

Effect of Trade Openness on Inflation in Ethiopia

(An Auto Regressive Distributive Lag Approach)

Meseret Feleke

A thesis submitted to the Department of Economics

Presented in Partial Fulfillment of the Requirements for the Degree of

Masters of Science (Economic Policy Analysis)

Addis Ababa University

Addis Ababa, Ethiopia

October, 2014

Addis Ababa University

School of Graduate studies

This is to certify that the thesis prepared by Meseret Feleke, entitled: Effect of Trade Openness on Inflation in Ethiopia: An Auto Regressive Distributive Lag Approach, and submitted in partial fulfillment of the requirements for the Degree of Master of Science (Economic Policy Analysis) complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

Signed by the examining committee:

Examiner: _____ Signature _____ Date _____

Examiner: _____ Signature _____ Date _____

Advisor: _____ Signature _____ Date _____

Chair of Department or Graduate Program Coordinator

ABSTRACT

Effect of Trade Openness on Inflation in Ethiopia: An Auto Regressive Distributive Lag Approach

Meseret Feleke

Addis Ababa University, 2014

This study empirically examine the effect of trade openness on inflation in Ethiopia using annual time series data over the period 1970/1971-2010/2011 by applying auto regressive distributed lag(ARDL) model for inflation. The control variables that are included in the inflation equation are gross fixed capital formation, money supply, per capita income and government consumption expenditure. The objective of this study is to test the applicability of Romer hypothesis in Ethiopia.

In the contrary to Romer hypothesis the finding of the study indicates that the role of trade openness on reducing inflation is insignificant both in the long run and short run. The result of the study confirms that among the control variables included in the inflation equation, gross fixed capital formation significantly reduce inflation. But money supply, per capita income and government consumption expenditure have a positive and significant effect both in the long run and short run. The most important policy implication that comes out of this study is that the policy makers should focus on measures other than external trade sector such as money supply and government expenditure in devising policies to combat and reduce domestic inflation.

Acknowledgment

No words can suffice to express my praises thanks to the almighty God for helping me to finalize this thesis. Guidance and mercy of God alone have enabled me to complete this study.

My deepest gratitude goes to my thesis advisor Dr. Tadele Ferede for his valuable comments and guidance throughout the course of this thesis.

I take this opportunity to express my heartfelt gratitude to Solomon Mosisa, Yohannes Gebru and Tsadkan Alemayehu for their assistance with the data and providing useful information.

I would also like to thank Mikias Tilahun for his constructive advice and moral support.

Table of Contents

List of Figures.....	vii
List of Tables.....	ixx
List of Appendices.....	x
List of Acronyms.....	xii
CHAPTER ONE: INTRODUCTION.....	1
1.1. Background of the Study.....	1
1.2. Statement of the Problem.....	2
1.3. Objective of the Study.....	6
1.4. Significance of the Study.....	6
1.5. Scope of the Study.....	7
1.6. Limitation of the Study.....	7
1.7. Organization of the Study.....	7
CHAPTER TWO: LITERATURE REVIEW.....	9
2.1 Theoretical Literature.....	9
2.1.1. Definition and measurement of trade openness.....	9
2.1.2 Theories of Inflation.....	9
2.1.3. Sources of Inflation in Developing Countries.....	19
2.1.4 The effect of other variables on Inflation.....	19
2.2. Empirical literature.....	22
2.2.1. Empirical Evidence on the Determinant of Inflation in Ethiopia.....	22
2.2.2 The Effect of Trade openness on Inflation.....	27
2.2.3. Conceptual framework for effect of trade openness on inflation.....	32
CHAPTER THREE: OVERVIEW OF ETHIOPIAN ECONOMY.....	37
3.1 Introduction.....	37
3.2. Trends of Economic Growth: Historical Review.....	38
3.3. Trend of Inflation in Ethiopia.....	44
3.4. The relationship between GDP growth and Inflation.....	48
3.5. The External Market: Exports and Imports.....	49
3.5.1. Export Sector.....	49
3.5.2. Import Sector.....	53

3.6. Trade Openness	58
CHAPTER FOUR: DATA AND METHODOLOGY	61
4.1. Empirical Model	61
4.2. Description of Variables.....	62
4.3. Data Source	63
4.4. Econometric Model.....	64
4.4.1. Test for Stationarity	64
4.4.2. Information Criteria (Lag Length Selection).....	65
4.4.3. Test for serial correlation	66
4.4.4. Cointegration	66
CHAPTER FIVE: RESULTS AND DISCUSSION	70
5.1. Description of the data set used in Estimation.....	70
5.2. Empirical Results for Unit Root Testing.....	71
5.3. Testing Long Run Relationship	73
5.4. Stability and Diagnostic tests	75
5.5. Long Run ARDL Model	80
5.6. Error correction model	83
CHAPTER SIX: CONCLUSIONS AND POLICY IMPLICATIONS	87
6.1. Conclusions	87
6.2. Policy Implications	88
REFERENCES	90
APPENDICES	97

List of Figures

Figure 2.1 Effect of other variables on inflation	21
Figure 2.2 Conceptual frameworks for the effect of trade openness on inflation.....	35
Figure 3.1 Real GDP Growth rate and Real GDP per capita Growth Rate.....	39
Figure 3.2 Sectoral percentage contributions to GDP (1960/61-2010/11).....	41
Figure 3.3 Agricultural and GDP growth rate (1971/72-2010/11).....	43
Figure 3.4 Inflation Rate (1971-2013).....	44
Figure 3.5 General, Food and Non-food inflation rate (1971-2013).....	47
Figure 3.6 Inflation and GDP growth rate (1972-2011).....	48
Figure 3.7 Average percentage earning share of major export items (1984/85- 2010/11).....	50
Figure 3.8 Average percentage shares of export destinations (1985/86-2010/11).....	52
Figure 3.9 Percentage share of major import items (1969/70 -2010/11).....	54
Figure 3.10 Share of major import items from the total import (2010/11 vs. 2011/12).....	55

Figure 3.11 Percentage share of food import from the total import (1997-2012)	56
Figure 3.12 Average percentage shares of major import sources (1984/85-2010/11)....	57
Figure 3.13 Trade Openness growth rate (1970/71-2010/11).....	58
Figure 3.14 Inflation growth rate and trade openness growth rate.....	59
Figure 3.15 Growth rates of Export as a share of Nominal GDP and Import as a share of Nominal GDP and Trade openness	60
Figure 5.1 Testing parameter stability of the long run ARDL (1,0,0,0,0,1) using CUMSUM and CUMSUM square test.....	79

List of Tables

Table 3.1 Average percentage Share of imports by end use (1969/70-2010/11).....	53
Table 5.1 Summary Statistics.....	70
Table 5.2 ADF test for unit root.....	72
Table 5.3 Critical values for upper and lower bound.....	74
Table 5.4 Diagnostic test for the long run ARDL (1, 0, 0, 0, 0, 1).....	75
Table 5.5 Estimated Long Run Coefficients using the ARDL Approach.....	80
Table 5.6 Error Correction Representation for the Selected ARDL Model	84

List of Appendices

Appendix 1 Diagnostic Test Results.....	97
Appendix 2 Long Run Auto Regressive Distributed Lag Estimation Result.....	98
Appendix 3 Error Correction Representation Estimation Results.....	99

List of Acronyms

ADF	Augmented Dickey Fuller
ARDL	Auto Regressive Distributed Lag
CPI	Consumer price index
CSA	Central Statistical Agency
CUMSUM	Cumulative Sum
CUMSUMSQ	Cumulative Sum of Squares
ECM	Error Correction Model
EEA	Ethiopian Economics Association
EPRDF	Ethiopian People's Revolutionary Democratic Front
FAO	Food and Agricultural Organization
GDP	Gross Domestic Product
GNI	Gross national income
GNP	Gross National Product
I ()	Integrated order of
IMF	International Monetary Fund
LM	Lagrange multiplier test of residual serial correlation
MENA	Middle East and North Africa
MoFED	Ministry of Finance and Economic Development

NBE	National Bank of Ethiopia
OECD	Organization for Economic Cooperation and Development
OLS	Ordinary Least Square
OPEC	Organization of Petroleum- Exporting Countries
QTM	Quantity Theory of Money
RESET	Regression Equation Specification Error Test
RGDP	Real Gross Domestic Product
SBC	Schwarz Bayesian Criterion
UECM	Unconditional Error Correction Model
UN	United Nation
UNECA	United Nations Economic Commission for Africa
USD	United States Dollar
VAR	Vector Auto Regression
WB	World Bank

CHAPTER ONE: INTRODUCTION

1.1. Background of the Study

Reducing macroeconomic problems is the objective of every country. Among those macroeconomic problems which are undesirable, inflation can be mentioned in the forefront. Although certain level of inflation is desirable to stimulate an economy (Gokal and Hanif, 2004), high inflation rate however, results in adverse effect on the economy such as greater uncertainty, less saving, and less export competitiveness. Moreover the high variability of inflation over time makes it difficult to plan ahead (Ashra, 2002).

Though it is generally considered that inflation has undesirable consequences, its sources and the magnitude of its effects may differ across countries given the structural differences that exist across countries. In line with this, different schools of thoughts have provided significant contributions to what they believe are responsible factors for the occurrence of inflation. For instance, Keynesians identified demand pull and cost push factors as the main cause for inflation (Thomas, 2011). On the other hand, Monetarists argued that inflation is mainly influenced by how fast the money supply grows or falls, thus according to them, inflation is a monetary phenomenon (Humphrey, 1976).

Apart from the above mentioned theoretical bases, Romer (1993) in his seminal paper found openness as another variable which affect the level of inflation. Accordingly, he

empirically showed that there is a negative relationship between openness and inflation for a cross-section of 114 countries over the period 1973 to 1988.

Romer (1993) gave two explanations for the inverse relationship between openness and inflation. The first one is that since unanticipated monetary expansion causes real exchange rate depreciation and the harms of real depreciation is greater in more open economies; the benefits of surprise monetary expansion are a decreasing function of the degree of openness. The second one is that, more open the country is, the more revenue the country gets from tariff. Hence, the possibility of relying on other sources of revenue such as seignorage will be less. As a result inflation is low in more open economies than less open economies.

1.2. Statement of the Problem

The applicability of Romer's hypothesis is in critical debate. Romer (1993) found that the link between openness and inflation holds for across almost all types of countries with the exception of the most highly developed countries. In line with this, taking trade openness as one component of openness, Kim and Beladi (2005) as cited in Mukhtar (2010) investigate the effect of trade openness on inflation and have found a positive relationship between inflation and trade openness for some advanced economies, such as the United States, Belgium, and Ireland, while for other countries, both developed and developing, their finding is the same with Romer's hypothesis.

Similarly Nasser et al. (2009) as cited in Thomas (2011) examined the evidence in relation to linking trade openness and inflation for 152 countries during the period 1950-1992. Their empirical results supported Romer's (1993) hypothesis.

Furthermore, Lane (1997) by using variables such as per capita income, country size and central bank independence as control variables shows that inflation and openness are negatively related and statistically significant in the developed industrial economies (Ashra, 2002).

On the other hand, there are some scholars who do not support the Romer hypothesis at all. Among them, for instance, Terra (1998) opposed the hypothesis by arguing that the negative correlation between openness and inflation was only observed in severely indebted countries during the 1980s crisis period. Terra (1998) gives an explanation for existence of the stronger negative link between inflation and openness among severely indebted countries. If the indebted countries are less open economy, they will need a larger exchange rate devaluation to generate the trade surplus for making debt repayments. The devaluation of the exchange rate, in turn raise the value of external liabilities in domestic currency. When inflation tax is taken as major source for payment of this liability, a higher inflation rate will result. Therefore, the less open a country is, the higher its inflation will be during a debt crisis.

Among the opponents of Romer's hypothesis, Evans (2008) argues that openness has a positive effect on inflation. This positive effect of openness on inflation is driven by the possibility of importing inflation from the rest of the world via the prices of manufactured

imports or raw material imports. Moreover, as the economy opens up, the fiscal and monetary authorities tend to lose their ability to control inflation in the domestic economy through fiscal and monetary policies. Similarly, Ghaderi and Samimi (2012) investigated the hypothesis that inflation is lower in more open economies for MENA region during 2000-2007 and have found evidence of a positive relationship between trade openness and inflation for those countries which contradicts with Romer hypothesis. Likewise, empirical works of Mehmet *et al.* (2009) and Thomas (2011) have arrived at the same conclusion, which is the positive effect of openness on inflation.

The other argument in the openness-inflation debate goes to either identifying inconclusive result based on time dimension or level of inflation or no relationship between the two variables at all. For instance, various empirical studies have revealed that openness had a negative impact on inflation in the short-run while had not effect in the long-run (Samimi *et al.*, 2011 and Alfaro, 2003). Lin (2010) as cited in Thomas (2011) had found that there is an indirect effect of trade openness on inflation when inflation is higher but the effect will be eliminated when inflation is lower.

Regarding the inconclusive result, Manni and Afzal (2012) states that as openness increases, the inflation in a given a country could be reduced or increased. The higher imports to a country resulted from greater openness could reduce the price level in a home country as the international price level is expected to be lower than domestic price level. On the other hand, increased imports could negatively affect the current account balance and as a result the domestic currency will depreciate which leads to inflation.

They empirically assessed the impact of trade openness on inflation in Bangladesh and found that trade openness is not statistically significant in affecting inflation in the country. Similarly, Gruben and McLeod (2004) showed that there is no any significant openness–inflation relationship among OECD economies.

Although there are many empirical studies about the relationship between trade openness as one component and inflation, the effect of trade openness on inflation is still inconclusive and the issue is an empirical question in the economic literature. This is because, the effect of trade openness on inflation level differs from one country to other and it is difficult to generalize the effect by simply taking one county’s experience. Thus, this study aims to test whether trade openness reduce inflation in Ethiopia as Romer (1993) stated in his hypothesis or not.

1.3. Objective of the Study

The general objective of the study is to examine the effect of trade openness on inflation in Ethiopia using data for the period 1970/71-2010/11.

The specific objectives of the study are

- To show whether trade openness has any effect on inflation in Ethiopia
- To examine whether trade openness has short run and long run effect on the inflation of Ethiopia.
- To give policy recommendation based on the result obtained.

The research questions of this study are:

- Does trade openness has any effect on inflation in Ethiopia?
- If trade openness in Ethiopia has effect on inflation, is it negative or positive effect?
and;
- Does trade openness has short run and long run effect on the Ethiopian inflation?

1.4. Significance of the Study

The effect of trade openness on inflation is still a debatable issue among economists and the effect varies from country to country. The inconclusive theoretical foundation so far has put policy makers in a dilemma. Thus, this study clarifies the effect of trade openness on Ethiopian inflation. Besides, the outcome of the study is expected to help policy makers, as an input, in decision making with regard to devising policies in combating

inflation. In addition to this, the study will pave the way for other researchers to advance their study on the topic.

1.5. Scope of the Study

This study examines the effect of trade openness on inflation for the years between 1970/1971 and 2010/2011 based on the availability of data for all variables. This study focused on the effect of trade openness on the general inflation. It did not go deep to examine the effect of trade openness on food and non-food inflation separately.

1.6. Limitation of the Study

Inconsistency of data from different government institution creates some difficulty in analyzing the data. So as to avoid such inconsistency attempt is made to stick to the same source as much as possible. Given the data problem, it might be the case that the result of the study could be affected by the quality of the data.

1.7. Organization of the Study

This study is organized as follows. Chapter one presents background of the study, statement of the problem, objective, significance, scope and limitations of the study. Chapter two gives review of both theoretical and empirical literatures which are related with inflation theories and the effect of trade openness on inflation. Subsequently the third chapter presents model specification, data source and methodology adopted. Chapter four deals with the overview of the Ethiopian economy particularly, inflation and

trade sector related issues. Chapter five presents the econometric analysis and interpretation. The last chapter deals with conclusions and policy implications based on findings obtained from the analysis.

CHAPTER TWO: LITERATURE REVIEW

2.1 Theoretical Literature

2.1.1. Definition and measurement of trade openness

Trade openness is frequently used to measure the importance of international transactions relative to domestic transactions. This indicator is calculated as the ratio of total trade (i.e. the sum of exports and imports of goods and services) relative to GDP. This ratio is often called the trade openness ratio (David, 2007). Various empirical researchers such as Ghaderi (2012) and Thomas (2011) have use export plus import as a share of GDP to measure trade openness.

The term “openness” may be somewhat misleading, since a low ratio does not necessarily imply high tariff or nontariff barriers to foreign trade, but may be due to factors such as size of the economy and geographic remoteness from potential trading partners (OECD, 2011). According to Sarkar (2004), increased trade openness refers to the increase in size of the country’s traded sector in relation to total production.

2.1.2 Theories of Inflation

2.1.2.1 Demand Pull theory of Inflation

2.1.2.1.1 Classical/Neo Classical theory of Inflation

To explain the cause of inflation Classical and Neo Classical economists used quantity theory of money (QTM) (Kibritcioglu, 2002). The QTM states that the value of all sales of goods must necessarily equal the value of all purchases.

Algebraically

$$M V = P T \dots\dots\dots 1$$

Where M is money supply, V is the velocity of money, P is the general price level, and T represents the real volume of transactions.

In structure of QTM, aggregate supply in the goods market is assumed to be given and equal to T (that is AS=T) .T now represent real output which is determined by the production function in the long run. But aggregate demand is stated as: $AD = \frac{M.V}{P}$.

In goods market equilibrium, aggregate demand and aggregate supply are equal.

AS = AD Which implies

$$T = \frac{M.V}{P} \dots\dots\dots 2$$

By assuming V and T are constant in the short run, the above equilibrium functions can be rewritten to price equation as follows:

$$P = \frac{\bar{V}}{\bar{T}} . M \dots\dots\dots 3$$

The above equation shows that when we double the money supply, the price will be doubled. The transmission way through which increase in money supply results in higher

price level is demand in goods market. The excess supply in money market results in excess demand in goods market. Then this excess demand causes inflation.

The relative version of the above equation is inflation function of QTM. This inflation equation obtained by taking the percentage change of the above equation. The inflation equation can be given as:

$$\pi \approx (v - g) + m \dots \dots \dots 4$$

Where; π , v , g and m represent the percentage changes in P , V , T , and M , respectively. Since it is assumed that V and T are constant in the short run, their percentage change becomes zero. The above inflation equation states that if one ignores the possible changes in V and T , the only factor that causes inflation is a monetary phenomenon or excess money supply.

2.1.2.1.2 Monetarist theory of inflation

Monetarists argue that the fundamental cause of inflation is excessive monetary growth, i.e., a rate of increase in the money stock substantially in excess of the rate of growth of real output. Thus given aggregate supply, an extension in money supply leads to higher prices (Humphrey, 1976). The main difference of Monetarists theory of inflation with that of Classical/Neoclassical theory of inflation is, in their treatment of V (the velocity of money) and T (real volume of transactions). Monetarists do not take V and T to be fixed (Barenjee (1975) as cited in Tafere (2008)).

2.1.2.1.3 Keynesian theories of inflation

Keynesians argued that under full employment conditions, the cause for inflation pressure is unexpected rise in aggregate demand. This surprising increase in aggregate demand creates unanticipated profits for producers. To take advantage of the rise in aggregate demand the producers expand their production which creates excess demand in labor market. This excess demand in labor market pushes up the wage. The increase in wage in turn creates excess demand in goods market and then inflation pressure will occur (Tafere, 2008).

Later on Keynesians come up with modified theory of inflation which states that inflation occurs because of employees' desire for higher wages and employers demand higher profits. If employees are given with a wage increase, employers will increase prices. The increase in price again forces employees to repeat their demands for higher wage. This produces wage-price spiral, which results in inflation (Greenidge and DaCosta, 2009).

2.1.2.1.4 Keynesian-Neoclassical Synthesis

Since there was no room for inflation in the Neo-Keynesian IS-LM model, the Keynesian neoclassical synthesis incorporated labor market dynamics into the IS-LM model by taking into account the so-called Phillips curve (PC) to eliminate the missing inflation equation in the model (Kibritcioglu, 2002).

The inflation equation can be given as:

$$\pi = \alpha U \dots\dots\dots 5$$

Where π represent the inflation rate and U represents the unemployment rate.

The trade-off between inflation rate and unemployment was expressed by α , which is less than 1. That is the lower the unemployment rate, the higher the inflation rate. A decrease in the unemployment rate indicate there is excess demand in labor market and hence in goods markets.

However, the demand-side determination of inflation within the IS-LM-PC model failed to explain stagflation in the late 1960s and 1970s. This resulted in the coming of monetary economists such as Milton Friedman and Edmund Phelps who proposed the so-called expectations-augmented PC in the late 1960s. This can be expressed as:

$$\pi = \alpha.U + \beta.\pi^e \dots\dots\dots 6$$

Where π^e represents inflation expectations and β represents the expectation adjustment parameter. In the short-run, there is still a negative relationship between inflation and unemployment for a given π^e . That is, inflation expectations act as a shift variable in the model.

According to the monetarists, the formation of inflation expectations is backward-looking, or adaptive. This means, not all information is available to economic agents during their formation of price expectations. The inflation expectation function given as:

$$\pi_t^e = \lambda.\pi_{t-1} + (1-\lambda).\pi_{t-1}^e \dots \dots \dots 7$$

Where, λ and $(1-\lambda)$ represent the adjustment parameters. The above inflation expectation equation shows that the expected rate of inflation at time t is a weighted average of the actual inflation rate and the expected inflation rate in the previous period. This equation is interpreted as an appropriate measure of inflation inertia.

2.1.2.2. Cost push theory of inflation

According to Humphrey (1976), cost push theory of inflation consider inflation as a host of non- monetary supply oriented influences that increase costs and hence prices. According to this theory, in the 1950’s and 1960’s the principal causes of cost inflation are union wage pressure and monopoly (administered) pricing policies. In 1973 and 1974, cost-pushers have blamed so-called special factors (random nonmonetary shocks) such as crop failures, commodity shortages, and the OPEC-administered increase in the price of oil, for causing the rise of inflation to double-digit levels.

Among the cost-push propositions, one of them incorporate the notions of passive money and reverse causation. The notion of passive money states that the money stock is an endogenous variable that responds passively to shifts in the demand for it. On the other

hand the notion of reverse causation states that, the direction of causation runs from the level of economic activity to money rather than from money to the level economic activity. Since the stock of money is demand determined, it cannot exert independent influence on prices. In addition money growth is the result-not the cause of increases in spending and economic activity. Thomas Tooke, one of the advocates of cost-push theories, argued that general prices were not determined by quantity of money rather by factor incomes such as wages, rents, profits, etc. In addition Tooke states other factors that affect the level of price. These factors are bad harvest, increase in demand for particular commodities of which the supply of the commodity remains fixed, tariffs and indirect taxes (Humphrey, 1976).

J. Laurence Laughlin (1909) as cited in Humphrey (1976), another proponent of cost push theory, state three types of cost push mechanisms, specifically; (1) wage-push, (2) administered pricing, and (3) commodity shortages. In wage –push mechanism, Laughlin describe the importance of unilateral wage setting by trade unions. This implies the existence of a significant degree of monopoly power in the labor market. Once that a high level of wages has been settled, it is difficult for employers to oblige a reduction in the wage rate. Thus the increase in wage rate leads to increase in price.

The second type of cost inflation cited by Laughlin is that due to administered pricing. He describes the situations in which expenses of production have no direct relation to prices. This is due to the existence of monopoly administering pricing in some industries (Humphrey, 1976). In this case cost inflation is as a result of cost and price increases

brought about by business monopolies and oligopolies. Thus this cost inflation theory usually takes the form of a theory of mark-up or administered price inflation (Haberler, 1960).

The third mechanism stated by Laughlin is due to raw material shortages and crop failures. Raw material shortages affect the rate of inflation directly and also indirectly through their effect on wage demands. With regard to the indirect, Laughlin mentioned that the increased price of food resulting from raw material shortages “cancel out all the gains of previous increases of wages, and forces laborers to repeat their demands for higher wage. Then the repeated increase in wage rate leads to higher cost of production (Humphrey, 1976).

2.1.2.3. Structuralist theories of Inflation

In 1950s, inflation could be occurred independent of demand for the commodities because of different structural features of the economy emerged as one hypothesis. In structuralist approach, the price of the commodity is not greatly influenced by forces of demand and supply. According to the mark-up view of price determination, prices are calculated by adding average variable cost to a gross profit margin mark up which is more or less invariant with respect to demand (Rebmann and Levacic,1979). Thus price of the final product is given as:

$$P = \frac{W}{AP_L} + IC + PM \dots\dots\dots 8$$

Where: P = price of the final product, W = money wage, AP_L = average product of labor, IC = average cost of material inputs (e.g. raw material, fuel, etc), and PM = gross profit margin per unit of final product.

The above price equation shows that factors that increase the price level are a rise in the money wage rate or the other elements of variable cost (IC), or the gross profit margin. An increase in average product of labor, unless offset by an equivalent money wage or profit margin increase, will reduce price level. According to structuralist view this occurs due to non competitiveness of markets. That is most firms operate in oligopolistic markets, while labor is organized into trade unions, which makes the competitive model of price determination inoperative in modern advanced economies. Structuralist argue that trade unions have a great role in pushing up wages independently of the state of demand which results in increase cost of production and then leads to inflation.

One of the models in structuralist school of thought is model of imported inflation. This model shows that a given country heavy reliance on external markets or factors may bring upward pressure on domestic prices. Another model in this school is the Scandinavian model, which states that in small open economies, inflation is influenced by world prices, wages and productivity (Frisch (1977) as cited in Greenidge and DaCosta (2009)).

2.1.2.4. The Public Finance Approach

According to Lim and Papi (1997), the public finance approach emphasizes that with the limit on domestic and foreign borrowing of the government, monetization can be taken as one alternative to finance budget deficit. Then this monetization of the deficit will create money growth which in turn creates inflation pressure.

2.1.2.5 New Political Macroeconomics of Inflation

According to Kibritcioglu (2002), the new political macroeconomics of inflation considers the role of non-economic factors such as institutions, political process and culture, in the creation of inflation. This approach also considers the possibility that continuous government deficit, as a potential cause for inflation. In addition the new political economy literature provides new perceptions on the relations between timing of elections, policymaker performance, political instability, policy credibility and reputation, central bank independence and the inflation process.

2.1.2.6. The Romer Hypothesis

Romer (1993) proposed the hypothesis that inflation is negatively related to openness. He explained his findings using the time consistency theory of inflation which states that the more open the country, the higher risk it will have by implementing a loose monetary policy. Since unanticipated monetary expansion causes real exchange rate depreciation, and because the harms of real depreciation are greater in more open economies, the benefits of surprise monetary expansion are a decreasing function of the degree of openness. Thus, if the monetary authorities' desire to increase money supply is important

factor that affect the level of inflation, monetary policy authorities in more open economies will on average expand less, and as a result openness reduces the impact of surprise monetary expansion on the real value of the currency which leads to lower inflation.

2.1.3. Sources of Inflation in Developing Countries

According to Woldemichael (2008), there are four frequently cited sources of inflation in developing countries. These are:

- When demand pressure exceeds the supply capacity of the country which is measured by output gap. That is the gap between the actual output and the potential output.
- Fiscal policy: Fiscal imbalances with scarce resources often lead to monetization of the fiscal deficit through inflation tax.
- Supply shocks resulting from factors as geographic and climatic conditions, changes in the terms of trade, drought and conflict.
- Inflation inertia

2.1.4 The effect of other variables on Inflation

Variables other than trade openness which are included in inflation equation are gross fixed capital formation as a share of GDP, money supply, per capita income and government consumption expenditure as a share of GDP. In the following paragraph the study shows the way through which the above stated variables affect inflation.

Gross fixed capital formation reduces the pressure on inflation through filling the output gap. That is increase in investment in a given country reduce the supply constraint and increase the availability of various goods which in turn reduce prices (Wijmbergen, 1984).

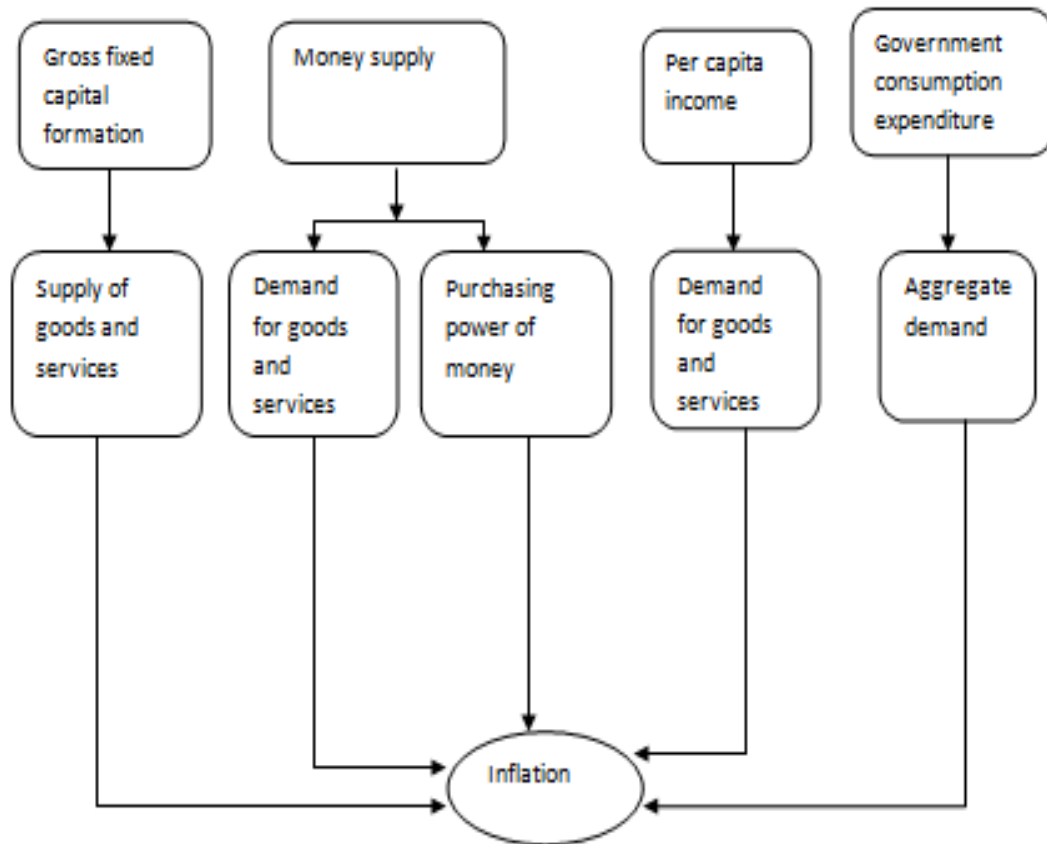
Money supply increase inflation through two main ways: increasing aggregate demand and reducing the purchasing value of money. As money supply in the economy increase peoples wants to spend more which increase aggregate demand and then price level. Similarly as the amount of money in the economy increase and increase, the money starts to lose its value which leads to inflation (Strano, 2003). Empirical studies such as Ghaderi and Samimi (2012) show that increase in money supply results in inflation.

Per capita income increases the pressure on inflation through its effect on aggregate demand. When the per person income in a given country increases, the demand of the people for goods and services will increase which finally results in inflation (FAO, 2013).

Government consumption expenditure results in inflation through its effect on aggregate demand. An expansion in government purchases has the potential to raise aggregate consumption. In turn, the resulting increase in consumption would raise aggregate demand (Nguyen, 2014; Vallés et al., 2005).

The following figure shows the channel through which other variables (that included in the model) affect inflation.

Figure 2.1 Effect of other variables on inflation



Source: Author's formulation based on the literature review

2.2. Empirical literature

2.2.1. Empirical Evidence on the Determinant of Inflation in Ethiopia

In this section, an overview of different studies on Ethiopian inflation in general and the determinants in particular are presented. Neda (2011) analyzed the inflation of Ethiopia by taking monthly observations from January 2000 to December 2010 of the Consumer Price Index, Food Price Index and Non-food Price Index. He tested the cointegration between the above three price indexes by applying Johansen's cointegration tests. The study shows that, the long run coefficient of consumer price index has a positive long run relationship with food price index and non-food price as expected in the theory.

Another study by Simpasa and Gurara (2011) examined inflation dynamics in selected East African countries including Ethiopia between July 2010 and July 2011. The explanatory variables in their inflation model are broad money supply, nominal exchange rate, domestic food production and world price. They found that the main driver of short-run inflation in Ethiopia is a rise in money supply. According to this study, inflationary pressures in Ethiopia reflect monetization of the fiscal deficit. In the long-run, non-food inflation is caused by monetary growth, interest rates and inflation expectations.

Durevall and Sjo (2012) assessed the main drivers of inflation in Ethiopia and Kenya by applying single-equation error correction models for the Consumer Price Index in each country focusing on the period from 2000-2010 with monthly data. Their approach recognizes that inflation can come from three sectors: i) the money sector, ii) the external sector and iii) the internal sector. Specifically, they focus on three main factors that affect

inflation: i) the supply and demand for real money balances, ii) the effects of external inflation on domestic prices and iii) internal supply shocks in the agricultural sector.

Their finding shows that world food prices and exchange rates have a long run impact, while money growth and agricultural supply shocks have short-to-medium run effects in explaining Ethiopia's inflation. There is also evidence of substantial inflation inertia. They further showed the importance of domestic food supply shocks in Ethiopia's inflation. In addition, World food prices and the dollar exchange rate are found to affect inflation in Ethiopia.

Taking annual data from 1970-2009, G/Kirstos and G/Egziabher (2012) examined the relationship between money supply and inflation in Ethiopia. The explanatory variables in their model were the growth rate of money supply, the growth rate of real GDP, oil price in USD, annual rainfall and budget deficit. The building block for their study was the quantity theory of money, which states that there is a relationship between money supply, velocity of money, prices, and real income. Besides investigating the relationship they calculated threshold level (optimal level) of money growth. In addition to money supply, real income and oil prices are significant in affecting inflation in Ethiopia.

Loening *et al.* (2008) analyze short run dynamics of inflation in Ethiopia using error correction model fitted with monthly observations from the year 2000-2006. The explanatory variables are exchange rate, foreign price level, interest rates, money stock and real output level. Their finding shows that increased money supply, the nominal

exchange rate, Agricultural output shocks significantly affect inflation in the short run. They show the existence of strong inflation inertia in Ethiopia.

By estimating error correction models for cereal, food and non-food consumer prices and the CPI using monthly data from January 1999 to November 2008, Birru *et al.* (2009) had analyzed the determinants of inflation in Ethiopia. Their focus was on markets in three main sectors: the monetary sector; the external sector, including the markets for tradable food and non-food products; and the domestic market for agricultural goods. They use general-to-specific modeling, starting with general models that include the money market and foreign sector error correction terms and the agricultural production output gap, and variables in first differences.

According to their study cereal and food prices seem to be determined by the exchange rate and foreign prices in the long run. The domestic agricultural market also plays an important role by both generating supply shocks, and possibly by creating backward and forward-looking expectations about future price changes. Lagged imported inflation and food inflation are the two significant factors that affect non-food inflation. Money growth, exchange rate changes, inflation inertia, imported inflation, oil-price inflation and world fertilizer-price inflation are the factors which affect inflation in the short run. But shocks in the domestic agricultural market are likely to be the most important. They conclude that inflation in Ethiopia is basically food inflation, and it is determined in the foreign sector in the long run. That is exchange rate and international prices explain a large fraction of Ethiopia's inflation.

Geda and Tafere (2011) investigated the factors behind the current inflationary experience in Ethiopia by applying vector autoregressive (VAR) formulation for the period 1994/95 to 2007/08 using quarterly data. They assume a segmented goods market. That is the market is classified into three sectors namely tradable sector, non-tradable sector and administered sector (fuel, transport, and utilities) with their respective price. The non-tradable sector price is split into food price and non-food price.

According to them, factors that affect inflation differ in short run and long run, and food and non-food sectors. The explanatory variables in their model are exchange rate, foreign price, unit labor cost, money supply, real income and food aid. Significant long run determinants of inflation in food sector are a sharp rise in food demand which is activated by an alarming rise in money supply (credit expansion), inflation expectation and international food price rise. On the other hand the short run determinants of food inflation are wages, international prices, exchange rates, constraints in food supply and cost marking-up. The long run determinants of non-food inflation are money supply, interest rate and inflation expectations.

Haji and Gelaw (2012) investigated recent soaring food inflation in Ethiopia using monthly data from 1997 to 2010 by applying Johansen's cointegration test and Vector Error Correction Model. The explanatory variables were broad money, agricultural production, world grain price, world fertilizer price, wage rate of unskilled labor, benzene price, non-food price. According to their study important factors that explain Ethiopia's soaring food inflation are the world grain price index, lagged world DAP price index,

domestic benzene price index, non-food price index, shocks in the goods and money markets, the continuous depreciation of Birr against dollar and the degree of inflation inertia.

Similarly, Menji (2008) examined the determinants of recent inflation in Ethiopia. The study used quarterly data starting from the third quarter of 1997/98 up to the second quarter of 2007/08. The explanatory variables are exchange rate, average lending rate of commercial banks, Gas Oil price, GDP, broad money supply and budget deficit. The result of the study shows that the long run factors that affect inflation in Ethiopia are structural factors, monetary expansion, lending rates and expectations. In the contrary exchange rate, one quarter lagged money supply, Gas Oil prices and budget deficit had insignificant impact on inflation in the long run.

As reviewed in the above paragraphs there is no researcher who has examined the applicability of Romer hypothesis (the negative effect of openness on inflation) in the case Ethiopia. That is no one includes openness or trade openness as one explanatory variable in inflation equation to test the effect of trade openness on inflation in Ethiopia. Thus in this study the researcher had tried to test the Romer hypothesis in Ethiopia by including trade openness in inflation equation.

2.2.2 The Effect of Trade openness on Inflation

Romer (1993) postulates a hypothesis that the more open a given country the less will be the inflation. He used panel data for 114 countries and then classified sample countries into 4 groups. For most of the countries he used the average annual change of log of GDP or GNP deflator as measure inflation. For those countries that do not have series of GDP or GNP deflator he used the change in the log of CPI as a measure of inflation. The study considered three types of control variables: (i) real income per capita: a general measure of development, (ii) a set of dummy variables for OECD membership and for various regions, (iii) dummy variables for the use of CPI rather than GDP deflator as an alternative measure of inflation. The result shows that openness has significant and negative effect on inflation for a wide range of countries except for a small group of developed economies.

After Romer, different researchers have examined the effect of openness on inflation and show that openness significantly reduces inflation. By applying multivariate cointegration and a vector error correction model, Mukhtar (2010) investigated the effect of openness on inflation in Pakistan from the period 1960 to 2007. The explanatory variables other than openness are budget deficit, GDP, and the exchange rate. The finding shows that in the long-run trade openness has a significant negative effect on inflation.

Sachsida (2006) used modern panel data techniques for 152 countries starting from the period 1950-1992 to examine the Romer hypothesis. The degree of openness is measured as the ratio of the importations in relation to the GDP. The result revealed in support of

Romer hypothesis. The researcher concluded that the negative effect of openness on inflation is not restricted to a subset of countries or a time period.

Some researchers show that the effect of openness on inflation depends on the time period. That is whether it is short run or long run. For instance, Malik *et al.* (2013) investigated Romer's hypothesis for Pakistan for the period 1970/71 to 2008/09 by employing ARDL approach to cointegration. They applied different measures of openness to trade (the ratio of exports to GDP, the ratio of imports to GDP and the ratio of trade to GDP). Besides openness the other explanatory variable was real GDP. The study validates the Romer hypothesis, but a more strong negative effect of openness on inflation is noted in the short-run as compared to the long-run.

By applying ARDL Bounds test approach to level relationship, Samimi *et.al* (2011) analyzed the effect of openness on inflation in Iran starting from the period 1973-2007. The explanatory variables are the money growth, government size, the openness and GDP per capita. The results show that openness has negative and significant effect on inflation in short-run but its effect in long-run is not significant.

According to Ashra (2002), the effect of trade openness on inflation is sometimes depends on whether an economy is experiencing hyper-inflation and/or whether it is a large economy. He explored the Romer hypothesis in 15 developing economies using panel data for the 1980s and the 1990s. The explanatory variables are openness, rate of growth of real agricultural value added, the average annual growth rate of money and

quasi money. The result of his study shows that trade openness has negative and significant effect on inflation.

There are many empirical researchers who oppose the Romer hypothesis. Terra (1998), for instance, oppose Romer's hypothesis using regression on 20 sample countries. The sample was then divided into four groups of countries according to indebtedness level (severely indebted, moderately indebted, less indebted and all other countries) and the same regression was run for each group of countries separately. The time structures used in the study were pre-debt crisis (1973-1980) and debt crisis period (1982-1990). Although the result shows strong negative relationship between openness and inflation among severely indebted countries during the debt crisis period, this relationship is not observed during the pre-crisis period, and among moderately and less indebted countries in both pre-debt period and debt crisis period.

Terra's explanation for existence of the stronger negative link between inflation and openness among severely indebted countries during a debt crisis is that, if the indebted countries are less open economy, they will need a larger exchange rate devaluation to generate the trade surplus for making debt repayments. The devaluation of the exchange rate, in turn raise the value of external liabilities in domestic currency. When inflation tax is taken as major source for payment of this liability, a higher inflation rate will result. Therefore, the less open a country is, the higher its inflation will be during a debt crisis

Likewise, Mehmet *et al.* (2009) examined the effect of openness on inflation in selected developing countries by applying panel data covering the period of 1980-2006. The

explanatory variables are exchange rate, openness to foreign trade, GDP per capita and foreign direct investment. The estimation results shows that openness have positive effects on inflation.

Ghaderi and Samimi (2012) examined the effect of trade openness on inflation in MENA countries by employing panel data technique from the period 2000-2007. The explanatory variables included in the model are money growth, trade openness (ratio of trade i.e., imports plus exports to GDP), lag of inflation, GDP per capita and Government size (share of government consumption in GDP). The obtained results indicate that trade openness has positive effect on inflation for MENA countries.

By using annual time-series data for the period 1947 to 2007, Zakaria (2010) investigated the impact of openness on inflation in Pakistan. The variables included in the study as explanatory variables other than trade openness are money supply, fiscal deficit, exchange rate depreciations, foreign inflation, foreign debt, democracy and terms of trade. He has applied Generalized Method of Moments (GMM) estimation technique to estimate inflation equation. The result of the study indicates that trade openness has positive effect on inflation in Pakistan.

Thomas (2011) examined the impact of trade openness on inflation for 8 Caribbean countries over a 30-year period using a modern panel data approach. The explanatory variables other than trade openness (measured as the ratio of external trade of goods and services to GDP) are exchange rate, population, the petroleum average crude price, GDP

and fiscal balance. The result conflicts with that of Romer (1993) who reported that in developing countries openness will more likely have a negative effect on inflation.

Alfaro (2003) used a panel data set of developed and developing countries from 1973 to 1998 to investigate the Romer hypothesis. The explanatory variables used are openness and other control variables such as exchange rate regime real income per capita, fiscal deficits as a percentage of GDP, government debt as a percentage of GDP. For openness measures, he used both the share of imports as a percentage of GDP and the share of exports as a percentage of GDP. He concludes that openness does not play a role in reducing inflation in the short-run.

Lin and Wu (2006) investigated the effect of openness on inflation in Asian G 4 and G 7 countries by applying panel data regression of eleven countries from the year 1973 to 1990. The explanatory variables are openness (measured as ratio of import to GDP) and real per capita Gross Domestic Product at period. Their empirical results show that openness does not have a regular impact on inflation.

From the above discussion, it is clear that there is no consensus on the effect of trade openness on inflation whether it decreases or increases inflation. As a result it is difficult to generalize the effect and apply the case of one country for the other countries. Thus this study tries to fill the gap by examining the effect of trade openness on inflation in the Ethiopian case.

2.2.3. Conceptual framework for effect of trade openness on inflation

Depending on different situation trade openness can increase or decrease the level of inflation. In the following two sections the study tries to present the way through which trade openness affect inflation.

2.2.3.1. Transmission channels through which Trade Openness reduce Inflation

Trade openness reduces inflation through the price effects of cheaper imports of finished goods and intermediate inputs on the reduction of the overall domestic price level. Trade openness could also indirectly lead to decrease in price level by encouraging domestic productivity growth due to the increased competition (Mukhtar, 2010).

Scott *et al.* (2004) also state two channels through which increases in trade openness lead to low level of inflation. First, by increasing competition trade openness lowers mark ups. Second, it improves average productivity, either because of the elimination of inefficient firms, or productivity spillovers between industries in different countries. Productivity growth reduces labor costs per unit of output, thus reducing output prices (Aron and Muellbauer, 2007).

Trade openness also tends to reduce the market power of monopolistic suppliers. This reduction in market power of monopoly will increase the availability of cheap goods (Aron and Muellbauer, 2007). According to Rogoff (1985) model, the reason behind existence of low inflation in more open countries is that such countries gain less from surprise inflation. Surprise money supply expansion results in real exchange rate

depreciation, which in turn leads to deterioration of terms of trade. Therefore open countries have less incentive to increase money supply which may reduce the pressure on inflation.

According to the ‘new growth theory’, openness reduces inflation through its effect on output. This operates through: (i) increased efficiency, which reduces costs of production through changing the composition of inputs that are obtained domestically and internationally; (ii) better allocation of resources; and (iii) increased capacity utilization. The above three ways contribute to reduction in price through decreasing cost of production and increasing the level of output (Ashra, 2002).

According to Afzal *et al.* (2013) trade openness affects inflation through “direct import price effects” and “indirect competition enhancement effects”. The flow of low cost imports reduces the inflation in the high cost countries. An increase in cheaper imports promotes price competition in importing countries which in turn reduces markups and increases productivity and consequently diminishes the inflation. Example of the “indirect competition enhancement effect” is Manufacturer exposure to global competition in their export markets will increase productivity. As the competition increases there will be faster domestic productivity growth and firms can pay high wages without shifting their cost in the form of high prices.

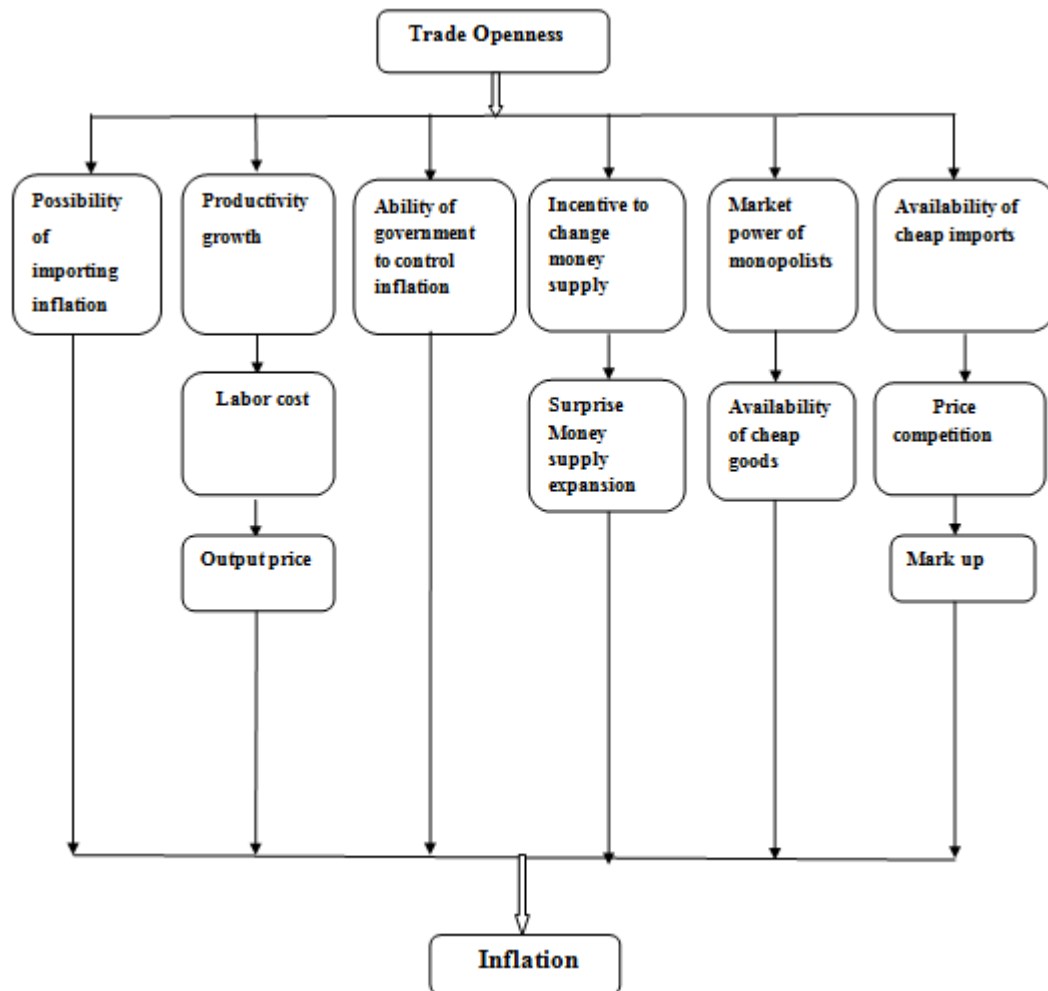
2.2.3.2. Transmission channels through which trade openness increase inflation

Evans (2008) illustrates two channels through which an increase in trade openness can increase inflation.

- I. The positive effect of trade openness on inflation is driven by the possibility of importing inflation from the rest of the world via the prices of manufactured imports or raw material imports.
- II. As the economy opens up, the fiscal and monetary authorities tend to lose their ability to control inflation through fiscal and monetary policies. Thus since the authorities of the country cannot control the level of inflation through different policies, inflation will increase.

The following figure tries to summarize the link (channels) through which trade openness affect inflation.

Figure 2.2 Conceptual frameworks for the effect of trade openness on inflation



Source: Author's formulation based on the review of literature

From the above empirical literatures on the effect of trade openness on inflation it can be concluded that, there is no consensus on the effect of trade openness on inflation. That means some scholars say trade openness reduce inflation and other argue that it increase inflation. In contrary to these some researchers prove empirically that trade openness has no role in determining inflation. Besides the effect of trade openness differ from one country to other country. Thus before taking one's country experience for other country, the effect of trade openness on inflation should be examined for each country.

CHAPTER THREE: OVERVIEW OF ETHIOPIAN ECONOMY

3.1 Introduction

In this section, the study tries to give an overview on the nature and structure of Ethiopian economy for the sample period of 1970/71 to 2010/11. Although the major theme of this paper is to examine the effect of trade openness on inflation, brief discussion is made on issues of inflation, export, and import and trade openness in particular.

Ethiopia is the second-most populous country in Sub-Saharan Africa with a population of about 92 million in 2012 (WB, 2013). Being one of the world's oldest civilizations, Ethiopia is also one of the world's poorest countries. Although changing at different times, with a GNI per capita of USD 370 in 2011, Ethiopia was classified as a low income country and one of the ten poorest countries in the region (sub Saharan average is USD 1270 including South Africa and USD 920 excluding South Africa) and the world (WB, 2013).

Ethiopia follows a public sector-led growth strategy that focuses on promoting growth through high public investment. The government adopted a 5-year Growth and Transformation Plan (GTP) in November 2010, which aims to attain high GDP growth (an average annual rate of over 11%) and become one of the middle income countries, and achieve the Millennium Development Goals (MDGs) (IMF, 2012). The economy is characterized by the dominance of agricultural sector, one of the pillars of GTP.

World Economic Outlook (September 2011), indicated that Ethiopia ranks fourth in the world among the fastest growing countries after Azerbaijan, Qatar and Angola for the period between 2005 and 2009. What makes Ethiopia's growth unique is that unlike the other three countries which are oil producers and exporters, Ethiopia's economy is primarily dependent on agriculture. Most recently, according to UNECA (2014), over the period of 2009–2013, Ethiopia recorded the fastest growth (9.4 % a year) putting the country to be the first in Africa.

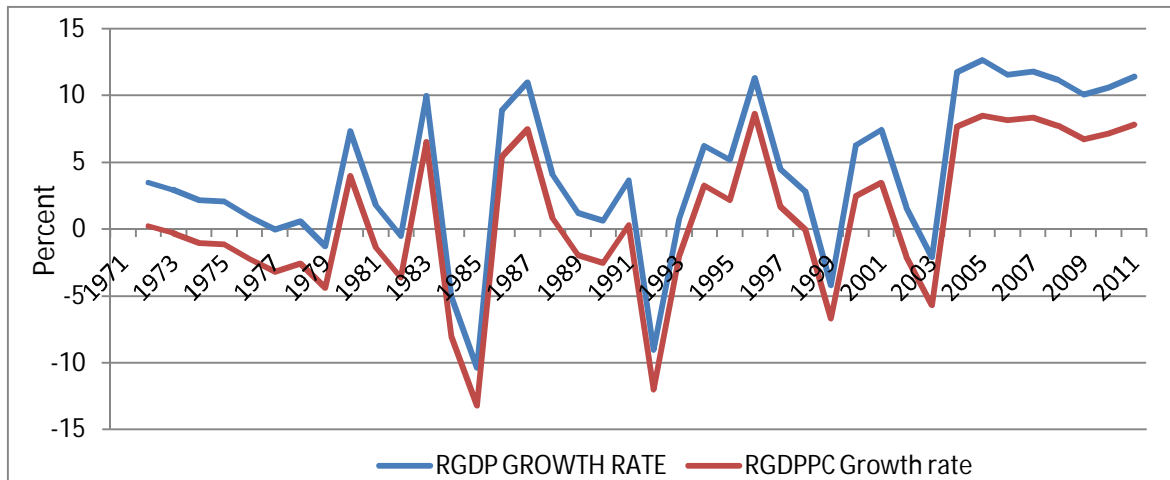
3.2. Trends of Economic Growth: Historical Review

Under the Imperial Regime (1930- 1973), the country had experienced for modern technology, developments in infrastructure and industries. In addition to this, much of the focus was centered on transferring resources from agriculture to develop manufacturing sector within the framework of free-market economic system. This had resulted in an increase in the rate of GDP in the late 1960 and beginning of 1970's compared to the previous periods.

However, during the last years of the Imperial regime the GDP growth rate started to fall mainly due to famine in some parts of the country (see figure 3.1). Not only that, the rise of opposition parties and political disorder in the country had enormous role for the decrease in GDP during the late years of the regime (Geda and Degefe, 2005).

Figure 3.1 Real GDP (RGDP) Growth rate and Real GDP per capita (RGDPPC)

Growth Rate



Source: Own computation based on data from MoFED

During the *Derg* regime (1974- 1991), known for its socialist policy, Ethiopia's GDP growth was dismal. This was related to the takeover of the private sector by the government, high pressure from different opposition parties within the country as well as war with Somalia. The severe drought that took place in 1984/85 was also additional factor for the decrease in total GDP as well as real GDP per capita. As figure 4.1 shows, the decline in both real GDP and real GDP per capita during the period of 1979 reached -1.3% and -4.4%, respectively. Among other things, the instability induced by the emerging new policy as well as the war with Somalia could explain the good part of this dismal growth (Geda, 2011).

Between 1984 and 1985, the severe drought declined the real GDP growth and real GDP per capita growth rate. The growth rates had reached -10.4% and -13.2 %, respectively. Though the economy experienced a severe decline in growth during that period, it was possible to see some recovery in the following years both in terms of real GDP and real GDP per capita. Figuratively speaking, the economy achieved its maximum real GDP and real GDP per capita growth (between the periods of 1974 to 1991) in 1987 which is about 11% and 7.5%, respectively. Following that, the economy had shown another collapse during the regime change, between 1991 and 1993 with an average growth of real GDP being -9% and real GDP per capita -12%.

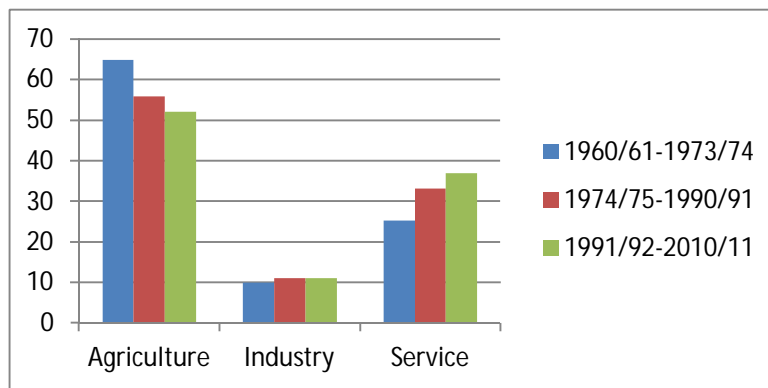
After the change in regime, the economy was able to recover once again during the transition period, and reached an average growth rate of 11.3% in real GDP and 8.6% in real GDP per capita (see figure 3.1). This growth rate in real GDP per capita was the highest growth rate throughout this regime. Like the previous regimes, this regime was also followed by two consecutive periods of collapse and an immediate recovery in the economic growth between the periods 1995 and 2003, where there starts an increasing trend. After 2004 onwards, it seems that the economy is moving smoothly with very slight up and down movement.

It can be said that the growth episodes in historical perspective are extremely irregular and are highly fluctuating. Moreover, the political conditions of the country had played a significant role in determining the growth of the economy.

3.2.1. Trends of Economic Growth: Sectoral Share

Being a predominantly agriculture based economy (where agriculture employs more than 85 per cent of the population and contributes nearly half to GDP), macroeconomic performance in Ethiopia is largely determined by what happens in the agricultural sector. It would be easy for understanding to see the performance of the economy in terms of sectoral share across the three regimes.

Figure 3.2 Sectoral percentage contributions to GDP (1960/61-2010/11)



Source: Own computation based on data from MoFED

As the figure above (figure 3.2) shows, during the imperial regime (before 1973/74) the agricultural sector on average contributed about 65% of the GDP. This contribution is the highest compared to the industrial and service sectors. But if one looks at the movement between the periods 1971/72-1973/74 in figure 3.3, it had showed a declining trend. In terms of the growth rate of agricultural output, on average the sector had grown by 1.3 % which is lower in comparison to the GDP growth rate of 2.9 % during the specified period.

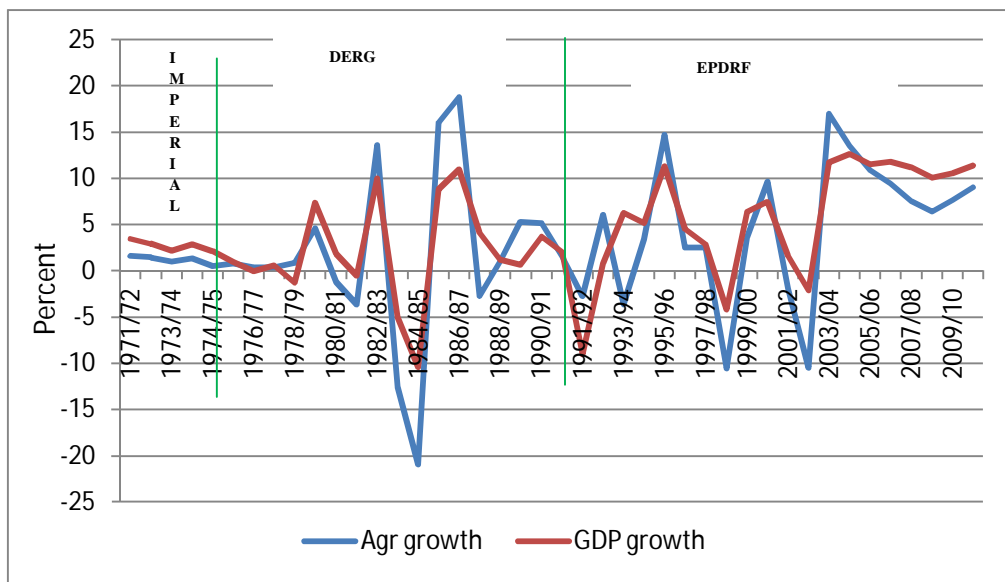
During the *derg* regime (1974/75-1990/91), the average contribution of the agricultural sector to the GDP had declined slightly to 56%. Apart from this however, the agricultural sector had continued to take the lion's share in the GDP. In terms of the growth rate of the share of this sector, it had showed a declining trend all over the years of the regime, except the last year of the regime where it was reversed and increased. Regarding the growth rate of the agricultural output, during the period it can be observed that there is an average growth of agricultural output by 1.6 % which is not satisfactory, although it is higher than the imperial regime.

It would be interesting to see the performance of the sector in a disaggregated sub periods. For instance, during the first four years of the period (1974/75-1977/78) the average growth rate of the agricultural output was 0.5%, which can be attributed to the civil war following the 1974 revolution as well as the war with Somalia. The following five years (1978/79-1982/83) was characterized by a growth rate of 2.9% which is due to stable and favorable weather condition. But, in the period of 1983/84-1984/85, the growth rate was -16.7% (See figure 3.3). This was a period of severe drought.

In relation to the growth of the industrial and service sectors, there was no significant (only a 1 %) increment observed in the industrial sector. However, the service sector had shown an average growth of 8 % compared to the imperial regime. This implies that the decline in the contribution of agricultural sector was over taken by the service sector, with no vital industrial development achieved.

During the post *derg* regime, the average share of the agricultural sector declined to about 52 %. This decline in the contribution was compromised by the growing share of the service sector to the GDP, which reached 37 % compared to 25% and 33% during the imperial and *derg* regimes respectively. The average growth rate of agricultural output was 4.8 %, while the growth rate of GDP was about 6 % (See figure 3.3).

Figure 3.3 Agricultural and GDP growth rate (1971/72-2010/11)



Source: Own computation based on data from MoFED

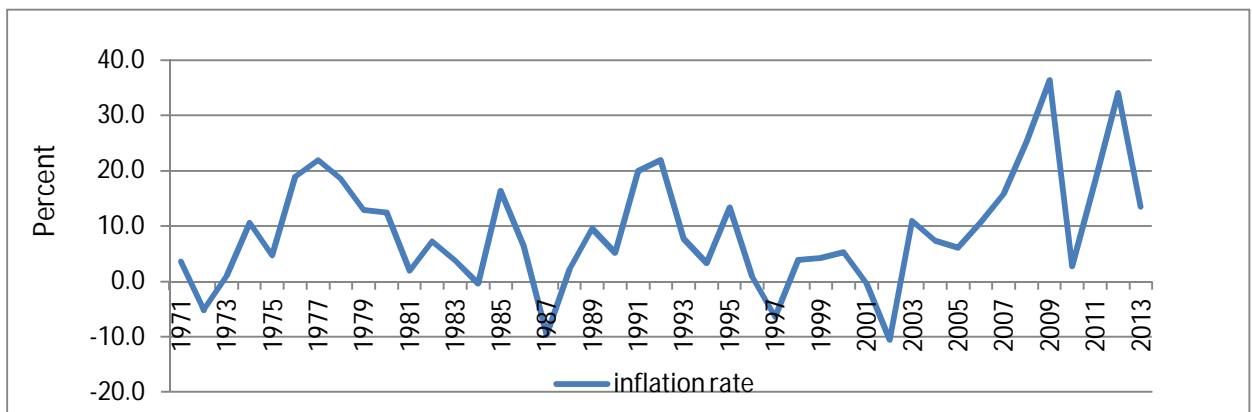
From the above discussion, it can be concluded that the macroeconomic performance of the country is highly and primarily related to the performance of the agricultural sector (see the above figure). The figure shows not only the rhythmic co-movement of GDP and agricultural growth, but also the erratic nature of both over the last four decades. This

is a direct result of the extreme dependence of the economy on rain fed agriculture. This in turn has a straight implication to agricultural policy that the country should adopt.

3.3.Trend of Inflation in Ethiopia

Ethiopia's growth over the period of 2000-2010, and in particular in the second half of this decade has been accompanied by an alarming level of inflation. Basically, inflation was not an issue before the year 2002/03, as before this period, government exercised tight monetary and fiscal policies (Geda *et al.*, 2008). Apart from this, given the fact that the economy is highly dependent on agriculture and hence rainfall any fluctuation on rainfall immediately leads to price variation.

Figure 3.4 Inflation Rate (1971-2013)



Source: Own computation based on the data from NBE

If we take a look into the inflation rate since 1971, the inflation rate reached its highest level in 2009 with a rate of 36.4% which is followed by the year 2012 and 2008 with a

rate of 34.4% and 25.3% respectively. Apart from these years, inflation rate was increasing starting from 1975 till it reached highest in 1977 and between 1991 and 1993 which can be associated with the political unrest and regime change. In the contrary, the rate of inflation decreased in large amount in the years of 1987 and 2003 which amounted to -9.6% and -10%, respectively.

The 1999-2000 price episodes were associated with the Ethio-Eritrean war and drought. Following that, plentiful output along with the low demand in urban centers due to slow business activity after the war can be taken as the reason for the 2000/01 deflationary situation. The 2003 inflation is believed to have been caused by severe drought.

In 2005, learning from the adverse impact of the fall in agricultural prices in 1997 and 2000/01, farmers were advised not to sell their products till prices go up. Credit availability to purchase basic agricultural inputs along with government's participation in the purchase of some surplus at a higher price had protected the seasonal price not to fall. Besides, government's preference of cash for food aid under the safety net program and the reduction of aid from major donors in the postelection events had obliged government to increase money supply which further aggravated the problem.

The upsurge in prices in the fiscal year 2008 was typically noticeable, which reached the rate of 36.4 %. The period 2007-2008 was characterized by international shocks (oil price and financial crisis), the prices for cereals increased by as high as 172 % (EEA, 2011). Moreover, money supply expanded at a faster rate (particularly, currency in circulation and credit advanced to public enterprises grew by 28.8 and 168 % respectively).

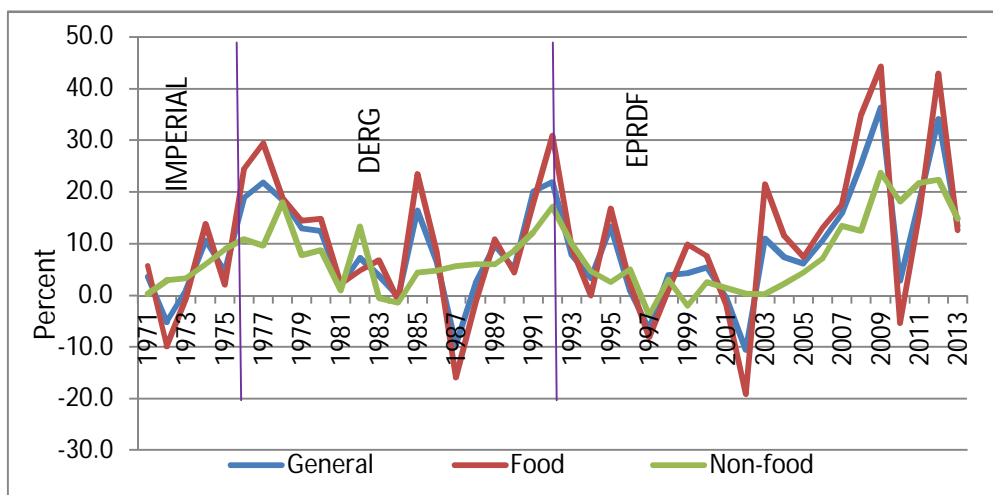
This was followed by deflationary trends in 2009 partly due to the move by national bank of Ethiopia (NBE) to resort to tight monetary policy (EEA, 2011). Specifically, credit ceiling and reserve requirement policy instruments were applied. This, however, was not sustainable probably due to other policy interventions by both NBE and government since late 2010 in which inflation started to rise again. For instance, NBE devaluated birr against dollar by about 17 %, government had increased the salary of civil servants by more than one third and also imposed price cap on basic commodities .Inflation rose by 18.1 %in 2011 from 2.8 %in 2010.

The year 2012 witnessed a high price inflation largely dominated by the upsurge in the food price levels. It can be observed from figure 3.5 below that, the growth rate of general price levels exactly follows the growth of food prices unlike the price growth of nonfood items. Like that of the general price, the food price had reached its maximum in the year 2009 which is about 44%, followed by the year 2012 (43%). This is due to the fact that food expenditures constitute a lion's share of household expenditures (about 60%). Thus the effect of rise in food price on general consumer price index is significant. The high inflationary pressures seemed to decelerate after 2012. Similarly, the levels of food and non-food price inflation stood at 12.6 and 14.8 % respectively during the same period.

In relation to the rise in food price, two forces may have played a role. First, a decline in the supply of output by farmers following the improvement in access to credit and market information which has reduced the need to take any surplus output they have to market

places immediately after harvesting. Second, the fall in supply of cereals as some donors shifted away from food aid in kind to cash aid may have led to decrease in food supply. Regarding the non food price increase, it can be associated with the strong demand resulted from huge public and private investments, fast growth in domestic credit and upward revisions in administrative prices, especially fuel (Geda, 2011).

Figure 3.5 General, Food and Non-food inflation rate (1971-2013)



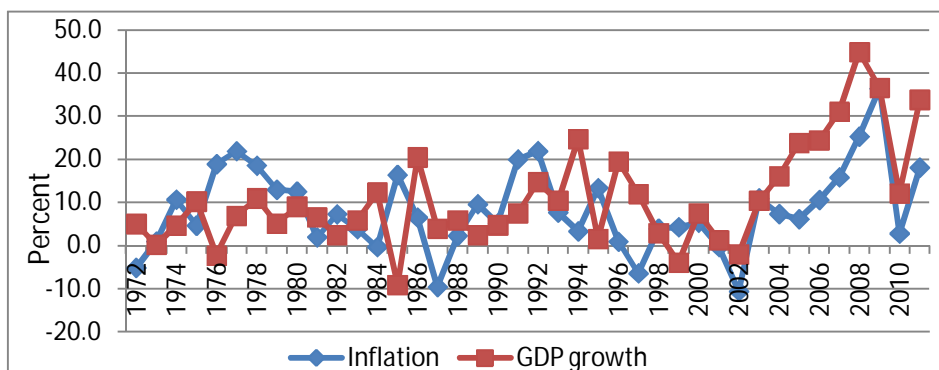
Source: National Bank of Ethiopia

Generally, expansion of monetary aggregate (substantial increase in money supply), in particular domestic credit, in the face of a relatively slower growth of the agricultural output, demand and supply side changes, and significant growth in government expenditure is believed to be the cause of the high inflation rate (EEA, 2013). Moreover, the devaluation of birr in September 2010 and international commodity price increases can be taken as causes for the high inflationary pressure (IMF, 2012).

3.4. The relationship between GDP growth and Inflation

Given the systematic relationship between GDP and rainfall (positive relation), which will be followed by price trend (inverse relation) in the Ethiopian economy, Ethiopia's inflation had started to show a parallel movement of output 2002/03 onwards.

Figure 3.6 Inflation and GDP growth rate (1972-2011)



Source: own computation based on data from NBE and MoFED

As the above graph indicates, starting from 1971 till 2003, there is an inverse relationship between inflation and output growth which can be attributed to the fact that during years of good rainfall as output rises, prices often drop considerably [which had been the case for years in the Ethiopian context]. After 2003 onwards, however, despite reported increase in output, especially agricultural output (refer to figure 3.3), prices had continued to rise. Specifically, between the periods of 2004 to 2009, general price level has recorded an average annual rise of 16.9 %, while GDP was growing by 29.5 %. This co-movement has been a puzzle for many scholars.

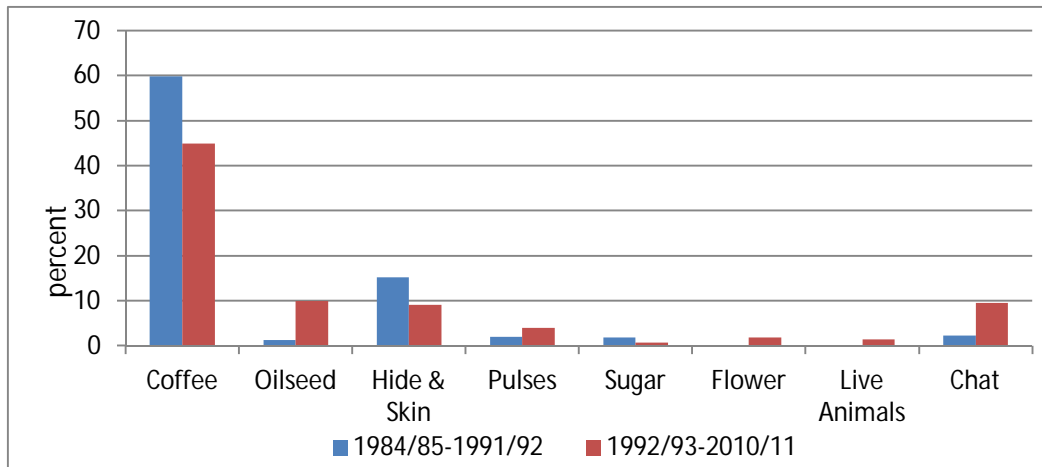
3.5.The External Market: Exports and Imports

An examination of the external trade policy of the three successive regimes in Ethiopia (the imperial, the derg and the EPRDF) reveals that the country's external trade policy has moved from a "liberalized trade policy" to "a controlled trade policy regime" and then back to "liberalized trade policy". Generally, the pre 1974 period was characterized by various measures implemented to facilitate trade both by the public and private sectors with the external sector. But during the period of 1974-1991, centralized economic system where the state is the dominant participant in the external trade was observed. In the following period, post 1991, the external sector was liberalized once again and invited the participation of the private sector as well.

3.5.1. Export Sector

The export sector of Ethiopia is characterized by undiversified nature concentrating on few primary commodities. In 2011/12 the value of export reached 3.1 billion USD registering a growth rate of 14.8 % compared to the previous year (EEA, 2013). As usual, coffee accounted for the largest share in the total export. For instance, the export of coffee constitutes about 59% and 45% during the periods of 1984/85 to 1991/92 and 1992/93 to 2010/11 respectively. Hides and skins follow coffee in the export earnings in the period 1984/85 to 1991/92. In 2011/12, the share of coffee from total export was 26.4 %.

Figure 3.7 Average percentage earning share of major export items (1984/85-2010/11)



Source: Own computation based on data from EEA

Recently, chat and flower have become among the major export items in the country. For instance, chat is the third major export item in terms of earning next to coffee and oilseed (1992/93-2010/11). Besides, the income earned from the export of flowers, which was nil in the pre 2005/06 period had grown tremendously and is able to capture a share of about 2% of the total earnings from the export sector within the past five years under consideration. Hence, the decline in the export share of coffee share nowadays is being compensated by increase in export earnings of new export items such as oilseed, chat and flower.

Regarding the annual growth rate of selected major export items, figure 3.7 indicates that, the growth rates are characterized by extreme fluctuations with huge differences. This

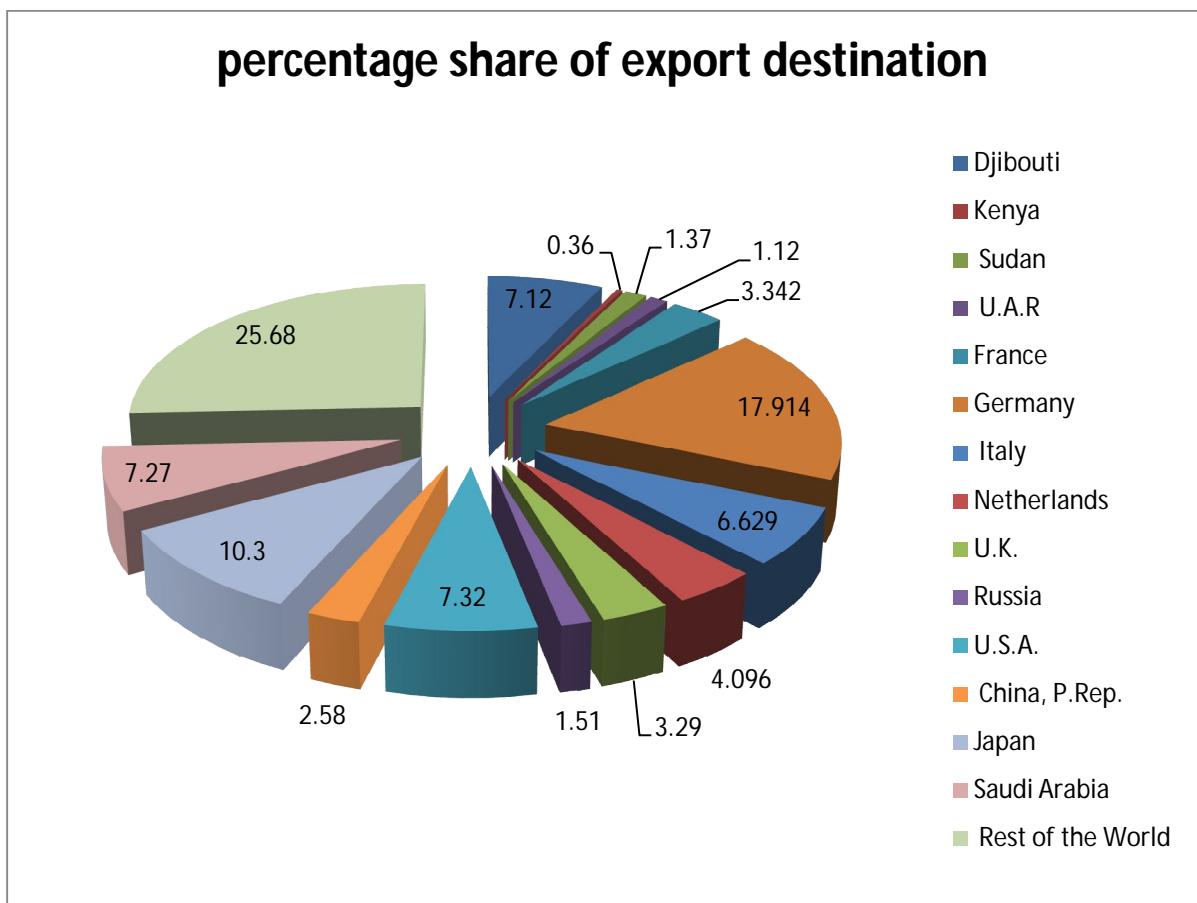
fluctuation, along with the dependency of the country on few export items, indicates the reason behind export earning instability in the country. Of course, there are other factors behind this instability. For instance, poor weather condition is the major constraint for the agricultural sector which is the primary source of export items. Moreover, poor production system, marketing problems and equivalently the impact of world market in the determination of commodity prices of our exportable items can be mentioned (Geda, 2011).

In terms of the destination of the exports, the bulk of Ethiopia's exports are destined to industrialized nations especially Germany, Japan, Saudi Arabia and Italy with the export share of 17.9%, 10.3%, 7.27% and 6.63% respectively during the study period (see figure 3.8). In other words, the above mentioned four countries absorb about half of the total Ethiopia's export. Except for the case of Djibouti which accounts for 7.13%, the trade share of Ethiopia with neighboring countries is very small. For instance, out of Ethiopia's total export only 1.37% goes to Sudan and 0.37% to Kenya.

Looking at commodity wise export destination, Germany maintained its leading place by taking the largest share of 28.7 % of the coffee export which was virtually similar with the previous year (2010/11). Saudi Arabia took 17 % of the coffee export which made it the second largest importer of Ethiopian coffee in 2011/12. The United States and Belgium also imported 7.7 and 6.2 % of the total coffee export of the country, respectively, in the year under review (EEA, 2013).

However, the pattern of export destinations has shown a magnificent change over the last fifteen years. For instance, the percentage share of Germany as an export destination for Ethiopia's commodities has shown decline since 1995/96 with a slight revival after 2003/04. Moreover, the share of Netherlands had showed an increment after 2004/05 which can be associated to the increasing export of flower to this country. Another exception is the increasing importance of Asian countries particularly, China and Saudi Arabia, as major export destinations for Ethiopia's commodities.

Figure 3.8 Average percentage shares of export destinations (1985/86-2010/11)



Source: Own computation based on data from EEA

3.5.2. Import Sector

In terms of end use, Ethiopia's imports are characterized and classified by imports of capital goods, raw materials, semi-finished products, fuels and consumer goods. As the table below indicates, the share of consumer goods and capital goods from the total import is higher while the share of raw materials had remained the lowest of all across the study period, which is below 5%. To be specific, the share of capital goods to the total import reached its lowest in 1974/75 which is 14%. On the other hand, it had reached the highest level in 1987/88 which is 47%. Similarly, although fluctuating, the share of consumer goods from the total import was its highest and lowest in 1985/86 and 1997/98 with an average share of 39% and 19.7% respectively (refer figure 3.9).

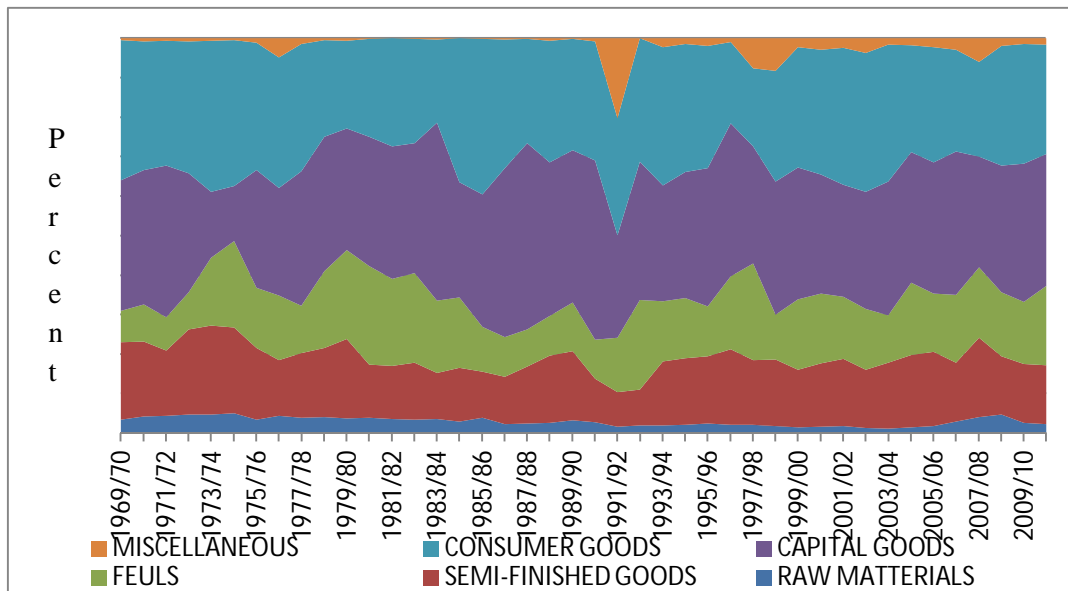
Table 3.1 Average percentage Share of imports by end use (1969/70-2010/11)

Import Items (by end use)	Imperial 1969/70- 1973/74	Derg 1974/75- 1990/91	EPRDF 1991/92- 2010/11	Overall Average Share (1969/70 2010/11)
Raw Materials	4.3	3.4	2.1	2.9%
Semi-finished goods	19.8	15.2	15.8	16.0%
Fuels	10.4	16.3	16.6	15.8%
Capital goods	30.5	34.7	32.3	33.0%
Consumer goods	34.2	29.7	29.5	30.1%
Miscellaneous	0.7	0.8	3.7	2.2%
Total				100%

Source: Own computation based on data from EEA

Looking at the variation in regime wise, there is a declining share of raw materials from the total import if one goes from imperial regime to the present regime. For instance, the average share of import of raw materials from the total import during EPRDF regime was half of the total share of raw materials during the *derg* regime. This is however reversed in the case of fuel import where there is about 56% increments during the *derg* regime compared to the imperial regime (see table 3.1). There is no significant change in the share of fuel from the *derg* regime to that of the present regime. Like that of the import of raw materials, the share of consumer goods from the total import had shown declining trend across the three regimes.

Figure 3.9 Percentage shares of major Import items (1969/70-2010/11)



Source: Own computation based on data from EEA

Recently, the value of import has shown a substantial increment, reaching 11.06 billion USD in 2011/12 (EEA, 2013). Compared to the year 2010/11, import value recorded a growth rate of 34.02 %. The majority of Ethiopia’s imports in 2011/12 were consumer goods followed by capital goods (figure 3.10). This is rather a new phenomenon because capital goods had in the past held the leading place in major import items for a long period of time. The share of capital goods showed a significant reduction of 6 % relative to 2010/11.

Figure 3.10 Share of major Import items from the total import (2010/11 vs. 2011/12)

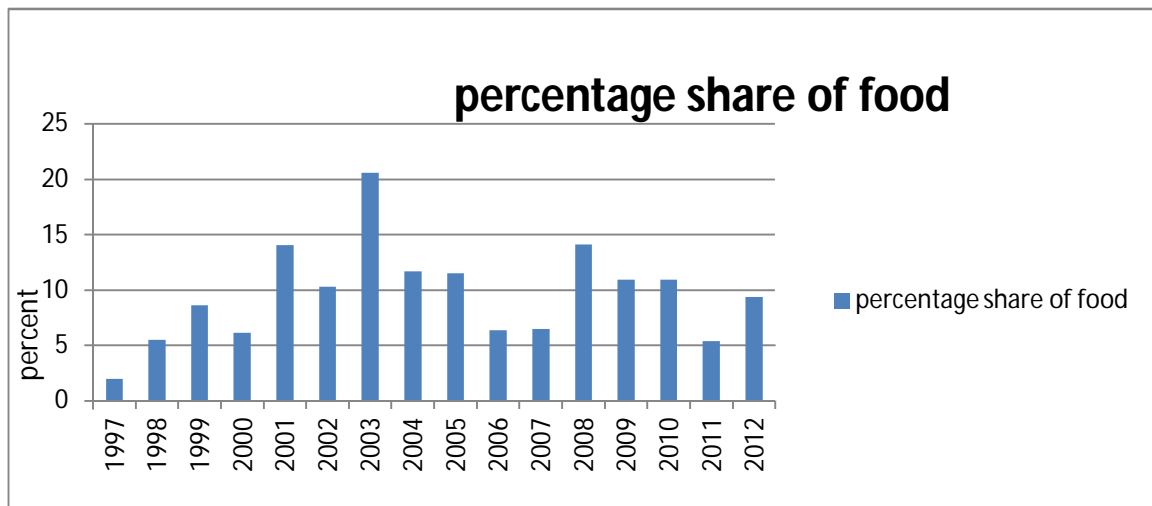


Source: Own computation based on data from EEA

Another important issue to rise over here is the share of investment goods (which is the sum of raw materials, semi-finished goods, fuel and capital goods) out of the total import. The share of investment goods had been fluctuating between 50% and 79%, of which the highest was registered in 1983/84 which was about 79%. On the other hand, the lowest

was on 1991/92 which is 50%. This is a reflection of the country's inability to produce capital goods and substitute its import across the study period.

Figure 3.11 Percentage share of food import from the total import (1997 - 2012)



Source: Own computation based on data from EEA

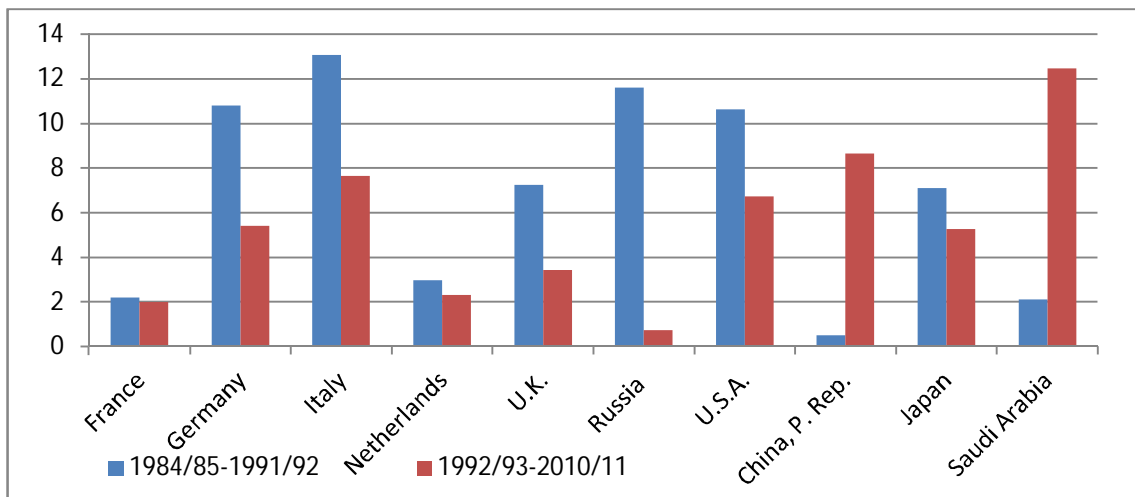
Figure 3.11 shows the percentage share of food out of the total import. Food is one component of consumer goods. Between the years 1997 and 2012 the percentage share of food import is very low except for the year 2003 which is around 20%. Between the period of 1997 and 2012, the average percentage share of food import out of total import is only 9.63 %.

Referring to the value of imports by country of origin (see the figure 3.12), Italy takes the lead followed by Russia in the pre EPRDF regime. This was totally changed and the role over taken by Saudi Arabia with an average value of import share which is 12%. Similarly, China's role as a major source of imported items for Ethiopia had shown huge

change in recent years. For instance, China’s value of import share which was only 0.5% during the *derg* period while this had grown to about 8% during the EPRDF regime. This is, of course, one of the indicators of China’s engagement in Ethiopia in particular and Africa in general in recent years.

Another interesting point over here is that, the value share of Russia as a major import destination had collapsed during the current regime compared to during the *derg* period which can be associated with the socialist ideology that the *derg* regime followed and the intimacy of Russia and Ethiopia during the period. Figuratively, this decline is from 13% between the periods of 1984/85 - 1990/91 to about 0.7% during the period of 1991/92-2010/11.

Figure 3.12 Average percentage share of major import sources (1984/85-2010/11)

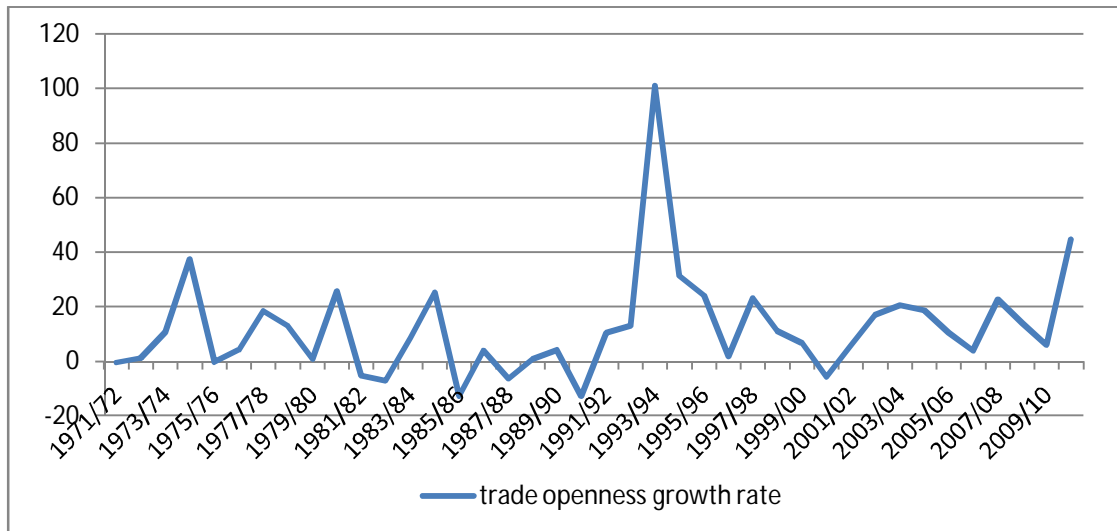


Source: Own computation based on data from EEA

3.6. Trade Openness

Trade openness, defined as the share of the sum of export and import to the total GDP, is another important variable which this study focuses on.

Figure 3.13 Trade Openness growth rate (1970/71-2010/11)



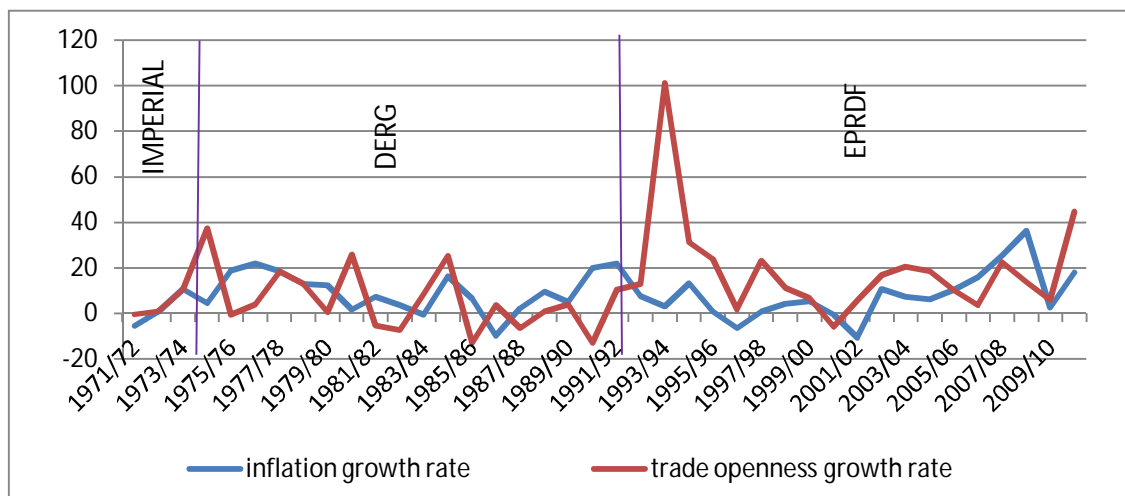
Source: Own computation based on MOFED data

If one looks at the growth rate of trade openness into two distinct periods, i.e., pre and during EPRDF periods, it is easy to observe the existence of huge variation. For instance, in the pre EPRDF period, trade openness registered the highest growth rate in 1974/75 followed by 1980/81. On the other hand, 1985/86 witnessed the lowest growth rate in trade openness which is -12.8 %. This can be explained by the existing severe drought in the country.

In the current regime, unlike the previous regimes, the growth rate of trade openness had shown a positive rate all over the years under study, except one year. The highest growth rate of openness (101 %) was registered in 1993/94. It was associated with the highest amount of export as well as import in the country, in which the new regime started to follow liberalized economic system. This situation was followed by decline both in export and import that resulted in decline the average growth rate of trade openness. In 2000/01, the growth rate had reached the minimum in the history of the regime under consideration which was equal to -5.77 %.

In addition to this variation, the average growth rate of trade openness during imperial and *derg* regime was only about 5.5 % compared to the current regime which is 19 %. This indicates that, the trade of the economy had become more and more of open in the current regime compared to the imperial and *derg* regimes.

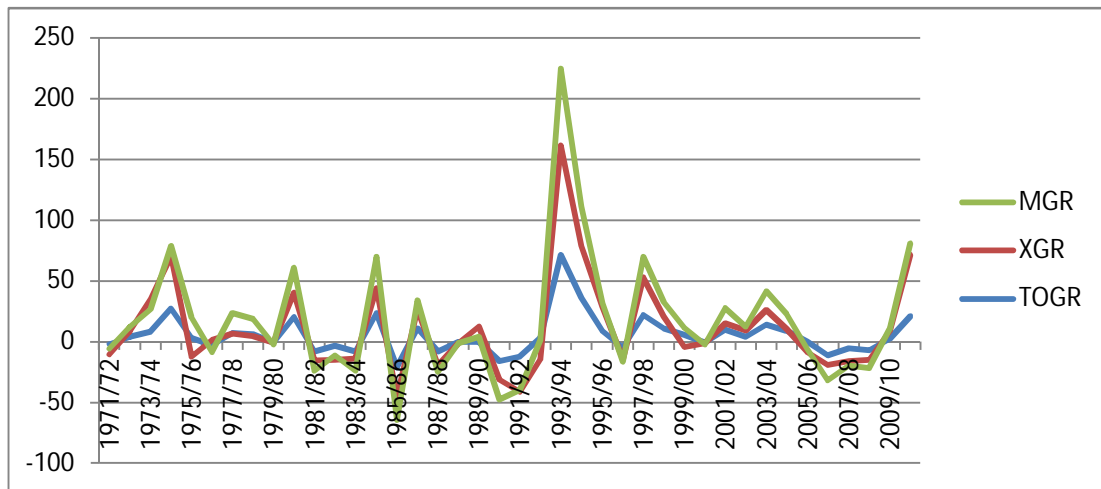
Figure 3.14 Inflation growth rate and Trade Openness growth rate



Source: Own computation based on data from MoFED

In 1971/72, between 1975/76 and 1979/1980 and between 1983/84 and 1987/88 inflation rate and trade openness rate more or less move together in a similar pattern. But starting from the year 1990/91 their pattern is irregular.

Figure 3.15 Growth rates of Export as a share of Nominal GDP (XGR) and Import as a share of Nominal GDP (MGR) and Trade openness (TOGR)



Source: Own computation based on the data from MoFED

In terms of the growth rates of export and import as a share of GDP and trade openness, one can observe that the three variables are moving in similar pattern, where import as a share of GDP growth rate taking the lead except in the years between 1980/81 and 1983/84, 1989/1990 and 1992/1993, and 2004/05 and 2009/10 which was followed by export as a share of GDP (figure 3.15). The three variables reach the highest level between the year 1992/93 and 1995/96. This might be due to the adaption of trade liberalization by the government.

CHAPTER FOUR: DATA AND METHODOLOGY

4.1. Empirical Model

The most common empirical method of examining the effect of trade openness on inflation has been to use a single equation model for inflation, taking trade openness as an exogenous variable among other variables that determine inflation. The inflation function adopted in this study stated as follows

$$\text{CPI} = f(\text{TO}, \text{GFCF}, \text{M}, \text{PCI}, \text{GCE})$$

This can econometrically stated as:

$$\ln \text{CPI}_t = \beta_0 + \beta_1 \ln \text{TO}_t + \beta_2 \ln \text{GFCF}_t + \beta_3 \ln \text{M}_t + \beta_4 \ln \text{PCI}_t + \beta_5 \ln \text{GCE}_t + \varepsilon_t \dots \dots \dots 9$$

Where;

$\ln \text{CPI}$ = Log of consumer price index

$\ln \text{TO}$ = Log of trade openness index

$\ln \text{GFCF}$ = Log of gross fixed capital formation as a share of GDP

$\ln \text{M}$ = Log of money supply

$\ln\text{PCI}$ = Log of per capita income

$\ln\text{GCE}$ =Log of government consumption expenditure as a share of GDP

4.2. Description of Variables

All of the variables included in the above model are stated in terms of Logarithm. The reason behind taking the logarithm of the variables is that, it enables to correct skewed data into normal distribution which is a critical assumption in econometric estimation (Verbeek, 2004).

Log of consumer price index ($\ln\text{CPI}$): is index for inflation rate. It is the annual percentage change in the value of fixed basket of goods and services. CPI is preferred to other indices because it represents the majority of economic actors that is consumer.

Log of trade openness index ($\ln\text{TO}$): is the measure of openness to trade. In this study, trade intensity or trade ratio $\left(\frac{\text{import}+\text{export}}{\text{GDP}}\right)$ used as proxy for trade openness. The reason behind applying trade ratio as a measure of trade openness is that it popular measure of trade openness and it is widely used by various researchers.

Log of gross fixed capital formation ($\ln\text{GFCF}$): is the net increase in physical assets (investment minus disposals) within the measurement period. It is proxy used to measure net investment. This variable is expected to have negative effect on inflation as

investment increase the availability of goods which in turn reduce the pressure on rate of inflation.

Log of money supply (lnM): Broad money supply (M2) is used as a proxy for money supply. It includes cash and checking deposits (M1) as well as near money which is less liquid and not as suitable as exchange mediums but can be quickly converted into cash or checking deposits. The expected sign of this variable is positive.

Log of per capita income (lnPCI): is the ratio of gross national disposable income to population. The expected sign of per capita income is positive.

Log of government consumption expenditure (lnGCE): is the government expenditure on goods and services that are used for the direct satisfaction of individual needs or collective needs of members of the community. The expected sign of this variable is positive.

The reason behind taking gross fixed capital formation and government consumption expectation as a share of GDP is that rather than taking these variable as they are it better to see the effect of the relative share of these variables to GDP.

4.3. Data Source

The study has used data on variables specified above starting from the year 1970/71 to 2010/11 based on the availability of data. Data on inflation and money supply are used from National Bank of Ethiopia. Source of data for GDP, Import, Export, gross fixed

capital formation, and gross national disposable income and government consumption expenditure is from MoFED while population data is obtained from CSA.

4.4. Econometric Model

The study employed the Bounds test approach to level relationship or Autoregressive Distributed Lag (ARDL) model of Pesaran et al. (2001). ARDL has a number of advantages in comparison to other conventional cointegration testing such as Engle–Granger and the Johansen Procedures. This approach is adopted for the following four reasons. First, this approach can be used to test for the existence of a long-run relationship which is applicable irrespective of whether the underlying regressors are $I(0)$, $I(1)$ or mutually cointegrated. Second, the variables in the model can be assigned different lag-lengths. Third, this approach gives unbiased estimates of the long-run model and valid t-statistics even when some of the regressors are endogenous. Fourth, it can be used in small sample sizes, whereas the Engle–Granger and the Johansen procedures are not reliable for relatively small samples.

4.4.1. Test for Stationarity

If the variables in the models are non-stationary, the regression will be spurious and the test statistics become asymptotically non-normal. Although the ARDL methodology does not require pre-testing for a unit root, in the case of $I(2)$ variables, the computed F-statistic for the existence of a co-integration relationship is not valid (Pesaran *et al.*, 2001). This is because the bounds test for F test is based on the assumption that the

variables are I (0) or I (1). Thus the first step in this approach is to make sure that none of the variables included in the model are I (2), as such data will invalidate the methodology.

The study uses Augmented Dickey-Fuller (ADF) tests to check that none of the variables are I (2).

ADF test is specified as

$$\Delta y_t = \phi + \gamma t + \theta y_{t-1} + \sum_{i=1}^q \beta \Delta y_{t-i} + e_t \dots\dots\dots 10$$

Where y_t is variable of interest, ϕ is constant, t is the time trend, Δ is a first difference operator and q is the lag length in the model.

The ADF tests the null hypothesis of $\theta=1$ which implies that y_t is I (1) and under the alternative, $\theta < 0$ implies y_t is I (0). In addition to this, the computed t statistics values are compared with MacKinnon (1996) critical values to determine whether the series are stationary or not.

4.4.2. Information Criteria (Lag Length Selection)

To specifying the unrestricted ECM and to test for stationarity, we need to select the appropriate values for the maximum lags. These maximum lags are determined by using one or more of the information criteria. This study uses the Schwarz Bayesian Criterion

(SBC). This information criterion preferred to other information criterion because it is a consistent model-selector and recommended by Pesaran *et al.* (2001) for ARDL regression.

4.4.3. Test for serial correlation

A key assumption in the ARDL or Bounds Testing methodology of Pesaran *et al.* (2001) is that the errors of the unrestricted ECM must be serially independent. The study uses LM test to test the existence of serial correlation.

4.4.4. Cointegration

The ARDL approach starts with specifying unrestricted (unconditional) error correction model (UECM). The UECM integrates the short-run dynamics with the long-run equilibrium without losing any long-run information.

The UECM for the model specified in equation 1 can be given as

$$\begin{aligned} \Delta \ln \text{CPI}_t = & \alpha_0 + \alpha_1 \ln \text{CPI}_{t-1} + \alpha_2 \ln \text{TO}_{t-1} + \alpha_3 \ln \text{GFCF}_{t-1} + \alpha_4 \ln M_{t-1} + \alpha_5 \ln \text{PCI}_{t-1} \\ & + \alpha_6 \ln \text{GCE}_{t-1} + \sum_{i=1}^p \phi_i \Delta \ln \text{CPI}_{t-i} + \sum_{i=0}^{q_1} a_i \Delta \ln \text{TO}_{t-i} + \sum_{i=0}^{q_2} b_i \Delta \ln \text{GFCF}_{t-i} \\ & + \sum_{i=0}^{q_3} c_i \Delta \ln M_{t-i} + \sum_{i=0}^{q_4} d_i \Delta \ln \text{PCI}_{t-i} + \sum_{i=0}^{q_5} e_i \Delta \ln \text{GCE}_{t-i} + \mu_t \dots \dots \dots 11 \end{aligned}$$

Where; P, q_1, q_2, q_3, q_4 and q_5 are maximum lag length for LCPI, LTO, LGFCF, LM, LPCI and LGCE respectively. $\alpha_1, \alpha_2, \alpha_3 \dots \alpha_6$, and $\phi_i, a_i, b_i, c_i, d_i$ and e_i represent long run and short run coefficient for LCPI, LTO, LGFCF, LM, LPCI and LGCE, respectively.

The UECM is estimated using OLS. The next step is to test the presence of cointegration (long-run equilibrium relationship between the variables) by restricting all estimated coefficients of lagged level variables involved equal to zero in equation 2. *F*-test is applied for the joint null hypothesis that the coefficients of the level variables are jointly equal to zero, which is stated below.

$$H_0: \alpha_1 = \alpha_2 = \alpha_3 \dots = \alpha_6 = 0$$

$$H_1: \alpha_1 \neq \alpha_2 \neq \alpha_3 \dots \neq \alpha_6 \neq 0$$

A rejection of H_0 implies that there is a long-run relationship among the variables. Exact critical values for the *F*-test are not available for a mixture of $I(0)$ and $I(1)$ variables. However, Pesaran *et al.* (2001) supply bounds on the critical values for the asymptotic distribution of the *F*-statistic. They give lower and upper bounds on the critical values. The lower bound is based on the assumption that all of the variables are $I(0)$, and the upper bound is based on the assumption that all of the variables are $I(1)$.

If the computed F-statistic falls below the lower bound it can be concluded that the variables are I (0), so no cointegration is possible, by definition. If the F-statistic exceeds the upper bound, we conclude that there is cointegration. Finally, if the F-statistic falls between the bounds, the test is inconclusive.

The long run elasticities are the co-efficient of one period lagged explanatory variable in the above UECM (equation two).

$$\ln \text{CPI}_t = \beta_0 + \sum_{i=1}^{h_1} \beta_1 \ln \text{CPI}_{t-1} + \sum_{i=0}^{h_2} \beta_2 \ln \text{TO}_{t-1} + \sum_{i=0}^{h_3} \beta_3 \ln \text{GFCE}_{t-1} + \sum_{i=0}^{h_4} \beta_4 \ln \text{M}_{t-1} + \sum_{i=0}^{h_5} \beta_5 \ln \text{PCI}_{t-1} + \sum_{i=0}^{h_6} \beta_6 \ln \text{GCE}_{t-1} \dots \dots \dots 12$$

Where $\beta_1, \beta_2, \beta_3 \dots \beta_6$ are long run coefficients of the variables used.

After testing for the existence of cointegration, it is possible to estimate the long-run equilibrium relationship between the variables. Finally, we obtain the short-run dynamic parameters by estimating an error correction model associated with the long-run estimates.

This is specified as follows:

$$\begin{aligned} \Delta \ln \text{CPI}_t = & \alpha_0 + \sum_{i=1}^p \phi_i \Delta \ln \text{CPI}_{t-i} + \sum_{i=0}^{q_1} a_i \Delta \ln \text{TO}_{t-i} + \sum_{i=0}^{q_2} b_i \Delta \ln \text{GFCE}_{t-1} \\ & + \sum_{i=0}^{q_3} c_i \Delta \ln \text{M}_{t-i} + \sum_{i=0}^{q_4} d_i \Delta \ln \text{PCI}_{t-i} + \sum_{i=0}^{q_5} e_i \Delta \ln \text{GCE}_{t-i} + \theta \text{ecm}_{t-1} + \mu_t \dots \dots \dots 13 \end{aligned}$$

Where; $\phi_i, a_i, b_i, c_i, d_i$ and e_i are the short-run dynamic coefficients of the model for LCPI, LTO, LGFCF, LM, LPCI and LGCE, respectively. ecm_{t-1} is the error correction

term with θ speed of adjustment. θ shows how fast the variables converge to equilibrium. If θ has a negative sign, the variables converge to equilibrium.

The error correction term can be stated as:

$$Ecm_{t-1} = \ln CPI_{t-1} - b_0 - b_1 \ln TO_{t-1} - b_2 \ln GFCF_{t-1} \\ - b_3 \ln M_{t-1} - b_4 \ln PCI_{t-1} - b_5 \ln GCE_{t-1} \dots \dots \dots 14$$

Where b 's are the OLS estimate of β 's in equation three.

CHAPTER FIVE: RESULTS AND DISCUSSION

5.1. Description of the data set used in Estimation

Before proceeding to the estimation of long run and short run models the study summarizes the variables included in the model by presenting summary statistics using Eviews 7.

Table 5.1 Summary Statistics

	LCPI	LTO	LGFCF	LM	LPCI	LGCE
Mean	3.712725	-1.60777	-1.96552	22.80293	6.417197	-2.53564
Median	3.774120	-1.85523	-2.05307	22.79797	5.861657	-2.49777
Maximum	5.347584	-0.68163	-1.33943	25.70260	8.884483	-1.72105
Minimum	2.248990	-2.44069	-2.58901	20.29617	5.169538	-3.44121
Std. Dev.	0.823089	0.577943	0.409526	1.487426	1.053209	0.417026
Obs.	41	41	41	41	41	41

Source: E views 7 output

The variables included in the study are natural log of consumer price index (LCPI), natural log of trade openness (LTO), natural log of gross fixed capital formation as a share of GDP (LGFCF), natural log of money supply (LM), natural log of per capita income (LPCI) and natural log of government consumption expenditure as a share of GDP (LGCE).

The dependent variable is LCPI and others such as LTO, LGFCF, LM, LPCI and LGCE are explanatory variables.

The table 5.1 indicates that observations used in the study are 41 starting from the year 1970/71 to 2010/11. The mean of each variable such as LCPI, LTO, LGFCF, LM, LPCI and LGCE are 3.71, -1.6, -1.97, 22.8, 6.42 and -2.54 respectively. Moreover, the median, maximum, minimum and standard deviation of each variable is also described in the above table.

5.2. Empirical Results for Unit Root Testing

Since autoregressive distributed lag (ARDL) model needs that all variables not to be integrated order of two or $I(2)$, the study has checked for the existence of a unit root for each variable before proceeding to testing existence of long run relationship between the variables. Augmented Dickey Fuller (ADF) unit root test is used to test for the stationarity of the variables. The following table shows the result for ADF unit root test for the variables used in the model.

Table 5.2 ADF test for unit root

Variable	ADF t-statistic					
	In level			In first difference		
	With intercept	With intercept and trend	Without intercept and trend	With intercept	With intercept and trend	Without intercept and trend
LCPI	0.441147(0)	-3.564639*(3)	5.364154(0)			
LGFCF	0.241114(1)	-2.188086(1)	1.488656(0)	-3.862029*(0)	-4.11162* (0)	-3.48328*(0)
LTO	0.996747(0)	-1.286589(0)	-2.13663 * (0)			
LM	-0.541502(0)	-1.817574(0)	3.268118(0)	-4.996160*(0)	-4.912540*(0)	-4.06485*(0)
LPCI	1.511854(1)	-0.923888(1)	2.615229(1)	-3.626496*(0)	-4.211529*(0)	-2.62089*(0)
LGCE	-2.215227(0)	-1.596167(0)	-1.766405(0)	-5.737761*(0)	-6.101390*(0)	-5.53804*(0)

Mackinnon (1996) critical values	With intercept only	With Intercept and trend	Without trend and intercept
1%	-3.605593	-4.226815	-2.624057
5%	-2.936942	-3.536601	-1.949319
10%	-2.606857	-3.200320	-1.611711

Source: Eviews 7 output result. * imply statistical significance at 5%

The null hypothesis in the ADF unit root test is ‘there is unit root or non stationary’ versus the alternative hypothesis of “no unit root or stationarity”. The decision rule is based on comparing the t-statistics with Mackinnon (1996) critical values.

If the test statistics is greater than critical value, the null hypothesis can be reject. That is the variable of interest is stationary. But if the test statistics is less than the critical value, the null hypothesis is fail to rejected which implies the non-stationary of the variable. In table 5.1, the number in the bracket next to the t-statistics is the lag chosen by Schwarz Bayesian Criterion in the unit root testing.

In addition to comparing the t-statistics to the critical value, it is important make sure that the sign of the lag of the variable of interest is negative. Thus when the sign of the lag of the variable is positive even if the t-statistics is greater than the critical value we fail to reject the existence of unit root. If we see the case of LM and LPCI (without intercept and trend), their t-statistics is greater than the critical values but the study fail to reject the existence of the unit root at level because the coefficient of their lag values is positive.

Therefore, as table 5.1 shows, all of the variables except LCPI and LTO are non-stationary in the level. In other words, LCPI and LTO are I (0) but the rest of the variables are I (1). Since the above test proved that the model is a mixture of variables that are integrated of order one and zero i.e. I(1) and I(0), the Autoregressive Distributed Lags Model (ARDL) Cointegration technique proposed by Pesaran *et al.* (2001) is the most appropriate method for estimation in these circumstances.

5.3. Testing Long Run Relationship

Since we make sure that none of the variables that are used in the model are I (2), the next step is estimating the existence of long run relationship among the variables. To test the conegration we have to choose the maximum lag length for the ARDL model. As

cited in Narayan (2004), for annual data Pesaran and Shin (1999) recommended choosing a maximum of two lags. From this a lag length that minimizes Schwarz Bayesian Criterion (SBC) is chosen.

As described in the methodology part, if the F-statistics from OLS regression of the unrestricted error correction model is greater than the upper bound, it shows the existence of the long run relationship. The F –statistics is compared to the critical values developed by Narayan (2004). The following table shows the critical values developed by Narayan (2004) for the 41 years of data for five explanatory variables with restricted intercept and trend at 1%, 5% and 10% level of significance.

Table 5.3 Critical values for Upper and Lower Bound

Level of significance	Lower bound I(0)	Upper bound I(1)
1%	4.045	5.898
5%	2.962	4.338
10%	2.483	3.708

Source: Narayan (2004) critical value tables

The F-statistics found from the OLS regression is 4.6575 which is greater than the upper bound 4.338 at 5% with restricted intercept and trend. Thus the study rejects the null hypothesis of no cointegration. That is there is a cointegration or a long run relationship among the variables.

5.4. Stability and Diagnostic tests

The most important step in any empirical study is testing the soundness of the model. This study carried out various diagnostic and model stability tests. These tests include Serial correlation test (Brush and Godfray LM test), functional form test (Ramsey's RESET test), normality test (Jaqure-Bera test), and hetroscedasticity test. In addition to these diagnostic tests the study applied CUMSUM and CUMSUM square test to check the parameter stability of the model. The following table shows the above listed diagnostic test results.s

Table 5.4 Diagnostic test for the long run ARDL (1, 0, 0, 0, 0, 1)

Test Statistics	LM Version	F Version
A:Serial Correlation	CHSQ(1)= 0.093717[.760]	F(1, 29)= 0.069855[.793]
B:Functional Form	CHSQ(1)= 2.5213[.112]	F(1, 29)= 2.0044[.167]
C:Normality	CHSQ(2)= 0.54373[.762]	Not applicable
D:Heteroscedasticity	CHSQ(1)= 0.10223[.749]	F(1, 37)= 0.097241[.757]
<p>A:Lagrange multiplier test of residual serial correlation</p> <p>B:Ramsey's RESET test using the square of the fitted values</p> <p>C:Based on a test of skewness and kurtosis of residuals</p> <p>D:Based on the regression of squared residuals on squared fitted values</p>		

Source: Microfit 4.1 output result

The LM serial correlation test, Ramsey's RESET test, Jaque-Bera normality test and autoregressive conditional heteroskedasticity are based on the null hypothesis of no serial correlation, the model is correctly specified, the residuals are normally distributed and no autoregressive conditional heteroskedasticity, respectively.

Table 5.4 shows that the ARDL model estimated in this study passes all the diagnostic tests. This is because the p value associated with both the LM version and F-version of the test statistics was fail to reject the null hypothesis specified for each test. That is in all diagnostic tests the p value is greater than 0.05.

The null hypothesis of no serial correlation (Brush - Godfray LM test) is failed to be rejected. For the reason that, the p- value associated with the test statistics (0.760 and 0.793 for LM version and F version, respectively) are greater than the standard significance level of 0.05.

Likewise the Ramsey RESET test could not be rejected which tests whether the model suffers from omitted variable bias or not. That means we fail to reject the null hypothesis of Ramsey RESET test which says that the model is correctly specified. This is because the probability values (0.112 and 0.167) are larger than the conventional significance value. Thus result proves that the model did not have omitted variable bias.

The null hypothesis which says that the residuals are normally distributed cannot reject. For the reason that, the p value associated with the Jaque-Berra normality test (0.762 for

LM version) is larger than 0.05, the study fail to reject that the error term is normally distributed.

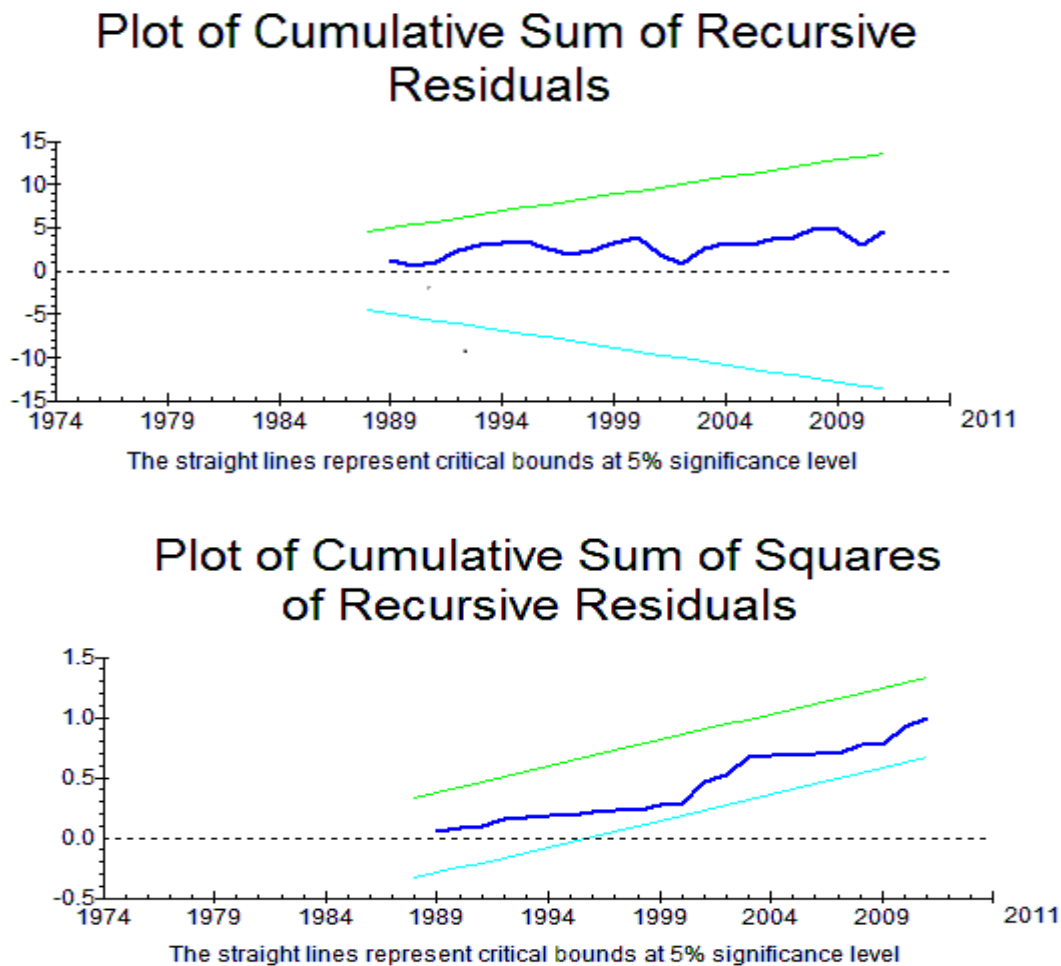
The null hypothesis of no heteroscedasticity is failed to be rejected. For the reason that, the p- value associated with the test statistics (0.749 and 0.7573 for LM version and F version respectively) is greater than the standard significance level 0.05.

Besides the diagnostic tests, the test of model stability (parameter constancy), is applied using CUMSUM and CUMSUM square test. The CUSUM test and CUMSUM square test basically uses the cumulative sum of recursive residuals and cumulative sum of square of recursive residuals based the first set of N observations and is updated recursively and then plotted against the break points. In this study the plot of CUMSUM and CUMSUM square starting from 1989 is based on the recursive residuals from observations before 1989. The test chooses the first N observation by itself. That is observations before 1989, in this study.

The study applies CUMSUM and CUMSUM square test stability tests due to a large extent to the fact that they are designed to test the null hypothesis of parameter stability against a variety of alternatives. In the contrary, other tests require prior knowledge of the type of coefficient variation or the timing of any structural shifts. Besides, these tests are not affected by serial correlation or non-predetermined regressors even if over-specified (Caporale and Pittis, 2004).

The plot of CUMSUM and CUMSUM square shows whether there is structural change in the model. The test graph plots the cumulative sum together with 5% critical lines. The test finds parameter instability if the cumulative sum goes outside the area and never returns back between the two critical lines. The following figures show CUMSUM and CUMSUM square test for ARDL (1, 0, 0, 0, 0, 1).

Figure 5.1 Testing parameter stability of the long run ARDL (1, 0, 0, 0, 0, 1) using CUMSUM and CUMSUM square test



Source: Microfit 4.1 output

Both the CUMSUM and CUMSUM square test result for the long run ARDL model of this study indicated that there is no structural instability in the model during the sample period. This is confirmed by the fact that the plots of the CUMSUM and CUMSUM square of the residual are within the boundaries of 5 percent significance level. These further give an indication about the stability of the long run coefficient of the model.

5.5. Long Run ARDL Model

Once the study identified the existence of cointegration between the variables, the next step is running the ARDL model to get the long run coefficients of the independent variables.

Table 5.5 Estimated Long Run Coefficients using the ARDL Approach

ARDL (1, 0, 0, 0, 0, 1) selected based on Schwarz Bayesian Criterion

Dependent variable: LCPI

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
LTO	-0.17927	0.13682	-1.3103[.200]
LGFCF	-0.79567 *	0.15103	-5.2684[.000]
LM	0.17748 *	0.076541	2.3188[.027]
LPCI	1.2489 *	0.15823	7.8930[.000]
LGCE	0.75718 *	0.19607	3.8617[.001]
C	-4.8469 *	1.7775	-2.7268[.011]
Trend	-0.034129	0.017840	-1.9130[.065]

Source: Microfit 4.1 output result, * imply statistical significance at 5%.

The long run equation for the model ARDL (1, 0, 0, 0, 0, 1) is given as below. The numbers in the bracket shows the number of lag chosen for each variable. Except for the dependent variable (LCPI) and LGCE, SBC does not taken any lag for the other independent variables. The figures in parenthesis in the below stated long run equation

indicate the calculated “t” values. Since all the variables are in natural logarithm form, the coefficients are elasticities.

$$LCPI = -4.85 - 0.18LTO - 0.8LGFCF + 0.18LM + 1.25LPCI + 0.76LGCE \dots \dots 15$$

(-2.73)
(-1.31)
(-5.29)
(2.31)
(7.89)
(3.86)

The result of the long run ARDL regression shows that as Romer (1993) proves trade openness has a negative effect on inflation although it is statistically insignificant.

According to Scott *et al.* (2004) and Mukhtar (2010) trade openness reduces inflation through the price effects of cheaper imports of finished goods and intermediate inputs on the reduction of the overall domestic price level. Trade openness could also indirectly lead to decrease in price level by encouraging domestic productivity growth due to the increased competition and productivity spillovers between industries in different countries. In addition through reducing the market power of monopolistic suppliers of goods in domestic country, trade openness will increase the availability of cheap goods (Aron and Muellbauer, 2007).

According to Cheung *et al.* (2012) since the channel through which trade openness reduce inflation is by creating market competition and productivity, when these channels did not function well trade openness might have insignificant effect on inflation. In our country case this channel did not work may be due to the nature of the inflation and trade structure. That means Ethiopia’s inflation is more of dominated by food inflation (Birru *et al.*, 2009). But the major goods that the country have been and is importing are not

food items rather they are capital goods and other consumer goods. In addition the amount of food items that Ethiopia has been and is exporting is not that much large. Thus, since the amount of imported and exported food is very small even if there is more trade openness it did not create that much competition and productivity in food market in the country. So there might not be that much reduction on food price. As a result trade openness might have insignificant role on reducing Ethiopia's inflation. In addition, according to Bleaney (1999), once other important determinants of inflation are brought into analysis, trade openness becomes insignificant. This negative but statistically insignificant effect of trade openness is in line with Samimi *et al.* (2011), Dogan and Berument (2003), Alfaro (2003), and Manni and Afzal (2012)

Coming to explanatory variables other than trade openness, LGFCF has negative and significant effect in the long run. That is, 1 % increase in gross fixed capital formation as a share of GDP leads to 0.8 % reduction in inflation in the long run. The possible explanation for this is, when there is more and more investment undertaken in a given country the availability of goods and services will increase. This increase in supply of good and service reduce the output gap which in turn reduces the pressure on inflation.

As many empirical studies prove, money supply in this study has a positive and statistically significant effect on inflation. A 1 % increase in money supply leads to 0.18 % increase in inflation. According to Gul (2011) and Mankiw (2002), money supply will increase inflation through two main ways. The first one is when money supply in the economy increases, aggregate demand will also increase. This in turn leads to inflation.

This means as people in a given country have more money, their demand for different goods and services will increase and as a result prices will push up. The second one is as money supply increase the value of the currency in the economy will reduce. This reduction in the value of the currency or purchasing power of the money implies that peoples need to have and pay more money than before to purchase the same basket of goods.

As shown on table 5.5, per capita income is found to affect inflation positively. To be specific, as per capita income increase by 1 % inflation will increase by 1.25 % in the long run. This is due to the fact that as per capita income in a given country increases the demand of the people for goods and services will increase and they start to consume more and more. As a result of this increment in consumption price of goods and services tends to increase and leads to inflation. This result is in line with the report of FAO (2013).

LGCE has a positive and significant effect on inflation. As table 5.5 shows, a 1 % increase in government consumption expenditure as a share of GDP leads to 0.76 % increase in inflation. This is explained by the fact that government spending of money for the purchase of consumption goods and services will the increase the aggregate demand for goods and services. This increase in aggregate demand will push up prices. This result is consistent with studies by done by (Nguyen, 2014; Vallés *et al.*, 2005).

5.6. Error correction model

The next step after estimating the long run coefficients is estimation of error correction representation. This ECM representation shows the short run dynamics of the model

along with the long run equilibrium of the model. The ECM term (ecm_{t-1}) shows how fast the variables converge to equilibrium. If the ECM term has a negative sign, the variables converge to equilibrium. The following table presents the result of short run dynamic along with long run relationships based on the ECM version of ARDL model.

Table 5.6 Error Correction Representation for the Selected ARDL Model

ARDL (1, 0, 0, 0, 0, 1) selected based on Schwarz Bayesian Criterion

Dependent variable is DLCPI

Regressor	Coefficient	Standard Error	T- Ratio[Prob]
DLTO	-0.099785	0.075772	-1.3169[.198]
DLGFCF	-0.44289*	0.11480	-3.8580[.001]
DLM	0.098790**	0.053023	1.8632[.072]
DLPCI	0.69518*	0.15531	4.4761[.000]
DLGCE	0.21763**	0.12285	1.7716[.086]
DC	-2.6979	1.2236	-2.2048[.035]
DT	-0.018997	0.0011196	-1.6968[.100]
ECM(-1)	-0.55663	0.12211	-4.5583[.000]

Source: Microfit 4.1 output result, * & ** imply statistical significance at 5% and 10%, respectively.

The coefficient of ECM (-1) is -0.55. This coefficient is highly significant and has a negative sign and implies a moderate speed of adjustment to equilibrium after a shock. The negative sign and significance of ECM at 5 % further proves the existence of a long run relationship or co-integration between the variables included in the model. This

coefficient shows that approximately 55% of disequilibrium from the previous year's shock converges to the long run equilibrium in the current year.

Like the long run, trade openness has negative but statistically insignificant effect on inflation of Ethiopia. The possible explanation for this insignificant role of trade openness might be the ineffectiveness of the transmission channel through which trade openness affect inflation. As stated in the long run model interpretation, this ineffectiveness might result from the trade structure and the inflation nature of the country.

Similar to the long run result, LGFCF has negative and significant effect on inflation. This is due to the increase in output as a result of the increase in investments. As gross fixed capital formation as a share of GDP increase by 1 % in the short run, inflation will reduce by 0.44 %, which is 0.8% in the long run. The possible explanation for this is difference in the long run and short run might be, the return of gross fixed capital formation is higher in long run than in the short run.

The short run effect of monetary growth on inflation is also similar with long run effect though there is a difference in magnitude. As money supply increase by 1% inflation will rise by 0.09%, which is 0.18 % in the long run. This shows the power of money supply in creating inflationary pressure is stronger in the long run than in the short run.

Similar to the long run, Per capita income has positive and significant effect on inflation. When per capita income increase by 1 %, inflation will push by 0.69 %, which is 1.25 %

in the long run. When per capita income of the peoples in a given country rises it results in the increase of demand for goods and services which in turn leads to inflation.

Like in the long run, government consumption expenditure significantly increases inflation with the coefficient of 0.23 in the short run. That is when government consumption expenditure as a share of GDP increase by 1 %, inflation will rise by 0.23 %, which is 0.76 % in the long run. This positive effect is because of the simulative effect of government consumption expenditure on aggregate demand which leads to a rise in general price.

Generally, like in the long run, in the short run, all explanatory variables have the same sign with the long run. Besides, except trade openness, all explanatory variables are statistically significant.

CHAPTER SIX: CONCLUSIONS AND POLICY IMPLICATIONS

6.1. Conclusions

The main outcomes of the empirical analysis confirm that trade openness produced a negative but a statistically insignificant influence on inflation both in the long run and the short run. This insignificant coefficient could be attributed to the ineffectiveness of the channel through which trade openness reduce inflation. These channels are creating market competition and productivity. In case of Ethiopia this channel did not work may be due to our trade structure and nature of the inflation. Besides the above explanations, the insignificance of trade openness in explaining inflation in the model might be due to the inclusion of main determinants of inflation in analysis which made trade openness to be insignificant in explaining inflation.

Regarding other variables in the model, LGFCF has a negative effect on inflation both in the short run and long run. This is due to LGFCF, a proxy for investment, reduce output gap which in turn reduce the pressure on inflation. The other variable which is LM has positive effect on inflation both in the short run and long run due to the effect of money supply on increasing aggregate demand and reducing purchasing power of the money . In relation to LPCI, it has positive and significant effect on inflation which could be attributed to positive effect of income on demand which leads to increase in prices. Similarly, LGCE has a positive and significant effect on inflation which is due to positive effect of government consumption expenditure on demand.

6.2. Policy Implications

Based on the findings of the study the following policy recommendations are forwarded. Since trade openness has insignificant role in explaining inflation in Ethiopia, the government/policy makers should focus on measures other than external trade sector in devising policies to combat and reduce domestic inflation. Besides further researches should be done on why trade openness has insignificant role on inflation.

As gross fixed capital formation significantly reduces inflation, in the short run the government should encourage investment through creating a conducive environment. In the long run, the government should pin point priority sectors, in particular to supply constraints, which need intervention in terms of investment both by, the private sector and the government itself.

To reduce the positive effect of money supply in aggravating inflation in the short run, the government should set the optimal level of money supply or it should follow tight monetary policy. In the long run the government should control factors that bring monetary growth. In the case of budget deficit financing, which is one factor behind money growth, rather than printing money the government should take other alternative deficit financing options such as widening tax base.

In the short run, to reduce the effect of per capita income on inflation the government should create awareness about how the peoples should allocate their income. But for the

long run various mechanisms which are believed to promote saving behavior of individuals and alleviate spending on unproductive areas should be devised.

In the long run, the government should identify the optimal level of spending which compromises the inflationary situation. In doing so, the spending target should be more on productive areas rather than unproductive ones. In other words, it should restructure its spending further away from consumption expenditure.

REFERENCES

- Afzal, M., Malik, E.M., Butt, A.R. and Fatima, K. (2013). “Openness, inflation and growth relationships in Pakistan: An application of ARDL bounds testing approach.”, *Pakistan Economic and Social Review*
- Alfaro, L. (2003). “Inflation, Openness, and Exchange-Rate-Regimes: The Quest for Short-Term Commitment.”, *Harvard Business School*
- Aron, J. and Muellbauer, J. (2007). “Inflation Dynamics and Trade Openness: with an application to South Africa.”
- Ashra, A. (2002). “Inflation and Openness: A study of selected developing economies. Asian G4 and G 7.”
- Birru ,Y.A., Durevall,D. and Loening ,J.L. (2009). “Inflation Dynamics and Food Prices in an Agricultural Economy: The Case of Ethiopia.” , *Policy Research Working Paper 4969*
- Bleaney, M. (1999). “The Disappearing Openness-Inflation Relationship: A Cross-Country Analysis of Inflation Rates” ,*IMF Working Paper WP/99/161*
- Caporale,G.M and Pittis,N. (2004). “Robustness of the CUSUM and CUSUM-of Squares Tests to Serial Correlation, Endogeneity and Lack of Structural Invariance: Some Monte Carlo Evidence.”, *London South Bank University*
- Cheung, Y.W, Binici, M. and Lai, K.S. (2012). “Trade openness, market competition, and inflation: Some Sectoral Evidence from OECD countries.” , *Central Bank of Turkey*

- David, H.L. (2007). “A Guide to Measures of Trade Openness and Policy”, *Indiana University South Bend*
- Dogan,B. and Berument, H. (2003). “Openness and the effectiveness of monetary policy: empirical evidence from Turkey.”, *Department of Economics, Bilkent University*
- Durevall, D. and Sjo, B. (2012). “The Dynamics of Inflation in Ethiopia and Kenya. African Development Bank Group”, *Working paper no. 151*
- EEA (2011). “Report on the Ethiopian Economy”, *Addis Ababa.*
- EEA (2013). “Report on the Ethiopian Economy”, *Addis Ababa.*
- Evans, R.W. (2008). “Three Essays on Openness, International Pricing, and Optimal Monetary Policy.”, *PhD dissertation paper.*
- FAO (2013). “World Agriculture Towards 2030/2050: The 2012 revision” , *Agricultural development economics division*
- G/Kirstos, K. and G/Egziabher, Z. (2012). “Inflation and Money Growth in Ethiopia: Is there a Threshold Effect?”
- Geda, A. (2011) “Readings on the Ethiopian Economy”. *Addis Ababa University Press*
- Geda, A. and Degfe, B. (2005). “Explaining African Economic Growth Performance the case of Ethiopia.” , *African research consortium, Kenya Nairobi.*
- Geda, A. and Tafere, K. (2011). “The Galloping Inflation in Ethiopia: A Cautionary Tale for Aspiring ‘Developmental States’ in Africa.”, *Institute of Africa Economic Studies Working Paper WP-A01-2011.*

- Geda, A., Shimeless, A. and Tafere, K. (2008). "Inflation in Ethiopia: What caused it and who is Paying for it" , *Memo, Department of Economics, Addis Ababa University.*
- Ghaderi, K. and Samimi, A. (2012). "Openness and Inflation: A Case Study for MENA."
- Gokal,V. and Hanif,S. (2004). "Relationship between inflation and economic growth"
- Greenidge,K. and DaCosta, D. (2009). "Determinants of Inflation in Selected Caribbean Countries", *Business, finance & economics in emerging economies vol. 4*
- Gruben, W.C. and McLeod, D. (2004). "The Openness-Inflation Puzzle Revisited.", *Applied Economics Letters.*
- Gul,S. (2011). "The Impact of money supply on Inflation in Pakistan.", *Interdisciplinary journal of contemporary research in business. Vol 3, no 8.*
- Haberler, G. (1960). "Inflation its causes and cures.", *American Enterprise Association.*
- Haji, J. and Gelaw, F. (2012). "Determinants of the recent soaring food inflation in Ethiopia." , *Universal Journal of Education and General Studies Vol. 1(8)*
- Humphrey, T.M. (1976). "On cost -push theories of inflation in pre-war monetary literature.", *Federal Reserve Bank of Richmond*
- IMF (2012). "The Federal Democratic Republic of Ethiopia, Staff report for the 2012 Article IV consultation.",*IMF country report No 12/287*
- Kibritcioğlu, A. (2002). "Causes of Inflation in Turkey: A Literature Survey with Special Reference to Theories of Inflation."
- Lim, C.H and Papi, L. (1997). "An econometric analysis of the determinants of inflation in Turkey.", *IMF working paper.*

- Lin, H.Y (2010). “Openness and Inflation Revisited.” , *International Research Journal of Finance and Economics*
- Lin, J.L and Wu, C.S. (2006). “The Relationship between Openness and Inflation in Asian 4 and G 7”
- Loening, J. ,Gounder, R. and Takada, H.(2008). “Inflationary expectations in Ethiopia: some preliminary results.”, *Applied Econometrics and International Development*.
- Malik, M.E., Afzal, M. and Fatima, K. (2013). “Openness, inflation and growth relationships in Pakistan: An application of ARDL bounds testing approach.”, *Pakistan economic and social review Vol 51, no. 1*
- Mankiw, N.G .(2002). “Principles of Macroeconomics.” ,*Third edition*
- Manni, U.H and Afzal, M.N. (2012). “Effect of trade liberalization on economic growth of developing countries: A case of Bangladesh economy.” , *Journal of Business, Economics and Finance*.
- Mehmet, H.S., Esener,C., Darici, B. (2009).”The effects of openness on inflation: panel data estimates from selected developing countries.”, *Investment Management and Financial Innovations, Vol 6*
- Menji, S. (2008). “Determinants of Recent Inflation in Ethiopia.”,*MPRA Paper No. 29668.MSC thesis*. Addis Ababa University
- Mukhtar, T. (2010). “Does Trade Openness Reduce Inflation? Empirical evidence from Pakistan”, *The Lahore Journal of Economics*.

- Narayan, K. (2004), “Reformulating Critical Values for the Bounds F-Statistics Approach to Cointegration: An Application to Tourism Demand Model for Fiji”, *Discussion Papers, ISSN 1441-5429, Monash University Victoria, Australia*
- Neda, S. (2011). “Multivariate time series analysis of inflation: the case of Ethiopia.”
- Nguyen, T.D. (2014). “Impact of government spending on inflation in Asian emerging economies: evidence from India, Vietnam, and Indonesia.”, *Pakistan institute of development economics, department of economics.*
- OECD (2011). “Trade openness, in OECD Science, Technology and Industry Scoreboard 2011”, *OECD Publishing*
- Pereira, A.M. and Sagales, O.R. (2002) “On the regional impact of public capital formation in Spain.” , *College of William and Mary Williamsburg*
- Pesaran, M.H, Shin, Y and Smith, R.J. (2001). “Bounds testing approaches to the analysis of level relationships.” , *Journal of applied econometrics*
- Pesaran, M.H. and Shin, Y. (1999). “An autoregressive distributed lag modeling approach to cointegration analysis.”, *The Ragnar Frisch Centennial Symposium.*
- Rebmann, A. and Levacic, R. (1979). “Macroeconomics: An introduction to Keynesian-Neoclassical controversies” , *Macmillan publishing. Second edition*
- Rogoff, K. (1985). “Can international monetary policy cooperation be counterproductive?”, *Journal of international economics, Vol. 18.*
- Romer, D. (1993). “Openness and Inflation: Theory and Evidence.” , *Quarterly Journal of Economics.*
- Sachsida, A. (2006). “Inflation and trade openness revised: an analysis using panel data”

- Samimi, A.J., Ghaderi,S. and Sanginabadi, B. (2011). “Openness and Inflation in Iran.” , *International Journal of Economics and Management Engineering*
- Sarkar, P. (2004). “Is there any impact of trade liberalisation on growth? Experiences of India and Korea.” , *Economics Department, Jadavpur University*
- Scott, A., Chen, N. and Imbs, J. (2004). “Globalization and Inflation: The Real Impact of Openness on Prices.” , *London Business School*.
- Simpsa ,A. and Gurara, D. (2011). “Inflation Dynamics in selected East African countries: Ethiopia, Kenya,Tanzania and Uganda.” , *African development bank*.
- Strano, A. (2003). “Money Supply and Inflation How and how much can the Money Supply affect the Inflation Rate?”
- Tafere, K. (2008).”The Sources of the recent inflationary experience in Ethiopia.” , *Msc thesis paper. Addis Ababa University*.
- Terra, C.T. (1998). “Openness and inflation: a new assessment”, *Quarterly Journal of Economics*.
- Thomas, C. (2011). “Trade openness and inflation: panel data evidence for the Caribbean.”
- UNECA (2014). “Dynamic industrial policy in Africa, Economic Report on Africa”, *UNECA and AU*
- Vallés,J. ,Gali,J. and Salido, J.D (2005). “Understanding the Effects of Government Spending on Consumption.”
- VanHoose, D.D and Daniel, J. (2006) “Openness, the Sacrifice Ratio, and Inflation: Is there a Puzzle?” , *Journal of International Money and Finance, Volume 25, No. 8*

- Verbeek.M. (2004). "A guide to Modern Econometrics.",*2nd edition. Erasmus University*
- WB (2013). "Second Ethiopia Economic Update, Laying the foundations for achieving middle income status"
- Wijmbergen, S.V (1984) "Government deficits, private investment and the current account; an intertemporal disequilibrium analysis." , *Discussion paper*
- Woldemichael, A.D. (2008). "Food Price Inflation and the Urban Poor in Ethiopia. Report on the Ethiopian economy" , *Ethiopian economic association*
- Zakaria , M.(2010). "Openness and inflation: Evidence from time series data"

APPENDICES

Appendix 1 Diagnostic Test Result

```

                                Diagnostic Tests
*****
*      Test Statistics      *      LM Version      *      F Version      *
*****
*
* A:Serial Correlation*CHSQ( 1)= .093717[.760]*F( 1, 29)= .069855[.793]*
*
* B:Functional Form *CHSQ( 1)= 2.5213[.112]*F( 1, 29)= 2.0044[.167]*
*
* C:Normality *CHSQ( 2)= .54373[.762]* Not applicable *
*
* D:Heteroscedasticity*CHSQ( 1)= .10223[.749]*F( 1, 37)= .097241[.757]*
*****
A:Lagrange multiplier test of residual serial correlation
B:Ramsey's RESET test using the square of the fitted values
C:Based on a test of skewness and kurtosis of residuals
D:Based on the regression of squared residuals on squared fitted values

```

Appendix 2 Long Run Auto Regressive Distributed Lag Estimation Result

```
Estimated Long Run Coefficients using the ARDL Approach
ARDL(1,0,0,0,0,1) selected based on Schwarz Bayesian Criterion
*****
Dependent variable is LCPI
39 observations used for estimation from 1973 to 2011
*****
Regressor          Coefficient      Standard Error      T-Ratio[Prob]
LTO                -.17927          .13682              -1.3103[.200]
LGFCE              -.79567          .15103              -5.2684[.000]
LM                 .17748          .076541             2.3188[.027]
LPCI               1.2489          .15823              7.8930[.000]
LGCE               .75718          .19607              3.8617[.001]
INPUT              -4.8469         1.7775              -2.7268[.011]
T                  -.034129        .017840             -1.9130[.065]
*****
```

Appendix 3 Error Correction Representation Estimation Results

```

Error Correction Representation for the Selected ARDL Model
ARDL(1,0,0,0,0,1) selected based on Schwarz Bayesian Criterion
*****
Dependent variable is dLCPI
39 observations used for estimation from 1973 to 2011
*****
Regressor          Coefficient          Standard Error          T-Ratio[Prob]
dLTO                -.099785              .075772                 -1.3169[.198]
dLGFCF              -.44289               .11480                  -3.8580[.001]
dLM                 .098790               .053023                 1.8632[.072]
dLPCI               .69518                .15531                  4.4761[.000]
dLGCE               .21763                .12285                  1.7716[.086]
dC                  -2.6979               1.2236                  -2.2048[.035]
dT                  -.018997              .011196                 -1.6968[.100]
ecm(-1)             -.55663               .12211                  -4.5583[.000]
*****
List of additional temporary variables created:
dLCPI = LCPI-LCPI(-1)
dLTO = LTO-LTO(-1)
dLGFCF = LGFCF-LGFCF(-1)
dLM = LM-LM(-1)
dLPCI = LPCI-LPCI(-1)
dLGCE = LGCE-LGCE(-1)
dC = C-C(-1)
dT = T-T(-1)

ecm = LCPI + .17927*LTO + .79567*LGFCF -.17748*LM -1.2489*LPCI -.75
718*LGCE + 4.8469*C + .034129*T

```

Declaration

I, the undersigned, declare that this project paper is my original work and has not been presented for Masters Degree in any other university, and that all sources of materials used here have been duly acknowledged.

Declared by:

Name: Meseret Feleke Chaka

Signature: _____

Date: _____

Confirmed by (Advisor)

Name: Tadele Ferede (PhD)

Signature: _____

Date: _____

Place and date of submission: Addis Ababa/Nov 2014