ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

NEXUS BETWEEN INFLATION PUBLIC DEBT AND ECONOMIC GROWTH IN ETHIOPIA

By: SIMENEW ERKYHUN

Addis Ababa

September, 2023

ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

NEXUS BETWEEN INFLATION PUBLIC DEBT AND ECONOMIC GROWTH IN ETHIOPIA

A thesis submitted to partial fulfillment requirement of the award of MSC degree in Economics (Economic policy analysis)

By: SIMENEW ERKYHUN

ADVISOR: DR. HELEN BERGA

Addis Ababa

September, 2023

Declaration

I undersigned declare that this thesis is my original work and it has never been presented by any other person for any award of degree in any institution, and that all sources of material used for the thesis have been properly acknowledged.

The examiners comments have been properly incorporated.

Declared by:

Name:SimegnewErkyhun

Signature: ……

Date: …….

Confirmed by advisor

Name:Helen Berga (PHD)

Signature: ……

Date……

Place and date of submission: Addis Ababa University, September 2023

Addis Ababa University

School of Graduate Studies

This is to certify that the thesis prepared by **Simegnew Erkyhun Emru**, entitled: **Nexus between inflation public debt and economic growth**: Evidence of Ethiopia from the period 1981-2021 and submitted in partial fulfillment of the requirements for the Degree of Master of Science in Economics (Economic Policy Analysis) complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

Approved by board of examiners:

. _____ .	. _____ .
Advisor	signature
. _____ .	. _____ .
Examiner	signature
. _____ .	. _____ .
Examiner	signature

September, 2023

Acknowledgement

I would like to express the deepest of my gratitude and thankfulness to my advisor Helen Berga (Dr.) for her endurance and constructive advice throughout the course of the thesis. Not only did she help me with vital advice, I have also learned a lot from her. The sisterly handling, she accorded me has served as a motivation for the achievement of this study.

The special thanks are devoted to kidaneTekle (Msc) for his enormous role to my knowledge of econometric methods as well his support with the data and providing useful information.

I also owe a great deal of gratitude to my co-workers NIB international bank karamara branch staff for cover my work during doing research.

Table of contents

page

Acknowledgement i

Table of contents ii

List of tables iv

List of figures iv

Acronyms v

Abstract vi

CHAPTER ONE 1

1. INTRODUCTION 1

1.1 Background of the study 1

1.2 Statement of the problem 3

1.3Objectives of the study 5

1.4Significance of the study 5

1.5Scope and Limitation of the study 6

1.6 Organization of the study 6

CHAPTER TWO 7

2. LITERATURE REVIEW 7

2.1 theoretical literature reviews 7

2.1.1 Inflation and economic growth 8

2.1.2 Public debit and growth 10

2.1.3 Public debit and inflation 11

2.2Empirical literature review 12

2.3 conceptual framework of the study 16

CHAPTER THREE 18

3. OVER-VIEW OF INFLATION, PUBLIC DEBT AND GROWTH IN ETHIOPIA 18

3.1Over view of public debt in Ethiopia 18

3.2 Over view of inflation and Ethiopian economy 22

3.3The performance of the Ethiopian economy 25

CHAPTER FOUR 29

4 METHDOLOGY AND DATA 29

4.1 data sources and variable description **29**
4.2 Model specification **29**
4.3 method of data analysis **34**
4.5Long run co-integration and error correction model **35**
4.5. The casualty test **36**
4.6 lag order selection **37**
4.7Threshold Model Specification **38**
4.8 diagnostic tests **39**
Chapter five 41
5. Data analysis and presentation **41**
5.1 descriptive analyses **41**
5.1.1 Trend of Economic growth in Ethiopia **41**
5.1.2 Trends of Inflation in Ethiopia **41**
5.1.3 Trend of public debt **42**
5.2-unit root test **43**
5.3 lag length selection **45**
5.4Diagnostictestingandmodelstability **45**
5.5 bound test for co-integration **46**
5.6 Long run estimation **47**
5.6 Long runs ARDL estimation of real GDP **47**
5.7 Short run ARDL estimation of RGDP **48**
5.7 granger causality test **49**
5.8Threshold estimation **51**
5.9 stability test **52**
Chapter six 53
6. Conclusion and recommendation **53**
Reference 55
Appendix 58

List of tables

Table 3.1 external public debt (In millions of dollars)..... 19
Table 3.2 domestic public debt..... 20
Table 3.3: annual average inflation rate in percent..... 24
Table 3.4 the performance of economic growth by sector level (%GDP)..... 26
Table 5.2 lags length selection..... 45
Table 5.3 diagnostic test..... 46
Table 5.4 bound test for co-integration..... 46
Table 5.5 long run estimation of real GDP, ARDL..... 47
Table 5.6Short run ARDL estimation of RGDP..... 48
Table 5.7 granger causality..... 49
Table 5.8 threshold inflation rate..... 51

List of figures

Figure 3.1 Diagrammatic representation of conceptual frame work..... 17
Figure 3.1 graphical presentation of public debt, inflation and GDP growth from 2006-2021..... 18
Figure 3.2external loan performances from the year (2013-2020)..... 22
Figure 3.3 annual average inflation rate and economic growth rate in percent..... 23
Figure.5.1. Trend of real economic growth through (1981-2021) in millions of birrs..... 41
Figure 5.2 trend of inflation through the period (1981-2021)..... 42
Figure5.3: domestic and external public debt through period (1981-2021) in millions of birr..... 43
Table 5.1 ADF unit root test..... 44
Figure 5.4 CUSUM stability test of economic growth equation..... 52
Figure 5.5 CUSUMQ test for economic growth equation..... 52

Acronyms

ADF	Augmented dickey fuller
AIC	akakike information criterion
ARDL	Dickey fuller
BIC	basin information criterion
CPI	consumer price index
ECM	Error correction model
ECT	Error correction term
EEA	Ethiopian economic association
ERCA	Ethiopian revenue custom authority
GDP	Growth domestic product
GTP	Growth and transformation plan
IMF	international monetary fund
LDCs	Less developing country
MOFED	Ministry of finance and economic development
NBE	national bank of Ethiopia
REEP	real effective exchange rate
RGDP	real domestic growth product
SDPRP	sustainable development and poverty reduction program
TOP	trade openness
UN	united nation
WB	World Bank

Abstract

Ethiopian Economy prior to 2002/03 exhibited moderate and stable inflation, However, a continuing rise in prices and strong economic expansion have been observed since 2002/3.Based on this circumstance and growing stock of public debt, this study examined causal relationships between inflation and public debt, public debt and growth, and between inflation and economic growth in Ethiopia. The estimation has been carried out by using Autoregressive Distributed Lag (ARDL) and Error Correction Method (ECM) using time series data set spanning from 1981 to 2021. To show the directional relationship between variables, the Granger causality test was used. The results indicated the existence of a long run relationship among the variables. Inflation level from 3.5 to 20 percent is important for long run real GDP growth. In the short-run, a rise in price discourages economic growth in Ethiopia. There is a short run causality running from inflation to real Gross Domestic Product; and in the long run economic growth and inflation move together. Trade openness has both long and short run negative impact on real GDP. Domestic public debt inversely affects real GDP growth in short term; in the long run external public debt has negative impact on Real GDP growth. The short run, long run and ECM estimates all agree over significance and causation: inflation and external public debt estimates have inverse and significant relationship, while inflation and real GDP have positive and significant long run relationship. The speed, at which real GDP returns to equilibrium after changes in inflation, public debt and other control variable, as measured by ECM, is 0.23 percent, indicating the strength of the economy's ability to accommodate shocks. The casualty results indicate that, there is a long-term unidirectional causal relationship between inflation and real GDP growth as well as a unidirectional relationship between domestic public debts to inflation. Inflation and domestic public debt were found to have a long-term one-way causal relationship with economic growth. Based on the study's findings, policies should be designed to ensure price level with in threshold level (3.5-20) percent. Additionally, policymakers should work together to improve output in order to lower prices for goods and services and promote economic growth with managed public debt.

CHAPTER ONE

1. INTRODUCTION

1.1 Background of the study

Inflation measures a rise in the general price of goods and services in a given economy. Economic growth with a stable inflation level is a major concern for most macroeconomics policy maker. Price stabilization play a major role in determining the growth rate of the economy, thus monetary authority implement policy related to monetary issue to assert a desirable level of inflation. For example in USA economy, Different product used as a sample (31 of 41), inflation above 40 percent result in output losses that are on average 2.4 percent. On the other hand when government debt is below 60% and inflation is mild (between 3% and 5% there may have positive relation between growth and debt. For his conclusion higher inflation (above 5%) is adverse effect to long- and medium-term economic growth (Temple, 2000).

Because creditors want a large risk premium, which raises the interest rate at which the country can borrow, inflation worsens the condition of market financing (Bildrici.M et al, 2007) States with greater government debt to GDP ratios, force their economies to acquire money with short maturity and higher rate, which may have positive impact on inflation. This holds true when the majority of the debt is external since debt growth is inflationary. Regardless of the central bank's stance, sustained fiscal deficit financing through public borrowing would eventually result in inflationary pressure. To prevent significant inflation that could impair macroeconomic stability, debt financing will need to be effectively coordinated with the monetary authority (A.sims, 2012)

Every nation that usually had a budget deficit utilizes a variety of sources, including borrowing from abroad to invest in productive elements and speed up growth. The financing of public goods that improve wellbeing and encourage economic progress is the main justification for government borrowing. Fiscal deficit financing that results in public debt can short-term boost aggregate output and demand, but in the long-term it crowds out capital output. Debt bullying and economic growth have a nonlinear relationship. Debt has a detrimental effect on growth after it reaches a certain point (90% of GDP) (Rogoff.K and Reinhart.c, 2010).

When the government spends more to cover the deficit than it receives in revenue, there is a

fiscal deficit. The government has access to both internal and foreign sources of funding. Internal sources include government-issued securities like bonds and treasury bills as well as direct loans from domestic financial institutions; whereas external sources include loans from foreign financial institutions like the WB and IMF. Government obligation of loans and budget deficit with limited capital availability result central bank print large amount of money to financing deficit. Deficit financing of this nature promotes a rise in the amount of money in circulation. Inflation will undoubtedly result from the increased money supply (Bahttacharya, 2009)

One of the factors that determine high inflation is the fiscal deficit. Most governments in less developed nations are investing more of their budgets in education, health, and other infrastructure in order to increase employment, foster economic growth, and maintain socio-economic stability. Budget deficit results from the fact that tax revenue is insufficient to pay for all government expenditures. Instead of collecting money from the public to cope with fiscal deficits and prevent high inflation and macroeconomic instability, the majority of governments borrow money on the local and international markets (Hemantha K.J.Ekanayake, 2012/14).

In the World Bank's 2021 World Economic Prospect publication, the report on the state of economic growth, public debt, and inflation in emerging nations was detailed. In sub-Saharan Africa, economic growth dropped to 4.1 in 2021 from 5.2 in 2020, according to research by the World Bank. Since 2010, the public debt in SSA has more than tripled, and in 2021, inflation rose more than usual. In combination with a rapid increase in public debt, the public debt to GDP ratio increased from 32% in 2010 to 56% in 2021. The number of SSA nations with high inflation caused by rising food and energy prices, a weaker currency, and slow investment growth that are most at risk of experiencing external debt distress in 2020.

Ethiopian economy passes different up and down at different regimes and political administrations. From 1974 until 1991, the military junta ruled Ethiopia the government implemented a command economy where prices and the market were under its control. In addition, the government was distributing goods to the nation at a set price, which helped keep inflation low, averaging 5.2 percent between 1980 and 2002 (Menji.S, 2008).

Ethiopian economy moved to a market system when the military regime was overthrown. The first ten years have minimal inflation, a moderate level of external loans and donations, and slow economic growth. But since 2002, Ethiopia's economy has had one of Africa's quickest rates of

growth, earning recognition from the World Bank (2010) and the Economic Commission for Africa (2007). Inflation has been persistent over the past 20 years, and other macroeconomic factors including large external public debt and foreign direct investment have also been present. While the country had double digit average growth since 2003, average inflation was expected to reach a level of 10% by 2020.Over the past two decades high growth rate was accompanied by persistent inflation and other macroeconomic variables like foreign direct investment and high external public debt. While the country records double digit average growth rate since 2003, average inflation exceeded10 percent level in 2020 (Paul, 2022).

Ethiopian government began investing heavily in state-led economic projects after 2010, both directly and through state-owned firms that took on debt. Despite the fact that external debt servicing costs increased from $13.7 billion in 2011 to $54.7 billion in 2020, the ratio of exports to debt was low. Private producers were being squeezed out as a result of governmental and state-backed actors' practices of excessive domestic borrowing. But among the steadily worsening public debt situation, the external debt stock has caused the most complicated economic situation (Federico, 2021).

1.2 Statement of the problem

Numerous researches on the relation between public debt and inflation have been conducted in recent years, but there hasn't been much agreement achieved yet. The literature on the case of inflation, growth and debt contains a variety of viewpoints.

In 52 African nations were studied regarding public debt, inflation, and growth between 1950 and 2012. The findings demonstrate that limiting public debt has a negative effect on economic expansion. The average rate of per capita growth was highest when public debt was 60% of real GDP and the average inflation rate was 8.2%. The highest level of governmental debt was a combined with slower economic growth and higher inflation. There are certain changes for three specific places that largely correspond to those of the analysis. GDP growth and inflation are both negative in North Africa. The highest level of growth ever seen corresponds to an average inflation rate of 5.33 percent when the ratio of debt to GDP reaches 30 percent. In sub-Saharan Africa, the relationship between the GDP growth rate and inflation has exhibited the same trend up to a certain percentage point of public debt to growth. However, when the public debit GDP ratio ranges from 30 to 60 percent, the highest growth rates of the GDP and GDP per capital are

observed. At an average inflation rate of 11%, the public debt to GDP ratio was less than 30%. The slowest rate of economic development and the highest rate of inflation are indicators of the highest level of public debt (Lopes daviga et al, 2014).

Numerous empirical analyses of the relationship between public debt (i.e., borrowing by the government on the domestic and international levels) and economic growth have been conducted. For instance, (Amsalu, 2017) explore the role of debit on economic growth in Ethiopia by using other control variable (i.e., capital expenditure, gross capital investment, trade openness, inflation and money supply). He finds that a sustained, and favorable association between the debt variable and economic expansion. On the other side, debt services have a negative relationship with economic growth that counteracts investment by causing the crowding out effect and the debt overhang issue. The study demonstrates a negative long-term relationship between debt servicing and per capital GDP growth, which may be primarily caused by the resource shift in debt service as opposed to investment. On the other hand, research conducted by (Abebe, 2019) for period between 1991 and 2018 on the influence of public debt on economic growth, domestic debt has a positive impact and external debt has a negative impact. However, we cannot explain how domestic public debt payment affects inflation and how it can promote economic growth.

Other empirical research that looked at inflation and economic growth in Ethiopia, (Fekadu, 2012)suggest that there is a short-term increase in economic growth and a short-term fall in inflation, but that inflation does not affect economic growth in the short term. He found that, on average, the impact of inflation on growth is effective for seven years, and he draws the conclusion that there is a long-term beneficial relationship between inflation and economic growth (Ashagrie, 2015). The empirical results of the threshold relationship between the level of inflation and economic growth over the period of 1971 to 2013 show that while inflation is currently negatively related with growth, it has a positive long-term relationship because of the financial repression that keeps borrowing costs low regardless of changes in inflation. He pointed out that macroeconomic stability and the standard of living are both negatively impacted by inflation. Robera (2021) For the determinant of inflation in Ethiopia he discovered that lowering the money supply, reducing government spending, raising external debt and real output, and decreasing oil prices are effective ways to manage inflation. According to his research, real GDP

and foreign debt have a negative impact on inflation, while oil prices, public spending, and the overall money supply have long-term positive relations. External debt and money supply have negligible short-term effects on inflation, whereas real GDP has a negative short-term impact on inflation. In those studies, it does not show how external public debt affect inflation and he does not consider inflationary impact of domestic debt.

Despite the fact that there have been attempts by previous researchers in Ethiopia on the area, most of them investigated the relation-ship between inflation and GDP growth and debt - growth, but relation between public debt and inflation is not well studied and the already existed study is smudged and inconclusive. In addition to this most research use data both pre and post liberalization period does not contain recent data set.

This study would examine how public debt affected inflation and growth and would use the autoregressive distributed lag model (ARDL) and error correction method to reveal short- and long-term relationships between these variables. In addition, it analyzes the three-way relationship between the variables by taking into account additional economic indicators. The time series annual data used for this paper's entire empirical research span the years 1981 through 2021.

1.3Objectives of the study

One of the main issues facing Ethiopia's economy at the moment is a higher public debt and rapid inflation. Ethiopia's economy switched to a private market system in 1991, government borrowing and spending increased more quickly than GDP's real growth rate. Even though Ethiopia has economic fluctuations and challenges in choosing the best policies connected to public debt, inflation, and production relationships, the long- and short-term causality as well as the statistical significance of those relationships have not been adequately addressed. Examining the relationship between debt, inflation, and growth over the long and short terms will be the main goal of this paper; this will be accomplishing by pursuing the following Specific object.

- To examine impact of public debt on growth and inflation
- To examine effect of public debt and inflation on GDP growth and
- To examine a casual linkage between inflation and public debt

1.4Significance of the study

Understanding the direction of the relationship between public debt, inflation and economic

growth has important implication for economic policy strategies to maintain sustainable economic growth.

This work would have different contribution for different stock holder. It should be used as reviews of literature to show the path of public debit, inflation and GDP growth performance. Having such knowledge or information about debt, GDP and inflation level would help in the decision of a country debt policy to improve stable economic growth and control inflationary impact of growth.

The study's findings, which involved an empirical investigation of public debt and inflation, would close a knowledge gap in the field. The studies would be a significant addition to the body of knowledge already available regarding how public debt affects inflation and economic growth. It is hoped that the finding of the study would impart some knowledge to all people interested to this area.

1.5Scope and Limitation of the study

I could have used the variable economic growth (GDP), inflation (CPI), debt growth rate and other control variable from the period 1981-2021.

In spite of the simplicity of data gathering from national bank (NBE), MOF and World Bank accurate data does not obtain and the study will not free from limitation. Data reported at different time and different source are difference amount for the same year. There are also political biases on the amount government debt and overhanging of debt.

1.6 Organization of the study

This thesis would organize into 6 chapters. the first is introductory chapter, second chapter present theoretical as well as empirical literature regarding debt, inflation and GDP growth, chapter three describe the over view of Ethiopian economy, chapter four present econometric methodology of the study chapter five cover estimation and interpretation of results. Finally, the last chapter, chapter six would present conclusion and recommendation.

CHAPTER TWO

2. LITERATURE REVIEW

2.1 theoretical literature reviews

The relationship between inflation, public debt, and economic growth is the subject of many theoretical theories. Rogoff.K and Reinhart. R. (2010) discussed the relationship between growth and government debt when the debt-to-GDP ratio falls below 90% the relationship between government debt and GDP growth is weak. There seems to exist a correlation between inflation and public debt levels for wealthy countries as a whole. Contradictory response to this claim is that low economic growth can lead to larger public debt, and external debt hinders investment from both domestic and international sources, which has a negative effect on economic growth for under developing countries. In addition to this, public debt negatively affect economic growth through future higher taxation, general price rise and uncertainty about banking and currencies crisis (Krugman, 1988).A positive shock to the overall public debts in a developing nation like Gambia has been shown to have an effect on both short- and long-term fluctuations of inflation; however, neither the short- nor the long-term statistical significance of the negative shock's effect on public debt has been shown. There are nonlinear relationships between these two variables, and those who detect it should exercise prudence to reduce inflation volatility (Akingbade U.Almola et.al 2022). The relationship between public debt and inflation is asymmetrical, meaning that in this developing nation, high levels of public debt cases for inflation while high levels of inflation reduce the real value of public debt. There is a positive relation between public debt and economic growth because it is an indirect tool of fiscal policy used by the government to support economic growth (Nguyen, 2015).

A 2015 UN report on developing country economic growth, inflation, and public debt Due to the sudden emergence of large emerging economies, the rate of economic growth in developing countries has grown more disparate in 2014. Thus, growth in developing countries as a group is expected as 4.8 and 5.1 percent in 2015 and 2016. Budget deficit and public indebtedness level in developing countries is lower than developed once. Commodity price weak government revenue is still underperformed against the high indebtedness of local government and the inflation rate in less developed economies would fall slowly over the outlook period.

2.1.1 Inflation and economic growth

Economic growth and inflation relationship study has attracted extensive literature and reached different conclusion regarding impact of inflation on economic growth. It seems upward movement in general price level or money loses purchasing power during inflationary period since each unit of currency purchase a few and few amount of goods. Different theory agreed at different conclusion about the responsiveness of output growth to inflation.

According to the classical growth theory, the level of technology, the labor force, the capital stock, and the land all affect economic growth. Even if classical theory does not directly incorporate inflation in to the model, it posited that inflation has a negative impact on growth and acknowledged the importance of stable macroeconomic conditions for long-term economic progress, that conclude the relationship between money supply and demand determines inflation.

Early neo classical Solow M. (1956) indicates no functional relationship between inflation and economic growth when growth is exogenously determined in the model.

Solow on growth theory the production function is constant return to scale, under this if you double the level of production function capital and labor, level of production would exactly double, hence population growth used as human labor.

Mundell. (1963) Show that there is a relation between growth and inflation, and that when inflation rises, it lowers people's wealth, causing a decline in the real money balance. In exchange for this, consumers migrate to other assets, raising their value and lowering interest rates, which encourages further investment in the economy and promotes economic growth. Mendel is the first to use the IS-LM curve to demonstrate that projected inflation has a true economic impact. He contends that because interest rates don't increase as much as inflation does, they decline when prices rise. He makes the assumption that saving affects real balance, real interest rates affect real investments, and inflation reduces real money balance. This causes wealth to drop, which encourages people to save more money. He contends that because the money rate of interest increased less rapidly than the rate of inflation, the real rate of inflation decreased throughout the inflationary period.

Tobin J. (1965) Support Mendel's idea that there is a link between inflation and economic growth assuming that money acts as a store of value in the economy. He illustrates how inflation has a positive effect on economic growth. Similar to physical capital, money is only usable as a

financial capital asset. According to the Tobin effect Inflation is a circumstance when a person should increase their capital rather than maintain a lot of cash; this boosts capital intensity and promotes economic expansion. Rise inflation rate raises the amount of output, according to Tobin's framework. But only when moving from one stable state capital stock to another steady state capital stock does the effect on production growth continue. As a result, in the steady state, output and consumption rise. He said that due to the downward rigidity of prices, the adjustment in relative price during economic expansion may be better achieved by the upward price movement of some persons.

According to monetarists, the rise in the money supply as a percentage of the economy is what causes inflation. There is no inflation and the money supply is only impacted by the nominal variable if it rises in parallel with the pace of output expansion. The rate of inflation is thought reflect both the past and present rate of monetary expansion at any particular period. Monetarist doesn’t accept nonmonetary expansion of inflation, i.e., those which attributes rising price to such related case as change in autonomous private consumption, change in government policy, cost push influence, food and fuel shortage on the ground, an increase in the stock of money per the unit of output constitute the true case of inflation. In general monetarist views the sole necessary and sufficient condition of inflation is excessive monetary growth.

According to a number of endogenous growth models Inflation appears to have a detrimental impact on economic growth. These theories describe economic growth is a generated factor with in the production processes rather than exogenous factor. In the case of endogenous growth, the growth rate is dependent on a variable, the rate of return on capital, such as inflation, which lowers the rate of return and slows growth.

Geregorio (1993) Create an endogenous growth model to show the various ways price increases, which drive up production costs, and reduction effect on growth. The first model is concerned with how money is employed in business operations and how they impact the rate of investment. This example company spent money on new equipment purchases. In this scenario, when inflation rises, businesses will be compelled to reduce their actual balance by raising transaction costs. Due to rising transaction costs, which also result in decreased investment, the shadow value of installed capital will increase. The second model focuses on the impact of inflation on household behavior and the preference for leisure over labor in terms of capital productivity. On

the business side, inflation increased labor costs, which decreased labor demand and employment, as a result of which the marginal capital product fell. On the household side, inflation encouraged consumers to switch from consumption to leisure, which decreased labor supply. In general, there is inverse effect of inflation on growth in this model,

2.1.2 Public debit and growth

Public debt is created as a result of budget deficits or when public revenue is insufficient to pay for public expenses. It is then utilized as a tool to close those budget gaps. In terms of the origin of the creditor, public debits are classed as internal when they are issued on domestic markets and as external when they are sold on foreign markets.

The inter relation between public debt and economic growth can be explained from three different theoretical perspectives. The first is the Keynesian perspective, which shows that debt and economic growth are closely related. They showed that increasing economic growth requires public debt brought on by a government-financed fiscal deficit. These theories argue that budget deficit in fiscal policy create a rise in demand in aggregate. As a result, there is an increase in the level of income and the need for transactions at greater prices. However, this beneficial effect can only be brought about if public borrowing is used to fund effective government spending, such as investments in infrastructure, health care, and education.

The second school of thought is associated with endogenous growth models and neo-classical theory. Mongolian (1961) Contrary to the Keynesian this theory show that public debt makes crowd out private investment and slow economic growth by increasing interest rate level and reduced investment. A budget deficit reduces private savings while private consumption increases, which results in a slowdown in economic growth. Krugman (1988) liquidity preference hypothesis also provide evidence for public debt hinder economic growth.

Third theoretical viewpoint is linked to the Ricardian viewpoint, which sees public debt as a resource transfer from one nation to another. According to the Ricardian hypothesis, changes in public expenditure or public debt leads to similar changes in private saving; hence there is no effect on the actual economy (Ricardo's, 1951).

Mankiw (1998) Missing debt planning; claim that fiscal policy that generates excessive debt (greater public debt) might hinder long-term growth by discouraging private investment, despite claim that this influence is minimal in terms of numbers. If there is policy ambiguity or the

anticipation of future confiscation, the negative growth effect of public debt may be more pronounced.

According to Modigilani.F (1961) Future generations are burdened with the public debt, which lowers the stock of private capital and, in turn, lowers flow income. Particularly public debt may have a detrimental effect on economic growth by discouraging private investment. In the long run, interest rates could significantly rise if a large share of government operations is funded through debit. Even though the current generation benefits from an increase in debt, future generations will still incur costs. The growth burden of public debt will only be partially or entirely offset if borrowed funds are used to support productive capital formation activities that ultimately increase the real income of future generations. Taxes are frequently used to cover debt interest. As a result, the capital stock and economic growth are reduced as well as the tax payer's lifetime consumption and savings.

2.1.3 Public debit and inflation

One of the main goals of government policy is to regulate the macro economy and maintain price stability. A consistent rise in the cost of market goods and services that related to a decline in the purchasing power of money is referred to as inflation. Countries must be used government debt wisely to increase nation's production capacity in order for the government to control this economic phenomenon.

In neoclassical theory of debt-financed deficit financial resources come from the private sector when the government starts a project, whether it is paid for with taxes or borrowed money. One typically assumes that when tax money is used, the majority of the resource is taken away from the person and put toward consumption. If this supposition is true, debt financing will leave the next generation with a low capital stock. As a result, its future generation will be less productive and more susceptible to inflation due to increased demand.

According to the demand-pull hypothesis of inflation, price increases are caused by an unexpected surge in demand relative to supply, assuming that the economy is at full employment. Perlman (1965) The size of the excess demand would determine how much inflation pressure exist there. Either the Keynesian fiscal theory or the quantitative theory of money could be used to combat demand pull inflation. The incidental role played by the money supply in the inflationary process, in which prices rise in direct proportion to the level of money

supply, is highlighted by quantitative theory. However, the fiscals' thesis stressed how factors like government spending and public debt have a fiscal impact on inflation.

From international monetary fund (IMF) working paper prepared by Akitoby et al (2014) explores how the public debt to GDP ratio in the G-7 countries is affected by low or high inflation. We find that there is an inverse relationship between public debt and inflation; in advanced economies, higher inflation somewhat lowers the public debt - GDP ratio.

Forslund et al (2011) According to an analysis of the data set, which included 1558 observations made in 104 developing countries between 1990 and 2007, inflation rate had adverse and insignificant impact, demonstrating that monetary worthiness is a track to the domestic loan market's expansion. Despite the fact that government debt and inflation are closely related, each country experiences it differently. Because governments need more of their own currency to pay their debts when there is inflation, the quantity of debt that must be repaid increases.

Aizenman and Marion (2011) Look how inflation helped the United States reduce its debt from 108 to 40 percent of GDP following World War II. However, inflation drives up debt, particularly short-term and international debt.

UN (2015) report, states that over the forecast period, the average inflation rate in developing economies slowly declines. Inflation in Africa decreased to 6.8% percent in 2016 as a result of tighter monetary policy and moderated import prices, while south Asian inflation is expected to remain between two and three percent in 2016. The pressure on inflation has decreased across the board in western Asia as a result of lower inflation rates, but this nation's debt load is growing.

2.2Empirical literature review

Numerous empirical macroeconomics studies have offered contradictory or inconsistent findings regarding the connection between public debt, inflation, and economic growth in both developing and established nations. By and large, empirical studies have demonstrated either a negative or positive association between the variable. Cross-country data used regression has been employed most frequently in empirical research on the relationship between public debt, inflation, and growth to arrive at diverse results.

Ezekiel et al (2020) Investigate long run impact of public debt and inflation on economic output expansion by using augmented distributed lag model approach to the estimation of dynamic

heterogeneous panel data collected from 40 different countries. We find that debt and inflation have a long-term negative impact on economic growth. It suggests that if the debt to GDP ratio rises and this increase becomes permanent, it would eventually have adverse impact on economic output. However, the increase is temporary; there won't be a long-term growth effect as long as the debt/GDP ratio returns to its normal level. Because of this, there is no universally applicable threshold effect in the link between public debt, inflation, and economic growth.

The macro panel research by Robert Barrow (1997), which analyzed data from 100 nations over three decades, is the one that has received the most citations about impact of inflation on economic output growth. He argues inflation rates above 15% are unquestionably detrimental to economic growth. However, no appreciable degree of inflation could be found in nations with average inflation rates under 15%.

Taghavi.M (2000) Investigate the link between growth, public debit and inflation and in advanced countries Germany, United Kingdom, France and Italy through the period 1970-1997. The vector auto regressive (VAR) estimated technique was employed in the investigation. The analysis found that government debt looks inflationary mostly over the long term, despite the fact that these four countries had more control over their deficits than their debt. There was no discernible trend regarding inflation during the short term. In all of these countries, the study's pair-wise causality test revealed that government debt had a three- to five-year lag on inflation. However, the study concluded that, based on accumulating empirical data, national debt might have a considerable adverse effect on inflation. He looks into how public debt affects investment, inflation, and growth in the sizable European economy using a hybrid co-integration and vector autoregressive approach. In contrast, neither growth nor short-term inflation are being significantly impacted.

Cohen (1993) Make the case that the relationship between public debt and economic growth is not linear, implies that investment rises to a particular level when foreign state debt increases. Beyond that point, debt overhang will deter investors from lending the government money. As interest rates rise, economic growth will inevitably slow down. Through a number of ways, high amounts of public debt can have a negative effect on economic growth. One of the most important channels is long-term interest rates.

Nguyen (2015) Using approximate approaches of various panel GMMs, the study empirically

investigates the relationship between public debt and inflation with economic growth over the 1990–2014 periods in 60 Asian, Latin American, and African nations. The anticipated result shows that inflation has a significant beneficial impact on public debt in the direction from public debt to inflation. The fact that the chosen Asian country's fiscal strategy depends on a sizable quantity of debt to fund its budget deficit shows that inflation, despite having a negative, significant impact on public debt, is inflationary.

Hassan H et al (2012) They found no compelling statistical evidence that external debt had a negative impact on GDP growth in Bangladesh from 1980 to 2012 in their study on governmental debt and economic growth. The analyses of the paper made use of the enhanced dickey-fuller test, the Johansen co-integration test, the error correction model, and the vector error correction model. The data shows a significant relationship between total public debt, government reserves, and investments. Government subsidies, on the other hand, don't work well with the manufacturing sector. However, there is no solid statistical evidence that indicates that external debt has a negative impact on GDP growth. Domestic debt, on the other hand, was found to have a slight but significant negative association with GDP.

Richard S. et al (2020) This study employs empirical research on the effect of public debt on Uganda's economic growth using the auto regressive distributed lag model (ARDL) bounds testing approach. The results show that while public debt has a longer-term, mixed impact on Uganda's economy, it has a short-term, significant negative impact on economic progress. Total debt service has a negative impact on the economy, whereas gross debt as a percentage of GDP has a positive impact. The finding also agreed that Uganda's economic growth was negatively impacted temporarily by governmental debt.

Boukrain (2021) Analyze the connection between inflation, state debt, and economic development in the Tunisian economy using VAR on quarterly data from 2010 to 2019. The results show that external debt and loans have considerable long- and short-term effects on inflation. Long-term inflation is impacted by a number of factors, including slow economic development, rising wage expenses that are passed on to consumers, mounting external debt, and depreciating national currencies.

Blidric.M and O.Ersin (2007) Examine experimentally, for nine countries between 1980 and 2004, the economic relationship between inflation and domestic public debt using the OLSE and

VEC models. The findings indicate that higher inflation rates increase the cost of domestic debt in such nations. As a result, those nations borrow at higher interest rates and for shorter maturities as their debt to GDP ratios rise.

Ahmed M.jand Tariq K (2012) Using the OLS estimator, this work empirically examines the relationship between domestic debt and inflation in Pakistan from 1972-2009. This study demonstrates that inflation is a significant problem in monetary countries, particularly in developing nations. According to the study, Pakistan's price level is raised by domestic debt and domestic debt servicing. The amount of domestic debt and the cost of financing estimated to have a significant impact on the level of prices, which leads to the conclusion that public debt contributes to inflation.

Harmon (2012) Explore how Kenya's state debt affected three key economic indicators from 1996 to 2011: interest rate, inflation and output growth. Using a descriptive study methodology and a straightforward linear regression model, it was found that there is a weakly positive correlation between public debt and inflation, whereas there is a negative correlation between public debt and GDP growth and interest rates.

Teklu (2014) An analysis of the impact of Ethiopia's external public debt on economic development showed that the model established a stable relationship with a negative and substantial coefficient and long-run equilibrium. External debt as a percentage of GDP in Ethiopia does not immediately affect real GDP but over time has a negative and significant relationship. Real GDP and capital formation are positively and significantly impacted over the short- and long-terms by investment and saving as a share of GDP, the study's control variable. Foreign public debt had a long-term debt overhang effect; despite the fact that the results indicated it had no short-term impact. However, only inflation and openness had no effect on growth or capital formation, while saving and investing had a significant and favorable impact.

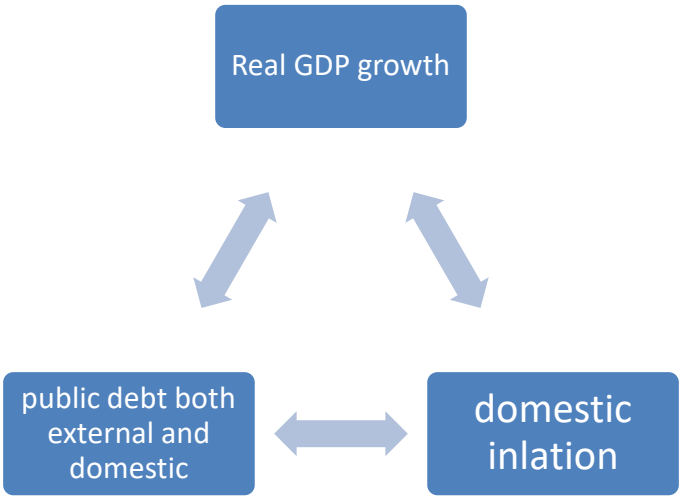
Using time series data from 1970-2017 Wondatir (2020) investigates empirically the link between Ethiopia's foreign state debt and economic growth by using ARDL model. Found that, over the long run, a high amount of public debt has a significant negative detrimental effect on economic growth and provides more problems to the economy. This demonstrates the conventional notion that Ethiopia's public debt is overhanging and that the servicing of the nation's public foreign debt has higher obstacle on economic growth.

2.3 conceptual framework of the study

From the finding of most of the papers cited in the forging paragraphs public debt has adverse effect on economic growth in developing country. Debt is divided in to production debt and dead weight debt. When a loan is obtained to enable the nation purchase some sort of asset, the debt is said to be productive. However, debt undertaken to finance wars and expense on current expenditure are dead weight debts. When a country obtains a loan from abroad, it means that the country can import from abroad goods and services without export revenue. These two types of debt, however, require that the borrower future saving must cover the interest and principal payment (debt servicing). Current inflation is important for future economic growth in most studies reviewed above.

In general, there are conflicting theories and empirical findings regarding the relationship between economic growth, public debt and inflation. However, in case of Ethiopia, government increases its debt level to mandate higher inflation by importing goods from abroad and increase productivity of countries' economies. But increase in public debt can leads to crowding out of debt over the economy and case of inflation at the time of debt financing by increase government money supply. Excessive public debt level can erode market confidence and increase uncertainty about a government ability to serve its debt, on the other hand in certain situation public debt can be used for productive purpose, such as investment in capital asset, for example GERD financed from domestic debt. In real term inflation erode the value of money and can reduce the burden of debt, But inflation cannot reduce public debt burden when debt is external. Moderate inflation have important contribution for growth due to positive associated with more conductive environment for investment and facilitate efficient resource allocation. On the other hand high and volatile inflation can create uncertainty, distort economic decision and eventually leads to lower productivity and growth.

Figure 3.1 Diagrammatic representation of conceptual frame work

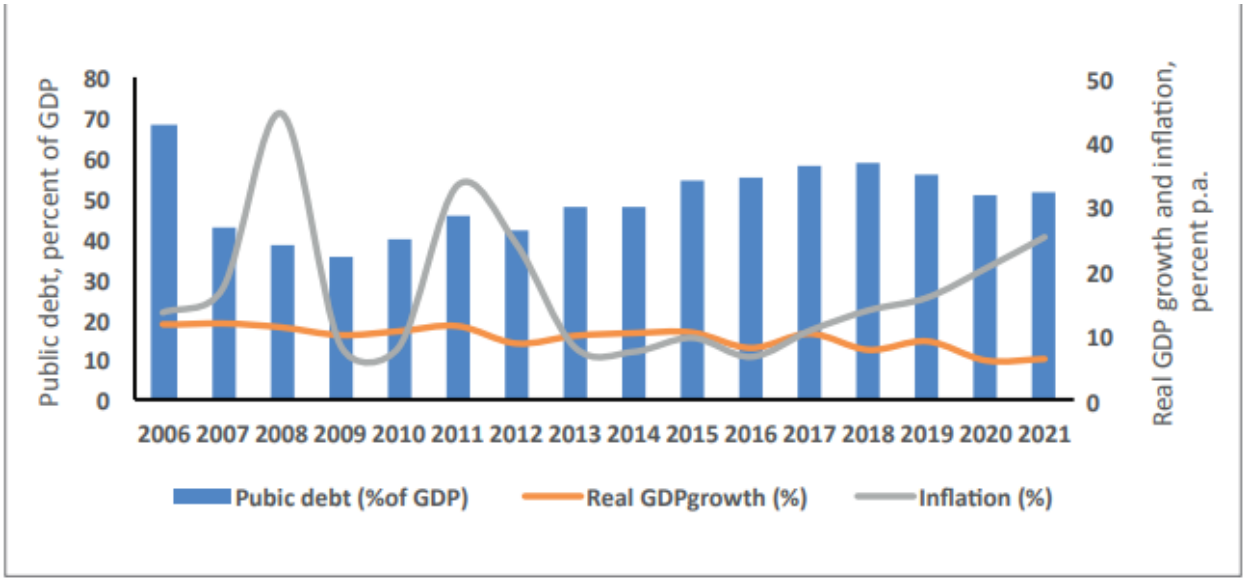


CHAPTER THREE

3. OVER-VIEW OF INFLATION, PUBLIC DEBT AND GROWTH IN ETHIOPIA

Ethiopian economy experienced several up and downtrend in inflation and growth throughout previous forty years. Ethiopia was generally recognized as a minimum inflation registered country with modest economic expansion prior to 2003. Inflation averaged 7.5 percent throughout this time, while growth averaged 2.6 percent. However, the nation has recently seen severe inflation. Additionally, there is a significant amount of state debt in Ethiopia. Due to Ethiopia's low tax revenue productivity and the country's trade and investment imbalances, it is unclear over the contribution of internal and foreign public debt to economic growth (NBE report 2020/21).

Figure 3.1 graphical presentation of public debt, inflation and GDP growth from 2006-2021



Data sources: International Monetary Fund, World Economic Outlook October 2021 database (IMF-WEO, 2021).

Figure 3.1 illustrates Ethiopia's real domestic growth product, public debt (internal and foreign), and inflation from 2006 to 2021. Ethiopia's public debt decreased practically continuously, from 68 percent in 2006 to 35 percent in 2009.However, the debt index has been progressively declining, with the public debt to GDP hitting 58.5 percent in 2018. The inflation rate decreased in 2009 to 8.1%, but actual economic growth did not alter significantly during the period, with the exception of real GDP declines in 2019 and 2020 of 6.3 and 6.1 percent, respectively.

3.1Over view of public debt in Ethiopia

The total amount of fixed-term direct government commitments that are still in force as of a specific date is known as the public debt. It covers domestic and international liabilities including loans, shares of other securities, currencies, and money deposits. It is the total amount of the government's liabilities, less the amount of stock and financial derivatives that it owns. The primary economic policy worry for governments of developing nations worldwide continues to be public debt. In order to resolve and fund the debt burden of LDCs, the debt level among high indebted poor nations and low-income countries generally has long been a serious challenge for international financial institutions and bilateral leaders.

International Development Association (IDA) and IMF (2018) states that Ethiopia continues to face a high risk of external debt distress and, consequently, a high risk of overall debt distress, predicted external current account deficit for 2017/18 was 6.4% of GDP, although over the long run, improvements in export performance, a modest rise in capital goods imports, and a continuous stream of remittances can all contribute to a gradual narrowing of the deficit. Economic transformation can reduce the import of public capital goods while increasing exports that are more dynamic and diverse.

In terms of debt loads, information from the National Planning Commission shows that at the end of June 2019, there were 27.05 billion dollars in total internationally outstanding loans, which is 4.9% greater than the previous year (2018). on the other hand, overall amount of outstanding loans to the central government increased by 8.2%, despite a 3.6% reduction in non-government guaranty loans. Two of the more pressing issues for external stability are the relative variation of foreign exchange rate viability and its connection to the variability of macroeconomic fundamentals like inflation.

Between 1991 and 2019, Ethiopia's government debt as a percentage of GDP averaged 35.34 percent, reaching an all-time high of 60 percent in 2018 and a record low of 24.70 percent in 1997.By comparison, as of the end of June 2018, 61.8 percent of all public debt and public grants were external debt.

Table 3.1 external public debt (In millions of dollars)

Particulars	2017/18	2018/19	2019/20	2020/21	Percentage change		
	A	B	C	D	E=B/A	F=C/B	G=E/D

Annual debt	3511.4	2788.6	3100.4	1407.29	-20.6	11.2	-1.14
Debt stock	25811.49	27075.59	28889.92	29502.90	4.8	6.0	7.2
Debt/GDP ratio	30.63	28.23	26.84	27.16	-7.9	-5.6	-2.43

Sources: MoF (2021/2022)

Table 3.2 domestic public debt

End of period	Total domestic public debt	Total public Debt/GDP %
2011/12	189080.8	44.57
2012/13	233404.3	39.36
2013/14	300026.6	44.10
2014/15	393421.7	44.15
2015/16	490230.3	50.74
2016/17	631092.7	51.80
2017/18	784633.1	55.28
2018/19	963699.9	58.45
2019/20	1190705.3	54.70
2020/21	1175939.31	53.79

(Sources: NBE)

Recent developments in Ethiopia's public debt situation brought to mind how the homegrown economic reform (HGER) identified a macroeconomic imbalance that the country's economy was currently experiencing: a heavy and quickly increasing public debt burden. It asserts that when there is a rapid increase in foreign debt in the context of poor project execution and export performance, there is a high risk of debt distress. The Ministry of Finance and Economic Cooperation published the Public Sector Debt Statistics Bulletin, which covers the fiscal years 2016/17 to 2020/21 and the years prior to this one.

According to the national bank Bulletin, the total public debt stock as of September 2020 was USD 54.7 billion, of which USD 29 billion is public debt denominated in foreign currency and USD 25.7 billion is public debt denominated in local currency. That issues fiat money (such as

the Ethiopian Birr) is always able to repay any amount of debt using its own currency. Although there is another risk such as inflation, a decline in confidence in the value of the currency, and so forth, theoretically there is no risk of defaults or the inability to service debt in its own currency. On the other hand, if the economy does not produce a significant quantity of hard currency income through various mechanisms, such as export of goods and services, public debt that is mostly held in foreign currencies has the potential to pose many issues to the economy. Given the persistent shortage of hard currency in the Ethiopian economy, any increase in the national debt, which is primarily made up of foreign currency poses serious macroeconomic risk to the nation.

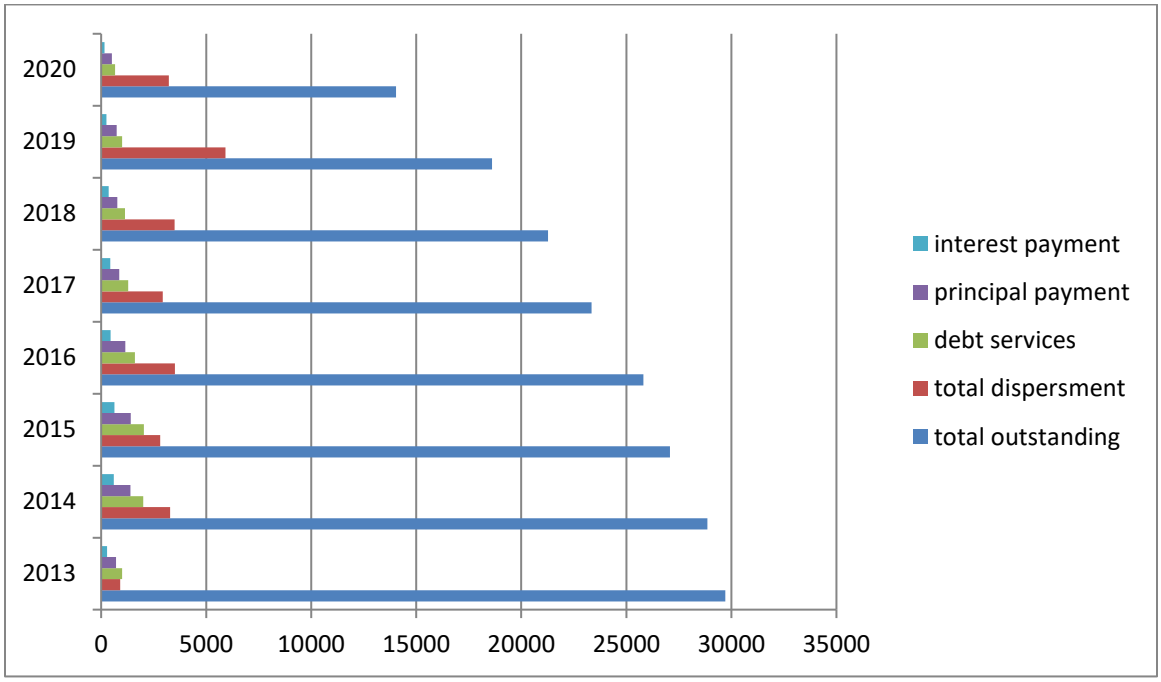
Between the fiscal years 2017/2018 and 2019/2020, the country's external debt climbed by 3 billion dollar or 12 percent increment and practically all of which are controlled by the central government. Since government-controlled enterprises no longer borrow abroad since the present administration took office, foreign currency-denominated external debt has continued to climb in other areas. The overall cost of repaying external debt, which was approximately US $1.6 billion in 2018 but grew to US $2 billion in the 2019/20 fiscal years, represents a 25% rise. Both multilateral and bilateral creditors made up 73.73 percent of total external debt in 2017/18.

According to the Bulletin, there has also been a significant growth in internal public debt, which went from 160.13 billion birr in 2017/18 to 230.24 billion birr at the end of 2019/20. This increase represents a 44 percent increase in internal public debt. Since one arm of the government is lending to another arm of the government, lending or direct advances from the central bank to the government are not considered debt in the conventional sense; rather, they are a way to inject more money into the economy (monetizing the budget deficit). The risk associated with this type of debt is related to its impact on inflation rather than the burden of debt. In reality, this is one of the main causes of the high degree of inflation that has been seen in recent years.

The commercial bank of Ethiopia (CBE), which was given money by the minister of finance and economic cooperation, is the owner of a sizable amount of debt that is held by a handful of state-owned firms and is primarily denominated in local currency. Given that both the lender and the borrower are state-owned businesses, the stability of both their financial and economic systems pose a greater difficulty than simply servicing the debt. In fact, money that was poured into the

economy but was not put to good use increased inflationary fuel in the economy, which reduced the population's purchasing power. Domestic public debt of the Ethiopian government was birrs 281862.6 billion, which was 17.4% more than one year prior.

Figure 3.2external loan performances from the year (2013-2020)



Source: MOF public sector debt bulletins (2021)

Currently the Ethiopia contracted debt between external creditor and central government in comprise of public enterprise, Ethiopian electric power (EEP), Ethiopian Sugar Corporation, Ethiopian Railway Corporation (ERC), Ethiopian Shipping Lines (ESL), grants from the MOF and state-owned bank (CBE), Ethiopian airline, and Ethio telecom are the key beneficiaries (NBE, 2020). Between 2013 and 2020, the overall amount of outstanding central government and non-government guaranteed debt increased, whereas government guaranteed debt somewhat decreased.

3.2 Over view of inflation and Ethiopian economy

Inflation is the broadening of price increases for commodities and services. According to a study of historical inflation and growth trends in Ethiopia, the Ethiopian economy has seen various stages of inflation and economic growth during the previous 40 years. This trend is related to downplaying changes in economic strategy and how economic actors respond. In Ethiopia, the

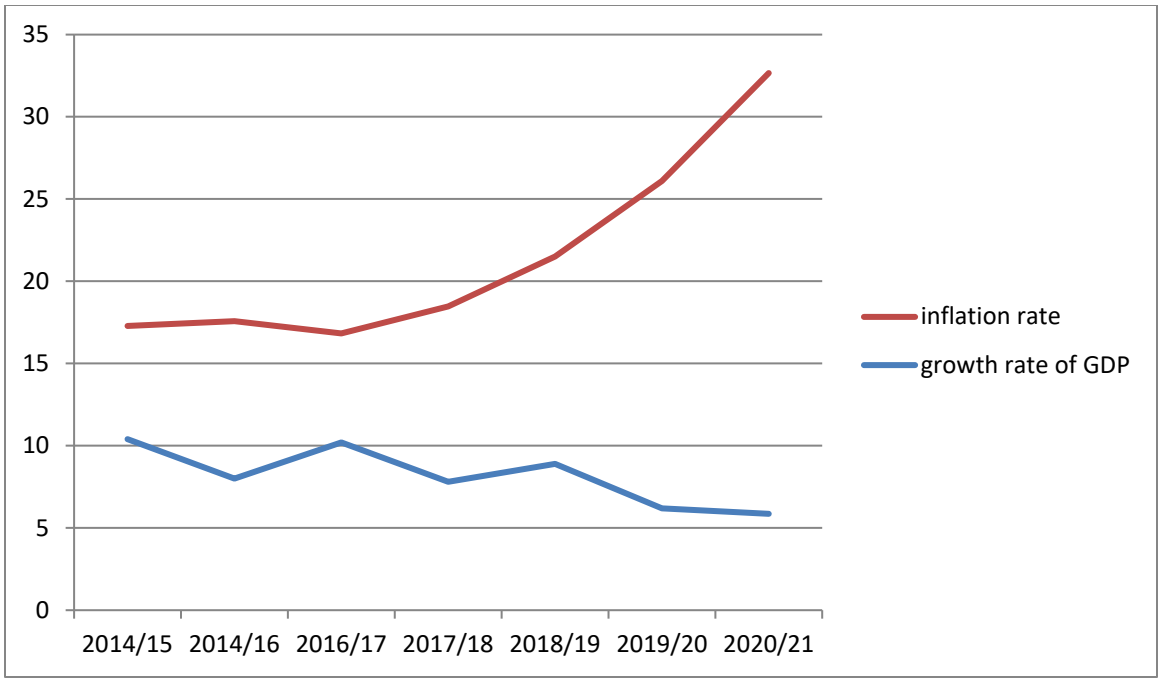
relationship between food prices and agricultural output or rainfall availability has historically been inversely related. Most of recent history has had modest levels of inflation. Despite the fact that occasionally extreme weather causes price variations, the pricing remained steady.

During the imperial era and derg, inflation was not a problem in Ethiopia. However, recently due to the various economic reforms measure and pressure of international price hikes such as the price of oil and other material inflation is rising with a higher rate. According to the National Bank of Ethiopia's report, data for the years 1974 to 2017 indicated a direct correlation between inflation and money supply growth of 9.84 and 16.45%, respectively. From 1974 to 1990, the averages were 8.32 and 12.54 percent, and from 1991 to 2017, they were 10.76 and 18.60 percent, respectively. This number unequivocally demonstrates the link between rising inflationary pressure and the broadening of the money supply.

Except for the years of supply shock and war, Ethiopia had a low inflation rate prior to 2003, with a single-digit low level. Because prices were regulated by the government and the government itself provided goods and services to the public at fixed prices during the derg era, inflation in Ethiopia was lower. For instance, the country's average inflation rate from 1971 to 2003 was 7.5 percent. In this time frame, 1991 to the year that the civil war came to a conclusion and the FDERE government assumed power to saw the highest inflation rate at 45 percent. The average growth rate for the same time period was 2.7 percent. However, from 2004 to 2014, inflation began to increase fast, with an average annual rate of 17.7 percent and a peak of 36.5 percent in 2008. The average growth rate over the same time period was 10.7%, despite higher inflation. Agricultural supply shock, imported inflation due to international price shock, and accommodating monetary policy are the main causes of greater inflation at this time (durevall, 2013) Before the failed election in 2005 and the subsequent violence, inflation was generally not a problem for the Ethiopian economy.

Recent development in consumer price level

Figure 3.3 annual average inflation rate and economic growth rate in percent



Sources: (CPI, World Bank)

From 12.6 percent a few years ago, the average head line inflation increased to 19.9 percent now. This was primarily caused by an increase of 10.2 percent in the price of food and nonalcoholic beverages from 13.1 percent to 23.3 percent and an increase of 3.9 percent in the price of non-food from 11.9 to 15.8 percent. As a result of higher price inflation for bread and cereals (14.1 percentage point), fruit (12.1 percentage point), food products not classified everywhere (10.8 percentage point), vegetables (10.7 percentage point), non-alcoholic beverages (10.6 percentage point), oil and fat (10.4 percentage point), and meat (5.7 percentage point), the annual average food and non-alcoholic beverage inflation scaled up to 23.3 percent from 13.1 percent last year, depicting a 10.2 percentage annual increase.

The average annual rate of non-food inflation also increased by 3.9 percent, to 15.8 percent in 2019/20, as a result of higher inflation in the following categories: alcoholic beverages and tobacco (11.9 percentage point), transport (11%), housing, water, electricity, and other gas and fuel (9.6 percentage), restaurant and hotel (4.3 percentage), recreation and culture (2.8 percentage), and miscellaneous goods (0.8 percentage point).

Table 3.3: annual average inflation rate in percent

Items	Weight	2018/19	2019/20	2020/21	Change(%point)	Contribution to

							headline inflation(%point)
		A	B	C	B-A	C-B	D
General	100	12.6	19.9	20.2	7.3	0.3	7.3
Food and nonalcoholic beverages	54	13.1	23.3	23.2	10.2	-0.1	5.5
Non-food	46	11.9	15.8	16.4	3.9	0.6	1.8

Sources: NBE bulleting, 2020/21)

3.3The performance of the Ethiopian economy

Prior to 1990/91, Ethiopia's economic system was primarily defined by centralized planning for resource mobilization and allocation, as well as governmental control of the majority of the economic sector and infrastructure nationwide. The private sector lost out on its complementary role in bolstering the nation's economic growth and raising the standard of living for the people. In the 1980s, economic growth and performance were dismal, averaging just 2.4 percent annually.

After the government changed in 1991, a program of economic reform was put in place with the understanding that the country's economy would suffer as a result of the prolonged civil war and food security issues that would result in intensive central planning. The economy has been liberalized through a series of policies that attempt to boost economic development, lower inflationary pressure, improve the balance of payments, and build up foreign exchange reserves. This marked a turning point in Ethiopia's economic history where the government methodically pursued a market-oriented economy by delegating more authority to the private sector and streamlining its own position.

Consequently, economic growth was evident Compared to the 1980s, when the real average climbed by 4.2 percent, it increased by 5.1 percent from 1991/92 to 2001/02. Agriculture output growth increased by 2.7%, the service sector by 7.1%, and the industrial sector by 7.5% during this time. However, due to erratic weather phenomena and the battle with the Eritrean government in the 2000s, the general growth during the 1990s was quite unstable and saw both contraction and rescission.

Meanwhile, agricultural growth shows up and down fluctuation from 1991 to 2020 the growth rate of this sector at this time is better performance or positive growth rate. Industrial growth rate registered higher performance during 1991 which is 27.1 and lower at 2006 (0.8%). service sector also registered higher performance during 1991 (20.7%) and low performance during the years 2001/02 (1.7%).

Since 2003/2004, Ethiopia's economy has had significant and consistent growth, growing by 10.3 percent annually on average; this is mostly due to a public sector-led development plan that prioritized infrastructure development. While the industrial sector is only somewhat assisting in accelerating the economy, the rise of the agriculture and service sectors was a key factor. As a result, the percentage of agricultural output decreased steadily from 51.6% in 2003/2004 to 33.3% in 2018/19. The service sector improved from 37.8 percent to 48.6 percent, and the percentage of industrial output in GDP climbed from 10.6 percent to 18.1 percent, demonstrating a rising dominance of the two sectors in the expansion of the national economy.

The economy has been growing steadily during the 2000s. The strong increase in agricultural harvest, increased inflow of foreign aid that helps the nation resist the shortfall in export revenues, and improvement to the macro environment, including narrow grosses of fiscal deficit and slow grosses of monetary aggregates, were primarily responsible for the growth performance.

Table 3.4 the performance of economic growth by sector level (%GDP)

Years	growth rate in Real GDP	growth rate in Agricultural	growth rate in Industrial	growth rate in Service sector
2012/13	9.9	3.1	2.8	4.1
2013/14	10.4	2.3	2.8	5.4
2014/15	8.7	4.9	19.6	9.6
2015/16	8	2.3	22.2	8.7
2016/17	10.1	6.7	20.3	7.5
2017/18	7.7	3.5	12.2	8.8
2018/19	9	3.8	12.6	11
2019/20	6.1	4.3	9.6	5.3

Source: (EEA 2020)

Ethiopia has had some of the greatest economic development in Africa over the past 20 years, but this expansion has frequently been accompanied by high levels of inflation and external debt. In Ethiopian politicians' discussions of economic growth, this inflationary growth process has taken center stage (EEA, 2020).

In its successive blueprint, the sustainable development and poverty reduction program (SDPRP), the plan for accelerated and sustainable development and poverty reduction program (SDPRP), and the growth and transformation plan (GTP) in various phases, the government emphasized its focus on broad-based growth and poverty reduction through enhancing growth and transformation the structure of the economy.

The Ethiopian economy has performed remarkably during the past ten years in many different ways. Agriculture makes up the majority of the economy in Ethiopia, contributing to over 42% of GDP and 80% of jobs. To accomplish the governments nebulous aims the country's five-year development and transformation plan (GTP) for five successive periods. From 2010 to 2015, Ethiopia's GTP placed a strong emphasis on industrialization and agricultural transformation as the main drivers of growth. The goal of the GTP is not achieved despite the fact that the economy is growing due to favorable weather conditions and an increase in the area of land cultivated in the agricultural sector, due to a variety of reasons (lack of infrastructure, limited credit availability for the agricultural sector, poor management, rising costs of agricultural inputs, lack of an agricultural product market, etc.).

The goal of the second Growth and Transformation Plan (GTP II) 2015/16-2019/20 is to continue the rapid and inclusive economic growth that has been achieved over the previous twelve years, ending in 2014/15. The plan, which is based on the development and accomplishment of GTP I, aims to attain an average annual economic growth rate of 11 percent during the plan period. On average, nevertheless, over the GTP II period, real GDP growth slows to 8.9%. This is a result of slower average growth in the industrial sector (16.4%), services (9%), and agricultural output (4.1%) compared to the GTP I period.

Over the past 20 years, the service sector's contribution has increased. The swift expansion of financial intermediation, public administration, and retail commercial activity was the primary driver of this tremendous growth in service. Even though the service industry has contributed

more than 10% of GDP over the past three years, tourism has become a smaller source of foreign exchange due to various factors (the global COVID pandemic, turmoil, and the country's political crises).

Although Ethiopia's industrial base is still quite tiny, there are plans for new projects in the steel, chemical, and pharmaceutical industries, which bode well for this industry's growth. Given the importance given to industrialization in the government strategy, both for export and import substitution, this trend is anticipated to continue.

Ethiopia's prospects for overall growth are positive, with government spending on infrastructure, agricultural reform, and non-traditional exports all expected to contribute to growth. There are, however, a number of hazards that could hinder future growth, including hyperinflation, a large foreign public debt, a lack of debt financing, a slowdown in the world economy, and droughts that occur frequently. The current state of the Ethiopian economy is marked by high inflation, a lack of foreign currency, a significant trade balance, a budget deficit, and massive debt (Alemayehu, 2019).

In general, this section shows the causal and inters relationship between variables in Ethiopia case under studies.

CHAPTER FOUR

4 METHDOLOGY AND DATA

In assessing the casual relationship between the variables GDP growth, inflation and debt most authors used vector auto regressive (VAR) and vector error correction (VECM) frameworks. But both the error correction mechanism model (ECM) and the auto regressive distributed lag (ARDL) method were used in this investigation because of the advantage on other method of analysis. The ARDL bound test approach was selected due to its many benefits. First if the regresses are I (1) and/or I (0), the ARDL approach can be used. Second, unlike other strategies require large data samples for validity, the ARDL model is statistically a more robust approach to determining the co-integration relationship between variables both in small and large samples. Third, the variable may have different optimal lags in ARDL technique. Finally, the ARDL test can be used to determine if a control variable is endogenous or weakly endogenous for a single reduced form equation and to assess the long-run relationships within a framework of system equations (Pesaran, 2001).

4.1 data sources and variable description

The study was based on secondary data sources from the World Bank, the International Monetary Fund, the Ministry of Finance, and the National Bank of Ethiopia (NBE). The relationship between public debt, inflation, and economic growth in Ethiopia from the years 1981 to 2021 will be examined in this study using time series data.

4.2 Model specification

As it is discussed in the literature there is no single statistical and empirical analysis method to access the relation between variable. The theoretical framework adopted by this study is borrowed from the work of (Lopes daviga et al, 2014)over the analysis economic growth, national debt and inflation on African economies. Additionally, the augmented Solow model and endogenous growth theory were used as theoretical review literature. Stanly Fisher devised a macroeconomic policy to growth in order to find potential channels. He also identified the responsiveness of growth to the foreign currency market and the national financing of deficits, and he examined casual relationships and the channels they operate via for the construction of

equations.

The empirical side's model developed by (pesaran et.al, 2001) ARDL and causality test developed by Engel and Granger, (1987). This section develops a model for real growth domestic product.

The growth equation is derived from the aggregate production function which depends on labor and capital but also encompasses other variables. The production function of the neo classical growth theory is expressed as $Y_t = f(K_t, L_t A_t)$……4.1

It is supposed that variables like trade openness, government debt and inflation are some of the most plausible factors that influence the growth rate of an economy.

Y_t= output at a time t

K_t= capital accumulation at a time t

L_t= labor input at a time t

A_t = exogenously determined level of technology or level of productivity at time t

$Y = AL^{\alpha}K^{\beta}$

$\log y_t - \log y_{t-1} = \log A_t - \log A_{t-1} + \log K_t - \log K_{t-1} + \log L_t - \log L_{t-1}$…….4.2

Endogenous growth models allow a linkage between public policies and growth in the long-run by assuming aggregate production functions that exhibit non-decreasing returns to scale.

The production function is an economic concept that represents the relationship between inputs and outputs in the production process. It shows how much output can be produced from a given combination of inputs, such as labor, capital, and technology. Now, let's connect these concepts. Inflation, public debt, and money supply can affect the production function in several ways.

Inflation can increase the cost of production by raising input prices, such as raw materials, wages, and energy. When input prices rise, firms may need to reduce their production or increase prices, which can impact the overall output level. Higher public debt can also lead to increased government spending, which may put upward pressure on prices and production costs.

Public debt can crowd out private investment by absorbing a significant portion of available funds in the economy. This can reduce the amount of capital available for businesses to invest in new technologies, equipment, and infrastructure, which can negatively impact productivity and the production function. Additionally, a high money supply growth rate can lead to inflationary expectations, which can discourage long-term investment and capital formation.

An increase in the money supply or expansionary monetary policy can stimulate aggregate demand and potentially increase output, conversely decrease in the money supply or tighter monetary policy can reduce aggregate demand, leading to lower production levels.

In addition to production function, equation developed from identity equation is also used to develop the growth equation.

Y=C+I+G+NX……4.3

Y=GDP, the term C is private consumption, the term I is investment negative relation to interest rate, G is government expenditure, and NX is export minus import i.e. positive relate with real exchange rate. On the base of this determination of real GDP the above relation convert to the following equation.

$GDP = \alpha - \beta_1(\gamma) - \beta_2(q) + \beta_3(g)$……4.4

Where, γ is real interest rate, i.e. the difference between nominal interest rate and inflation $(r - inf)$. q, is real exchange rate positive related with net export. g, is government expenditure. When government increase their expenditure above revenue (T-G <0) debt is one means of financing a deficit. We shall denote by G_t the government spending at period$t$, andT_t, tax at period$t$. Let as G-T>0 there is a deficit in the budget, debt equation,

$PD = (1 + r_t)PD_{t-1} + G_T - T_t$

G_T=PD-$(1 + r_t)PD_{t-1} + T_t$

The total government deficit, which is equal to the change in government debt, is equal to the sum of interest payment and the primary deficit G-T (debt).

PD is total public debt and $r_t$is interest rate,

Trade openness equation ($\frac{X+M}{Y}$) also generate from identity equation NX (X-M).

Top = $\frac{X+M}{Y}$ and NX =X-M, X=NX+M

Top= $\frac{NX+M+M}{Y}$ then NX=TopY+2M, positive correlated with real effective exchange rate.

X and M represent export and import respectively.

We substitute the above equation in identity equation Y=C+I+G+NX

$GDP = \alpha - \beta_1(r - \inf t) - \beta_2 RER + PD - (1 + rt)PD_{t-1} + T_t + \mu$ … … … 4.5

RER denotes real exchange rate, and T donate government revenue from tax. Public debt relates the identity equation through government deficit financing (i.e. government

expenditure is greater than government revenue).

AS or GDP = f (L, K, A)
Y=GDP then f (L, K, A) = C+I+G+NX

In the supply side, producers need resources such as labor and capital to produce output. According to neoclassical economists, output is also determined by total factor productivity Fischer S. (1994). The employment of labor and capital depends on their factor prices, wage and interest rate respectively.

The identity equation assumes that the decision whether to consume or invest a saving depends on the real interest rate. Nominal interest rate depends on, among others, total money supply in the economy. Net exports are represented by exchange rate Exchange rate policy that promotes exports encourages production.

Complied the variable of model from the aggregate demand as well as aggregate supply part of macro frame work discussed above. The research in this study believed that such completion of factor from demand as well as supply side may help policy maker to identifies factor from two sides and taken measure that can affect either side without affecting the overall performance.

Based on the variable related with production function and the work of other researcher like; (Berehanu et al., 2020), (Mengistie, 2022)in Ethiopia use variable in growth equation is important for the inclusion of variable in my work. It is supposed that variable like growth rate of labor force, debt, inflation and trade openness is the most important factor that influences the growth rate of the economy

Specifically, the growth equation can be modeled as follows

GDP = f (INF, DPD, TOP, L, EPD) Where

$$\ln GDP_i = \beta_0 + \beta_1 \ln INF_i + \beta_2 \ln PDE_i + \beta_3 \ln PDd_i + \beta_4 \ln TOP_i + \beta_5 \ln L_i + \varepsilon_i \quad \ldots\ldots\ldots\ldots 4.6$$

β_i, ε_i are respectively the coefficient and white noise error term

GDP = growth domestic product measured as areal term,

INF =Consumer price index (CPI) inflation measures the annual percentage change in the average consumer's cost of acquiring a basket of goods and services.

DPD = denotes total public debt which source is internal either national or commercial bank.

EPD= debt from external sources (i.e., ether bilateral or multilateral institution)

TOP = trade openness measures the effect of trade policy calculated as the summation of import

and export divided by growth domestic product.

L = indicates labor force participation rate as a percent of total population.

The model for empirical analyses presented as follow

Description and its prediction of variable

Real Gross domestic product (RGDP): is a general indicator of economic scale that has been modified to account for price variations over time. There is no such a strong and distinct association between these two macroeconomic variables, according to empirical and theoretical research. Gross domestic product, which for the sake of this study is calculated in local currency called birr, is the total value of all finished goods and services produced in a nation over a specific period of time. The number of products and services produced in a specific time period and their corresponding prices determine the market value of gross domestic product. Real gross domestic product (GDP) was used to measure the country's overall economic performance between 1981 and 2021 using its constant national currency.

Inflation The average consumer price index is used to compute rate as an annual percent change. The averages used to calculate inflation include the years 1981 through 2021. Basically, it seems reasonable to take the inflation rate as a variable to be explained in order to reveal the kind of link between the degree of inflation, economic growth, and public debt, and in fact many international studies adhere to this method.

Money supply: wide money that the money market receives. As was previously established in the theoretical section, we anticipate a positive relationship between inflation and the money supply.

Public debt both internal and external debt accumulated to cover expenditures is included in the total amount of government loans still due. The present Ethiopian debt increase is also utilized to anticipate a positive relationship with inflation. Public debt also has a positive relationship with GDP growth up to a specific threshold level.

TOP which is the sum of import and export divided by GDP and is anticipated to have a favorable impact on economic growth. (David Romer, 1993)If a country is more open to commerce it could be able to borrow technologies from other nations, expect to positive relation to economic growth.

LR (Internal Average Lending Rate) is the rate at which banks typically provide short- and

medium-term funding for various sectors that support a nation's economic expansion. The loan rate is determined by the financing's purpose and the borrower's creditworthiness.

DS Debt services repayments are claims made against the government and are thought to have a detrimental impact on economic expansion. When a government has a heavy debt load, the need to pay off the debt will inevitably have an impact on how production resources are distributed during the production process and retard output growth.

4.3 method of data analysis

The data would distribute into different table and figure to show the trend of how variables evolved over times. We would also to check the linearity and non-linearity among the variable. After the required data collected, we use both descriptive and econometrics analysis to identify the relationship between variables. The descriptive analysis used to qualitative aspect of the study while the empirical aspect used to examine the direction of the relation by different test.

Different economists agreed that time series data must be evaluated using time series econometric method due to the dynamic effect of time series data. Different researchers utilize the econometrics program iView for economic analysis to analyze this data.

The earlier study on the relationship between debts, inflation, and growth in developing countries used the Granger causality technique based on trivariate error correction model (ECM) to examine the causality link between variables and the ARDL (autoregressive distributed lag) model proposed by Psarian-shin-smith (2001) for co integration test.

The ARDL model is crucial to our cause since the model used to analysis three equations independently. The control variable can be estimated to be either exogenous or weakly endogenous using the ARDL model.

The primary goal of the study was to determine whether there was a linkage between public debt, inflation, and economic growth in Ethiopia. To do this, ARDL, which has gained a lot of popularity in recent years and is frequently used in empirical research due to its numerous advantages over traditional empirical analysis methods Eager granger (1987); Johnson (1990), was used. The ECM helps to assess the short- and long-term casual relationships between the variables. The following test will be run prior to applying the error correcting model. There are three types of tests: stationary, lag length estimation, and co-integration tests.

The stationary test, also known as a unit rut test, is a crucial approach for ensuring that all model

variables have a constant mean and variance. Forecasting future value is logical as a result. The vector autoregressive model was used to determine the lag length of the variable. We can use the co-integration test to look into the link between the variables if the unit root test shows the presence of non-stationary. In order to calculate the number of co-integration vectors for any given number of non-stationary variables of the same order, we utilize this test to see if there is a long run relationship among non-stationary variables (Rays, 2011).

The casualty test is used to determine whether the variables have any causal relationships. The causality test is used to determine which variable, given X and Y, is case (precedes) another variable. X is said to case Y if its lagged value accurately predicts Y or if the initial variable, X, has information about Y that makes it possible to predict Y's future value.

4.5Long run co-integration and error correction model

To determine whether an economy is, in the long run, convergent toward equilibrium or not, the error correction model test is crucial. The error correction mechanism (ECM), which explains the change in the explained variable by the change in the explanatory variable as well as divergence from the long run relationship between the variable and its determinant, should be used to analyze the short run dynamics. In other term it explains the achievement of the long run equilibrium of endogenous variables through short run adjustments. The co-integration term, known as error correction term, works to correct the deviation from the long run equilibrium through short-run adjustments. The estimation of the following co-integration regression would be valid if the order of integration is determined and made to be I (0) or I (1).

In the ARDL approach, each variable acts as a dependent variable in turn while estimating an unlimited error correction method. Empirical estimation has been done using the bound test for co integration, also known as the auto regressive distributed lag, keeping in mind the time series features of the data. If the variables are co-integrated in the short-run and long-run models, estimation is possible in two phases. The first phase of estimation involves determining whether the variables in the equation being estimated have any long-term relationships. Conducting an error correction procedure for long-term adjustment is the second phase. Each endogenous variable is employed as the dependent variable in the ARDL model, which uses the conventional log-linear functional specification of long-run relationships between variables.

$$\ln GDP_i = \beta_0 + \beta_1 \ln INF_i + \beta_2 \ln PDE_i + \beta_3 \ln PDd_i + \beta_4 \ln TOP_i + \beta_5 \ln L_i$$
$$+ \sum_{i=1}^{n} \alpha_1 \quad \Delta lnGDP_{t-i} + \sum_{i=0}^{n} \alpha_{2i}\, \Delta lnINF_{t-i} + \sum_{i=o}^{n} \alpha_{3i} \Delta ln\, PDd_{t-i}$$
$$+ \sum_{i=0}^{n} \alpha_{4i} \Delta PDE_{t-i} + \sum_{i=0}^{n} \alpha_{5i}\, \Delta lnTOP_{t-i} + \sum_{i=o}^{n} \alpha_{6i} \Delta ln\, L_{t-i}$$
$$+ \varepsilon_i \ldots\ldots\ldots\ldots 4.7$$

Where Δ are the first difference operator,ε_i is error term. While n is the lag length, the parameter β is the associated long-run multipliers for the underlying ARDL model.

After accounting for the variable's historical value, the unexpected movement in the variable constitutes the error term in this regression. If different variables are connected with one another, macroeconomics applications usually follow. The model's error term was then correlated with each equation.

For instance, the long-term relationship between the variables in the model (4.7) for growth domestic product is discovered by testing the alternative hypothesis of H_0=β1=β2..... βtdiffer from zero for joint significance of the lagged level variable against the null hypothesis of no co integration, i.e. H_0=β1=β2..... βt=0 The F- statistics that were produced as a result of this test are compared to two sets of crucial values (lower and upper bound values) that were provided by Nayran (2005). In the ARDL model, all variables are assumed to be I(0) in the lower set of critical bounds and I(1) in the higher set. If the estimated F- statics is higher than the upper bound critical value, the null hypothesis that there is no co integration is rejected. If the computed F-test is lower than the lower bound critical value, the null hypothesis that there is no co integration is not rejected. If the estimated F statics lie between the lower and upper bound critical values, the co-integration conclusion is not decisive.

4.5. The casualty test

Differentiating the casual relationship among economic variable is one of the most important and yet one of the most difficult issue in empirical investigation. To look at the basic granger causality definition support that we have three terms, y_t, x_t and z_t and that we first attempt to forecast x_{t+1} using past term ofy_t, x_t and z_t. These examine whether a variable with its lagged

values has any predicting ability on another variable. The F-statistic value determines the parameter under consideration is zero or different from zero (Granger, 1969). It was employed in this study to examine the causal relationship among economicgrowth, public debt and inflation.

The presence of co-integration alone does not indicate the direction of causality. Hence we need to test whether the relationship between variable is uni-directional or bio-directional. A sort of statistical relationship where the second occurrence is a result of the first event is known as a casualty relationship. To determine whether there are casualties between our variables, we utilize the Granger Casualty Test. The common Granger casualty test is to ascertain whether a variable's previous lag value helps predict change in the presence value of another variable.

$$\Delta GDP_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i}\, \Delta GDP_{t-i} + \sum_{i=1}^{n} \beta_{2i}\, \Delta INF_{t-i} + \sum_{i=1}^{n} \beta_{3i}\, \Delta PD_{t-i} + \beta_{4i} ect_t + \mu_t \dots\dots\dots\dots 4.8$$

$$\Delta INF_t = \gamma_0 + \sum_{i=1}^{n} \gamma_{1i}\, \Delta INF_{t-i} + \sum_{i=0}^{n} \gamma_{2i}\, \Delta PD_{t-i} + \sum_{i=0}^{n} \gamma_{3i}\, \Delta GDP_{t-i} + \gamma_{4i} ect_{2t} + e_t \dots\dots\dots 4.9$$

$$\Delta PD_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i}\, \Delta PD_{t-i} + \sum_{i=0}^{n} \alpha_{2i}\, \Delta INF_{t-i} + \sum_{i=0}^{n} \alpha_{3i}\, \Delta GDP_{t-i} + \alpha_{4i} ect_{3t} + v_t \dots\dots\dots 4.10$$

ECM= error correction term

T, p= lag length

μ_t, e_t, v_t = are random disturbance term

Where β_4, α_4 and $\gamma_4$are coefficient of error correction terms and use natural logarithm and the first difference to stabilize the model, andect_{it} are the lagged error corrections terms.

The error correction term contains the information on long-term casualty; whereas the significant coefficient of the difference lagged individual independent variable captures the short-term casualty. Long-term causality is indicated by a negative and statistically significant error correction term, but short-term causality is shown by the significance of the lag explanatory variable.

4.6 lag order selection

Before going to testing the long run relationship between the variable the optimal lag length for

ARDL model estimation should be determined. A maximum of eight lag length is initially imposed in AR process. Then, the parsimonious ARDL is selected using the Akaike information criteria and Bayesian criteria.

4.7Threshold Model Specification

The model is developed by Khan and Senhadji (2001) for the analysis of threshold level of inflation for industrialized and developing countries. Following the aforementioned work, this study is based on four-variable model consisting of economic growth, inflation, public debt both internal and external. To test the existence of threshold level in the relation between real GDP inflation and public debt GDP growth, first compute the residual sum of square (RSS) for threshold level of inflation and public debt individually ranging from lower level to upper. Threshold level of inflation is the one that minimize the sequence of RSSs. The test for the existence of threshold effect has been conducted using the full sample.

The threshold level of inflation is based on the following equation:

$$rGDP = \beta_0 + \beta_1 INF_i + \beta_2 PDE_i + \beta_3 PDd_i + \beta_4 TOP_i + \beta_5 L_i + \mu \ldots\ldots\ldots\ldots\ldots\ldots 4.11$$

Where, K is the threshold level of inflation (i.e., the rate of inflation and public debt at which structural break occurs) and μ is the random error term which represents measurement error in the explanatory variables. The dummy variable D is defined in the following way:

D = 1 INF > K

D= 0 if INF$\leq$ K and

D=1 PD>K

D= if PD<K

When trade openness and labor force are omitted from the model formulation, the equation to estimate threshold level of inflation can be written in the following conditional form:

$rGDP_t = \beta_0 + \beta_1 INF_t + \beta_2 D\,(INF-K) + \mu_t$

$rGDP_t = \beta_0 + \beta_1 PD_t + \beta_2 D\,(PD-K) + \mu_t$

The coefficient of the dummy variable β_2 measures the effect of inflation and public debt rate on the economic growth when it is greater than the assumed structural break level and the opposite for the coefficient of inflation and public debt rate β_1.In the above threshold model, the sum of the two coefficients ($\beta_1 + \beta_2$)represents the annual growth rate of economic growth when inflation rate is doubled. By estimating regressions for different values of **K** which is chosen in

an ascending order (i.e., 1, 2 and so on), the optimal valueof K is obtained by finding the value that maximizes the $\mathbf{R^2}$ from the respective regressions. This also implies that the optimal threshold level is that which minimizes the residual sum of squares (RSS). This procedure has become widely accepted in the literature on this topic. However, the process is tedious since it requires the estimation of the equation several times for different values of K. It is important to know inflation and public debt growth rate level to determine beneficial to economic development.

4.8 diagnostic tests

There should be the dependability of checking the post estimation tests in order to confirm the suitable result acquired in the estimate result. For dynamic models, the most important post-estimation tests include autocorrelation, normality test, model stability, heteroscedasticity test, stability test (CUSUM, CUSUMQ), and son.

Autocorrelation problem

Is the issue with time series models where a serial relationship between succeeding errors develops over time. The autocorrelation decision rule, Reject the null hypothesis of no autocorrelation if the likelihood of Chi-Square (2) is less than 5%, otherwise accept the null hypothesis of no autocorrelation.

Heteroscedasticity problem

When the distribution of the error term around the mean is not constant (there is no constant variance), heteroscedasticity is present. Although heteroscedasticity has no effect on the parameter's bias-freeness, it changes the minimal variance and efficiency features of OLS estimators. The decision-making process is based on accepting or rejecting the 5% probability null hypothesis of hetroscedasticity. One can rule out the homoscedasticity hypothesis if the computed Chi-square (x2) value is greater than the crucial x2 value at the selected level of significance. Otherwise, it would be recognized that the alternative theory.

Normality test

Whether or not the result follows a symmetric distribution of data is determined using normality. If the likelihood of Jarque-Bera is greater than 5%, the model is normal, and vice versa.

Test of cumulative sum (CUSUM)

The study used the cumulative sum tests (Brown et.al,)proposed this test reflect the good fitness

of the ARDL model to confirm the long-term connection between variables. The residual of ECM is plotted using these experiments. The result implies that the coefficient of the ARDL model is stable if the statistics in the plot fall within critical constraints at a 5% significance value.

Chapter five

5. Data analysis and presentation

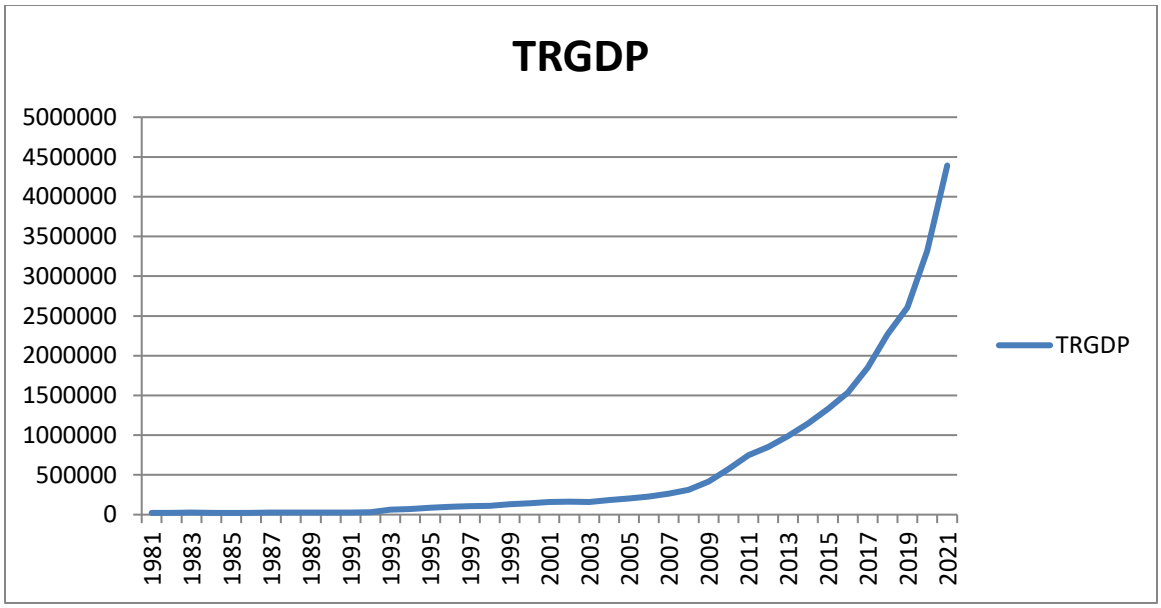
5.1 descriptive analyses

From literature reviews part of the study, it has been shown that there is different variable that would be affect the dependent variable in this research used, among which some of this are to be used in my work. The effect of a nation's fiscal, monetary, and other economic policies implemented by its policy makers determines economic growth. It is difficult to demonstrate how inflation, the quantity of public debt, and economic growth are related.

5.1.1 Trend of Economic growth in Ethiopia

Ethiopia's economy is expected to grow rapidly between 2000 and 2021, according to World Bank projections, ranking as the fifth-fastest growing nation in Africa. 2019 World Bank As previously indicated, real gross domestic product increased significantly in Ethiopia's economy during the reviewed period. From 1981 to 2005, the economic growth pattern of Ethiopia showed a moderate but steady rise. From 2005 to 2021, there was significant economic growth in Ethiopia, which led to rapid economic development. Figure 5.1 shows that Ethiopia's economy occasionally grows quickly, which is relevant to this study

Figure.5.1. Trend of real economic growth through (1981-2021) in millions of birrs

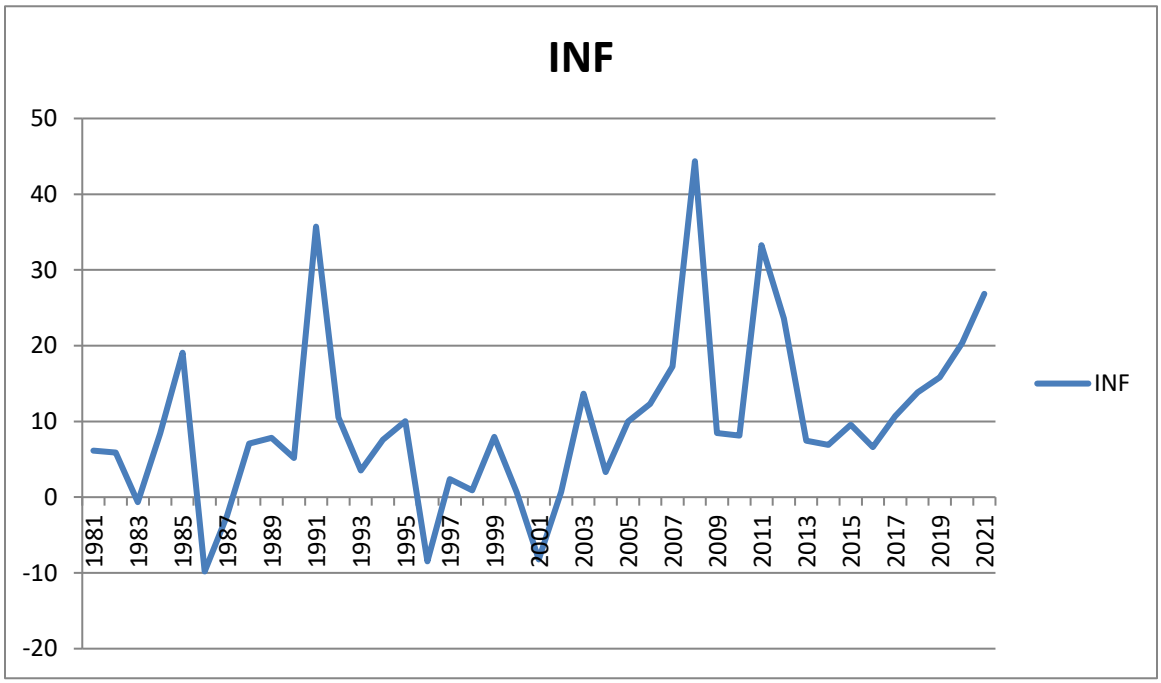


5.1.2 Trends of Inflation in Ethiopia

Ethiopia's inflation trends demonstrate that the rate of inflation has changed throughout time.

Before 2005, inflation remained at a manageable low rate, with the exception of 1991, when it pikes to a high level of 35% due to political unrest and increasing food prices. However, since 2005, there has been a high-pitched increase despite the period's tremendous economic expansion. Inflation in the Ethiopian economy has fluctuated significantly within the study's time frame. The data presented indicate that Ethiopia experienced significant higher inflation rates in 1991 and 2008. Ethiopia experienced modest inflation from 2012 to 2018. Ethiopia's inflation rate for 2018 was 13.8%.

Figure 5.2 trend of inflation through the period (1981-2021)



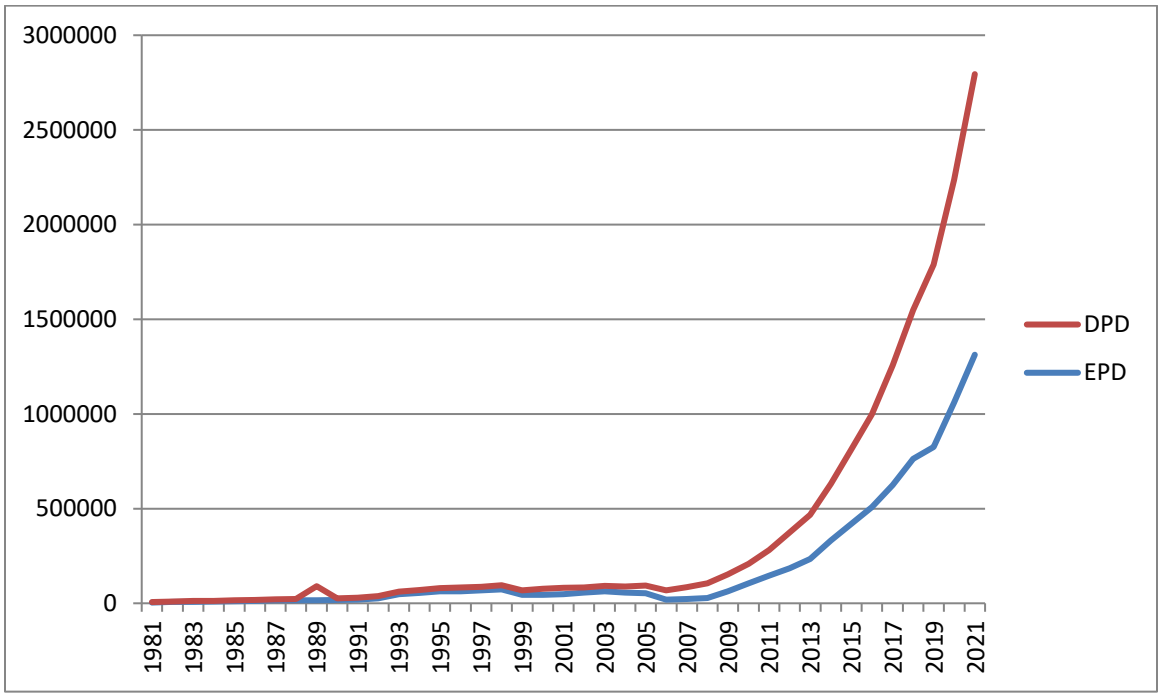
5.1.3 Trend of public debt

Public debt both internal and external was stable from the year 1981 to 2007, however despite numerous debt cancellation and restructuring incentives, stock of external public debt has occasionally continued to climb. This is because public enterprise borrowing has increased. Even the growth rate of inflation is low in 2017-2019 the total accumulation of public debt was high 894203 million birr during 2019.

Over the observation period domestic public debt have the same change with external public debt in both composition and structure. Government use domestic public debt to finance its budget

deficit, and demand to finance project. From national bank report indicates the major sources of domestic debt are direct advance from national bank. Domestic debt has shown an increasing trend from 1981 that was 2908.7 million birr and currently reached 148484 million birrs particularly after 2007 record high level of increment.

Figure5.3: domestic and external public debt through period (1981-2021) in millions of birr



5.2-unit root test

Many applied econometrics studies that used time series data did so during periods of very high volatility, i.e., the series' means and variances might shift over time. Working for this series at their level results in erroneous results for which no conclusion can be drawn because the f-distribution and t-statics conventional statistical tests are invalid. As a result, all of the series included in econometric regression model had to be stationary, and the disturbance term was assumed to have a zero mean and constant variance.

All variable may not have to be integrated in the same order when using the ARDL bounds testing approach. It might still be essential to run unit root tests to make sure the entire variable is I (0) or I (1). Furthermore, I (2) time series variable cannot be employed with the ARDL technique. Therefore, the time series property of the variables is examined using the usual augmented dickey fuller (ADF) method. The ADF tests assume that a series is non-stationary

and reject it when there is evidence to the contrary.

Table 5.1 ADF unit root test

Variable	Level		First difference	
	t-statistics	p-value	t-statistics	p-value
lnRGDP	2.220354 (-2.936942)	0.9999	-4.152772 (-2.938987)	0.0023
lnINF	-5.035434 (-3.526609)	0.0011	***	***
lnDPD	-2.166858 2.936942 (-)	0.2211	-6.776500 -2.941145)	0.0000
lnEPD	-1.944530 (-2.936942)	0.3093	-4.721660 (--3.529758)	0.0026
lnDS	-2.423197 (-2.936942)	0.1420	-9.779006 (-2.938987)	0.0000
lnLF	--3.334094 (-2.936942)	0.0198	***	***
lnLR	-1.541630 (-2.945842)	0.5014	-4.601479 (-2.957110)	0.0007
lnTOP	-1.266162 (-2.936942)	0.6358	-7.327702 (-2.938987)	0.0000
LNMS	-0.021353 (-3.529758)	0.9945	-3.798978 (-3.529758)	0.0272
lnREER	-2.367674 (-2.936942)	0.1570	-6.195886 (-2.938987)	0.0000

Source computed E-views

Note: *** indicates stationary at level or integrated of order zero I (0), other variable is stationary at first difference or integrated of order one I (1).

Table 5.1 shows that each variable's computed value (T-statistics) appears first in the row and its crucial or tabulated value appears second or within bracket. We say there is no unit root or the variable under discussion is stationary when the calculated value is greater than the tabulated value.

For variable domestic public debt (LNDPD), external public debt (LNEPD), lending interest rate

(LNLR), real GDP (LNRGDP) and money supply (LNMS) cannot be rejected at level of 5% significance level, however inflation (INF) is stationary at level with trend and intercept and labor force is stationary at level. Every variable become stationary with first difference. Even if ARDL model used both I (0) and I (1) we check the stationary of first difference for none applicability of integrated order two I (2) in the model. In general INF and LF are stationary at level at 5% percent significance level; the other variable is stationary at first difference at level except for MS with first difference and trend.

5.3 lag length selection

The next step after studying the unit root test is to choose the lag length for co-integration because the quantity of lag captures the series' dynamism. Based on the lag order selection criteria, the maximum lag length for each variable was established before the test. According to table 5.2, the real GDP equation has a maximum lag length of four and uses both the Schwarz and Akaike information criterion to determine the maximum lag length.

Table 5.2 lags length selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-133.9152	NA	4.79e-06	7.617036	7.921804	7.724481
1	92.56892	355.0291	3.43e-10	-1.976698	0.461448	-1.117138
2	170.5862	92.77735	9.62e-11	-3.545202	1.026322	-1.933526
3	247.2535	62.16263	5.39e-11	-5.040729	1.664173	-2.676937
4	434.3584	80.91022*	3.90e-13*	-12.50586*	-3.667578*	-9.389950*

Note: * indicates selected lag order, LR: sequential modified LR test statistic (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion and HQ: Hannan-Quinn information criterion.

5.4Diagnostictestingandmodelstability

Diagnostic tests are carried out to determine whether the estimated long-run and short-run models are trustworthy and verifiable. These tests, which are advised by Pesaran et al. (2001), are used to determine whether the long-run and short-run coefficients are generally stable. These tests include serial correlation (Brush and Godfray LM test), functional form (Ramsey's RESET test), normality (Jaque-Bera test), and hetroscedasticity (Breusch- Pagan-Godfrey tests).

Table 5.3 diagnostic test

Test	LNRGD	LNINF	LNDPD	LNEPD
Jarque-Bera normality test	0.361321 (0.834719)	0.917747 (0.631995)		2.325860 (0.312569)
Breusch-Pagan-Godfrey tests	0.162440 (0.8724)	0.955444 (0.3463)	1.159649 (0.3489)	0.790617 (0.6273)
Brush and God fray LM Test	1.648859 (0.1362)	0.7417 (0.4983)	0.309114 (0.8686)	0.1587 (0.0729)

Because the p-values for each variable in the aforementioned Breusch-Godfrey test result are 0.1362, 0.4983, 0.8686, and 0.0729, respectively, we accept the null hypothesis that there is no autocorrelation because the probability of Chi-Square (2) being larger than 5%. It is confident that the model does not have an autocorrelation issue as a result.

Both the Breusch-Pagan-Godfrey test and the Jarque-Bera normality test found that the model's normality and homoscedasticity were fulfilled when the probability of the Chi-Square (2) statistic was more than 5%.

5.5 bound test for co-integration

The first stage in the ARDL approach for co-integration is to determine whether there is a long-term relationship between the variables. The joint null hypothesis that there is no long-run relationship between the variables is tested by the f- statistics, which are obtained from this regression's output. At 5% of significance value, the f-statistic will be compared to the lower and upper bounds of the crucial value.

Table 5.4 bound test for co-integration

Dependent Variable	F-statistic for Each equation	1%		5%		10%	
		I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
LNINF	5.940990	3.6	4.9	2.87	4	2.53	3.59
LNGDP	13.02435	3.93	5.23	3.12	4.25	2.75	3.79

The estimated ARDL model's (4.4) computed f-statistic of 13.02 for growth domestic product exceeds the Narayan (2005) critical value's upper bound at the 5%, 10%, and 1% significance levels. The outcome indicates that the null hypothesis of no co-integration is rejected and

illustrates the long-term relationship between the RGDP and the variables included in the regresses (i.e., INF, EPD, DPD, LF, and TOP). The null hypothesis of no co-integration is similarly rejected for the ARDL model (4.7) given for inflation because the calculated f-statistic of 5.94 is greater than the upper bound of the critical value at 10%, 5%, and 1% significance levels, indicating long-term relationships between the variables.

5.6 Long run estimation

The next stage is to determine the long run confidence of the empirical model based on the unit root test's confirmation of the absence of the variable that is integrated of order two and the existence of long run co-integration relations among the variable.

5.6 Long runs ARDL estimation of real GDP

Real GDP, inflation, domestic public debt, external public debt, and trade openness are all confirmed to be co-integrated over the long run by the bound test of long run co-integration. The projected long run coefficients after adjusting for real GDP are shown in table 5.5 after the long run relationship has been verified.

Table 5.5 long run estimation of real GDP, ARDL

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNDPD	0.222723	0.251840	0.884384	0.3888
LNEPD	-0.526218	0.320367	-1.642547	0.1188
LNINF	0.229961	0.082919	2.773310	0.0130
LNLF	2.200183	1.400069	1.571481	0.1345
LNTOP	-1.570961	0.649982	-2.416929	0.0272

The growth model's specification is given in logarithmic form, and each variable's coefficient measures the unit reactions to economic growth as a result of the explanatory variable. According to the above finding, two factors, such as inflation and trade openness, have a substantial long-term impact on Ethiopia's economic growth because their probabilities are less than 5%. Long-term economic growth is not being greatly impacted by internal or external public debt. The impact on the nation's economy of the external public debt is negative, the same result for (Mohamed Indris, 2022) and (Wondatir Atinaf, 2020)adverse effect of national debt

both in short run and long run economic expansion. Domestic public debt is the positive contributor of growth and has insignificance evidence for this relation.

However, the coefficient parameter of inflation is statistically significant and favorably influences economic growth according to the study's investigation of the relationship between economic growth, public debt, and inflation the same result obtained with the work of (Fitsum.et al, 2016), (Mulualem, 2015), (Mohamed Indris, 2022) and (Adem feto, 2022)inflation and economic growth move together, But differ from (Segni, 2020) no relation between real GDP and inflation both in the short run and long run. More specifically, 1% rises in inflation at the moment result in 22% average long-term increases in economic growth, other things being equal. Trade openness affects long run economic growth negatively the period under study from 1981-2021. Over time, 1% increases in trade openness leads to a 157% decline in the nation's economic growth, given other things are remain constant, it is same result with the work of (Tegene, 2022)and (Berehanu et al., 2020)inverse effect of trade openness on Ethiopian output growth.

5.7 Short run ARDL estimation of RGDP

The dependent variable's short-term movement is explained by the previous period's deviation from long-term equilibrium by the ECM (-1). Numerous policy and non-policy shocks have affected the Ethiopian economy, but as the ECM finding shows, their effects are not long-lasting.

Table 5.6Short run ARDL estimation of RGDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.117114	0.203653	10.39571	0.0000
@TREND	0.044325	0.003961	11.19173	0.0000
D(LNDPD)	-0.025782	0.017620	-1.463185	0.1617
D(LNDPD(-1))	-0.092852	0.020882	-4.446514	0.0004
D(LNDPD(-2))	-0.201045	0.017499	-11.48923	0.0000
D(LNDPD(-3))	-0.203503	0.014441	-14.09168	0.0000
D(LNEPD)	-0.070108	0.031874	-2.199562	0.0420
D(LNEPD(-1))	0.107810	0.024463	4.406974	0.0004
D(LNEPD(-2))	0.108142	0.025263	4.280620	0.0005
D(LNINF)	-0.005410	0.005182	-1.043971	0.3111
D(LNINF(-1))	-0.060378	0.008034	-7.515179	0.0000
D(LNINF(-2))	-0.027670	0.006799	-4.069869	0.0008

D(LNINF(-3))	-0.020602	0.007350	-2.803034	0.0122
D(LNTOP)	-0.172159	0.070649	-2.436817	0.0261
CointEq(-1)*	-0.232717	0.023141	-10.05636	0.0000

R-squared	0.955739	Mean dependent var	0.140815
Adjusted R-squared	0.927573	S.D. dependent var	0.135117
S.E. of regression	0.036363	Akaike info criterion	-3.499588
Sum squared resid	0.029090	Schwarz criterion	-2.846513
Log likelihood	79.74238	Hannan-Quinn criter.	-3.269348
F-statistic	33.93235	Durbin-Watson stat	2.192957
Prob(F-statistic)	0.000000		

The short run coefficients and ECM would be estimated once the long run coefficients of the economic growth equation were accepted. The outcome shows that the error correction term's coefficient is -0.23, which is significant and has the right sign. The concept means that when a shock occurs in the short run, the system adjusts itself to equilibrium by 23% annually in the long run. In other words, the disequilibrium from the previous year is converged by 23% in the long run every year to its equilibrium. With the exception of a negligible negative relationship at the first difference, the calculated coefficient of the short run equation shows that domestic public debt is significantly and negatively connected to real GDP in different lag orders.

Inflation has a short-term negative relationship with real GDP, but a long-term positive relationship.

The external public debt coefficient is statistically significant at the level where it results in a 7% decline in real GDP growth when all other factors are held constant. Trade openness has a negative and large long-term impact; a 1% increase in trade openness causes a 17% short-term decline in GDP. The above graphic displays the probability of each explanatory variable's contribution to economic growth notwithstanding the other factors' lack of significance.

5.7 granger causality test

Table 5.7's Granger causality test results illustrate how different variables interact with one another. The test was run to determine whether or not the former variable is the granger case for the latter variable.

Table 5.7 granger causality

Null Hypothesis:	Obs	F-Statistic	Prob.

LNEPD does not Granger Cause LNRGDP	39	0.39247	0.6784
LNRGDP does not Granger Cause LNEPD		1.74857	0.1893
LNDPD does not Granger Cause LNRGDP	39	0.59017	0.5598
LNRGDP does not Granger Cause LNDPD		3.93973	0.0289
INF does not Granger Cause LNRGDP	39	12.1671	0.0001
LNRGDP does not Granger Cause INF		2.04306	0.1452
LNDPD does not Granger Cause LNEPD	39	3.40309	0.0450
LNEPD does not Granger Cause LNDPD		0.72602	0.4912
INF does not Granger Cause LNEPD	39	5.80004	0.0068
LNEPD does not Granger Cause INF		0.62474	0.5414
INF does not Granger Cause LNDPD	39	0.31892	0.7291
LNDPD does not Granger Cause INF		5.18121	0.0109

The Granger Causality test results in Table 5.7 show the effect of variables on one another. The test was performed to predict whether the former variable Granger causes the later variable or otherwise.

The null hypothesis that real GDP does not granger cause domestic public debt is rejected at a 5 percent level, but domestic public debt does not granger cause to real GDP is not reject, according to the Granger causality test result provided in table 5.11. As a result, this finding suggests a uni directional causal relationship between economic growth and domestic public government debt. The implication of the finding is that real GDP growth contains useful information for predicting the short-term values of domestic public debt. At a 5% level of significance, the null hypothesis that inflation has no impact on real GDP is rejected. The opposite, however, is not rejected, demonstrating that inflation is caused by economic development. This suggests that while economic growth rate does not indicate anything about the short-term characteristics of inflation in Ethiopia, inflation significantly suggests something about the short-term behavior of economic growth. At a 5% level of significance, the hypothesis that domestic public debt does not contribute to inflation is rejected. This means that there is some information regarding inflation provided by domestic public debt. Cases relating to external public debt are not supported by inflation, which only supports a one-way causal

relationship between inflation and EPD. A country should use external debt to pay its imports since higher internal inflation causes it to import more items from abroad.

5.8Threshold estimation

The threshold level of public debt and inflation is the level which significantly slows level of economic growth. In this paper the threshold level of public debt cannot be determined as a result of none linearity public debt growth relationship.

Table 5.8 threshold inflation rate

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF < 3.543065 -- 10 obs				
TRGDP	2.91E-05	2.53E-05	1.150096	0.2579
C	-5.201473	3.014377	-1.725555	0.0932
3.543065 <= INF < 20.35634 -- 25 obs				
TRGDP	1.32E-06	1.21E-06	1.091283	0.0526
C	8.848922	1.148788	7.702836	0.0000
20.35634 <= INF -- 6 obs				
TRGDP	-3.15E-06	1.15E-06	-2.743056	0.0095
C	35.74549	2.636153	13.55971	0.0000

R-squared	0.851232	Mean dependent var	9.812920
Adjusted R-squared	0.829979	S.D. dependent var	11.19180
S.E. of regression	4.614783	Akaike info criterion	6.030866
Sum squared resid	745.3679	Schwarz criterion	6.281632
Log likelihood	-117.6327	Hannan-Quinn criter.	6.122181
F-statistic	40.05300	Durbin-Watson stat	1.934107
Prob(F-statistic)	0.000000		

estimation result from the above different level of inflation provide, for inflation level below 3.5 percent and greater than 20 percent inflation has significantly negative contribution to economic growth. Inflation level between 3.5 and 20 percent has important contribution for economic growth. Allowing the inflation level to significantly exceed from this range may invite unprecedented consequences of galloping and uncontrollable inflation. Letting inflation rate falls below the threshold level may also slow down economic growth.

5.9 stability test

We used the CUSUM and CUSUMQ tests to assess the model's stability, which ruled out the potential of structural instability. The CUSUM graph in figs. 5.4 and 5.5 demonstrates that the short-run coefficient is stable across the sample period and is located within the critical limit. As a result, the results are unaffected by heteroscedasticity or an autocorrelation issue, demonstrating that the estimated ARDL model has passed the key econometric diagnostic test.

Figure 5.4 CUSUM stability test of economic growth equation

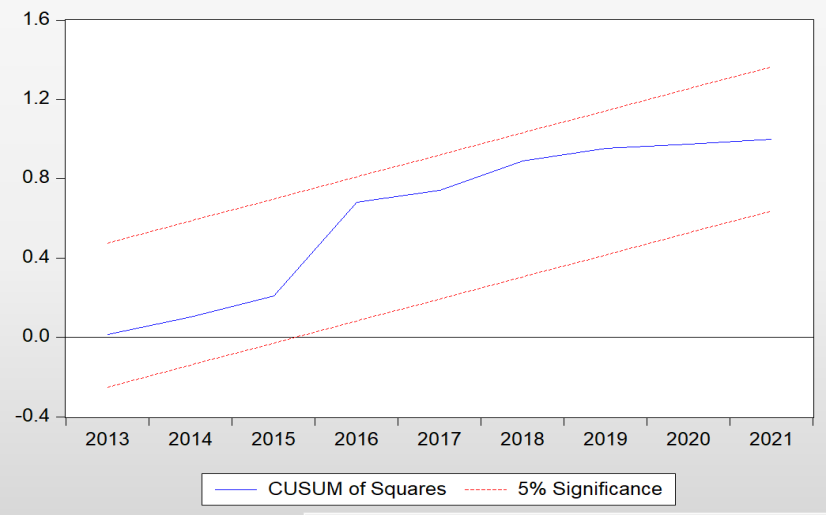
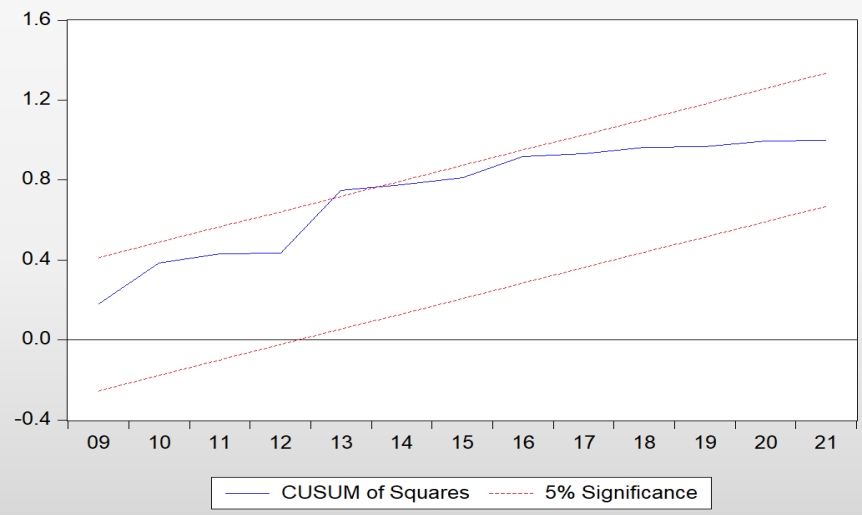


Figure 5.5 CUSUMQ test for economic growth equation



Chapter six

6. Conclusion and recommendation

Conclusion

Low and stable inflation has been the feature of Ethiopian economy for most period of its past history. The country hadn't been large burden of public debt compared with sub-Saharan Africa countries.

This study examined the effects of inflation and public debt on economic development and their interactions in the case of Ethiopia from 1981 to 2021.The ARDL co-integration technique was used to conduct the empirical analysis and the Error Correction Method (ECM) is used to capture the short-run dynamism of the model and the pace of adjustment. According to the study's empirical findings, domestic public debt has insignificant positive impact on economic growth over the long term while external public debt has insignificant negative impact. Additionally, the results demonstrated that real GDP growth had a short-term beneficial impact on inflation and a long-term negative one.

In the short term, both internal and foreign public debt significantly hinders economic growth, but over time, as debt servicing is crowded out, this effect is negligible. Consequently, we can draw the conclusion in the case of Ethiopia; that public debt does not determine long-term economic growth. While labor force had a positive but insignificant relationship to actual economic growth, trade openness showed a long-running negative relationship with real GDP.

Regarding the inflation rate, it has a positive but negligible effect on economic growth, but in the short run, there is a meaningfully negative relationship, which implies that an increase in inflation in the short run causes the real economic growth rate to drop. Even if there is no specific threshold level of inflation and public debt to economic growth, the threshold level of inflation from 3.5 percent to 20 percent is important contribute to economic growth.

Another finding from the Granger causality result is that there is a one-way causal relationship between real GDP and domestic public debt. There was a one-way causal relationship between inflation and RGDP that ran from inflation to RGDP. Along with this, there is a one-way relationship between inflation and foreign public debt.

Recommendation

Although the study has certain limitations, we nonetheless think that the conclusions make important suggestions about public debt, inflation, and economic growth. First, since our findings show a correlation between external public debt and inflation, which means that as general prices rise and development costs rise as well, inflation needs to be controlled in order to lessen the burden of external debt in the future. As a result, accountably bodies must control inflation with in threshold level in order to lower external public debt.

Seconded To increase the nation's production level, policymakers should incorporate the necessary measures to guarantee effective management of both domestic debt and total national debt. Government should make sure, through a necessary committee, that national debt is used to promote investment, which would stimulate capital formation and lead to sustained economic growth.

Third Ethiopia is currently experiencing both high inflation and strong economic growth. It is critical to assess the likelihood of the nation's present economic progress and inflation. challenge of high inflation already present in the nations is made worse if the main driver of growth is inflationary method of financing various public investments. This happens because more money and higher domestic public debt is created than is really wanted by the economy. In order to lower inflation in Ethiopia policy maker should work together to rise output and supply level and manage money supply.

Reference

A.sims. (2012). Modeling the influence of fiscal policy on inflation,.

Abebe. (2019). impact of public debt on economic growth in ethiopia.

Adem feto. (2022). nexus between inflation economic growth and un mployment in ethiopia.

Ahmed M.jand Tariq K. (2012). Domostic debt and inflation effect: evidence from Pakistan economy. *international journal of humanities and social scince, 2(18)*, 256-263.

Aizenman and Marion. (2011). using inflation to erod US public debt.

Akingbade U.Almola et.al. (2022). is the effect of public debt symmetric or asymmetric? *evidence from the Gambia*.

Akitoby et.al,. (2014). Inflation and public debt revrsal in the G7 countries. *internationl monetary fund (IMF)*, 14-96.

Alemayehu. (2019). Ethiopia's "Homegrowen" Reform: if the diagnosis is not right it may end up a whit list.

Amsalu. (2017). Extrnal debt- economic growth nexus in deeloping countries: evidence from ethiopia. *international journal of African and Asian studies, 40*.

Ashagrie. (2015). inflation growth nexus in Ethiopia,evidence from threshold auto regresive model. *ethiopian journal of economics*.

Bahttacharya. (2009). Linkage between tight money poicy and inflation.

Berehanu et al. (2020). the impact of public external debt on economic growth in ethiopia.

Beyene. (2020). external debt and economic growth in ethiopia.

Bildrici.M et al. (2007). domostic debt, inflation and economics crises, a panel cointegration application for emerging and developing countries. *aplied econometrics and international development, 7(1)*, 31-47.

Blidric.M and O.Ersin. (2007). Domostic saving, inflation and economics crisis: a panel co- integration aplication to emerging and developing economies. *applied econometrics and international development*.

Boukrain. (2021). Debt, economic growth and inflation in ethiopia,. *Jouranal of smart economic growth*.

Brown et.al,. (n.d.). Testing stablity of time series model. *1975*.

chongo. (2013). Ugandas experience with debt and economic growth. *an emperical analayis of the effct of public debt on economic growth 1980-2016*.

Cohen. (1993). A relationship between external public debt and economic growth.

David Romer. (1993, NOV). Openes and inflation: theory and evidence. *quarterly journal of economics*.

durevall. (2013). Inflation daynamics and food price in Ethiopia.

Ezekiel et.al. (2020). Effect of public debt on economic growth of nigeria:. *an empirical investigation*.

Federico. (2021, may 10). Ethiopia debt:an economic and political liability.

Fekadu. (2012). "Relationship between inflation and economic growth in Ethiopia". *an emperical analysis*.

Fitsum.et al. (2016). the relation between inflation money supply and economic growth in ethiopia.

Forslund et al. (2011). the determinat of the compostion of public debt in developing and emerging market countries.

Geregorio. (1993, june 3). Inflation, taxation and long run growth. *journal of monetary economics, 31*,

271-298.
Harmon. (2012). The impact of public debt on inflation, GDP growth and interest rate in kenya. *(Doctoral dissertation)*.
Harmon Emmanuel Y. (2012). The impact of public debt on inflation GDP growth and interest rate in Kenya.
Hashem Pesaran. (2013, nov 21). Debt, inflation and growth: robust estimation of long run effect in dynamic panel data models. *CAFE research paper No.13.23*.
Hassan H et al. (2012). Public debt burden and economic growth of bangladesh.
Hemantha K.J.Ekanayake. (2012/14). the link between fiscal defcit and inflation,. *Do public sector wage mater*.
Hilsher. (2014). inflating away the public debt? *An emperical assessment NBER working paper*.
Karen et.al. (2021). Public debt and and economic growth in Nigera. *an emperical investigation*.
Krugman. (1988). Financing versus forgiving a debt overhanging. *journal of Developmentl economics, 29*, 253-268.
Laryea and Sumaila. (2001). determinant of inflation in Tanzania.
Lopes daviga et al. (2014). Public debt, economic growth and inflation on African economy. *MPRA paper NO 57377*.
Mankiw. (1998, january). government debt. *handbook of macro eonomics*.
Martin F.M. (2015). debt, inflation and central bank independance. *european Economic review, 7,*, 129-150.
Mebtu melaku. (2020). determinant of inflation in ethiopia.
Mengistie. (2022). assesment of public exyernal debt in ethiopia.
Menji.S. (2008). determinants of inflation in ethiopia.
Modigilani.F. (1961). Long run implication of alternative fiscal policies and the burden of national debt,. *economic journal* .
Mohamed Indris. (2022). the impact of public external debt on economic growth of ethiopia.
Mulualem. (2015). defcit and its impact on inflation.
Mulualem Eshetu. (2021). *The relation between saving, investment and economic growth in ethiopia,ARDL and VECM aporoach.*
Mundell. (1963). inflation and real interest. *journal of poletical economy, 71(3)*, 280-283.
Mustepha. (2013). Money supply growth and its inflationary effect in Nigeria.
Nguyen. (2015). The relationship between public debt and inflation in developing countries emperical evidence based on difference panal GMM. *Asian journal of emperical research*.
Nguyen Van Bon. (2015).
Olifan. et.al. (2018). determinat of external debt in ethipia.
paul. (2022). public debt in ethiopia.
Perlman. (1965). Is inflation is demand pull or cost push?
pesaran et.al. (2001). The autoregresive distributed lag bund test. *determination of long run relation in series*.
Pesaran-shin-smith. (2001). bounds test approaches to the analaysis of level relationships.
Ricardo's. (1951). on the principle of political economy and taxation.
Richard Ssempala et al. (2020). Uganda experiance with debt and economic growth: an emperical analysis of the effect of public debt on economic growth.
Robera. (2021). dterminat of inflation in ethiopia. *2*.
Rogoff.K and Reinhart.c, R. (2010). Growth in time of debt. *american economic review, 100(2)*, 573-578.
Segni. (2020). the relation betwen inflation and economic growth. *evidence of ethiopia of ethiopia from the period 1991 2019*.
Solow M. (1956, Feb). contribution to the theory of economic growth. (70, Ed.) *Quarterly journal of economics*, 65-94.

Taghavi.M. (2000). Debt, growth and inflation in large European economies: A vector auto regresive analysis. *Journal of evolutinary economics 10,* 159-173.
Tegene. (2022). assesment on external public debt on ethiopian economy.
Teklu. (2014). External resource moblization and external debt situation in Ethiopia. *inter Africa socio economic presentation.*
Temple. (2000). Inflation and growth, stories short and tol. *Journal of economic surveys, 14*, 395-426.
Temple.J. (2000). Inflation and growth, stories short and tol. *Journal of economic surveys, 14*, 395-426.
Tobin J. (1965). Money and economic growth,Econometrica, 33(4). 671- 684.
UN. (2015, january). The launch of the world economic situation prospect. *united nation conference center*.
Wondatir. (2020). EXternal debt growth nexus. *Economics, Manegment and sustainability*.
Wondatir Atinaf. (2020). external debt growth nexus. *emperical evidence from ethiopian economy*.
World Bank. (2021, january). The launch of the world economic situation prospect. *african over view*.

Appendix

Long runs ARDL estimation of inflation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNDPD	0.611499	0.406497	1.504312	0.3735
LNEPD	-4.381558	0.311218	-14.07875	0.0451
LNLR	-3.421749	1.318290	-2.595598	0.2341
LNMS	38.88779	2.436706	15.95916	0.0398
LNRGDP	-14.56358	0.905111	-16.09038	0.0395
LNREER	-33.02840	2.267040	-14.56895	0.0436

Short run ARDL estimation of inflation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	889.5909	52.09464	17.07644	0.0372
@TREND	-54.03617	3.174906	-17.01977	0.0374
D(LNINF(-1))	6.859697	0.385287	17.80413	0.0357
D(LNINF(-2))	6.883956	0.435337	15.81292	0.0402
D(LNINF(-3))	-2.029960	0.185396	-10.94934	0.0580
D(LNDPD)	-18.14975	1.167449	-15.54650	0.0409
D(LNDPD(-1))	-37.67706	2.346065	-16.05968	0.0396
D(LNDPD(-2))	-29.59475	1.897770	-15.59448	0.0408
D(LNDPD(-3))	-5.537469	0.381184	-14.52701	0.0438
D(LNEPD)	-28.44121	1.919846	-14.81432	0.0429
D(LNEPD(-1))	58.36988	3.567430	16.36188	0.0389
D(LNEPD(-2))	24.84020	1.300761	19.09666	0.0333
D(LNEPD(-3))	-3.847467	0.403399	-9.537613	0.0665
D(LNLR)	-18.01942	1.645905	-10.94803	0.0580
D(LNLR(-1))	47.67032	3.267053	14.59123	0.0436
D(LNLR(-2))	30.42631	1.692659	17.97545	0.0354
D(LNLR(-3))	-15.81452	1.210675	-13.06257	0.0486
D(LNMS)	178.5057	11.87490	15.03219	0.0423
D(LNMS(-1))	-291.4826	18.17317	-16.03917	0.0396
D(LNMS(-2))	-7.958543	2.329978	-3.415716	0.1813
D(LNMS(-3))	102.4380	6.658336	15.38493	0.0413
D(LNRGDP)	97.90485	5.140311	19.04648	0.0334

D(LNRGDP(-1))	332.5843	20.86428	15.94037	0.0399
D(LNRGDP(-2))	116.0397	6.379406	18.18974	0.0350
D(LNRGDP(-3))	83.62503	5.483174	15.25121	0.0417
D(LNREER)	-14.28589	1.383280	-10.32755	0.0615
D(LNREER(-1))	332.3230	20.44050	16.25807	0.0391
D(LNREER(-2))	118.0427	6.556279	18.00453	0.0353
D(LNREER(-3))	40.28485	2.846605	14.15189	0.0449
CointEq(-1)*	-13.28355	0.778550	-17.06190	0.0373

R-squared	0.996484	Mean dependent var	0.031340
Adjusted R-squared	0.981915	S.D. dependent var	1.535212
S.E. of regression	0.206455	Akaike info criterion	-0.360856
Sum squared resid	0.298365	Schwarz criterion	0.945294
Log likelihood	36.67583	Hannan-Quinn criter.	0.099623
F-statistic	68.40080	Durbin-Watson stat	3.522204
Prob(F-statistic)	0.000003		

long run external debt ARDL estimation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNRGDP	0.691955	0.143368	4.826431	0.0001
LNINF	0.090463	0.085908	1.053033	0.3043
LNDS	0.150647	0.129482	1.163454	0.2577
LNTOP	-1.176020	0.289738	-4.058912	0.0006

short run external debt ARDL estimation result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.457251	0.405531	8.525237	0.0000
D(LNEPD(-1))	0.463642	0.104289	4.445741	0.0002
D(LNEPD(-2))	0.585932	0.113583	5.158628	0.0000
D(LNINF)	-0.017036	0.020037	-0.850241	0.4048
D(LNINF(-1))	-0.108005	0.022028	-4.903118	0.0001
D(LNINF(-2))	-0.023611	0.020973	-1.125794	0.2730
D(LNINF(-3))	-0.089839	0.020789	-4.321573	0.0003
D(LNDS)	-0.301713	0.070693	-4.267934	0.0003
D(LNDS(-1))	-0.256760	0.069365	-3.701558	0.0013

D(LNDS(-2))	0.005435	0.059528	0.091295	0.9281
D(LNDS(-3))	-0.136617	0.061653	-2.215894	0.0379
CointEq(-1)*	-0.611006	0.073773	-8.282213	0.0000

R-squared	0.819841	Mean dependent var	0.135458
Adjusted R-squared	0.740570	S.D. dependent var	0.287496
S.E. of regression	0.146434	Akaike info criterion	-0.747879
Sum squared resid	0.536072	Schwarz criterion	-0.225419
Log likelihood	25.83576	Hannan-Quinn criter.	-0.563687
F-statistic	10.34236	Durbin-Watson stat	1.906421
Prob(F-statistic)	0.000001		