc's leader, Russia gave a lot of financial and military aid to the Ethiopia that helped the country through bad times.

Figure 3.2.2: Real GDP 1976-1991



Source: NBE

Ethiopia's real GDP has been fluctuating over these years. The lowest was recorded in 1984 at this time the RGP was 36476.24 while the highest was recorded in 1989 with 49329.15 RGDP. To see the relation between Ethiopia's RGDP with its trade balance we have to compare and contrast their growth and decline over the regimes period year to year. Going from 1976 to 1977 the real GDP showed a small decline on the other hand 1977 is the year that showed a small decline in the trade deficit. This might be some coincidence so we have to see other years. After 1978 the real GDP started to rise after a small decline in the previous year and then this rise continued again in 1979 and 1980.

But this time the trade balance did not follow the trend of the real GDP instead 1979 trade deficit declined when real GDP increased and then increased up again in1980 until 1986 with different rate of increase. For the real GDP there was a decline in 1981, a huge increase in 1982 and then a continuous decline in the preceding years. Then comes the year 1984 in which the lowest real GDP was recorded. But even in this time trade deficit is still continuing to grow. The real GDP started rising after experiencing the lowest up until 1989 (until being the highest) with different rate of increase year to year. By its turn trade deficit declined in 1986, increased in the next year and then dropped to a small level when real GDP reached the highest point in 1989.

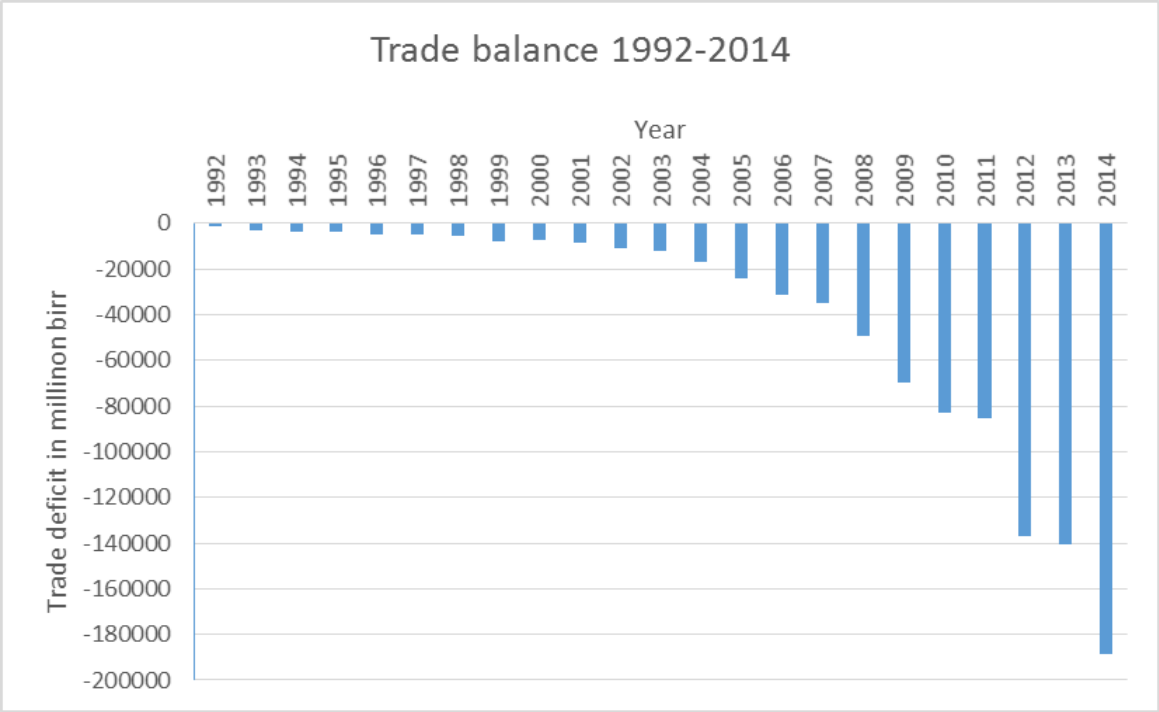
But in 1990 trade deficit increased to the highest level of trade imbalance on the other hand the same year real GDP declined until 1991. The year 1991 took both trade deficit and real GDP down to a small amount. This decline is explained by being a transition period with a huge civil war going on in the country. Seeing their trend it might seem like they are either negatively related or they are not related at all but it will be difficult to decide on this matter because

logically as a countries GDP grows the country will have money to spend on, that can be either buying products, investing, building infrastructure.

During the Derg regime investment was completed by the government, and in order to build factories the country has to import much of the equipment that is needed to setup the factories and so there will be increase in import that will deteriorate the trade balance. This was not seen in this country may be because most of budget comes from aid and borrowing from countries , development banks or even from ordinary banks which exist in developed world so this hides the relationship between the two.

After the Derg regime was overthrown by the EPRDF forces by a military coup d'état in 1991, the economic system was changed immediately "free market" economic system. This system, with the help of former West bloc nations like America and Britain in the name of IMF and World Bank and even directly, opened up Ethiopia to the rest of the world to invest in the country, privatized government owned projects and let the currency to float after a long years of being fixed. This move by the government changed the experience of the country. One of these experiences is devaluation and letting the currency to float, with the advice of IMF through the policy called structural adjustment policy (SAP) was practiced for the first time and so 1 US dollar was exchanged for 4.27 birr. This move was warmly welcomed by the IMF and so they poured in a lot of aid into the country to help "support itself". With the freely floating exchange rate the currency continuously depreciated and every now and then there were some devaluations made by the national bank. The following graph shows the new trend of the trade balance after the fall of Derg.

Figure 3.2.3: Trade Balance 1992-2014



Source: NBE

Following the changes made there was a continuous increase in trade deficit. But from the graph it look as though there is a huge decline comparing the two regimes however the trade deficit or

the trade imbalance gap has been widening ever since the EPRDF took control over the country. The few years that experienced a decline during this regime are 1997, 2000, 2002 and 2011 when comparing to the previous years.

These years showed a decline only when we compare their result with the preceding years thus their results are still high and still show a great deal of trade deficit. The rate of increase of the trade deficit was very small at the beginning of the years but as it goes on the rate increase of trade balance increased to be very high. The rate of increase begins to be high as of 2002 onwards and this increase is due to the high economic development of the country. As a country's economy increase because of rise in investment there probably be higher demand in imported equipment and the population of Ethiopia has grown faster thus there were a huge demand in the country with a little bit of supply increase therefore the government had to import not sophisticated equipment but agricultural products to satisfy the need of the people. The other thing that made trade deficit go up high is devaluation because devaluation makes prices of imported goods to go higher and theoretically volume of imports decline but in Ethiopia prices of imported goods goes higher however volume of import does not decline because of other factors.

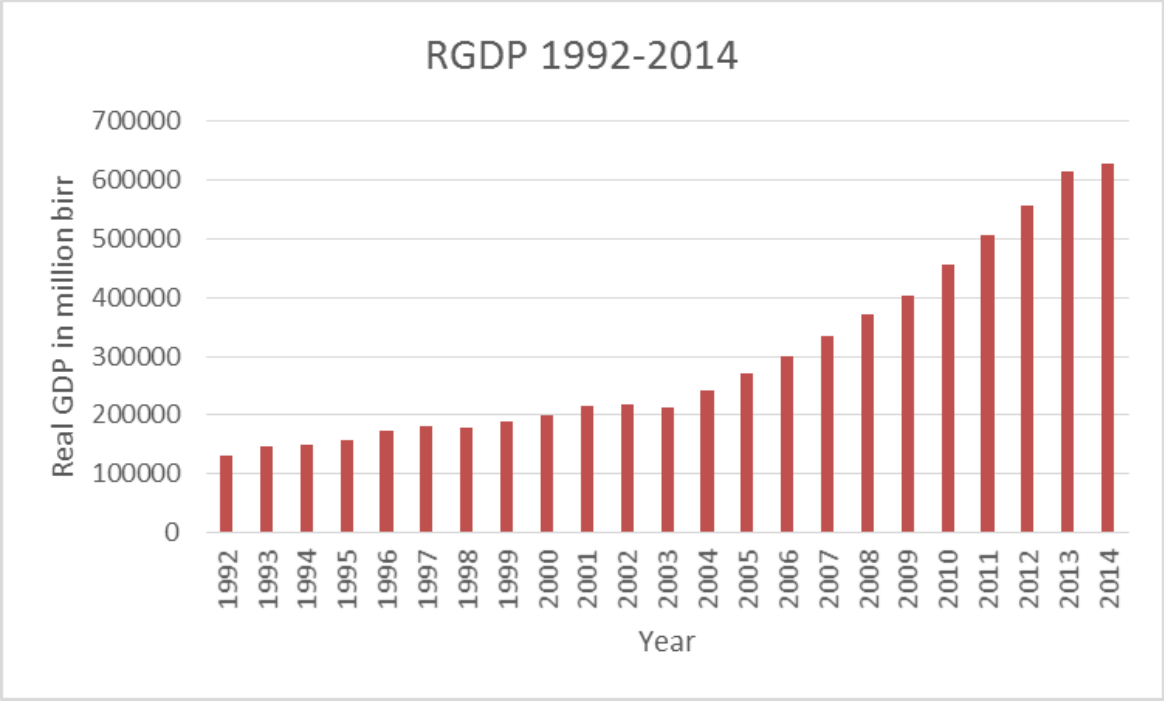
Therefore when devaluation is made the money paid to get or to import will be higher so the trade deficit which is calculated in monetary terms will be higher. For instance there were two devaluations in 1992 and 1993 then the next year the trade deficit was still growing. The other year that was with devaluation was the year 2000. In 2001 the trade balance widened even more but declined after just one year. A question might arise here, i.e. may be devaluation in Ethiopia starts to be effective after some years but from 2002 onwards the national bank of Ethiopia recorded a galloping trade deficit. To halt or to ease the trade deficit off, the national bank

devaluated the currency again in 2009. This move again was welcomed by the International Monetary Fund but stating that this was not enough.

Even though welcomed, the move did not change anything, the trade imbalance is reaching at a concerning point to the country. The national bank did not stop here it devaluated the currency all over again in 2010 hoping for all possible good outputs, and the hope seemed to be working in 2011 when there was a slight decline in the deficit but it did not last longer than a year. Because the year 2012 showed a trade deficit that was never seen in the countries entire history. The trade deficit reached -152,263.7 before that in 2011 it was only -90,524 (in million birr). We can see by how much the trade imbalance of the country has widened by the effect of devaluation (depreciation) along with many other factors. Among this factors might be Real Effective Exchange Rate (REER) which shows how much a country's currency depreciation affects trade balance and the world's economy, weather condition in Ethiopia and many other factors.

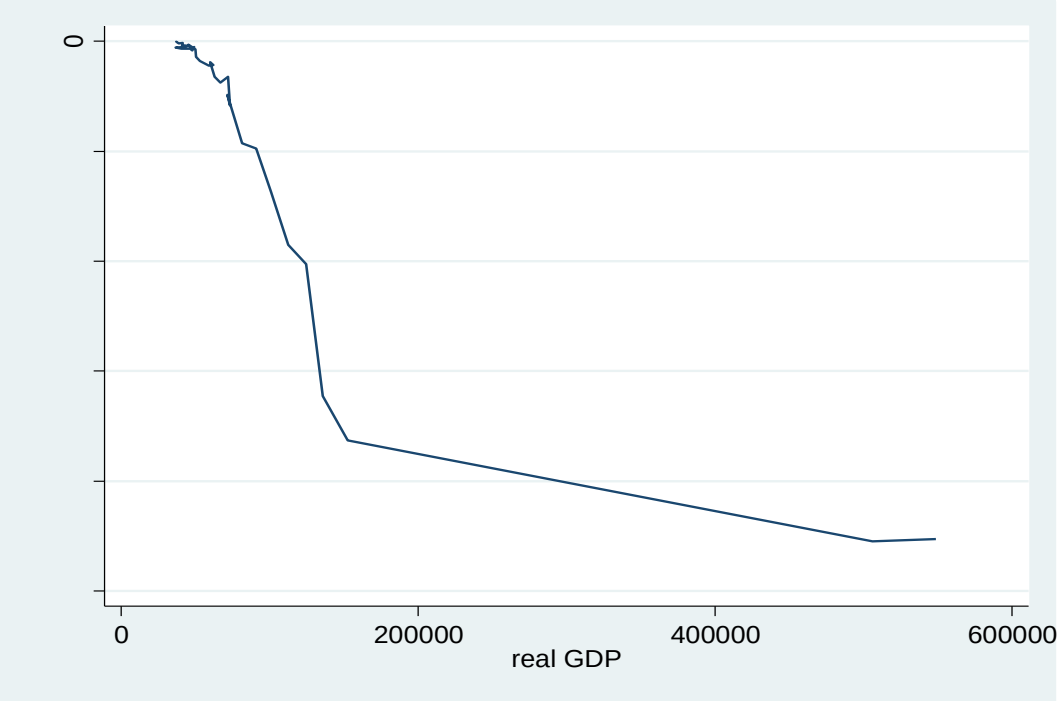
The other factor may be real GDP. The relation between real GDP and trade balance during the Derg regime or under "socialist" economic system was a bit hard to understand and now we will try to see what their relationship is under the EPRDF regime.

Figure 3.2.4: Real GDP 1992-2014


RGDP 1992-2014
Real GDP in million birr
700000
600000
500000
400000
300000
200000
100000
0
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
Year

Source: NBE

Figure3.2.5: Relation between real GDP and Trade Balance



Source: NBE

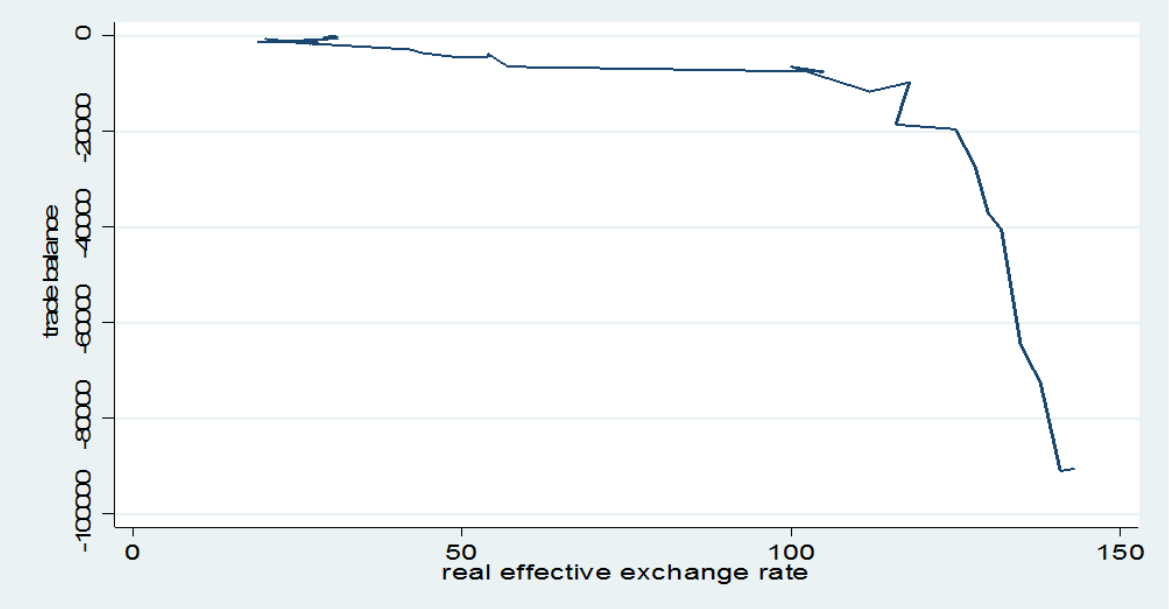
The rate of increase of the real GDP was slow just like the rate of increase in trade deficit in the first few years of the new type of government. But after 2002 again just like the trade deficit the real GDP rate of growth sky rocketed and showed no sign of declining. These rise in the real GDP occurred due to economic growth of the country. The economic growth which was around 10% to 11% made real GDP grow even higher in the last two years. Watching the movement or growth of trade deficit from the above graph since 1992 looks very similar to real GDP. When real GDP increased by a small amount trade deficit increases by greater than the amount of increase of real GDP.

In 2010 when real GDP sky rocketed the same happened to the trade deficit (although not the highest it's the second highest from all the data) but when real GDP reached the highest trade

deficit declined a little bit (this is the only point of departure since the new regime controlled the country) so there is definitely a relationship worth checking because as the second graph shows there is an inverse relationship between the two because the second graph which shows the relation between the dependent and the independent variable is negatively sloped and its slop tells the relation between the two, as GDP grows there is increase in trade deficit (decline in trade balance) that is a relationship that needs to be discovered.

The relation between real effective exchange rate and trade balance (trade deficit) can be depicted using a graph like the following one.

Figure 3.2.6: Relation between trade balance and REER



Source: NBE

The curve of the graph is concave to the origin which is also negatively sloped graph and so the relationship between real effective exchange rate and trade balance according to the graph is

negative i.e. the increase of the independent variable (REER) will decrease the dependent variable (trade balance). In the first 16 years of the data taken where the currency was held constant through the fixed exchange rate system, there were no great variation in trade balance even if the REERI showed increase although there were a bit increase in the trade deficit. But after the fixed system was abolished REER and trade balance started to relate well and the increase of the first on led to the decrease of the other one respectively. Therefore we can conclude that trade balance and real effective exchange rate are negatively related.

CHAPTER FOUR

4. MODEL SPECIFICATION, METHODOLOGY and ESTIMATION TECHNIQUE

4.1 Methodology

This part of the study uses an econometrics technique to explain the situation with the currency devaluation and/or depreciation with other variables and their effect on the terms of trade of Ethiopia. Though the main topic of this paper is to find the impact of devaluation on trade balance leaving aside the other variable, here we used TOT to explain the trade balance through it. This is done because the data for trade balance is negative for Ethiopia and so we cannot take the lagged value of it. Previous studies indicate that real depreciation and devaluation of exchange rate played vital role for improvements in the export performance of some countries by increasing the competitiveness of their products in international markets. To prove this theory or previous studies we employed a model.

4.2 Definitions of variables

In this model there are different variables that could possibly affect the terms of trade and the inflation rate of Ethiopia. These variables are real gross domestic product (RGDP), the lending interest rate (i), openness (OP) and real effective exchange rate (REER) collectively. Though there are different variables that could affect the terms of trade of the country, these variables are selected in terms of their potential to affect the terms of trade in a higher level and also some variables were removed to avoid multicolinearity problem in estimating the long and short term

results of the model. Besides availability of the data was highly constrained. For example, time-series data on some of the factors such as tariff rates, trade taxes and political stability index that are used in some studies of this nature are not readily available for Ethiopia.

Terms of Trade: The price of a country's exports relative to that of its imports. It is calculated by dividing the price of exports by the price of imports, then multiplying the result by 100. If a country's terms of trade (TOT) is less than 100%, there is more capital going out (to buy imports) than there is coming in. A result greater than 100% means the country is accumulating capital.

Trade Openness: Trade openness refers to the outward or inward orientation of a given country's economy. Inward orientation refers to the economies that overlook taking or are unable to take advantage of the opportunities to trade with other countries. Some of the trade policy decisions made by countries that empower outward or inward orientation are trade barriers, import-export, infrastructure, technologies, scale economies and market competitiveness. The most commonly used standard measure of liberalization in the new growth theory literature is the ratio of total trade (export + import) to GDP.

REER: It is a trade –weighted geometric average of the level of consumer prices in home country relative to that in its trading partners. The real effective exchange rate is used to capture appropriate incentives for exports, which may trigger supply response. The indicator is obtained by deflating the nominal effective exchange rate (a measure of the value of a currency against a weighted average of several foreign currencies) by a suitable effective deflator (Henok, 2011). This data will allow us to capture the exchange rate change in Ethiopia in order to estimate our dependent variable.

INF: Inflation rate is defined as a sustained increase in the general level of prices for goods and services. It will be measured by the degree in which exchange rate movement transmitted in to traded goods.

4.3 model specification

This paper describes the circumstance of the internal and external balance of the country due to the changes made using two separate models. Previously we used descriptive method to point out the status of internal and the external balance in Ethiopia, however, here we are going to use two models, one for capturing the impact of the exchange rate change on terms of trade of Ethiopia and the other one is to capture the impact of the exchange rate change on inflation rate using some econometrics techniques called VAR model.

The general form of the models estimate have the following forms:

Model I

TOT= f (RGDP, REER, INF, i)

Where, TOT= Terms of Trade

RGDP= Real Gross Domestic Product

REER= Real Effective Exchange Rate

i= the lending interest rate

INF= Inflation rate

Model II

INF= f (i, REER, RGDP, OP)

Where, INF= Inflation Rate

RGDP= Real Gross Domestic Product

REER= Real Effective Exchange Rate

i= the lending interest rate

OP= Openness to trade

For the convenience of the estimation process in all of the models, all variables are first converted in to natural log and are denoted by lnTOT, lninf, lnRGDP, lnOP,lnREER and lni

Model I

$$\boldsymbol{lnTOT_t = \alpha_0 + \alpha_1(lnREER_t) + \alpha_2(lnRGDP_t) + \alpha_3(lni_t) + \alpha_4 lnINF_t + \varepsilon_t}$$

Model II

$$\boldsymbol{lnINF_t = \beta_0 + \beta_1(lnREER_t) + \beta_2(lnRGDP_t) + \beta_3(lni_t) + \beta_4(lnOP_t) + \mu_t}$$

The coefficients α_0, α_1, α_2, α_3, $\alpha_4$and β_0, β_1, β_2, β_3, β_4 are the parameters of the econometric models, and they describe the directions and strengths of the relationship between TOT and that of inflation respectively with the factors that used to determine TOT and INF in the model (called Explanatory Variables).ε_t and μ_t, represent the error term for the models.

The main objective of this model is to find the effectiveness of a currency devaluation/depreciation along with finding the relationship between the real GDP with terms of trade and finding the effect of Real Effective Exchange Rate on Ethiopia's terms of trade. The same goes with the model for finding its impact on inflation rate. These model use the data from the year 1976 to 2014. And since Ethiopia followed fixed exchange rate until 1992 and no devaluations and no depreciation were recorded during that period thus from 1977 to 1992. The other variable is REERI, REERI is real effective exchange rate index, and its data uses the year 2000 as a base year. Therefore REERI 2000=100 and all the amounts are in millions of Birr. According to time series econometrics, a given regression like the above equation can explain the long-run relationship among the variables either if all the variables are stationary at level i.e. if they are cointegrated.

4.4 **Empirical analysis**

4.4.1**Test for Stationarity and cointegration**

Stationarity test is a very important test if the analysis is a time series analysis. Therefore if a variable is stationary the mean and variance of the variable are stagnant over time and if the variable is non-stationary the mean and variance of this given variable are continuously changing through time and this will lead to a spurious regression. And according to Wooldridge, stationary implies that the distribution of a process remains unchanged when shifted in time by an arbitrary value. More formally, a stochastic process is said to be weakly stationary if its mean and variance are constant over time and the value of the covariance between the two time periods depends only on the distance or gap between the two time periods and not the actual time at which the covariance is computed. (Wooldridge, 2000)

Unit root test

Since the data set is a time series data, stationary of the variables is important. First a regression based on non-stationary time series explains the relationship during the study period only. This means that it is impossible to infer about the long run relationship of the variables. In addition, regression of non-stationary time series on another non stationary time series may lead to spurious regression. I.e. a situation where the estimated regression has a high R^2 and significant t- values without any economic relationship between the variables. In order to avoid these problems stationary test has been conducted on the variables using Eviews. Augmented Dickey Fuller (ADF) test and Phillips-Perron (PP) tests have been chosen to test for the existence of unit root because they accounts for correlation and in addition they are also widely used in unit root tests.A time series is said to be integrated of order d, denoted *I* (d), if it becomes stationary after being differenced a minimum of d times (Dickey & Fuller, 1979)

Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) Test

Dickey (1976), and Dickey and Fuller (1979, 1981) developed a method for testing the stationarity of a time series variable by directly testing the null of the unit root (non-stationarity). The original Dickey-Fuller (DF) test is based on a simple autoregressive of order one, AR (1) process with a white-noise disturbance. However, because the DF test regression does not include values of variables beyond one lag, the error terms may be serially correlated; results based on such tests may be biased and are not valid (Davidson and Mackinnon, 1999; Gujarati, 2004; and Kirchgassner and Wolters, 2007). The ADF test avoids this problem because it corrects for serial correlation by adding lagged-difference terms (Greene, 2003). The general

form of the ADF equation in which no intercept term and time trend are included is the following:

$$Y_t = \mu + \rho y_{t-1} + \mu_t$$

Or

$\Delta Y_t = \mu + y y_{t-1} + \mu_t$ Where y=ρ-1 μ_t: IID $(0,\sigma^2)$

Then we test the hypothesis:

H_0 : ρ =1 (i.e. $y_t$series is non stationary)

H_1 : ρ<1 (i.e. μ_t series is integrated of order zero or stationary)

If there is a deterministic component (intercept, trend, dummies) in the data generating process,we must allow a time trend to enter in the regression model and it can be expressed as:

$\Delta Y_t = \mu + \gamma_t + \beta y_{t-1} + \mu_t \mu_t \sim$ IID $(0,\mu_t)$

But the DF test assumes data generating process follows autoregressive (AR) of order one; AR (1), and residuals are 'white noise'. However, if data generating process is AR (p), where p>1, the error term will be auto-correlated due to misspecification of dynamic structure of the concerned variable. In this case the DF test is no longer valid, and lagged differences of the dependent variable should be added or augmented to the test model in order to mitigate autocorrelation problem, in the disturbance term. This is incorporated in the augmented Dickey-Fuller test (ADF).

The ADF test can be captured by the following specification of an equation

$\Delta Y_t = \mu + y_t + \beta y_{t-1} + \sum_{i=1}^{k} \lambda i \, \Delta \mathrm{Yt} - \mathrm{i} + \mu_t$

Wherey_t is the variable of interest, t is the time trend, k is the lag length which is determined by a general to specific method where by a generous lag structure will be allowed and the insignificant lags will be eliminated sequentially based on Akaike Information Criterion (AIC) and μ_t is a random variable assumed to be 'white noise'. Then we test the set of hypothesis:

H_0 : β = 0 (i.e. y_t series is integrated of order one or unit root)

H_1 :β< 0 (i.e. y_t series is integrated of order zero or non-unit root)

Where, Ho and Ha are the null and alternative hypothesis respectively.

On the other hand PP test is vigorous to serial correlation and time-dependent heteroskedasticity. But in contrast to the ADF, the PP test does not add lagged difference terms to account for a potential serial correlation in the error terms; rather, it uses non-parametric statistical methods. In particular, where the ADF tests use a parametric autoregression to approximate the ARMA structure of the errors in the test regression, the PP tests ignore any serial correlation in the test regression.

4.5 Econometric Method

Vector Autoregressive (VAR) Modeling and Co-Integration Analysis

Recently, long run linear relationships among variables in the presence of short-run deviations from the long run equilibrium are checked, using co-integration test. In the face of non-stationary series with a unit root, first differencing appears to provide the appropriate solutions to ensuring series are weakly stationary. First differencing, however, does possess a major limitation in that

it tends to ignore the long run properties of the data. If two time series y_t and x_t are both integrated of order *d* (i.e. I (*d*)), then, in general, any linear combination of the two series will also be I (*d*); that is, the residuals obtained on regressing Y_t on x_t are I (*d*). If, however, there exists a vector *b*, such that the disturbance term from the regression ($e_t = y_t - bx_t$) is of a lower order of integration I (*d-b*), where $b>0$, then Engle and Granger (1987) define y_t and x_t as cointegrated of order (*d,b*).

The procedure used for co-integration testing and estimation of the VAR in this study follows the methodology developed and used by Johansen (1988, 1991), and Johansen and Juselius (1990). This method is preferred to the single equation based Engel-Granger two step procedure due to the following reasons. The Johansen (1988) procedure allows testing for the presence of more than one cointegration vector. Moreover, it permits to estimate the model without priority restricting the variables as endogenous and exogenous. It is used to determine how each endogenous variable responds over time to a shock in that variable and in every other endogenous variable. Johansen (1988, 1991) has shown that the test for co-integration can be expressed as a test of reduced rank of a regression coefficient matrix. The coefficient matrix can be estimated consistently using linear regression techniques and the test statistic can be computed from the solution to an Eigen value problem. Moreover, linear restrictions on the co-integrating parameters can be tested by computing the shortcomings of the Engle-Granger method likelihood ratio test statistic which follows a χ^2 distribution (Walls, 1993).The starting point in this procedure is formulation of VAR model in the following form. Considering K-lags of Z_t, a general *pth*-order VAR representing the interrelationships among the *n* variables in the model; as given in Johansen and Juselius (1990) is of the form.

$$Z_t = \Omega + \partial_1 Z_{t-1} + \partial_2 Z_{t-2} + \ldots + \partial_p Z_{t-p} + \varepsilon_t = \Omega + _t$$

Where, Z_t is an (n χ 1) vector containing the n-variables (including LNRGDP, LNI, LNOP, LNREER) ∂ **i;** is (n χ n) matrix of coefficients; W is a vector of deterministic terms like trends and intercepts; and ε t are iid(0,Σ) vector of error terms with Σ representing the contemporaneous covariance matrix.

3.3.2 Optimal Lag Length Selection

Selection of the optimal lag length is important for parsimonious of the results. *"Too few lags in the model lead to rejection of the null hypotheses too easily, while too many lags in the model decrease the power of the tests. This indicates that there is some optimal lag length."* (Verbeek, 2004). To determine the optimal lag length different information criteria can be employed. The objective of the information criteria method is to select the number of parameters which minimize the value of the information criteria. The most widely used ones are Schwarz information criterion (SC), and Hannan-Quinn information criterion (HQ), Akaike information criterion (AIC) and the Bayesian information criterion (SBIC). The VAR model will incorporate the one which is selected by most of these criteria.

The Vector Error Correction Model (VECM)

A vector error correction model is a restricted VAR model that has cointegration restrictions built in to the specification. It is designed for use with non-stationary series that are known to be cointegrated. The vector error correction specification restricts the long-run behavior of the endogenous variables to converge to their cointegrating relationships while allowing a wide range of short-run dynamics. The cointegrating term [the error correction term] corrects the

deviation from long-run equilibrium gradually through a series of partial short run adjustments. (Eviews, 2013)

Following the Granger representation theorem, if some variables are co-integrated, the vector error correction model (VECM) representation can be written as follows:

$$\Delta Z_t = \sum_{i=1}^{k-1} ri\ \Delta Zt - 1 + a(\beta 1\ Zt - 1 + \beta 2\ Zt - 1 + \cdots + \beta n\ Zt - 1) + \ \mu + \varphi D + e)$$

If there is only one cointegrating vector and if the endogenous and exogenous variables are identified in the long run analysis, we can develop the VECM by conditioning on the exogenous variables. In this case, only the error correcting terms of the endogenous variables appear in the error correction model. Thus, assuming that Yt is endogenously determined in the model and Xjt represents weakly exogenous variables, we can model for Yt. This is performed using the lagged first difference of Yt, the current and lagged first differences of the explanatory variables as well as the error correcting term. To achieve parsimony in the model, insignificant regressors from the general model are removed. In the process the adequacy of the model must be checked to support the reduction approach.

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 Yt and Xt, is contained solely in the time series data on these variables. The test involves estimating the following pair of regressions (Gujarati 2004):

$$Y_t = \sum_{i=0}^{n} (\alpha_i X_{t-1}) + \sum_{j=0}^{n} (\beta_j Y_{t-j}) + \mu_{1t}$$

$$Y_t = \sum_{i=0}^{n} (\gamma_i X_{t-1}) + \sum_{j=0}^{n} (\delta_j Y_{t-j}) + \mu_{2t}$$

Where, it is assumed that the disturbances u1t and u2t 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 autoregression (VAR). The first equation postulates that is relatedY_t to past values of itself as well as that of X_t, and the second equation postulates a similar behavior forX_t.

Four cases of causality can be identified; unidirectional causality from $X_t$to Y_t exists if $\Sigma\alpha i \neq 0$ in $\Sigma\delta_j = 0$, unidirectional causality from $Y_t$to X_t exists if $\Sigma\alpha_i = 0$ in $\Sigma\delta_j \neq 0$, 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 the regressions.

Diagnostic tests on the residual of the vector error correction model

Tests of autocorrelation, normality, hetroskedasticity and exogeneity on the residuals of the vector error correction models are conducted with the help of Lagrange-multiplier test, Jarque-Bera test, Breusch-Pagan test and RMSE tests respectively. These tests are used to confirm the basic assumptions regarding the residual and the validity of the results in this study.

Diagnostic Checks

Error Vector Autocorrelation Test

The other diagnostic test for evaluating the complete specification and robustness of the results of an econometric model is the test of serial correlation of the residuals. This study uses the Breusch-Godfrey Lagrange Multiplier (LM) test, which is a multivariate test for residual serial correlation up to some specified lag order. The test statistic for the chosen lag order (L) is computed by performing an auxiliary regression of the residuals (ε_t) on the original variables and the lagged residuals (ε_{t-L}).

Residual Vector Normality Test

The test of normality of the residuals is one of the important post-estimation diagnostic tests in empirical studies. This study uses the multivariate extension of the **Jarque-Bera (JB)** test for residual normality. **Jarque-Bera** is a test statistic for testing whether the series is normally distributed. The test statistic measures the difference of the skewness and kurtosis of the series with those from the normal distribution. (Eviews, 2013). The statistic is computed as follows:

$$\mathbf{JB}=\frac{N}{6}\left(S^2+\frac{(K-3)^2}{4}\right)$$

Where N is the number of observation; S is the coefficient of Skewness, K is a measure of kurtosis; and the test statistic is χ^2 distributed 2 degrees of freedom. The joint test is based on the null hypothesis that the residuals are normally distributed (i.e., S = 0 and K= 3).

Impulse Response Functions and Variance Decomposition

Impulse Response Functions

Impulse response analysis is used to investigate the interrelationships between the variables and assess adjustments to long-run equilibrium. 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 is also transmitted to all of the endogenous variables through a dynamic structure of the VAR. The response is measured in terms of the standard deviation. Impulse-response functions provide information for analyzing the dynamic behavior of a variable due to a random shock or innovation in other variables. The impulse response traces the cross effect on current and future values of the endogenous variables of one standard deviation shock to the variables. The impulse response functions show the sign, magnitude, and persistence of real and nominal shocks to the dependent variable.

Variance Decomposition

Variance decompositions illustrate the portion (or relative importance) of variance in the prediction for each variable in the system that is attributable to its own innovations and to shocks to other variables in the system. While impulse response functions trace the effects of a shock to one endogenous variable on to the other variables in the VAR, variance decomposition separates

the variation in an endogenous variable into the component shocks to the VAR. Thus, the variance decomposition provides information about the relative importance of each random innovation in affecting the variables in the VAR. The technique breaks down the variance of the forecast error for each variance following a shock to a particular variable, and in this way, it identifies which variables are strongly affected and those that are not.

CHAPTER FIVE

5. Empirical Results and Analysis

This chapter presents and discusses the results of the empirical analysis based on econometric frameworks given in the previous chapter. First, the results of various preliminary tests that should be undertaken before and after the estimation of the VAR models are presented. In chapter three we were able to see the impact of our interest variable i.e. REER on inflation as well as Trade balance. The econometric analysis in this study identifies the long run effect of the change in exchange rate in the form of devaluation or depreciation on both inflation rate and terms of trade of Ethiopia. In addition, other variables will be taken into consideration to assert to what level of extent will our dependent variable has impact on our dependent variables. For the analysis and all the tests Eviews 8.0 and Stata 12 are used throughout the entire paper.

5.1 Unit root test

In analyzing time series data testing for stationarity is a vital condition. As it is mentioned earlier, the results obtained by using non-stationary time series may be spurious in that they may indicate a relationship between variables which does not exist. In order to receive consistent and reliable results, the non-stationary data needs to be transformed into stationary data. In contrast to the non-stationary process that has a variable variance and a mean that does not remain near, or returns to a long-run mean over time, the stationary process reverts around a constant long-term mean and has a constant variance independent of time. The most common tests are employed to check on the stationarity of the data. As explained in the methodology, formal testing for stationarity and the order of integration of each variable are primarily undertaken

using ADF and Phillips-Perron tests. The tests with the ADF and PP methods are performed with different trend assumptions (only intercept, both linear trend and intercept, and no intercept and no trend). The PP test has an advantage over the ADF test as it gives robust estimates when the series has serial correlation and time-dependent heteroscedasticity and there is a structural break. (Mallik & Chowdhury, 2001) The result from PP test will be found in the appendix.

The following table represents the results of the ADF test. The results from the stationarity test equations under the ADF demonstrate that only an intercept must be included in all variables (RGDP, REER, INF, i, OP) in testing for stationarity.

Table 5.1: ADF Unit root test results for both Model I and II

	Variables	***Test statistic under different assumptions***			***Order of Integration***
		Intercept	**Trend and Intercept**	**No Trend, No Intercept**	
1	Lnopennes	1.362202	-2.073340	-1.050696	I(1)
	D(Lnopennes)	-6.319166*****	-6.231467	-6.301587	
2	Lni	-1.910240	-2.350528	0.134702	I(1)
	D(lni)	-6.416437*****	-6.354093	-6.486485	
3	Lnreer	-1.115965	-1.062618	-0.545419	I(1)
	D(lnreer)	-4.873317*****	-4.865374	-4.909842	
4	Lnrgdp	2.770838	-0.484684	5.148602	I(1)
	D(lnreer)	-4.620306*****	-6.176272	-1.086487	
5	Lntot	-2.213916	-2.675756	0.053222	I(1)
	D(lntot)	-6.047670*****	-6.085392	5.985134	
6	Lninf	0.757669	-1.833046	5.513986	I(1)
	D(lninf)	-4.317081*	-4.445401	-1.183108	

As we can see from table (5.1) the test shows that all variables are stationary at 5% level of significance. Hence, we continue the analysis by taking the first difference, so that we may determine in which order the variables become stationary. When we look the results of ADF and PP tests conducted on the difference of the variables, the null hypothesis of unit root is strongly rejected. The results of both the ADF test and the PP test show that all variables are stationary at first difference since we failed to reject the null hypothesis of stationarity. Hence we can conclude that all the variables are stationary at first difference and demonstrate that all variables included in the model are integrated of order 1, *i.e*., I (1).

5.2 **Cointegration test**

Optimal Lag Length Selection

Cointegration test 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 Likelihood Ratio test [LR], the Final Prediction Error test [FPE], the Akaike information criteria [AIC], the Shwarz 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.

Lag Exclusion Test

A number of the lags (of some endogenous variables) that are chosen as optimal may hadve insignificant contributions to movements in real GDP, individually as well as jointly. Therefore, whether the first lags (chosen as optimal) of all variables are individually and jointly important and should be included in the testing for co-integration and estimation of the VECM should be

evaluated. This approach was taken with the Wald form of the lag-exclusion test (which is asymptotically chi-square distributed). The following tables show that the first lags of all of the endogenous variables are significant both individually and jointly for both models. This suggests that the use of the first lags of the variables in the models are valid.

Cointegration test

There are two possibilities to deal with nonstationary variables in a given model after the stationarity test. One is, to difference the series so as to obtain stationary variables and if so, then continue with the analysis. This is used only for the analysis of a short run relationship. If not, the second is, to test if the linear combination of the nonstationary variables is stationary by using cointegration test. The cointegration test is made using the Johansen cointegration test. Thus, the presence and the number of such cointegrating relationships are evaluated with the trace and the maximum eigenvalue. It may also be possible to use the Engle-Granger two-step procedure to test for cointegration. However, the Engle-Granger method tests the presence of only one co-integrating relationship and does not reveal whether there may be other such relationships. The below table is the result for Johansen cointegration test for the first model.

Table 5.2: Johansen cointegration test for model I

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.893988	185.4627	76.97277	0.0000
At most 1 *	0.760579	106.9158	54.07904	0.0000
At most 2 *	0.662862	56.88219	35.19275	0.0001
At most 3	0.270460	18.82801	20.26184	0.0778
At most 4	0.199567	7.791083	9.164546	0.0905

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Co-integration Rank Test will enable us to estimate Vector Error Correction Model based on the number of cointegration rank obtained. It should also be noted that such pre-tests and justifications would increase the credibility of the results. The trace value test identified three co-integrating relationships at the 5% level of significance as seen from the above table. This is evidence of the significant long-run relationship among the variables.

Table 5.3: Johansen cointegration test for model II

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.665697	101.2678	76.97277	0.0002
At most 1 *	0.499571	60.72652	54.07904	0.0114
At most 2	0.420915	35.11181	35.19275	0.0510
At most 3	0.234819	14.89850	20.26184	0.2322
At most 4	0.126301	4.995698	9.164546	0.2839

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

In the second model where we take Inflation Rate as a dependent variable and the rest an independent. The result from the unrestricted cointegration rank test has reviled that two cointegrating relationships at the 5% level of significance as seen from the above table. This is evidence of the significant long-run relationship among the variables. These results also legitimize the use of the VAR and the Johansen method instead of the single-equation-based Engle-Granger two-step procedure.

5.3 Post-Estimation Diagnostics

After estimation it is a must to check for different post-estimation diagnostic tests to guarantee that the residuals from the model are Gaussian that the assumptions are not violated and the estimation results and inferences are trustworthy. The post estimation diagnostic tests include: Residual vector serial correlation LM test, a test for to check the existence of Hetroskedasticity and residual vector normality (Jarque-Bera).

5.3.1 Residual Vector Serial Correlation LM Test

The estimated error correction model passes all diagnostic tests. Breusch-GodfreySerial Correlation LM test indicates that the residuals of the estimated error correction model do not suffer from autocorrelation. This can also be confirmed by looking at the each of the model's autocorrelation function given in the appendix.

5.3.2 Residual Vector Heteroskedasticity Test

It is vital to test for violations of the Gauss-Markov assumptions, one of which is the absence of heteroscedasticity; thus making sure that we have the best linear unbiased estimate (BLUE).The other diagnostic test used in this study is hetroskedasticity test for and it is evaluated using Breusch-Pagan-Godfrey test. This test is a Lagrangian multiplier test of the null hypothesis of no heteroskedasticity against the alternative hypothesis of heteroskedasticiy. The result suggests that

there is no enough evidence to help reject the null of hypothesis no heteroskedasticity. Hence, the residuals of the model are found to be homoskedastic.

5.3.3 Residual Vector Normality Test

The Jarque Bera test is used to determine whether the error terms are normally distributed or not. The null-hypothesis that the residuals are normal is rejected in this particular study for Model I. However, econometric theory states that the existence of non-normality does not affect and distort the estimator's BLUE and consistency property (Enders, 1995). To the contrary, for Model II the null-hypothesis that the residuals are normal is accepted. Making the result normally distributed as well as the distribution is symmetrical around the mean and the kurtosis, Mesokurtic distribution-normal distribution. Both of the results can be found in the Appendix 4.

5.4 Impulse Response Functions and Variance Decomposition

5.4.1 Impulse Response Functions

Impulse response function is used to trace the effect of a one standard deviation shock to one of the innovations on current and future values of the endogenous variables. We can identify the positive or negative impact of the variables and determine how long it would take for that effect to work. It is a method of assessing the interaction among the variables in the VAR. But it should be noted that the impulse response results based on cholesky's impulse response analyses are

sensitive to the ordering of the variables and the lag length. Thus to account of this problem, the results in this study are based on the generalized impulse response functions (GIRFs).

The results for Model I indicate that there is negative relation between terms of trade and real effective exchange rate in the short run. As we can see from the third column of the first row of Appendix 5, it is obvious that the effect of one standard deviation shock of REER on TOT is negative in the short run. But after a few years they will start to have a positive relationship. The increment of the one will bring a rise to the other. Hence this tells us that in Ethiopia, REER have contractionary impact in the short run. Similarly there is negative relation between TOT and real GDP in the short run. It is quite clear that the effect of one standard deviation shock of real GDP on TOT is negative in the short run. From the presented result of the impulse response, we can generally find the effects of the endogenous variables.

The results for Model II indicate that there is negative relation between inflation rate and trade openness in the short run. As we can see from the first column of the first row of Appendix 6, it is obvious that the effect of one standard deviation shock of trade openness on inflation rate is negative in the short run. But after a few years they will start to have a positive relationship. The increment of the one will bring a rise to the other. Hence this tells us that in Ethiopia, Openness have contractionary impact in the short run. In contrast there is Positive relation between REER and inflation rate in the short run. We can clearly see that the effect of one standard deviation shock of REER on inflation rate is Positive in the short run. But in the long run, their relationship changes to being an inverse one. From the presented result of the impulse response, we can generally find the effects of the endogenous variables.

5.4.2 Variance Decomposition

Variance decomposition provides a different method of depicting the system dynamics. It decomposes variation in an endogenous variable in to 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. (Eviews, 2013)

The table in appendix 7 shows that variation in the growth of TOT is explained only by its lagged value in the first period. After the first period, the variation in TOT can be explained by a group of other endogenous variables in the system. After the third period more than 50% of the variation in TOT is explained by other variables. In the long-run the most significant variation in TOT is explained by real GDP followed by the lending interest rate, inflation rate and real effective exchange rate in their order of importance. Real GDP being the most important factor in explaining the changes TOT in the long run, plays a vital role in the overall economic status of the Ethiopia. The main topic of this research being the impact of REER on TOT, REER is the least important factor to explain the changes in TOT. Though it is said that REER has a positive impact on TOT in the long run, devaluing a currency or letting the currency to depreciate more through the "Market process" will only make Ethiopia experience the TOT deterioration of the short run as REER is weak in explaining the long run change.

In the case of Model II that variation in the growth of inflation rate is explained only by its lagged value in the first period. After the first period, the variation in inflation rate can be explained by a group of other endogenous variables in the system. In the long run the most significant variation in explaining inflation rate is real GDP. As we have seen in the first model's real GDP plays a vibrant role in affecting the Ethiopian economy. After real GDP, trade openness explains the most in the variation of inflation rate. Though insignificant, interest rate

takes the place after trade openness. Just like in the first model, REER is the least important factor to explain the changes in inflation rate in the long run. Though it is said that currency devaluation will have a decreasing impact on inflation rate in the long run but REER is weak in explaining the long run change.

5.5 Vector Error Correction Model (VECM)

The error correction mechanism (ECM) is a mechanism used to correct any short run deviation of the variables from their long run equilibrium. Economic variables have short run behavior that can be captured through dynamic modeling. If there is long run relationship among the variables, an error correction model can be formulated that portray both the dynamic and long run interaction between the variables.

5.5.1 The long run model for Model I

Before estimating the values of the model to find the relationship between the variables in the long run, we have tested for the stationarity and cointegration tests which makes the model fit for the estimation. The results from the estimation will be presented here as for the first model the selection of the number of lags was done through Johansen test and it was three cointegrateing relationships. This study considers only the first cointegrating equation that relates terms of trade to other variables as the focus is to examine the impact of other variables [and real effective exchange rate in particular] on TOT. The other cointegrating equations are not considered in this

study. After imposing this normalization restriction by the Johansen method, the cointegrating equation for TOT. The result of the estimation is given by the following table.

Table 5.4: The Estimated Long-Run Model I

Normalized cointegrating coefficients (standard error in parentheses)					
LNTOT	LNRGDP	LNINF	LNI	LNREER	C
1.000000	-1.065438	1.026846	-2.121928	-0.997728	20.92211
	(0.27310)	(0.16511)	(0.16365)	(0.11122)	(3.33315)

Adjustment coefficients (standard error in parentheses)

$$lnTOT_t - 1.065438lnRGDP_t + 1.026846lnINF_t - 2.121928lni_t - 0.997728lnREER_t + 20.92211 = 0$$

*All the variables which are expected to explain the terms of trade [LnTOT] were to be found significant as expected.

The real GDP has a positive sign and is statistically significant in explaining the economic growth in the long run. Increase in the real GDP by 1% increases terms of trade by 1.0654%. The

finding of this study shows that when the real GDP of Ethiopia increases does promote the stable flow of terms of trade in the long run. The growth in real GDP in the long run is due to the facts of a good in performance in the leading economic activity. As the government of Ethiopia is planning to make Ethiopia's economy to be industry lead economy and it is thriving to the achievement of this plan. As a result if things go according to the government's plan, in the long run Ethiopia's economy will be based on the good performance of this economic sector. The growth in real GDP will enable the country to have more financial capital enabling local and foreign investors to have more dispensable resource at hand. These resource will be creating opportunities to the expanding of industry let along creating more output in the industry and other sectors as well. Because the return is going to be higher in the future, more investment is going to be possible empowering the country to export more domestically produced goods. Hence the positive link between real GDP and TOT in the long run. The inverse is also true, if the country's performance in the real GDP is to go down in the long run, it is going to affect the TOT directly and thus negative result will be recorded or TOT deterioration will occur. The Marshall Lerner condition states that if demand for exports and imports is relatively elastic PED x + PED m >1 then an increase in terms of trade will worsen the current account (balance of trade). An improvement in the terms of trade means that export prices are increasing faster than import price. Therefore there will be a fall in exports and an increase in quantity of imports. Therefore, it is likely that with lower exports the current account deficit (+ trade deficit) will get worse, i.e. bigger deficit. But the case with Ethiopia is different as we are selling agricultural products whose prices in the international market are inelastic to the price changes and importing industrial products whose prices are higher and price elastic, making terms of trade are direct

linked to explain trade balance. In all the analysis this direct link will make us to infer the results to TOT for trade balance.

Inflation rate [lnINF] is equally statistically significant as are all the variables. It is negatively related to and statistically significant in explaining TOT in the long run. Any inflationary situation Ethiopia in the long run will affect the terms of trade of the country positively. If inflation rate was to increase by 1%, the terms of trade will decline by1.026846%.

The relationship between the lending interest rate [lni] and terms of trade is found to be positive and significant. Reducing the lending interest rate by 1% may decrease terms of trade by 2.121928% in Ethiopia in the long run. The inverse relationship between interest rate and TOT in the long run may be due to the fact that in the long run if interest rate is to decline, more lending will be possible for banks. These will create the opportunity for investors to invest more and produce more surpassing the import. The investment made will create more supply in the international market and hence the price of Ethiopia's export will decline which will further more worsen the TOT.

The main objective of this paper and this specific model is to find the impact of real effective exchange rate on the terms of trade of Ethiopia. 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 1% increases TOT by 0.997728%. The theories that are for the devaluation of a currency do state that in the long run, it will promote export and discourage imports helping a country in achieving terms of trade or trade balance. The result here shows a different outcome to what we have seen in the empirical literature. Through time Ethiopia is not going to benefit from the current depreciation/ devaluation of the

Birr but worsen it because devaluation is going to cause TOT decline. The current terms of trade imbalance is not going to sort of out itself by removing the negative impacts of the depreciation and/or the devaluation to make Ethiopia competitive in the international market as most researches would suggest. The finding of this paper is that the current or any previous devaluation and/or depreciation of Birr is going to be contractionary to Ethiopia's trade competitiveness and the domestic market will have high priced products that are not affordable.

5.5.2 The Short run model for Model I

From the estimation result it can be inferred that the dependent variable's variation i.e. 90% of the variation in terms of trade can be explained by the independent variables. The adjusted R-squared value, which accounts for the number of variables, shows that the explanatory variables account for 81.2% of the variation in terms of trade. Changes in terms of trade can be motivated by activating three period lagged inflation rate. According to the table below, inflationary situation in the short run will positively affect terms of trade of Ethiopia. The current terms of trade data shows that Ethiopia's tot has been declining for years. But when the country experienced a massive inflation rate, the tot has showed a bit of increase. The inflation rate according to CSA is below 10% and it seems to be declining in recent years and if we see the trend of the terms of trade, it has started falling after the high inflation rate that was recorded in 2010. The short run result asserts the positive relation between the inflation rates is positive unlike their long run relation. The rest of the variables presented in the short run analysis show negative relation towards the terms of trade.

The short-run coefficient of real GDP indicates a negative significant causal effect on terms of trade. This relationship is significant. This inverse relationship between terms of trade and real GDP may be due to the following reasons:

First, In Ethiopia as real GDP grows it is due to the performance of Agriculture which accounts for nearly half of the GDP. In addition the performance of other sectors like the service sector along the industry sector do also contribute to the GDP growth. As shown in the descriptive analysis part using the graphs, Ethiopia's real GDP has been increasing. This increase means that the country will be able to afford products which are expensive and are essential for the country. Ethiopia as an LDC lacks a lot of infrastructure, health facility, proper schooling and so on, thus as Ethiopia's capacity to purchase products which are sold in the international market and are not domestically produced will grow with the growth of real GDP.

Ethiopia, to satisfy the needs of the people and to increase the economic status of the country will purchase or import products that will make the country better off through helping the country in the development process. The people also expand their wants and needs once the country's real GDP growth. Even though the people's economic status vary in great amount in Ethiopia, the growth in real GDP will make the well fortunate people expand their wants and so the importation of luxury car (whose prices are very much high and even higher if they are custom made cars) luxury house building materials etc. will increase in greater amount. As a result import exceeds export even if the country's export increase from the previous amount it will not exceed import because Ethiopia sells or exports agricultural products whose prices are set by the international market and also whose prices are very low when compared to industrial products (which are the main imports of the country) in the short run.

On the other hand a decline in the real GDP will *increase* the terms of trade as it decreases import and the country will strive more to export. Therefore the estimation result shows the inverse relation between trade balance and real GDP is correct as predicted in descriptive part of the analysis.

The relationship between the lending interest rate and terms of trade is found to be negative in the short run. Unlike the long run which shows a positive relation between interest rate and terms of trade, in the short run the relation between the two was a direct one. Any increment in the lending interest rate of Ethiopia will increase investment and hence the increment of export over imports will be possible. TOT will be affected positively by the increase of interest rate in the short run.

Any positive change in the real effective exchange rate will affect the TOT negatively as the real effective exchange rate is negatively related to TOT in the short-run. This implies that depreciation of the domestic currency i.e. Birr in the short-run will be able to promote TOT and trade balance. This contradicts the finding for the long-run relationship between the two variables. A three period lagged relationship between the variables 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. Even though 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 but according to this paper's finding, citrus paribus, devaluation will improve TOT and hence trade balance. However, as we have seen from the descriptive part of the study, the devaluation and the depreciation have not brought about any change to the balance of payment

and the terns of trade of Ethiopia. This can be reasoned as Ethiopia is highly influenced by other countries economy and any economic policy making can be offset by the deeds and policies of other nations even if we kept other things constant. The result of the short run analysis which showed, negative relationship between REER and TOT has a dissimilarity to researches done in Ethiopia, like Tirsit (2011), Dessie (2011), including IMF and some others.

Table 5.5: Short-Run Coefficients for Model I

	Coefficient	Std. Error	t-Statistic	Prob.
Coin. eq^{n} 1	-0.915772	0.147776	-6.197025	0.0000
C(D(LNTOT(-1))	-0.056525	0.149454	-0.378206	0.7100
C(D(LNTOT(-2))	-0.187181	0.127965	-1.462747	0.1618
C(D(LNTOT(-3))	0.081214	0.123239	0.658992	0.5187
C(D(LNRGDP(-1))	-1.927623	0.710301	-2.713810	0.0147

C(D(LNRGDP(-2)))	-0.459241	0.502474	-0.913960	0.1005
C(D(LNRGDP(-3)))	0.335286	0.536279	0.625208	0.5401
C(D(LNREER(-1)))	-1.578208	0.280668	-5.623046	0.0000
C(D(LNREER(-2)))	-1.124108	0.240124	-4.681373	0.0002
C(D(LNREER(-3)))	-1.622702	0.302929	-5.356711	0.0001
C(D(LNINF(-1)))	0.417962	0.298538	1.400030	0.1295
C(D(LNINF(-2)))	1.297034	0.400499	3.238544	0.0048
C(D(LNINF(-3)))	0.036111	0.343200	0.105220	0.0917
C(D(LNI(-1)))	-1.486193	0.242515	-6.128254	0.0000
C(D(LNI(-2)))	-0.841996	0.264317	-3.185556	0.0054
C(D(LNI(-3)))	-1.028630	0.183176	-5.615517	0.0000
R-squared	0.906023			
Adjusted R-squared	0.812045			

In general, the study found mixed results on the relationship between real effective exchange rate and TOT in the short-run and long-run. The results of the econometric analysis show that the traditional view [the aggregate demand channel] holds in the short-run and the modern view [the aggregate supply channel] holds in the long-run. Depreciation of the domestic currency does not promote the export as it is expected to because effect of the exchange rate does not act up in the short-run. But it devaluing a currency is going to be a long lasting strategy in Ethiopia as REER can come into effect to bring about a positive change to the Ethiopian trade experience. Depreciation of the domestic currency may decrease the foreign exchange earnings the country receives in the short-run. This will affect the growth of some sectors in the economy negatively.

As the depreciation process continues, the foreign earnings from the export sector will become large enough to cover the cost of imported materials for the country. The other variables have also their own effect on TOT according to their level of significance.

5.5.3 The long run model for Model II

The secondary model of this research is all about the effects of REER on inflationary situations in Ethiopia. As shown in the model description part, the model also consists of effects of lending interest rate, trade openness and that of real GDP on inflation rate. The long run result of the analysis will be presented in the below table. The selection of the number of lags was done through Johansen test and it was three cointegrating relationships. This study considers only the third cointegrating equation that relates inflation rate to other variables as the focus is to examine the impact of other variables [and real effective exchange rate in particular] on inflation. The other cointegrating equations are not considered in this study.

Table 5.6: The Estimated Long-Run Model II

Normalized cointegrating coefficients (standard error in parentheses)

LNINF	LNOP	LNREER	LNRGDP	LNI	C
1.000000	1.118637	-0.157228	-2.009445	-0.678144	25.24432
	(0.17677)	(0.12491)	(0.11013)	(0.18121)	(1.84164)

$$lnINF_t - 2.0094lnRGDP_t + 1.1186lnOP_t - 0.6781lni_t - 0.1572lnREER_t + 25.244 = 0$$

All the variables which are expected to explain the inflation rate [lnINF] were to be found significant as expected except the lending interest rate [lni].

The real GDP has a positive sign and is statistically significant in explaining the inflation rate in the long run. Increase in the real GDP by 1% increases inflation rate by 2.01%. The finding of this study shows that when the real GDP of Ethiopia increases does cause for inflationary situation in the long run. This relation may be explained by theory on cause on inflation. Inflation can be caused because of *cost push* or *demand pull.* In order to explain the above case, we are only going to look at demand pull inflation cause. As the theory stats that, demand pull inflationary situations can be caused by the growing number of demand which surpasses supply. According to the theory when aggregate demand is over aggregate supply, it is going to cause inflation in the country. Here in our analysis, we have found that real GDP can cause inflationary situation in Ethiopia in the long run. The growth of real GDP is going to bring about more changes to the people as they are going to be able to earn more income, better access to infrastructure and better education for that matter. These changes will be creating more demand throughout the entire economy. Since income is going to grow, retailors want to get a piece of it too and hence they will be providing the goods and services in a much higher prices aggravating the inflationary situation.

The long-run impact of trade openness on inflation rate is found to be negative and statistically significant, which means that a 1% increase in trade openness declines inflation rate by 1.12% in

the long-run. The more Ethiopia is open to the international market, the more it is going to be inflationary in the country in the long run. Other researches made on the relationship between real GDP and trade openness have found that they are positively related. And here we have seen that real GDP has in fact a positive relation with that of inflation rate. And hence we can see that whenever Ethiopia's trade is more open to the outside world, real GDP will increase and affect inflation rate to increase.

The other variable which is significant and the center piece of the study is REER. The relationship between REER and inflation rate is found to be positive in the long run. This means that any increase/appreciation of real effective exchange rate by 1% increases the inflation rate by 0.157%. In another terms, if Ethiopian national bank were going to devalue or even let birr depreciate in the market process by 1%, in the long run this change can be the cause of the decline of inflation. This result confirms the finding by (Mohammednur, 2012) in which he found out that exchange rate devaluation/depreciation will not cause inflation in the long run. According to estimation we have made here and the data on percentage devaluation, the national bank of Ethiopia recently did make a devaluation of 23.7% and 16.5% respectively. Therefore a 3.721% and 2.591% decline in inflation rate is expected in the long run.

5.5.4 The Short run model for Model II

From the estimation result it can be inferred that the dependent variable's variation i.e. 56.34% of the variation in terms of trade can be explained by the independent variables. The adjusted R-

squared value, which accounts for the number of variables, shows that the explanatory variables account for 45.8% of the variation in inflation rate. According to the table below, trade openness will affect inflation rate positively. Asserting that every time there is more opportunity for Ethiopia's trade to be more open and interactive with the rest of the world, inflation rate will also rise in the country. A 1% increase of openness in trade will result in 0.237% rise in inflationary condition. The short run result and the long run result do not correspond in their impact towards affecting the inflation rate. If Ethiopia's trade policy is inclined towards creating more favorable conditions to be open to the rest of the world, inflation is to follow for sure in the short run however that is not going to last long as this effect is going to be washed out and inflationary conditions are avoided in the long run.

Table 5.7: Short-Run Coefficients for Model II

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.221069	0.080334	-2.751874	0.0101
C(2)	-0.209905	0.082240	-2.552346	0.0162
C(D(LNINF(-1))	0.003291	0.146106	0.022522	0.9822
C(D(LNOP(-1))	0.237261	0.115011	2.062941	0.0482
C(D(LNREER(-1))	0.297373	0.144587	2.056713	0.0488
C(D(LNRGDP(-1))	-0.526985	0.297671	-1.770357	0.0872
C(D(LNI(-1))	0.035874	0.109607	0.327297	0.7458
R-squared	0.563412			
Adjusted R-squared	0.458029			

For real effective exchange rate (REER) the long run and short run result do correspond in affecting inflation rate. The short run impact of REER on inflation rate is positive. As explained in the long run analysis of the any increase in the REER i.e. appreciation of the birr is going to

result inflation in Ethiopia. On the other hand devaluation of the currency will help Ethiopia to decrease the inflation rate. A 1% devaluation of birr will result in a 0.297% decline in inflation rate. However, the estimation and the reality doesn't match in the short run case of the impact of REER. As we were able to see it in the descriptive part of this study, inflation rates were very high following the big devaluation. The answer could be, there are many variables that do affect inflation rate in the country which are not included in this particular study due to time and availability constraint of the data like that of price of oil, global economic performance and consumer price index. These variables might be the cause of the big inflation rate that was recorded as the biggest inflation of the country's history offsetting the positive impact of exchange rate devaluation.

On the other hand, the relation between real GDP and inflation rate is negative in the short run. An increase in the economic performance of Ethiopia measured by the real GDP growth will cause the inflation rate to fall in the short run. If our country's real GDP rises by only 1%, inflation will be falling temporarily by 0.526%.

In general the results collected for the estimation are mixed once again. As the IMF and World Bank urge, devaluing a currency showed that it is going to create more opportunities for Ethiopia in terms of achieving the internal balance by helping to avoid inflationary situations. In addition, real GDP has brought an unexpected result by affecting inflation rate negatively in the short run and positively in the long run. To the contrary, trade openness's result was as expected as it affects inflation positively in the short run and negatively in the long run.

Chapter Six: Conclusion and Recommendation

6.1 Conclusion

Before doing the research we have looked through many researches made on the topic of devaluation/depreciation and we have come across different results of different researchers. Existing empirical studies provide findings both in favor of and against the idea of devaluations.

This thesis has attempted to be able to give its own valid conclusion on the effectiveness of devaluation in achieving Internal and External balance in Ethiopia based on the analysis done. The study used different methodologies to assess its effectiveness over inflation and trade balance and used data ranging from the year 2007/8 to 2013 for the inflation descriptive part, and for econometrical description for both inflation and trade balance used data ranging from the year 1976 to 2014.

From the analysis and the data collected from the National Bank of Ethiopia and other sources like the IMF reports, suggests that the reason behind the recent devaluation was to make Ethiopia competitive in the international market and sell as many products (primary products) as possible. This thesis has tried to see the effect of the devaluation on different variables that could be affected by this policy action. The relationship between inflation and devaluation/depreciation according to the descriptive study showed a direct relationship i.e. whenever there is a currency devaluation Ethiopia experiences a very high rate of inflation. The continuous depreciation of the Ethiopian birr also contributed a lot to the inflation along with the global economic crisis (especially in the year 2008). This is because prices of imported goods increase and from the analysis we can see that price of equipment, being the largest import of the country, goes up high but the highest inflation rate was not recorded in the non-food section but it was recorded in food

section, in which equipment and food has little relation as most food items are produced using labor. This is because of oil price increase due to the devaluation and due to the increase of the price of oil in the global market along with the global economic crisis. The Ethiopian birr has been depreciating in the past continuous years and inflation has been rising up until 2013/14 and the 2014/15. As we have discussed it in the descriptive part of the study, a new base year was created to compare current prices with and also the government has also taken fiscal policy measures that are responsible for the decline of inflation rate in Ethiopia in recent years. Using econometric method, we were able to estimate the short and long run result of inflation rate in Ethiopia when endogenous variables like lending interest rate, Real Effective Exchange Rate, Real GDP and trade openness vary through time. Real effective exchange rate chosen as the explanatory variable as it contains the exchange rate fluctuation in it. The long run result for the impact of real effective exchange rate on inflation rate is positive. Asserting the idea that any currency devaluation or depreciation will not be causing inflationary condition in Ethiopia in the long run but rather it might even play a role in the decline of inflation. The short run impact of REER on inflation rate is also positive. As explained in the long run analysis of the any increase in the REER i.e. appreciation of the birr is going to result inflation in Ethiopia. On the other hand devaluation of the currency will help Ethiopia to decrease the inflation rate. The result of the other variable, real GDP has a negative relationship inflation rate in the short run and positive in the long run.

The other variable is Trade Balance. This thesis tried to see what could be the relationship between trade balance and devaluation/depreciation using descriptive analysis in the first phase of the research and found out that devaluation/depreciation and trade balance showed a negative or inverse relationship i.e. whenever there is a devaluation or a depreciation, trade balance goes

away from being balanced. Here in Ethiopia's case, it continuous to be negative as if it adds up to the trade deficit. This is because the devaluation does not decrease the level of import and increase the level of export as it was supposed to in Ethiopia. Because the country is still backward and undeveloped it still needs to import a large amount of equipment and other material for the fulfillment of the need of the people so when there is a devaluation the prices of imported goods increase but because the level of import does not decline at all or most of the time it will increase so the trade deficit adds up. And also export does not increase in the amount that would cancel off the trade deficit because there are a lot of African and non-African countries who produce the same exact product that Ethiopia is exporting as a result there is a negative relation between devaluation and trade balance. The VAR estimation of this thesis took a different path in explaining the external balance as we took the values of terms of trade (TOT) to explain trade balance because the data for trade balance were not fit for estimation. Based on the direct relationship between TOT and trade balance as studied by different scholars was taken as a basis for finding the effect of any devaluation/depreciation on the external balance. The result we have got when using an econometric technique, were seen to be totally similar from what we observed in the descriptive part. In the VAR analysis, the short run relationship between TOT and real effective exchange rate is negative. Because trade balance is explained by TOT and hence the real effective exchange rate has a negative relationship with trade balance. In the descriptive part of the study which are observed in the short run witnessed a negative relation between the two which were clearly seen by the deteriorating trade balance and depreciating exchange rate. The analysis result showed an unlikely path that devaluation of Birr will cause trade balance but this balance will not last long because in the long run the relationship between devaluation/depreciation is going to be negative, adding up to the deterioration all the way.

Besides the above variable the study has seen the relation between TOT and real GDP and some other variables too. The short-run coefficient of real GDP indicates a negative significant causal effect on terms of trade. Ethiopia's growth in real GDP is going to be accompanied by a deteriorating TOT, which in turn will result in a huge trade deficit in the short run. But rather in the long run a positive relationship will be inevitable, as the real GDP growth it will improve the deteriorating TOT and therefore will decrease the trade deficit while avoiding trade imbalance. However, in the post estimation of the analysis variance decomposition, we have found that real effective exchange rate is not going to be the major determining factor in the long run for TOT to deteriorate or not to. And hence it is very risky to take devaluation or letting currency to depreciate as a policy action for TOT improvement.

In general, achievement of internal and external balance as an ideal status to be is not going to be attained overnight or even by taking only one policy measure while undermining the other possible fiscal and monetary measures. Exchange rate devaluation or depreciation as a policy measure to achieve external balance is not going to be effective in the long run and certainly not effective in the short run though its significance as a major affecting factor and we found positive relation with devaluation. Inflation rate, as part of the internal balance, is going to be increasing in the long and short run of Ethiopia's economic cycle.

6.2 Recommendation

Based on the findings of this study, the following policy implications can be drawn.

The main objective of a devaluation is to insure competitiveness in the international market and achieving trade balance and receiving any positive outcomes that come with it. But this thesis suggests that the use of currency depreciation as a tool for correcting trade imbalance for countries like Ethiopia is not advisable. The product we supply to the international market are agricultural products whose prices are inelastic to price changes. Though the estimation result shows it's going to be better in the long run, it also tells us that it might not be an important factor for the correction of trade imbalance. Though this is not a prefect study we recommend import substitution industrialization is more appropriate to achieve trade balance. Because first, this policy is what made Ethiopia succeed in the previous times and achieve a trade balance. If we can produce imported goods domestically with the available resource we can really decrease the level of import and if we develop the products well we can even export more and gain more foreign currency. If this is possible we can use devaluation at this point as a policy measure because we have products whose price are not set in the international market and make our products cheaper accessible.

Furthermore the government must help the agriculture system to develop well and make farmers employers. This will create jobs in the agricultural sector instead of only using family labor and animal labor. In addition to the above recommended policy, the government should also use tight fiscal policy and also setting price ceiling which will make inflationary situations ease down.

Finally, Ethiopia has to be self-sufficient before starting to export, therefore building the country using the available resources, implementing import substitution industrialization, supporting the agricultural system to grow more and the use of appropriate policy measures which are not aid

related imposed policies would enable Ethiopia achieve both Internal and External Balance.

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Appendixes

Appendix 1: Optimal Lag Length criteria

Optimal lag length criteria for Model I

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-6.816158	NA	1.33e-06	0.656453	0.876386	0.733216
1	183.0294	316.4093	1.42e-10	-8.501635	-7.182036*	-8.041060*
2	208.4914	35.36384	1.51e-10	-8.527300	-6.108035	-7.682912
3	244.9562	40.51644*	1.01e-10*	-9.164233*	-5.645302	-7.936032

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5%

level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Optimal lag length criteria for Model II

Lag	LogL	LR	FPE	AIC	SC	HQ
0	13.30362	NA	4.34e-07	-0.461312	-0.241379	-0.384550
1	204.3549	318.4188	4.34e-11	-9.686383	-8.366784*	-9.225807*
2	232.1201	38.56284	4.05e-11	-9.840008	-7.420743	-8.995619
3	266.1832	37.84790*	3.09e-11*	-10.34351*	-6.824583	-9.115312

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Appendix 2: Lag exclusion criteria

Lag exclusion criteria for Model I

Chi-squared test statistics for lag exclusion:

Numbers in [ ] are p-values

	LNTOT	LNRGDP	LNREER	LNI	LNINF	Joint
Lag 1	17.79892	59.15797	50.58091	31.57681	37.57285	197.9676
	[0.003209]	[1.81e-11]	[1.05e-09]	[7.20e-06]	[4.60e-07]	[0.000000]
Lag 2	7.012418	16.66459	9.460233	8.584932	10.63100	51.40187
	[0.219718]	[0.005182]	[0.092056]	[0.126810]	[0.059207]	[0.001426]
df	5	5	5	5	5	25

Lag exclusion criteria for Model II

Chi-squared test statistics for lag exclusion:

Numbers in [ ] are p-values

	LNINF	LNOP	LNREER	LNRGDP	LNI	Joint
Lag 1	31.52904	32.26864	33.84514	82.61826	22.77046	177.3429
	[7.36e-06]	[5.26e-06]	[2.56e-06]	[2.22e-16]	[0.000373]	[0.000000]
Lag 2	13.64539	11.45880	5.601000	25.71198	6.124669	57.38429
	[0.018026]	[0.043005]	[0.346998]	[0.000101]	[0.294276]	[0.000237]
df	5	5	5	5	5	25

Appendix 3

Covariance and correlation between variables for model I and II

Included observations: 39

Covariance Correlation	LNTOT	LNRGDP	LNREER	LNINF	LNI
LNTOT	0.168290				
	1.000000				
LNRGDP	-0.137609	0.294629			
	-0.617989	1.000000			
LNREER	0.080424	-0.125646	0.143895		
	0.516814	-0.610221	1.000000		
LNINF	-0.234884	0.418558	-0.191355	0.646371	
	-0.612170	0.359128	-0.627446	1.000000	
LNI	-0.028225	0.064943	-0.068254	0.110590	0.056989
	-0.288207	0.501190	-0.553720	0.576212	1.000000

Included observations: 39

Covariance

Correlation	LNINF	LNRGDP	LNREER	LNOP	LNI
LNINF	0.646371				
	1.000000				
LNRGDP	0.418558	0.294629			
	0.359128	1.000000			
LNREER	-0.191355	-0.125646	0.143895		
	-0.627446	-0.610221	1.000000		
LNOP	0.208590	0.158096	-0.098897	0.135033	
	0.506045	0.392615	-0.609478	1.000000	
LNI	0.110590	0.064943	-0.068254	0.051436	0.056989
	0.576212	0.501190	-0.553720	0.586342	1.000000

Appendix 4: Post-Estimation Diagnostics test

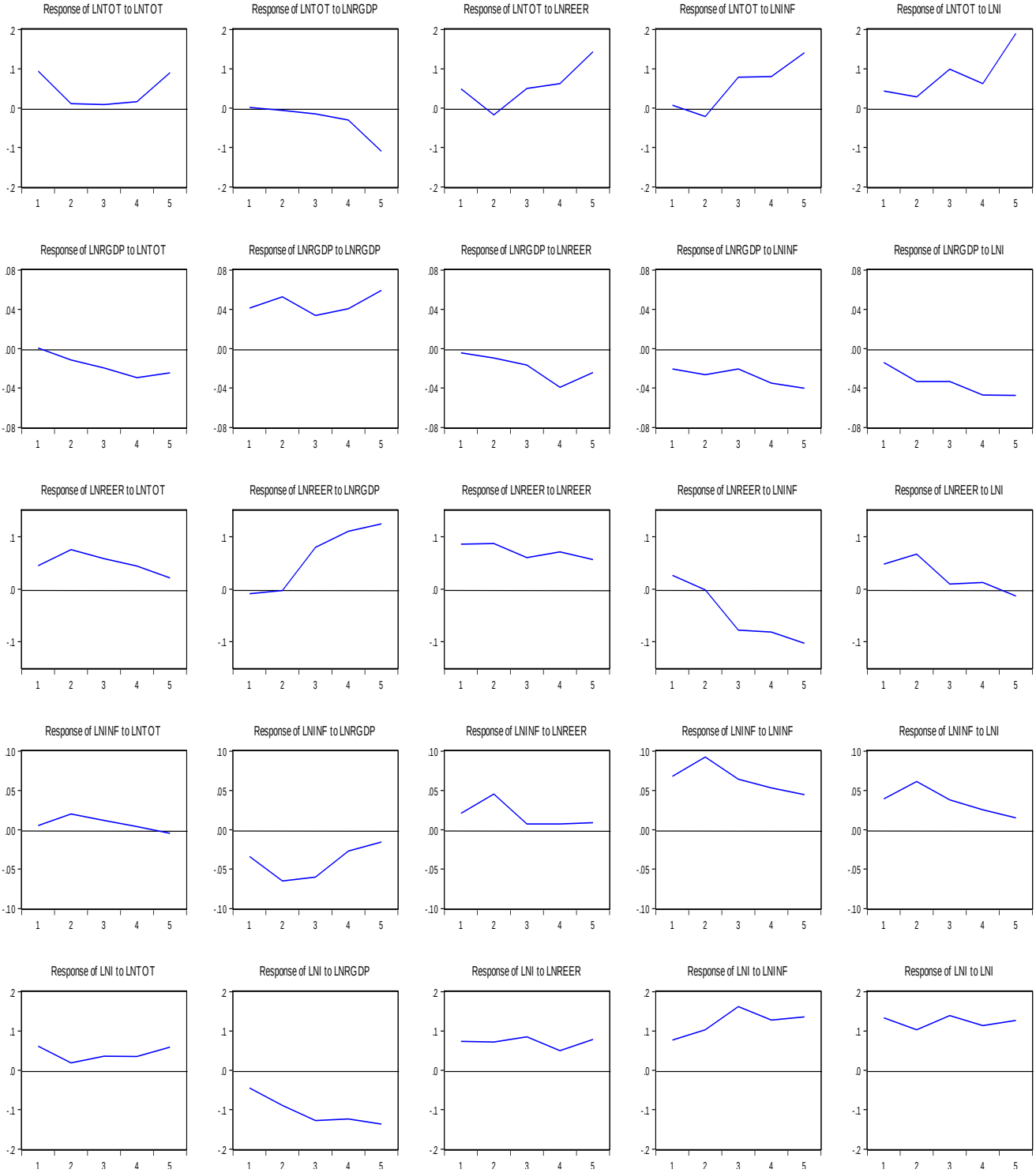
Post-Estimation Diagnostics test for Model I&II

	Statistics		P value
	Lags	**Chi square**	
Residual vector Serial correlation LM test for Model I	**1**	**20.55**	**0.3637**
	2	**42.02**	**0.6514**
	3	**45.22**	**0.6953**
Residual vector Serial correlation LM test for Model II	**1**	**27.9**	**0.3436**
Residual Vector Normality (Jarque-Bera) Model I	**Joint**	**171.1**	**0.423**
Residual Vector Normality (Jarque-Bera) Model II	**Joint**	**45.03**	**0.04**
Residual Vector Heteroskedasticity Model I		**259.3215**	**0.3914**

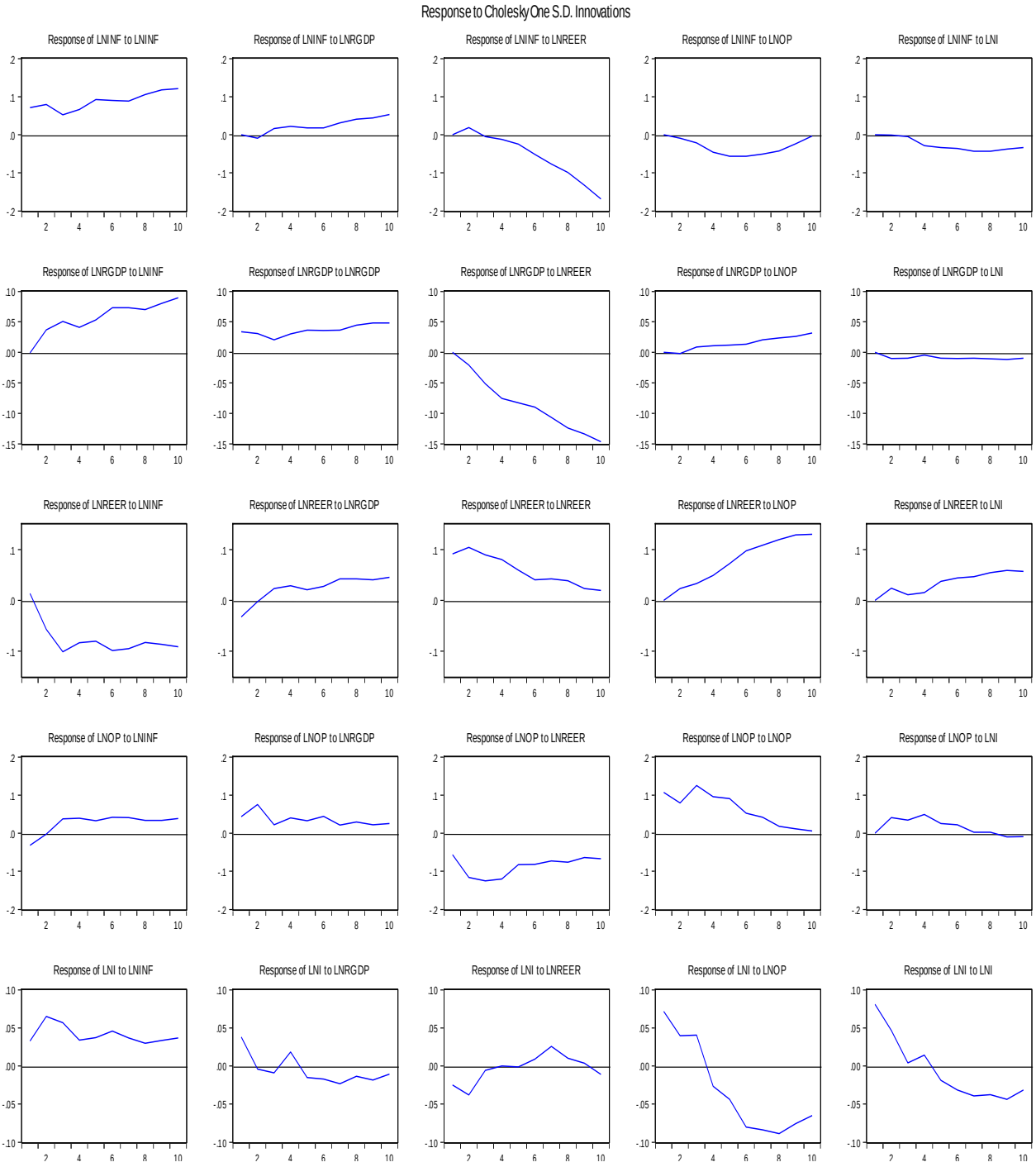
Residual Vector **Heteroskedasticity Model II**		**296.7158**	**0.4447**

Appendix 5

Response to Generalized One S.D. Innovations



Appendix 6: Impulse response function



Appendix 7: Variance Decomposition

Variance Decomposition of LNTOT for Model I

Variance Decomposition of LNTOT:						
Period	S.E.	LNTOT	LNRGDP	LNINF	LNI	LNREER
1	0.093811	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.116363	65.99722	0.253992	6.465269	17.14970	10.13382
3	0.163442	33.73775	0.920060	28.41553	31.64278	5.283881
4	0.186848	26.60887	3.338663	37.17133	25.16439	7.716738
5	0.276125	22.70861	17.80788	27.66958	25.22165	6.592280
6	0.398793	20.15019	29.92354	20.41142	24.00606	5.508792
7	0.457673	20.77223	31.36465	18.77819	23.10619	5.978745
8	0.474022	20.90808	30.37606	18.62259	24.34407	5.749186
9	0.482679	21.01891	29.80473	18.69629	24.35310	6.126962
10	0.492635	20.61578	31.41230	18.26176	23.79104	5.919129

Tab: Variance Decomposition of LNINF for Model II

Variance Decomposition of LNINF:

Period	S.E.	LNINF	LNOP	LNREER	LNRGDP	LNI
1	0.070810	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.096739	92.15948	1.053868	6.739377	4.74E-05	0.047226
3	0.109212	82.71267	6.909313	7.193885	3.091495	0.092639
4	0.125815	73.64657	8.393265	5.488782	11.26572	1.205665
5	0.145409	65.73443	6.529877	4.235421	18.32907	5.171209
6	0.167479	56.49990	5.206044	4.379368	23.99409	9.920604
7	0.196245	46.35385	5.990959	6.226966	27.51534	13.91288
8	0.233601	37.14979	9.486319	8.992994	28.12976	16.24114
9	0.278977	29.74022	14.78904	11.86797	26.76582	16.83695
10	0.331681	24.11068	20.67518	14.45064	24.55060	16.21291