ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

The Relationship Between Budget Deficit and Economic Growth: Evidence from Ethiopia

By: Desalegn Beksisa

June, 2021

Addis Ababa, Ethiopia

The Relationship Between Budget Deficit and Economic Growth: Evidence from Ethiopia

A thesis submitted in partial fulfillment of the requirements for the degree of

Master of Science in Economics

Desalegn Beksisa

Advisor: Guta Legesse (PhD)

Addis Ababa University

Addis Ababa, Ethiopia

June, 2021

Acknowledgment

I fully acknowledge my indebtedness and render to almighty GOD for his countless help throughout my life.

I would like to give my warmest thanks to my supervisor, Guta Legesse (PhD). His friendly guidance and kindly quick responses in case I have had any inquiries have been invaluable throughout all stages of this work. I would also like to express my gratitude to all my instructors for their kindness and for what they truly taught me, which have contributed greatly to the advance of the thesis.

My heartfelt great thanks to Mr. Mezgebu Amha and Mr. Firehiwot Handamo (both are former Fiscal policy directors at the Ministry of Finance, Ethiopia) for their genuine support and for the invaluable advice, which gave me great opportunity until this level.

Finally, I would like to thank all persons and my families for their support and encouragement in my education.

Declaration

I, Desalegn Bekisa Emana, declare that this study is my own research, and as part of or entire this thesis has not been submitted for a degree in any qualification at this University or any other institution of higher education.
This research is done mainly in candidature for a Master's Degree in Economics at Addis Ababa University.
The sources that I used in this research I cited and the research write without quotations, it is my own work.

Signed by the Examining committee:

Advisor ———————— Signature ———— Date————

Examiner ———————— Signature ———— Date————

Examiner ———————— Signature ———— Date————

Abstract

This study examined the relationship between budget deficit and economic growth of Ethiopia using time series data for the period 1991 to 2019 by applying the ARDL bounds testing approach. The empirical results indicate that budget deficit and economic growth in Ethiopia have a negative relationship in the long run, and have a weak positive association in the short run. A one percent increment in the budget deficit causes 1.43 percent decreases in the economic growth of the country. This result is consistent with the neoclassical view which says budget deficit is bad for economic growth during stimulating periods. Moreover, in the long run, both variables trade openness and inflation have a positive impact on Ethiopian economic growth, and on the other hand, the economic growth of Ethiopia is negatively affected by the nominal exchange rate in the long run. Apart from this, in the long run, gross capital formation and lending interest rates have no significant impact on the economic growth of the country. Therefore, the study recommends the government should manage its expenditure and mobilize the resources to generate more revenue in order to contain the impact of budget deficit on economic growth.

Key Words: Budget deficit, Economic growth, ARDL bounds

Contents

List of Tables

List of Figures

Acronyms

ADF	Augmented Dickey Fuller
AIC	Akaike Information Criteria
ARDL	Auto-Regressive Distributed Lag
BD	Budget Deficit
DF	Dickey Fuller
ECM	Error Correction Model
ECT	Error Correction Term
EGTS	Engle-Granger Two-Step
GCF	Gross Capital Formation
GDP	Gross Domestic Product
GTP II	Growth and Transformation Plan Two
IMF	International Monetary Fund
INFL	Inflation Rate
MEFF	Macroeconomic Fiscal Framework
MoFEC	Ministry of Finance and Economic Cooperation
LIR	Lending Interest Rate
NEX	Official Exchange Rate
NGDP	Nominal Growth Domestic Product
OLS	Ordinary Least Square
RGDP	Real Growth Domestic Product
SBIC	Schwarz (Bayesian) Information Criteria
TRO	Trade Openness
UNDP	United Nations Development Programme
VECM	Vector Error Correction Model

1 INTRODUCTION

1.1 Background of the Study

A budget is a tool that plans the country's policies and it consists of the details of estimation of the receipts and expenditure for the financial year which may be reevaluated subject to annual revisions depending on the country's conditions. The prepared budget plan could be in deficit or surplus or balance depending on the conditions of the countries starting from planning up to collecting the tax and disbursement of the expenditure. The budget deficit is occurs when the total revenue collected from taxation, social contributions, grants, recurrent appropriations in-aid, or other revenue sources are less than the expenditures projected in the budget. Budget surplus happens when the total tax revenue exceeds the total expenditure.

Budget balance happens when the government receipts are equal to the government expenditure in the financial year and it can be used as instrument to stabilize economy. As (Aleksandar and Pece , 2017) having a balanced budget is very important for achieving long-term and stable economic growth in every country. And, (Fisher, 1993) supports this view and indicates that budget balance is important to stabilize macroeconomic variables that have an effect on the economic growth of the country. In another case to measure the government's role in economic activities, a country with a budget deficit or budget surplus is better than the budget balance (Siegel, 1979).

The magnitude of fiscal surplus or deficit the government run is important to measure the effect of fiscal policy on the economy of the country (Siegel, 1979). The impact of budget deficit is not only links to the fiscal policy, it also links to monetary policy and it has its own implications. When the government-run budget deficit, central banks must run selective monetary policy in order to maintain the stability of prices in the economy. Contrary to the efforts to boost the economy, such limitations lead to a reduction in private investments and private final consumption, in particular consumption of durable goods. In a situation where household consumption and private investments are significant drivers of economic growth, running a budget deficit is better by conducting expansionary fiscal policy (Noveski, 2018).

Government expenditure needs are unlimited, but financing resources are not. The prevalence of budget deficits is evident. The extent of the budget deficit and its financing is not managed prudently; it has negative consequences for macroeconomic stability. Therefore the bottom line in government budget management is the level and its means of budget deficit financing. Budget deficit and it's financing is sensitive to affect macroeconomic variables, because of this the government try to design the budget deficit and its financing in view of promoting the desired macroeconomic goals (MoFEC, 2017).

The causes of budget deficits are of varying levels. The causes may be from an incomplete understanding of the government's fiscal position (forecasting error) or/and

exogenous shocks to the general public finances or/and endogenous changes in economic policy settings (Aliona et al, 2008). In another case, as cited in (Osoro, 2016), the major causes of the budget deficit in Kenya include corruption, unwarranted public expenditure, and a high noncompliance rate among taxpayers, as PKF, 2012 indicates.

There are three views about the relationship between budget deficit and economic growth. The Keynesian theory asserts that budget deficit and economic growth have a positive relationship, the Neoclassical, on the contrary, states both variables have a negative relationship and Ricardian equivalence argues the relationship between the two variables is neutral (Bernheim D. , 1989).

The budget can be financed through the collection of taxes, government borrowing, the printing of money, and donor funds (Osoro, 2016). The government of Ethiopia finances the budget deficit from two major sources. Those are collecting taxes and central government debt. The government generates a higher share of the revenue from taxes. Government debt is the stock variable and it consist the domestic and foreign debt. In line with this, in Ethiopia recently, the major source of the government debt comes from domestic markets through government bond and issue of treasury bills (MoFEC, 2017).

Nevertheless, domestic borrowing may have both positive and negative impacts on economic growth. When the government sells the bonds to the private sector to fiancé budget deficit, it decreases the bond prices and rise interest rate. And where the interest rates are controlled, domestic borrowing leads to credit restrictions and reduction of private investments. However, a positive effect of domestic borrowing is that the money used for debt servicing remains within the country which automatically restrains the possible loss of liquidity towards the foreign land (Gaber, 2010).

The government can finance its deficit externally through the mobilization of resources from international financial institutions, bilateral relations, and multilateral institutions. Foreign borrowing increased foreign debt stocks which led to the currency crisis, the balance of payment crisis, and capital flight and devaluation of the currencies, and debt reschedules. When the currency is devalued it causes inflation, and rescheduling debt has an effect on foreign investment. The other way to finance the deficit is money printing by increasing the supply of money in the economy and it has an effect on inflation; it affects macroeconomic stability. In extreme cases, the government initiates an increase in the money supply in order to pay the debt (monetizes the public debt). For short-term securities, the government offered the bank, and this caused the rise of money supply because banks may consider bonds more attractive for investing (William and Klaus , 1993).

The way of the government finances budget deficit may have impacts on the economic growth of the countries. This may be in case of imprudent use of any mode of financing what they got, and without analyzing the impact of that and taking the policy responses then they have adverse macroeconomic sequel on the economic activities of the country. The role of the fiscal policy in economic growth of the country,

in the long run, scout the relationship between budget deficit and economic growth important to whether the government can continue operating under the ongoing fiscal policy without impacting the economic growth of the country negatively (Kneller et al, 1999).

1.2 Statement of Problem

The budget deficit is one of the most important macroeconomic factors by effecting the economic growth of the country (Fisher, 1993). On the other hand, macroeconomic variables are affected by the budget deficit and, at the same time macroeconomic variables affect the budget deficit (Risti et al, 2013). Many studies indicated that the mode of financing the budget deficit is directly related to the relationship between the two variables and the impact of the budget deficit on economic growth of the country (Kneller et al, 1999). Mainly, an increase in productive spending and non-productive spending which could result in a budget deficit would have different impacts on economic growth.

A deficit policy of the countries plays a great role in assisting the achievement of macroeconomic stability and fiscal sustainability. For this reason, most governments use the budget deficit as a useful instrument in achieving their economic objectives. This means that a large and accumulating budget deficit may not necessarily be a bad policy objective if such deficits are effectively utilized to strengthen economic growth. In line with this, an appropriate operational definition and budget deficit measure must be understandably stated. Otherwise, the experience of higher nominal budget deficits may be deceptive depending on the operational measure embraced by a particular country (Antwi et al, 2013).

Ethiopia had registered the fastest economic growth for the past decades by running a budget deficit and they finance the deficit from both external and internal sources. Both of them have impacts on the macroeconomic stability and economic growth of the country. As (William and Klaus , 1993), money financing of the deficit give on to higher inflation, while debt finance leads to higher real interest rates or increased quelling of financial markets, with the fiscal gains coming at increasingly unfavorable terms. Consumers greet differently to conventional taxes, unconventional taxes, and debt financing, in ways that make fiscal accustoming the most effective means of increasing national saving. Private investment but not private consumption is sensitive to the dominant rate of interest, which rises under domestic borrowing to finance the deficit.

There is strong evidence that fiscal deficits spill over into external deficits, give to an appreciation of the real exchange rate. Fiscal deficits and growth are self-reinforcing: good fiscal management preserves access to foreign lending and circumvents the crowding out of private investment. The virtuous circle of growth and good fiscal management is one of the strongest arguments for a policy of low and stable fiscal deficits. If the sources of the deficit are the productive or macro development expenditure or deficit linked to investment the economy might grow faster than the

burden of the debt because the investment output gradually will lead to long-term growth.

And in general, the idea of the relationship between budget deficits and economic growth is inconclusive and is the subject of debate around the world (Aisen and Hauner, 2008). Theoretically there are three views on the relationship between budget deficit and economic growth and it's mostly believed that higher budget deficits have negative impacts on macroeconomic stability (Douglas, 1999). In case of empirical, there is no concurrence empirical agreement upon the relationship between budget deficit and economic growth. But, the policy recommendation depends on the country and/or country group cases. Thus, identifying the relation between the two variables is crucial to macroeconomic stability and fiscal sustainability.

Many studies have been carried out in least developed countries (LDCs) to identify the relationship between budget deficit and economic growth and also to assess the effect of budget deficit on economic growth. However, most of the empirical works have a mixed result; there is no consensus over this issue. Some researchers, (Girma, 2013), believe the government does not only spend on goods and services, so the fiscal deficit for a small open economy like Ethiopia is to stimulate domestic import demand. This result implies that the budget deficit affects economic growth through imports by decreasing output of the country. (Tulakemel, 2015), conducted the study on the effect of budget deficit on economic development in case of East African countries (excluding Ethiopia) and the finding indicates, there is a positive relationship in all countries and the effect of budget deficit on economic performance vary on how financing the deficit, if the government uses for investment then it would have a positive relationship, but for recurrent expenditures there would be a negative relationship between the two variables.

Therefore, regarding the relationship between budget deficit and economic growth, the evidence is somewhat ambiguous and mixed in general. Moreover, previous studies on this area in the case of Ethiopia are only few, and even there is no research directly assessing the relationship between budget deficit and economic growth. For instance, the study carried out by (Haile, 2014), assessed the relationship between government budget deficit, inflation, and money supply. The result indicates budget deficit affects both inflation and money supply in the case of Ethiopia in the long run, but there is no indication of the relationship between budget deficit and economic growth in this study. (Wolde-Rufael, 2008), analyzed the relationship between budget deficit, money, and inflation in Ethiopia during 1964 - 2003 and the result designates that there is a long-run relationship among the series with a unidirectional Granger causality running from money supply to inflation and from budget deficits to inflation. But, fiscal policy does not seem to have any impact on the growth of the money supply. These papers indicate budget deficit affect the economic growth of the countries through other macroeconomic variables, but both studies do not assess the relationship between budget deficit and economic growth.

Therefore, this paper aims to come up with to the reunite of the relationship be-

tween budget deficit and economic growth in Ethiopia by employing ARDL approach. Particularly, the dynamic relationship between budget deficit and economic growth go along with the impact of budget deficit on economic growth in Ethiopia as it has not besides been fully assessed. Thus, the paper aims to identify the relationship between budget deficit and economic growth in case of Ethiopia during the spanning time of 1991 to 2019.

1.3 Objective of the Study

1.3.1 General Objective

The main objective of this paper is to determine the relationship between the budget deficit and economic growth in Ethiopia during 1991 to 2019.

1.3.2 Specific Objectives

Specifically, it addresses some key questions:

- To determine the impact of the budget deficit on economic growth;
- To assess the performance of the budget deficit of Ethiopia link to the performance of economic growth; and
- To investigate major challenges in administering the budget deficit.

1.4 Research Questions

The questions to be answered in this paper are:

1. What is the relationship between the budget deficit and economic growth in Ethiopia during 1991 to 2019?
2. What is the effect of the budget deficit on economic growth in Ethiopia during 1991 to 2019?
3. What are policies that the Government of Ethiopia can adopt to manage budget deficits?

1.5 Scope of the Study

The study emphasized the relationship between the budget deficit and the economic growth of Ethiopia for the past 29 years using the time series data from 1991 to 2019 obtained from the World Bank Data Index.

1.6 Significance of the Study

This study has several contributions to literature and policy recommendations. By examining the budget deficit and economic growth on a country-specific level, the study contributes to the literature and aims at influencing both fiscal and monetary policy in Ethiopia. The empirical findings indicate the best way how to manage a huge budget deficit without harming the economy. Therefore, policymakers have a better understanding of the issue surrounding the relationship between the budget deficit and economic growth. This study also aims to determine the effect of budget deficit on economic growth and issues related to which is the economy-driven budget deficit. Therefore, this paper contributes to the literature on the budget deficit and economic growth association.

1.7 Organization of the Paper

The rest of the study is organized as follows. In chapter two, some relevant theoretical and empirical literatures are discussed. The overall research methodology is discussed in chapter three. Chapter four discusses the findings of the study and diagnostic checking and stability of parameters. And, at the end, in chapter five, conclusions and recommendations are discussed.

2 LITERATURE REVIEW

2.1 Introduction

This chapter has two sections. Section one explores some theories on the relationship between budget deficit and economic growth and the second one discusses some empirical studies that have formerly been carried out in the related areas.

2.1.1 Theoretical Literature Review

There are three theoretical views on the relationship between budget deficit and economic performance of the countries.

Neoclassical View

The Neo-classical school assumes that there is full employment in the economy and households plan their consumption over their life cycles. Neo-classical schools state that the present generation has no consumption shortcut in the case of the budget deficit. Budget deficit leads to lower national savings. When the government finances the deficit by debt, it leads to an increment in the debt stock and interest payment rise. This indicates the capital market is affected by the deterioration of national savings and interest rates rises. In the case of a closed economy, the source of capital has a constraint and in this case with underemployment of resources, the budget deficit leads to an increase in expenditure which transforms into high-interest rates, under the worth of present and future national savings.

In the case of an open economy, an increase in expenditure has no effect on interest rates on international markets. But may lead to an increase in external borrowing which will lead to the devaluation of the local currency. This affects the export-import of the country and increases the current account imbalance of the economy. The Neoclassical school suggests that budget deficit affects economic growth by discouraging investors and low activity of investment, which is actually a case of crowding out private investment (Bernheim D. , 1989).

Keynesian Views

Keynesian economists assume the existence of unemployed resources and credit constraints individuals in economy. Keynesian's budget deficits are good due to an increase of government expenditure effectively to the economy and stimulate the economy by increasing national output and employment rate. According to this school of thought, the budget deficit comes from the increment in government expenditure, and its need not crowd out private investment. This is because increased government spending stimulates private investment and national output. The budget deficit accelerates national output and economic growth through increasing in stimulating aggregate demand. Keynesian's concluded that deficits have crowded-in investment rather than crowding-out (Robert, 1989).

Ricardian Equivalence

David Ricardo initially introduced this theory based on the two assumptions of ratio-

nal expectations that households are prospective and households' vision until taxation. As the performance of tax collection is low and the budget deficit is supplied through borrowing, the government would have no choice but to increase taxes in the future in order to repay the debts and interests. According to this perspective, Ricardo thinks that people have found out by experience that increased government bonds as a result of bringing down taxes offer a temporary income (revenue) for the individual at the present time. When the government debt is increased, consumers save more to provide higher tax payments in the coming years, which rise public savings. This has no arrangement on the interest rate and the decrease in taxes may not lead to permanent revenue. So, any trimming in current taxes must be going on with an increment in future taxes; further, augmenting private savings would totally compromise reduction in public sector savings. National saving and thus interest rates remain unchanged, which consequently leads to unchanged private sector investment.

Ricardo believed that the budget deficit increased due to rising costs of government, which may be paid now or at a later time. Tax cuts or lower taxation in the present will be balanced by higher taxation in the future; this means that the budget deficit will have no impact on saving and consumption or macroeconomic variables. The government may finance the deficit by taxing or through borrowing and this borrowing is repaid in the future generation. So they argue that deficit financing through borrowing has no effect on the current account and exchange rates (Barro, 1989).

2.2 Empirical Literature Reviews

There are many types of research attempting to explain the relationship between budget deficit and economic growth, using various approaches applied to empirical data in the world. The results of these researches are mixed, which provides empirical evidence for all three above-mentioned paradigms. The empirical review of the world literature concerning the relationship between budget deficit and economic growth is summarized as follows;

2.2.1 Empirical evidence in support of the Neo-classical view

(Akoto, 2019), assessed the relationship between budget deficit and economic growth by using Ghana survey data from 2007 to 2016. The finding designates that Ghana's budget deficit financing and economic growth are negatively correlated and this implies that deficit financing has harmed Ghana's economic growth over the research period. (Amwaama, 2018), by using secondary data from 1993-2015 of the Namibia employing ARDL, to determine the association of budget deficit and economic growth. Then, the overall finding shows that both in long run and short run budget deficit affects Namibian economy negatively. Assuming other variables are constant, a 1 percent point of increment budget deficit causes a lower real GDP growth rate by 0.23 percentages.

To study the impact of fiscal deficit on economic growth, (Navaratnam and Mayandy, 2016) used five South Asian countries (including Bangladesh, India, Nepal, Pakistan,

and Sri Lanka) for the period of 1980-2014 and found that the fiscal deficit harms economic growth in Bangladesh, India, Pakistan, and Sri Lanka. However, the evidence in Nepal was a positive impact during the study period. (Fatima and Rehman, 2012), used Pakistan time-series data from 1980-2009 to analyze the effect of government budget deficit on investment and economic growth. They concluded that fiscal deficit affects economic growth of the country very adversely by affecting the physical and social infrastructure in the country.

(Hubbard, 2012), provides an economic analysis of the government budget deficit in the United States and finds out that when the public debt is increasing the real interest rate is also increasing. This leads to the crowding-out of private investment in the U.S. and imbalances the saving. The study also showed that the trajectory of government spending will eventually increase tax burdens and leads to the reduction of capital formation, economic growth, and living standard condition. (Fisher, 1993), assessed a consistent sample of countries, and the results designated a reverse causal relationship between the budget deficit and economic growth. As a result, the budget deficit leads to a reduction in capital accumulation and productivity growth, with an obvious negative impact on the growth rate of GDP.

(Anayochukwu, 2012), determined the causality of inflation and fiscal deficits by using the Granger causality test using data in Nigeria from 1970-2009. The study shows that fiscal deficit affects economic growth negatively and it Granger causes inflation and also both have a negative relationship with economic growth. And, (Awe & Funlayo , 2014), analyzed the impact of budget deficit on the economic growth of Nigeria applying the different methods of OLS regression and studying time series of 1980-2011. The study indicates that there is a negative association between budget deficit and economic growth and there is a long-run relationship between the two variables. In addition, (Odhiambo et al, 2013), used Nigerian data from 1970-2015 to determine the direction of causality between budget deficit and inflation by using the Granger causality pairwise test. The study shows that there is no Granger causality between budget deficit and inflation, but there is a significant relationship between the two variables. This shows that budget deficit has unidirectional causality to inflation, and directly or indirectly budget deficit affects the price rise of the country through the oscillation of the exchange rate.

2.2.2 Empirical evidence in support of the Keynesian view

(Biplob, 2019) investigated the effects of the budget deficit on economic growth by applying the ARDL approach using time series data of Bangladesh from 1981-2017. The result indicates that both in the short run and long run the budget deficit effects economic growth of the country positively and only in the long run, total government expenditure leads to an increment of the economic growth. (Duokit, 2016), use 30 years period of time-series data of Sierra Leone by employing the Classical Ordinary Least Square (OLS) technique to appraise the impacts of budget deficit on the economic growth. The overall result indicates that the budget deficit is a positively related to the economic growth of Sierra Leone. (Emmanuel A et al, 2018), examine

the relationship between budget deficit and economic growth in Liberia by employing OLS to estimate the parameters and a parsimonious Error Correction Model. From the result, in the long run, there is a positive relationship between budget deficit and economic growth in Liberia. As the finding indicates, a 1.0 percent increase in deficits will result in an increase of approximately 0.42 percent in economic growth of Liberia.

(Osoro, 2016), using time series of Kenya data from 1980-2014, by employing the OLS method to estimate parameters and determine the relationship between budget deficit and economic growth and to determine the level of budget deficit that is favorable to the economy of Kenya. The study shows that there is a positive relationship between budget deficit and economic growth, but as the budget deficit increases, the effect on growth decreases. The study specifies in the Kenyan economy, the optimal level of a budget deficit of approximately 4 percent of Gross Domestic Product (GDP). Meanwhile, beyond the specified level of budget deficit, it may have a negative relation to economic growth.

(Murwirapachena et al, 2013), used the Johansen co-integration test and VECM technique on a time series data covering the period from 1980-2010 of South Africa to investigate the economic determinants of the budget deficit. The result designates that excluding foreign debt, all the determinants have a positive effect on the budget deficit. The result shows that budget deficit has positive impacts on economic growth, but as the budget deficit increases, the effect on the growth decreases. (Aslam, 2016), by using time series data from 1959-2013 of Sri Lanka to assess the relationship between budget deficit and economic growth by employing VECM. The study designates that both variables have a positive association. (Nayab H. , 2015) and (Ahmad, 2013) carried out the individual study by using Pakistan time-series data from 1967-2007 and 1971-2007 respectively to determine the effects of budget deficit on economic growth and they designated that budget deficit has a positive effect on growth.

(Abel M et al, 2018) use annually panel data for the period from 1997-2016 obtained from World Development Indicators (WDI), and the International Monetary Fund (IMF) to determine the political economy on the budget deficits among the BRICS countries by applying a panel cointegration approach to assess the long-run relationship between economic growth, budget deficits, inflation, and gross investment. The result of the study indicates that there is a long-run equilibrium association between economic growth and the selected variables and also there is a positive relationship between budget deficit and study variables during the study period. (Arjomanda et al, 2016), assess the impact of growth, efficiency, and government budget deficit in MENA selected countries in the period of 2000-2013 by using static panel models. The results showed government budget deficit which is the dependent variable indicates positive effects on economic growth and inflation rate. (Pelagidis, T., & Desli, E. , 2014), analyzed the role of fiscal policy in supporting growth with some European experiences. The result pointing to a positive relationship between fiscal deficit and capital profitability and dogmatic aversion to budget deficits may be perilous. (Maji et al, 2010), and (Dalyop, 2010), determined the effect of budget deficit on economic growth in Nigeria at a different time and both showed that two variables

had a positive relationship.

2.2.3 Empirical evidence in support of the Ricardian Equivalence view

(Al-Tamimi, 2020), describes the impact of the budget deficit on the Jordanian economy for the period of 2010-2019 by employing the ARDL model. The finding indicates that the budget deficit calculated as a percentage of GDP and inflation rate have insignificant effects on the Jordanian economy in the study period. To identify the macroeconomic effects of budget deficits in Uganda (Lwanga, 2014), using a time series data from 1999-2011 to specify the impacts of budget deficit on other macroeconomic variables by applying the VECM technique. The study shows that the variables in the study have long run relationship and there is unidirectional causal relationships running from budget deficit to other macroeconomic variables like current account balance, inflation, and lending interest rate. But in case of economic growth the result indicates there is no causal relationship between budget deficit and GDP. The current account balance and GDP have a bi-directional causality relationship. The study designates that budget deficit causes for enlarge increment of current account imbalance and interest rate rises.

(Keho.Y, 2010), conducted a study focusing on West African Economic and Monetary Union (WAEMU) countries to identify the effects of fiscal deficit on economic growth. The (Keho.Y, 2010) result failed to reject the null hypothesis of Granger non-causality for Côte d'Ivoire, Senegal, and Togo, showing no evidence of causality between deficit and growth and this confirmed the Ricardian hypothesis. In Niger, there is unidirectional causality from deficit to growth and this indicates the long-run deviation in the fiscal deficit lead to a deviation in the economic growth rate of the country, but the vice versa is not true. But in countries, like Mali, Burkina Faso, and Benin, there is a reciprocal causality between growth and deficit. This means that variations in budget deficits cause changes in economic growth and vice versa. The existence of causality under the growth equation affects the totality of the coefficients on the lagged budget deficit and it is positive, and it indicates that deficits hinder economic growth rates. (Rahman, 2012), carried out research on the relationship between budget deficit and economy in Malaysia with quarterly data in 2000-2011 and designated that there is no long-term relationship between fiscal deficit and economic growth in Malaysia during the study period.

2.2.4 Combined Empirical Evidence

(Odhiambo et al, 2013), carried out research on the relationship between fiscal deficits and economic growth using the OLS approach in Kenya from 1970 to 2007. The multivariable linear regression model used in this paper suggested that there is a positive relationship between the two variables. Particularly, it shows that a 1% change in budget deficits contributes 6.6% a positive change in the growth of an economy. The previous level of budget deficits was also found to have a positive impact on economic growth at a 5% level and that 1% change in the previous level of budget deficits increases growth by 0.09%. On the other hand, the budget deficit crowds out private

investment by increasing the interest rate on investment because the government borrows more from domestic financial institutions. (Gupta and Baldacci , 2005), have shown that the relationship between the budget deficit and economic growth, in the short and long term. The composition of public expenditures and revenues is important to the overall impact of the budget deficit on economic growth. In countries where public expenditures are directed primarily to pay for public administration, it was observed a lower rate of growth of GDP, while in countries where public expenditures are mainly directed towards investments and purchases of goods and services, the situation is reversed.

(Oluwafadekemi and Adeyemi , 2015), used a threshold autoregressive model on time series data covering the period from 1981-2014 of Nigeria to establish an optimal fiscal deficit level and to scrutinize the effects of fiscal deficits on Nigeria's economic growth. The study analysis has supported the existence of a significant positive relationship between economic growth and the repressor's capital, labor, inflation rate, and trade openness. The paper located that a significant negative relationship exists between fiscal deficits, financial depth, and economic growth in Nigeria. The result of the threshold budget deficit indicates that at 5% of the threshold level they help economic growth. In one lag year, the budget deficit happened and the country ran always a budget deficit but it had no positive contribution to the economic growth of the country.

Related to this optimal fiscal deficit (Onwioduokit and Bassey, 2013) the study found that the optimal level of fiscal deficit of 6.0 percent for the Gambia economy, and by employing VAR during the period 1980 to 2009 one year lag of fiscal deficit impacts positively the real GDP. Most of the empirical studies reveal that the budget deficit above 3% of GDP hinders and slows down economic growth, while the deficit of less than 1.5% of GDP is neutral or has no effects on growth. But this argument does not apply in the case of Macedonia, because in 2003 the budget deficit was 4.1% of GDP, meanwhile the growth rate was 2.9%. The study concludes that the budget deficit should not exceed 6% of GDP in order to have negative implications for the economic growth rate. Here again, it should be noted that in our case, other and different factors have a much greater impact on the rate of economic growth (Aleksandar and Pece , 2017).

(Adam and Bevan, 2005), analyze the budget deficit of 45 developed countries found a close link between deficit and economic growth. They conclude that in two ways one way is reducing the budget deficit to 1.5% of gross domestic product (GDP) causes a positive impact on the growth rate of GDP. The second way is, reducing the budget deficit below this limit did not initiate positive effects on economic growth, and it can be harmful due to significant fiscal contractions. (Kneller et. al , 1999), indicated that budget deficits may have different effects on economic growth depending on how the budget deficit happened. If the budget deficit is a result of reducing distortion taxes, the effect on economic growth would be positive because tax reduction stimulates investors and increases aggregate demand. If the budget deficit is a result of reduced not distortionary taxes, economic growth there is no economic growth in

this case. If the budget deficit is a consequence of increment in investment government expenditures, the effect on economic growth would be positive, because productive government expenditures lead the macro development. If the budget deficit is a result of increasing the unproductive government expenditures, there is no economic growth, and the growth rate can be reduced with the budget deficit and it is hard for the government to recover the economy.

2.3 Summary of Literature

When summarized from both the theoretical and empirical literature conclusions. Theoretically, there are three views: the Keynesian theory views that states the relationship between the budget deficit and economic growth is positive, the Neoclassical views that contradict the Keynesian views i.e. they have a negative relationship, and the Ricardian equivalence that argues the relationship between the two variables is neutral. In the case of the empirical literature, many studies are trying to indicate the relationship between the two variables and the direction of influence. However, as seen from empirical literature, the relationship between budget deficit and economic growth varies depending on time for the same country and country to country and the direction of influence also varies.

Some researchers indicate that the relationship between the two variables is positive; budget deficit increases the output of the country and decreases unemployment, while other researchers found out that there is a negative relationship between the two variables; when the government runs a budget deficit. The government takes actions to finance the deficit and the way of taking action to finance may have impact on the economic growth of the country. Some support the Ricardian equivalence theory indicating that the budget deficit and economic growth have no relationship, meaning, budget deficit has no effect on economic growth.

2.4 The relation between Economic growth and Other Control Variables

The shock on one variable may affect the other variables directly or indirectly. Theoretically, the economic growth of a country affects either directly by increasing the capital stock or by advancing technology indirectly. The relationship between economic growth and trade openness is inconclusive and there is a debate both in developing and developed countries. The countries with higher trade openness lead to faster and stable growth than the closed economies, by increasing both the ability and willingness to service external obligations (IMF, 2002). But the impact of trade openness depends on the economic activity of the countries in case of performing export and import. A country with better production of goods may have good economic performance and a country with more import of goods may perform low economic growth.

There are two opinions regarding the effect of inflation on economic growth. When inflation causes demand-pull inflation, the aggregate demand in the economy increases, and economic growth rises by increasing the employment rate. When inflation is

caused by a supply push, too much money is injected into the market. This affects people who receive a fixed income, the purchasing power of wages that doesn't follow the rise of prices and causes shrinking value of loans and savings. This affects economic growth and macroeconomic stability negatively. In another case, the lending interest rate theoretically has a negative association with economic growth. When the lending interest rate decline, investors want to invest more in the country, and more investment leads faster economic growth. On the contrary, a higher lending interest rate leads to lower investment and as well, slower economic growth. The other variable, nominal exchange rate affects economic growth through balance of payment and overvaluation of local currency affects economic performance of a country by lowering the saving and investment by eroding of business and consumer confidence.

3 DATA AND METHODOLOGY

3.1 Introduction

This chapter discusses the data sources and the overall methodology of the study to determine the relationship between budget deficit and economic growth in Ethiopia during 1991-2019.

3.2 Data Sources

The study used both primary and time series secondary data sources. The primary data come from interviews with a few people from the Ministry of Finance; Fiscal Policy, Debt Management, and Budget directorates. The secondary data for a period running from 1991 to 2019 for the past 29 years is collected from World Bank Data Index.

3.3 Techniques of Data Analysis

In this study, to determine the relationship between budget deficit and economic growth, simple descriptive and econometric methods have been employed. The tools of descriptive statistics such as tables and graphs are used. And also an econometric model is applied to determine the relationship between two variables in Ethiopia during the study period.

3.4 Model Specification

The model specified as follows is used in order to analyze the relationship between Budget Deficit and Economic Growth by identifying the variables that may affect the real economic growth. And these variables taken into consideration are Gross fixed capital formation (investment) (GCF), Budget deficit (BD), Trade Openness (TRO), Inflation (INF), Nominal exchange rate (NER), and Lending interest rate (LIR). Real economic growth rate is considered as a dependent variable. The variables are put in econometric function as follows to identify the relation of variables in the model.

$$Y_t = f(BD, X_i^{'})(1)$$

Where $Xi's$ are controllable variables and it contains $X1 = GCF$, $X2 = TRO$, $X3 = INF$, $X4 = NER$, and $X5 = LIR$.
Definition of the variables that this study uses described as the following way:

- $RGDP(Yt)$ is a rate of real gross domestic product and it's defined as the inflation adjusted measure that reflects final value of the goods and services produced by the country in specific period of time and measured as the percent rate of increment.

- GCF is Gross fixed capital formation as a ratio of real GDP. Gross capital formation is measured by the whole value of the gross fixed capital formation, changes in inventories and acquisitions, and fewer disposals of valuables for a

unit. And additionally, it consists of net changes within the level of inventories. Capital formation/accumulation is an important factor for economic growth. Therefore, in this study, gross capital formation has been expected to have a positive impact on economic growth.

- BD denotes Budget deficit and it is the total revenue collected minus total public expenditure, measured as the percentage of the real GDP. The effect of the budget deficit on economic growth is inconclusive as economists have three views on the idea. The impact of this variable in this regard is empirically undetermined.

- INF is the Inflation Rate; it is the price rise of goods and services in the period of time and which is used to measure the impact of price on the GDP and the monetary financing of the budget deficit by the central bank; and it is measured by percentage change over the past year. The inflation caused by demand-pull inflation rises when aggregate demand in the economy outpaces aggregate output demand and it raises the real gross product of the country and causes unemployment fall. The inflation caused by supply push (cost-push) inflation rise the cost of wage and the cost of the raw materials. In this case, the cost of factor of production is higher. This lead reduction of the total amount of production and it affects the economic growth of the country negatively. In this case too much money chasing too few goods affects the people who receipts fixed income, the purchasing power of wages that don't follow the rise of prices and causes the diminishing value of loans and savings. When the inflation is higher it affects the macro-economic stability and adversely affects the wellbeing of people. Macroeconomic instability affects the economic growth and rise in the fiscal deficit of the government. Then the impact of inflation rate on economic growth is determined by the sources of inflation.

- TRO is Trade Openness. It is defined as the share of Export plus Import values to the real GDP over the same period. It plays a role in the determination of the currency crisis. Greater trade integration declines a country's financial limitations and occurs in the currency crisis by increasing both the ability and willingness to service external obligations (IMF, 2002). A greater export ratio shortfalls the likelihood of sharp reversals of capital flows, as the country is more able to service its foreign currency-denominated debt and debt services as an addition to meet external obligations by making a country more vulnerable to creditors' sanctions in case of default. This indicates exports have the potential of impacting positively on economic growth if a country increases demand for domestically produced goods on the international market. Greater imports can also lead to a decline in national income. This usually occurs when imports displace domestic production of goods and services; and this cause the total output of the country will drop as well as total employment, which negatively affects national income. Thus, the combined effect of imports and exports is ambiguous.

- NER is the nominal exchange rate of foreign currency into the domestic currency; it is defined as the purchasing power currency of one country to another.

In this case, the US dollar into the Ethiopian Birr. It is argued that undervaluation of the currency stimulates economic growth. This is true particularly for developing countries and poorly managed exchange rates can be ravaging for economic growth.

- LIR is a lending interest rate, defined as the rate at which financial institutions lend the money to investors or borrowers. When the lending interest rate is low, investors invest more by borrowing money from financial institutions. When lending interest rate is higher investment is low and it impacts the economy negatively. The Lending interest rate has been expected negative impact in economic growth.

Following the definition of variables used in the model for analysis, the econometric model of the above mentioned function is represented as follows;

$$Y_t = \beta_0 + \beta_1 BD + \beta_2 GCF + \beta_3 TRO + \beta_4 INF + \beta_5 NER + \beta_6 LIR + \epsilon_t \quad (2)$$

Where, ϵ_t is an error term- is included to capture the effects of all other factors that may affect economic growth, but have not been taken into account explicitly in this model.

It is important to point out that all variables under study are transformed into natural logarithms to avoid heteroskedasticity (N.Gujarati, 2004), to reduce skewness, to linearize the relationship, and to standardize the data or ease interpretation of the parameters estimates as elasticity of the variables. Therefore, in the long run we express by percentage change and the equation 2 can be rewrite as;

$$lnY_t = \beta_0 + \beta_1 lnBD + \beta_2 lnGCF + \beta_3 lnTRO + \beta_4 lnINF + \beta_5 lnNER + \beta_6 lnLIR + \epsilon_t \quad (3)$$

3.5 Estimation Method

To test the long run and short-run relationship between the dependent variable (real GDP growth rate) and independent variables, the study applies the Autoregressive Distributed Lag (ARDL) Model. By using the Augmented Dickey-Fuller (ADF) test, the study investigates the time-series properties of our data before estimating the model. The unit root tests are checked by the stationarity tests of the variables to see none of the variables aren't ordered two (I.e. I (2)), which is a precondition to employing the ARDL model (Pesaran et al., 2001) as cited by (Gebru, 2015).

The Autoregressive distributed lag Model (ARDL)

This paper makes an analysis by employing the ARDL bounds test, which is a dynamic model in which the effect of the regressors $X's$ on y occurs over time rather than all at once. The ARDL approach has a couple of advantages over the co-integration tests. Firstly, the ARDL approach is most suitable even with a small sample. Secondly, it does not restrict the integration of the variables in the same order. Thirdly, using the single-equation estimates the long-run relationship and there is no restriction on the variables of interest to be all are endogenous and it gives an unbiased estimator in the long run. According to (Pesaran et al, 2001) as cited in Tewodros (2015), the ARDL

modeling of unrestricted error correction model using Ordinary Least Square (OLS) can be represented as follows.

$$\Delta Y_t = \beta_0 + \delta_1 \Delta Y_{t-1} + \delta_2 \Delta X_{t-1} + \sum_{i=1}^{p} \beta_i \Delta Y_{t-i} + \sum_{i=1}^{q} \alpha_i \Delta X_{t-i} + u_t (4)$$

The ARDL approach to cointegration (See Pesaran et al. 2001) entails to estimating of the error correction model (ECM) version of ARDL model for the determinants of economic growth:

$$\Delta Y_t = \alpha_0 + \sum_{i=1}^{p} \alpha_1 \Delta Y_{t-i} + \sum_{i=0}^{p} \alpha_2 \Delta BD_{t-i} + \sum_{i=0}^{p} \alpha_3 \Delta GCF_{t-i} + \sum_{i=0}^{p} \alpha_4 \Delta TRO_{t-i} + \sum_{i=0}^{p} \alpha_5 \Delta INF_{t-i} + \sum_{i=0}^{p} \alpha_6 \Delta NER_{t-i} + \sum_{i=0}^{p} \alpha_7 \Delta LIR_{t-i} + \beta_1 Y_{t-1} + \beta_2 BD_{t-1} + \beta_3 GCF_{t-1} + \beta_4 TRO_{t-1} + \beta_5 INF_{t-1} + \beta_6 NER_{t-1} + \beta_7 LIR_{t-1} + \epsilon_t (5)$$

Where, Y_t is a dependent variable which is the real gross domestic product of the country; GCF is gross capital formation as percentage of the $RGDP$; BD is an independent variable which is budget deficit defined as the difference between the government receipt and expenditure including the grant as a percentage of the real gross domestic product; TRO is trade openness defined as the sum of export and import divided to the $RGDP$; INF is Inflation rate defined as the average price rise of goods and services; NER is nominal exchange rate; LIR is nominal interest rate defined as a lending rate of the financial institutions to the borrowers/ investors; α_0 is the intercept; $\alpha_1 - \alpha_7$ and $\beta_1 - \beta_7$ are short-run and long-run elasticities, respectively, with respect to above identified variables; ϵ_t is an white noise residuals; Δ is the difference operator; and p is the optimal lag length of the variables.

Hypothesis Test
The null hypothesis is; H_0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = 0$, which implies that there is no long run relationship*Against*, *The alternative hypothesis is*;H_1: not H_0. Meaning, there is long run relationship.

If there is an evidence of cointegration of the variables, the following long-run ARDL model is estimated.

$$\Delta Y_t = \beta_0 + \beta_1 Y_{t-1} + \beta_2 BD_{t-1} + \beta_3 GCF_{t-1} + \beta_4 TRO_{t-1} + \beta_5 INF_{t-1} + \beta_6 NER_{t-1} + \beta_7 LIR_{t-1} + \epsilon_t (6)$$

When the underlying variables have a long-run common stochastic trend, the speed of adjustment to its long run from the error correction model can be appeared. The error correction model of the original model for real GDP model of equation 4 is expressed as follows:

$\Delta Y_t = \alpha_0 + \sum_{i=1}^{p} \alpha_1 \Delta Y_{t-i} + \sum_{i=0}^{p} \alpha_2 \Delta BD_{t-i} + \sum_{i=0}^{p} \alpha_3 \Delta GCF_{t-i} + \sum_{i=0}^{p} \alpha_4 \Delta TRO_{t-i} + \sum_{i=0}^{p} \alpha_5 \Delta INF_{t-i} + \sum_{i=0}^{p} \alpha_6 \Delta NER_{t-i} + \sum_{i=0}^{p} \alpha_7 \Delta LIR_{t-i} + \phi ECT_{t-1} + \epsilon_t (7)$

Where, ECT_{t-1} is the error correction term lagged by one period; and ϕ is the coefficient of the error correction term , (ECT).

Hypothesis Test
Null hypothesis, H_0: $\phi = 0$, it indicates there is no convergence to its long run dynamics
Against, *Alternative hypothesis,*H_1: $\phi \neq 0$, indicates there is long run relationship between the dependent variable and exogenous variables.

The coefficient of error correction model is also expected to have negative sign, which indicates the convergence to its long run dynamic equilibrium.

3.6 Tests of Data

3.6.1 Stationary Tests

Before estimating the macroeconomic time series model, assumptions on the variables that are stationary or non-stationary should be checked, to identify the nature of time-series data by using the Augmented Dickey-Fuller (ADF) Test. Non-stationary models are not encouraged in regression because they produce spurious results also called non-sense regression (Gujarati D. , 2004). When mean and variance are constant in time variation, there is stationarity. The stationary test makes sure that there is not a spurious result. Thus, if the employed variables in the model are stationary, then it avoids model misspecification and spurious results. Whether a constant and a trend are included in the regression model, the stationarity test result may vary and must be checked properly in the circumstances of including a constant and a trend.

Hypothesis test:
Null hypothesis: there is a unit root, against *the alternative hypothesis:* there is no unit root.

In case of making a decision from the hypothesis test, we reject the null hypothesis when calculated value is greater than tabulated value, i.e. the variables have no unit root or they are stationary.

3.6.2 Cointegration Test

A cointegration test is used to identify if there are two or more non- stationary time series that are integrated and cannot turn away from equilibrium in the long run. The concept of the co-integration test introduced by Nobel laureates Robert Engle and Clive Granger, in 1987, and the developed technique to estimate valid parameters and to test for long-run relationships between non-stationary variables known as Granger Representation Theorem. It's run when the result of the two non-stationary

series one on the other does not give a spurious regression. The test is used to establish if there is a correlation between time series in the long term. At this time researchers examine the long-run relationship between the variables by adding to the non-stationary of the variables by cointegration test.

Cointegration tests identify whether two or more non-stationary time series are integrated together and in a way that they cannot deviate from equilibrium in the long term and it is used to identify the degree of sensitivity of the two variables over the specified period of time. We correct the case of non-stationary series by taking the first differencing of the given variables. In the presence of non-stationary and cointegration, the error correction model is used to estimate the relationship between the variables. This paper makes an analysis by employing the ARDL bounds testing.

3.6.3 Granger Causality Test

The presence of a relationship between the variables does not designate the direction of the influence of the variables. In the time series regression analysis if the residuals of the two variables do not have unit roots, the econometric relationship between the variables could be co-integrated; there is Granger causality between the variables either one way or both directions causality. To test the Granger causality between variables, each variable is regressed on the lagged values of the other variable.

$$Y_t = \beta_0 + \sum_{j=1}^{j} \beta_j Y_{t-j} + \sum_{k=1}^{k} \delta_k X_{t-k} + \epsilon_t \tag{8}$$

$$X_t = \alpha_0 + \sum_{j=1}^{j} \alpha_j X_{t-j} + \sum_{k=1}^{k} \phi_k Y_{t-k} + u_t \tag{9}$$

In the model specified above, X_t and Y_t are the variables; $\epsilon and \mathrm{u}_t$ are mutually uncorrelated error terms, t denotes time period; and j and k number of lags. In this model, there are presences of four cases for significance tests;

• • $If \delta_k = 0$ and $\phi_k = 0$, there is no relationship between the two variables.

• $If \delta_k = 0$ and $\phi_k \neq 0, Y_t$ granger cause $X_t (Y_t$ is weakly exogenous).

• $If \delta_k \neq 0$ and $\phi = 0, X_t$ granger cause $Y_t (X_t$ is weakly exogenous).

• $If \delta \neq 0$ and $\phi \neq 0$, based on the coefficients magnitude and sign, the impact of the direction is decided and the two variables are interdependent.

3.6.4 Diagnostic Test

The normality of the data has a big value on the goodness of the overall model and to determine whether the overall model is good or not by diagnostic checking test.

Diagnostic tests with non-normality of errors, serially correlated errors, heteroscedasticity, and functional form misspecification are the tests to check whether the model is good or not overall. For valid interpretation of the regression estimates in OLS, the constant variance of the residuals and non-serial correlation assumptions are essential (Gujarati D. , 2004).

Residuals Normality Test

The goodness of fit of the model is better to know whether sample data are skewed and kurtosis to the normal distribution. The Jarque and Bera (JB) test is applied to check the normality of the error terms. The JB test statistic uses the residuals as proxies for the unobserved disturbances and assesses whether the values taken by the third and fourth moments are compatible with those expected under the null hypothesis of normality.

$$JB = T[(\frac{1}{6}) + (\frac{1}{24})(\frac{m_4}{m_2^2} - 3)^2] = T[\frac{skewness^2}{6} + (\frac{1}{24})(kurtosis - 3)^2] \approx \chi^2 \quad (10)$$

Where, $m_j = \frac{\sum U_t^j}{T}$, T is the number of observations. This statistic is distributed as chi square implying that large values of this test statistic relative to theχ^2 distribution lead to rejection of the null hypothesis. In this regard, the null hypothesis is rejected when the calculated value greater than the standard level of significance.

Autocorrelation Test

Autocorrelation test measures whether the observations have a relationship at time vary and identifies the pattern of the observations over the time series. By the assumption, there is no linear correlation between the error terms. The autocorrelation is the problem in the time-series data and the consequences of estimating the regression model by OLS when the assumption of no serial correlation between equation disturbances. When the assumption fails the estimated coefficients derived by OLS are unbiased as well as inefficient, even if at large sample sizes. In this case, the standard error estimates could be incorrect.

Then the researcher would make wrong inferences about whether the independent variables are significantly determining the variations in the dependent variable or not. In the case of positive serial correlation in the error terms, the standard error estimates by OLS is biased downwards relative to the true value of the standard errors implying that the OLS understates their true variability. This would lead to an increase in the probability of type I error or rejection of the null hypothesis when it is correct. In this case, it leads to give a wrong conclusion and the policymakers make wrong policy. To test the general test for the autocorrelation in any order whether the residuals are correlated over more than one period, Breusch-Godfrey Lagrange Multiplier (LM) test is better and applied in this regard.

Hypothesis test:

Null hypothesis: there is no serial correlation, against *the alternative hypothesis:* there is serial correlation.

$$LM = [\frac{e'x(x'x)^{-1}xe}{e'e}] = TR^2 \tag{11}$$

With a normal distribution of the disturbance term, under the null hypothesis asymptotic chi-square and R2 is the coefficient of determination and T is sample size.

The test decision is reject H_0 when $LM \succ \chi^2_{1-\alpha}$. Decision making; reject the null hypothesis when the critical value is less than the calculated values, which indicates there is no serial correction between the observations over the time series.

Heteroscedasticity Test One of the classical linear regression model assumptions is homoscedasticity or the variance of error terms across sections or in the sample size constant over time. In case this assumption of classical linear regression is failing, then it causes a heteroscedasticity problem. If the assumption of homoscedasticity loses, the Ordinary Least Square estimator is no longer BLUE. Estimating the regression model by OLS when the assumption of homoscedasticity is not valid has the consequence that the OLS estimator is inefficient (the variance of the OLS coefficients is incorrect), inconsistent and it is unbiased where the regressors are non-stochastic.

By identifying the nature and pattern of heteroscedasticity and estimating the variance of the parameters, doing a White noise test is better to test the existence of heteroscedasticity.

$$nR^2 \approx \chi^2_{p-1} \tag{12}$$

Where p is the number of all regressors, n is sample size and R^2 is the coefficient of determination.

Hypothesis test: *The null hypothesis is*: there is homoscedasticity against *the alternative hypothesis*: not null hypothesis i.e. there is a heteroscedasticity problem.

We reject the null hypothesis, when calculated value of nR^2 greater than the critical value of chi-square at the chosen level of significance. When we the reject null hypothesis at least one rho is statistically significantly different from zero and it indicates the existence of heteroscedasticity among the residuals.

Test for stability of the model

In the time series regression model the pattern of the data on dependent and independent variables remains the same all over the period of the study is the fundamental assumption. In the case of this assumption, over the entire data set the linear regression model fitted. When the parameters remain the same over the entire period of study, the estimated regression model and the parameters are better to predict. To check whether the parameters are remaining the same over the period of the study and coefficients are stable in the long-run and short-run dynamic we applied the cumulative sum of recursive residuals (CUSUM). To make a judgment on the rejection of a hypothesis, we compare probability value (p-value) with the test statistics.

4 ANALYSIS AND DISCUSSIONS

In this chapter, the study analyzes the collected data using statistical software (Stata15) and presents the results and discussions accordingly. By using Ethiopia time-series data over the period 1991 to 2019, the study aims to determine the relationship between budget deficit and economic growth. The data employed for the purpose of this study is collected from the World Bank data index 2020.

4.1 Descriptive Analysis

To know the properties and the behavior of the study variables before estimating the main model is important to assess the variables. Table 4.1 below, reports the behavior of the variables included in the model.

Table 1: Summary of all the variables

Variables	Obs	Mean	Std. Dev	min	Max	Skewnes	Kurtosis
RGDPG	29	6.98	5.94	-8.67	13.57	-1.28	3.76
BD	29	-1.20	0.96	-3.71	-0.28	-1.60	4.49
GCF	29	14.48	14.21	1.84	47.71	1.11	2.71
TRO	29	30.5	10.5	7.5	47.8	-0.08	2.17
NEX	29	11.86	7.00	2.01	28.1	0.79	2.53
LINR	29	10.86	2.69	6.00	15.08	-0.33	1.83
INFL	29	10.86	11.59	-8.48	44.39[1]	1.08	4.47

Source: Compiled by the Author

From Table 4.1, the real economy has annually grown by 6.98 percent on average, registering a maximum of 13.57 percent in 2004 and a minimum of -8.67 percent in 1992. The budget deficit share of RGDP registered 1.23 percent on average, with 3.71 and 0.28 minimum and maximum percentages respectively. Gross capital formation as a share of RGDP has 1.84 and 47.71 as a minimum and maximum respectively and it has a 14.48 average value. Trade openness has 7.52 and 47.8 as a minimum and a maximum respectively. The nominal exchange rate has annually grown by 11.86 percent on average and has 2.01 and 28.12 as a minimum and a maximum respectively.

The lending interest rate has annually grown by 10.86 percent on average and it has 6 and 15.08 a minimum and a maximum percentage respectively. The Ethiopian inflation rate annually on average grew by 10.86 percent and it registered -8.48 and 44.39 as a minimum and maximum respectively during the study period. All variables have less standard deviation than the mean values; this indicates the normality of the variables. From the real economic growth of the country, there is a higher variation between the maximum and minimum value and also there is a large gap between the years of these values registered. To avoid this variation of the variables, the variables changed to natural logarithms form and it is useful to express the variable's effect on the endogenous one in terms of elasticity in the analysis.

4.1.1 Trends of Ethiopian Economic growth

Over the last two decades, the Government of Ethiopia reduced poverty through economic growth and macroeconomic stability and has been implementing a development program. Ethiopia registered 6.98 percent of the average annual growth rate of the economy from 1991 to 2019 by registering higher economic growth of 13.57 percent in 2004 and -8.67 minimum growth in 1992, -7.14 in 1991 and -3.45 in 1998 and -2.16 in 2003 as the below figure shows. 1992 is the transitional year in Ethiopia because of the dawn fall of the Derg regime and EPRDF introduced the new policy actions in 1992, so the economic growth may be affected by this situation in this year and in 1998 there was the war between Ethiopia and Eritrea and it affects the economic growth of Ethiopia. From 1998 to 2003 there was the Ethio-Eritrea border war and several droughts[2]. Because of these reasons, the economic growth of the country either registered low economic growth or negative economic growth from 1998 to2003. For the rest of the year they registered positive economic growth by small cycling.

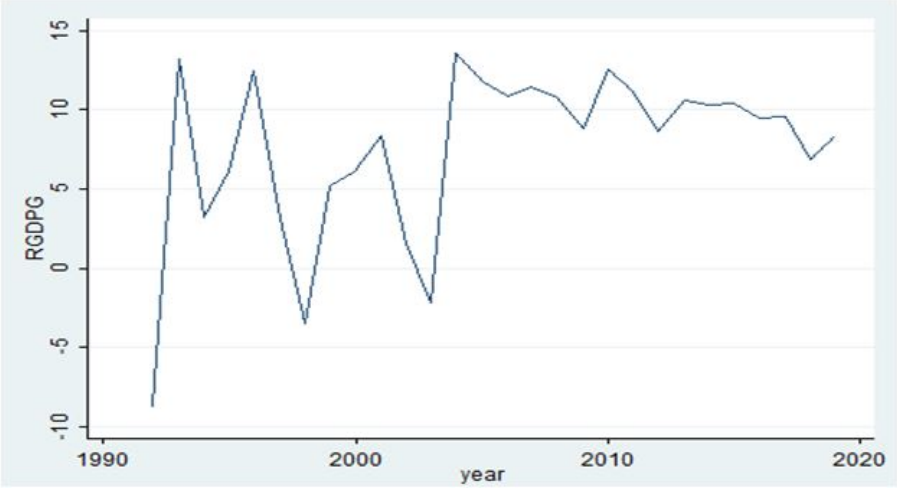

Figure 1: Trend of Ethiopian economic growth from 1991-2019
Source: Compiled by the author

4.1.2 Trends of Ethiopian Budget Deficit

Ethiopia registered 1.23 percent of budget deficit to GDP averagely from 1991 to 2019 and the minimum percentage of the budget deficit to GDP of the country was 0.28 registered in 1997 and maximum value registered in 2019. As figure 2 below indicates, the government runs always a budget deficit and after the year 2010 the government had run a higher budget deficit. After 2010 the share of gross capital formation to real GDP increased dramatically[3], simply we understand the Ethiopian government

[2]As World Bank report in 2014 for Ethiopia, from 1998 to 2003 the Ethiopian economy was affected by the Ethio-Eritrean war and several droughts.

[3]As World Bank data index indicates the Ethiopian share of gross capital formation to the real gross domestic product was increasing from the year 2010.

uses more expenditure for capital and the budget deficit may be coming from this spending including fewer revenue collections.

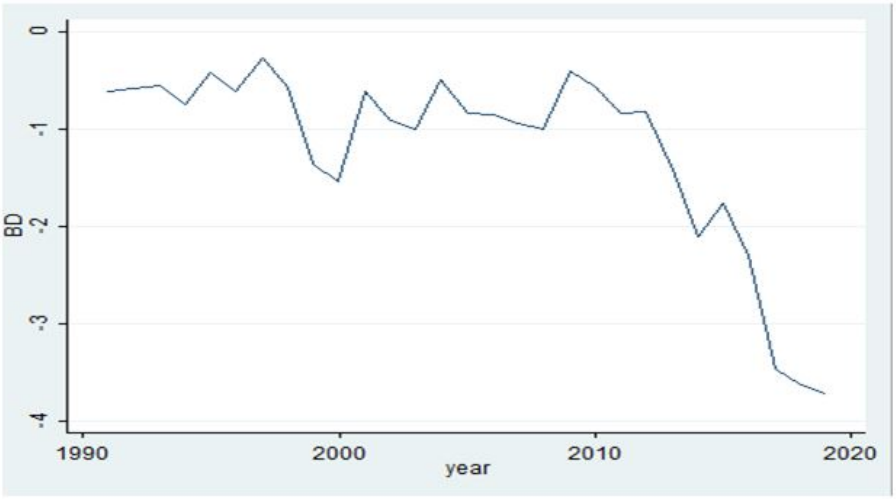

Figure 2: Trend of the Ethiopian Budget Deficit Percentage to Real Gross Product
Source: Compiled by the author

4.1.3 Trends of RGDP growth and percentage of BD to RGDP

Ethiopia registered 1.23 percent of budget deficit to GDP averagely from 1991 to 2019 and the minimum percentage of the budget deficit to GDP of the country was 0.28 registered in 1997 and maximum value registered 3.71 percent in 2019. When we see by linking budget deficit performance with economic growth performance, in 1992 the Ethiopia economy registered lower economic growth during the study period and the percentage of the budget deficit to GDP was lower (0.56), but this value is not the minimum during the study period. In 1991 the economic growth registered the second lower growth in the study period and the percentage of the budget deficit to economic growth lower, but is not minimum value and in the year the country registered minimum percentage of budget deficit to GDP (i.e. 1997) the economy growth registered 3.14, the value is not minimum or maximum value. In 1998 the economic growth of the country was registered -3.45 the third lowest economic growth, from this maybe the registered minimum percentage of the budget deficit to GDP in the lag year (i.e. 1997) affects negatively the economic growth of the country.

The year of higher economic growth registered the percentage of the budget to GDP is 0.49; this percentage is lower in value, but neither maximum nor minimum percentage. If we see the performance of the budget deficit to GDP one lag year and one year forward, from the year of higher economic growth was registered. In one lag year (i.e. 2003) the percentage of the budget deficit to GDP is 1.00. This is neither minimum nor maximum. One year forward (i.e. 2005) the budget deficit percentage to GDP is 0.84, which is neither maximum nor minimum. In the case of

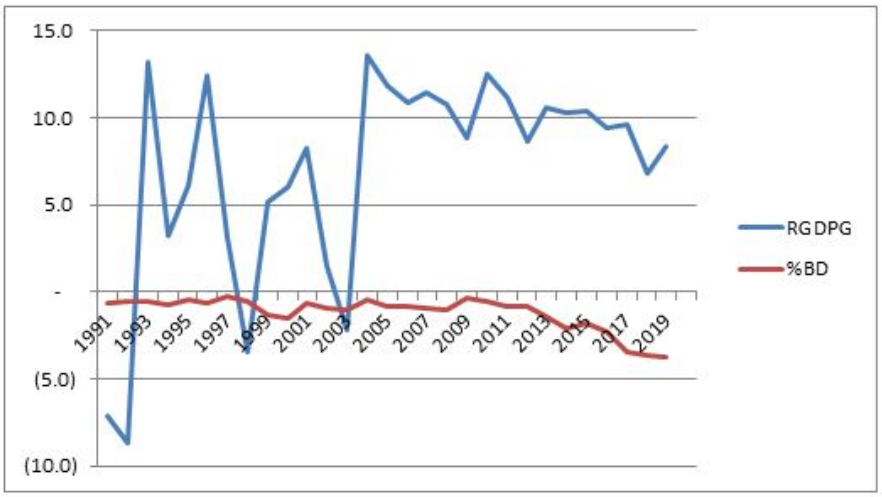

Figure 3: Trends of RGDPG and percentage Budget deficit to RGDP
Source: Compiled by the author

the year higher percentage of the budget deficit to GDP registered (i.e. 2019) the performed economic growth is neither lower nor higher. The years from 1998 to 2003, the economic growth of the country either registered low economic growth or negative economic growth because, there was the Ethio-Eritrea border war and several droughts[4], in these years the performance of the budget deficits percentage to GDP is neither minimum nor maximum.

From the above figures 3, which indicate the relation between the percentage of budget deficit to real GDP and real economic growth in Ethiopia, there is no feasible relationship between them. In the meantime, we cannot say they have a positive or negative relationship by simply looking at the trend. Rather it may be possible to say there is a weak relationship between the budget deficit and economic growth which encourages us to look at the analysis of the model than relying on looking at the graph of the trend.

4.2 Analysis of Interview

In this section, the interview part is analysed as follows and the interview was collected at Ministry of Finance where experts from three directorates like Fiscal policy Directorate, Budget Directorate, and Debt Directorate participated in. The participants more or less responded that they had some understanding of the budget deficit and economic growth of the country. They are already familiar with the macroeconomic fiscal framework preparation and also know the budget preparation process of the country.

[4]As World Bank report in 2014 for Ethiopia, from 1998 to 2003 the Ethiopian economy was affected by the Ethio-Eritrean war and several droughts.

Regarding how to forecast the budget deficit, respondents answered that the macroeconomic Fiscal Framework (MEFF) is done every year and macro variables are entered into the model and forecasted through analysing the performance of the past recent years by taking macroeconomic assumptions that affect government expenditure and revenue since the budget deficit depends on these two variables. However, the current Macro-economic Fiscal Framework (MEFF) allows for partial equilibrium analysis, with certain key macro variables taken as exogenous. This indicates that the model has no greater integration of the real sector, monetary and external sectors.

Regarding the systematic government budget management in the country, there is a program-based budget system applied in the federal institutions to manage and control government expenditure. But, this budgeting system has not been implemented as much in the government institutions and levels[5]. And, there are also Integrated Financial Management Information Systems (IFMIS) and Integrated Budget and Expenditure System (IBEX) to assist public sector budgetary institutions, and promote better public financial management with a centralized registry of public sector revenues and expenditures. The policies to manage the budget deficit of the country are categorized into two ways; increase revenue or decrease expenditure. In case of cutting spending, the government of Ethiopia controls aggregate expenditure to ensure affordability, minimization of unwarranted public expenditure, and effective and efficient use of public expenditures. In case of increasing revenue, the government of Ethiopia timely increases tax bases to mobilize resources more, and improve the tax administrative effectiveness.

In the case of the evaluation of last year's budget deficit impact on the macro variables, there is no such analysis of the impact on next year's macro variables. In the case of the direction of impacts of the budget deficit on the other macroeconomic variables, it is not separately evaluated at a time but from economic theory, we expect which macroeconomic variables will be affected and the direction of association they may have. In line with this, regarding how to monitor and evaluate the budget deficit of the country, the respondents respond that the budget deficit is monitored and evaluated every month, but there is no model-based on. If there would be a high budget deficit happened, there wouldn't be policy directives taken by policymakers actively at that time.

On the sources of a budget deficit in the country, the respondents say it is not yet separately determined. And, added that it may come from forecasting error, exoge-

[5]In the case of Ethiopia, the program budgeting system has been introduced recently under the expenditure management and control program (EMCP) which is one of the sub-programs of the public sector reform. This budgeting system has not been implemented as much in the government institutions and levels. The Ethiopian government started the program budget without considering the necessary conditions for the successful implementation of the program. Important institutions and institutional frameworks are underdeveloped in country. Despite some progress are in introducing a program budget at the federal level, Ethiopia faced different challenges in the successful implementation of the reform program. Among them, Lack of sufficient training for public personnel, absence of basic infrastructures (IFMIS, accrual accounting system, and new institutional set-up) which supports the reform program is not yet developed and improved in Ethiopia (Assefa, 2015).

nous shocks to the public finances, and endogenous changes in fiscal policy settings. On the relationship between budget deficit and economic growth, there is no identified direction of association in the country. But, the economic growth of the country for decades has been well and there is also the government-running budget deficit and the government spends more on megaprojects to ensure sustainable economic growth in order to eradicate poverty. In this regard, the budget may become from this government spending on macro developments. On the documented fiscal rules regarding the budget deficit, the country has no written document on fiscal rules regarding the budget deficit. But, it is available in the plan document and other reports, for example in GTP II, which says the percentage of budget deficit should not exceed 3 percent of GDP, and IMF also advises the country to perform less than 3% of GDP. However, with regards to the performance of the analysis on the achievement of less or greater, there is no analysis of whether the threshold is really important or not.

On the effect of budget the deficit on economic growth in Ethiopia regarding how to finance the budget deficit or how to forecast budget deficit financing whether from external and domestic financing, there is analysis when a macroeconomic fiscal framework is prepared with the focus on the effect of the two financing methods and depending on the amount of financing in the category. In administering the budget deficit, delay of megaprojects[6], Natural disasters, Climate change, Endogenous changes in the fiscal policy and monitoring policy settings, world price rise, and political situations are among the major challenges in administering the budget deficit in Ethiopia.

4.3 Empirical Analysis

The variables included in the regression model are transformed to logarithmic form to express the variables in terms of elasticity. The number of lags in the analysis is most important to predict the variables and give accurate results and it's highly sensitive in econometric analysis of time series data. Thus it needs a priority to specify the number of lag lengths and it's determined by the given information criterion in the model and obtained at the minimum value of the information criterion.

In this regard, the maximum lag length for this model is two, as Akaike information criterion (AIC) which is automatically identified by an asterisk (*). This maximum lag length of two does not refer to each variable, and some variables may have less than two lag lengths.

[6]In the Ethiopian case, some known projects have been either delayed, have had cost overruns, poor in quality, poor user satisfaction or did not meet the initial objectives (Fetene, 2008; Tekalign, 2014). According to Tekalign (2014), 79.1% of the construction project fails to meet its objectives in Ethiopia and if completed it is with an average cost overrun of more than 26.2%. We must know that Project failures have significant effects from economic as well as political points of view. If the project takes a longer time, it requires additional resources, and budgets and this increases labor, material, machinery, and equipment cost. This affects the budget of other projects and in general, it affects the economy of the country and results in dissatisfaction of the society at large (Makulwasawatudom et. al., 2003; Chanet et al., 2004) as cited on (Asnakew, 2016).

Table 2: Maximum lag length selection

Lag	LL	LR	df	P	FPE	AIC	HQIC	SBIC
0	-0.182				0.097	0.495	0.576	0.787*
1	-0.080	0.203	1	0.652	0.105	0.566	0.661	0.907
2	2.564	5.289*	1	0.021	0.093*	0.435*	0.543*	0.824
3	3.349	1.572	1	0.210	0.095	0.452	0.574	0.891
4	4.185	1.672	1	0.196	0.098	0.465	0.601	0.953

** designates lag order selected by the criterion*
LL: log lag, LR: sequential modified LR test statistic, FPE: Final prediction criterion, AIC: Akaike information criterion, SC: Schwarz information criterion, HQIC: Hannan-Quinn information criterion
Source: Compiled by the author

4.3.1 Unit Root Tests

All study variables should satisfy the criteria to apply ARDL bound procedures; and the study starts checking the stationarity of variables employing the Augmented Dickey-Fuller (ADF) unit root testing techniques. To apply the ARDL bounds testing procedure, all variables should be stationary either at level or first order difference or mixed of them.

Table 3: Unit root test (Augmented Dickey-Fuller test)

	Integrated of order zero, I(0)		Integrated of order one, I(1)	
Variables	With trend	Without trend	With trend	Without trend
LRGDPG	-3.189*	-2.709*	-3.897**	-4.011***
LBD	-0.753	0.588	-5.377***	-4.914***
LGCF	-1.733	0.791	-5.374***	-5.261***
LTRO	-0.476	-1.701	-7.506***	-6.029***
LNEX	-2.274	-2.249	-3.014*	-3.083**
LLINR	-2.169	-1.922	-3.656**	-3.767***
LINF	-4.84***	-4.313***	-7.563***	-7.684***

*Note: *** ,** and * denotes stationarity at 1% 5% and 10% respectively.*
Source: Compiled by the author

As we have seen from Table 4.3, GDP ($LRGDPG$) is stationary at integrated of order one, I(1), both with-trend and without trend, since the absolute test statistics is less than the critical value at 5% level of significance. The budget deficit (LBD) is stationary at a 5% level of significance (with and without trend) at first order difference. Gross capital formation ($LGCF$) and lending interest rate ($LLINR$) are not stationary at the level and stationary at the first order difference at 5% level of significance. Trade openness ($LTRO$) is also not stationary at the level and stationary at first order difference at a 5% level of significance. However, inflation ($LINF$) is

stationary both at the level and the first order difference. In general, all variables excluding inflation are non-stationary at the level and become stationary at the first order difference. Meaning, they all are except inflation integrated of order one. So it fulfills the ARDL bound procedure, and it detects a spurious regression.

4.4 Long Run ARDL Bounds Tests for Co-integration

In order to empirically analyze the long-run relationship and short-run dynamic interactions among the variables of interest, this study applies the autoregressive distributed lag (ARDL) cointegration technique. As the ARDL bounds test result, F-calculated (81.9), is higher than (4.43) of the critical value at 1 percent level of significance of the upper bound, there is evidence to reject the null hypothesis of no long-run relationship between the variables. Meanwhile, it indicates there is a relationship in the long run between the variables.

4.4.1 Long Run ARDL Model Estimation and Error Correction Model

Run the appropriate ARDL bounds test and Error correction model, after confirming the long-run cointegration relationship among the variables to find out long-run coefficients and speed of adjustment respectively, which is reported in Table 4.4 below. In the table below, the first column contains a list of variables, the second column contains the adjustment coefficient, the third one contains long-run coefficients and the last column contains short-run coefficients of listed variables. It confirms the existence of long-run co-integration of the variables from the ARDL bounds test result.

As we see from the below Table 4.4, the coefficient of error correction term of the given equation has a negative sign as expected to be and is statistically significant. One period of its lag confirms that the co-integration relationship among the variables is at a 1 percent level of significance. The result indicates that in case of shock reveals, the economic growth of the current period adjusts to its equilibrium by 20.8 percent in the next period.

The results indicate that in the long run, the budget deficit has a statistically significant negative effect on economic growth, although in the short run budget deficit has a weak positive effect on the economic growth of the country. In line with this, a one-percent increment of the budget deficit causes a 1.4 percent turn down in real economic growth in the long run, citrus paribus. This result confirms the empirical results in the literature (Akoto, 2019) in Ghana, (Amwaama, 2018) in Namibia, (Awe & Funlayo , 2014), in Nigeria, while opposing the result of (Tulakemel, 2015) in East African countries.

The result supports the idea of neo-classical views that the budget deficit has a negative relationship with economic growth. From a neo-classical perspective when the government runs a budget deficit, the deficit is financed by debt. When budget deficit is financed by debt, the stock debt becomes higher and the principal payment rises. This causes an interest rate increment and crowds out private investment.

When private investment decreases, the output of the country becomes lower and the per capita income minimal. A one percent increment of the budget deficit causes a 1.1 percent decrease in real economic growth in the short run, citrus paribus. This result confirms the research done in East Africa by (Tulakemel, 2015). The estimate from ARDL model also supports most of the empirical results found in the literature (Emmanuel A et al, 2018) in Liberia, (Osoro, 2016) in Kenya. And also the result in case of the short run consistent the view of Keynesian economists, that the budget deficit good for economic growth.

Trade openness is positively related to economic growth in the long run at a 5% level of significance, but it is contrary in the short run. In line with this, a one percent increment in trade openness causes 0.78 percentage rises in real economic growth of the country in the long run. On the contrary, a one percent increase in trade openness in the short run causes a 0.73 percent decline in economic growth, others remain constant. This may be in the short run the country imports more goods and services that can also lead to a decline in national income.

These usually occur when imports displace the domestic production of goods and services. When this happens, the total output of the country, as well as total employment, will drop, which negatively affects national income. In line with the expectation of trade openness, the effect on economic growth is ambiguous, depending on the more produced or more importers. The expectation is known identify by empirical data analysis and there is positive effect on economic growth in Ethiopia in the long run. This result consistent (Bekele, 2017) and (Asnake and Liu , 2019) paper result that indicates the trade openness in Ethiopia stimulates the economic growth of the country.

The nominal exchange rate is negatively associated with economic growth in the long run and it is statistically significant at a 5% level of significance, but in the short run, it has no immediate association. One percent increment in the exchange rate causes a statistically significant 0.64 percent turn down in economic growth in the long run, others remain constant. This result indicates that the undervaluation of the currency does not stimulate the economic growth of Ethiopia in the long run. In the meantime, devaluation may affect economic growth negatively in different ways such as by increasing price rise (inflation), increasing interest rates, and reducing the accumulation of foreign reserves. Theoretically, views on the relation between nominal exchange rate and economic growth of the country depend on the valuation of domestic money undervalued or overvalued in foreign currency. The result supports the (Maru, 2018) paper that indicates the nominal exchange rate significantly and negatively affects the real economic growth of Ethiopia.

The other variable, the lending interest rate has no significant effect on Ethiopian real economic growth in the long run based on the analysis. This indicates that when the lending interest rate increases, it is not an incentive for investors and discourages them to invest more; and rather they prefer to put on saving than investing. This affects economic growth by decreasing the national output thereby increasing the un-

Table 4: ARDL Model Estimation and Error Correction Model Result

Variables	ADJ	LR	SR
LBDI		-1.436**$_{(0.584)}$	
lTRO		0.783**$_{(0.274)}$	
lNEX		-0.637**$_{(0.248)}$	
llIR		0.208$_{(0.223)}$	
lINFL		0.161**$_{(0.063)}$	
LGCF		0.216*$_{(0.108)}$	
L.lRGDPG	-1.208***$_{(0.068)}$		
D.LBDI			1.081*$_{(0.611)}$
D.lTRO			-0.728***$_{(0.238)}$
D.llIR			-0.461*$_{(0.255)}$
D.lINFL			-0.295***$_{(0.055)}$
LD.lINFL			-0.240***$_{(0.027)}$
Constant			4.088***$_{(0.923)}$
Observations	27	27	27
R^2	0.987	0.987	0.987

*Note: In the above table ***, ** and* designate the variables has statistical significance at level of 1%, 5% and 10% respectively; Standard errors of the Betas signify in parentheses; D. indicates the first difference operator; L. indicates the lag operator.*

Source: Compiled by the author.

employment rate. However, it has weak evidence of a negative significant effect on the economic growth of the country in the short run at a 10% level of significance. With the line in the expectation, lending interest rate has a negative association with real economic growth; however, as a result lending interest rate has no significant association with Ethiopian real economic growth in the long run. But in the short run lending interest rates have a weak negative association with economic growth in Ethiopia and confirm the economic theory.

On the other hand, gross capital formation has a weak positive association with economic growth in the long run, although it is insignificant at a 5% level of significance. However, gross capital formation has no immediate impact on economic growth in the short run. in the case of the long run, the result consistent with economic theory which states that capital formation is the major determinants of economic growth (Keynesian and Solow's theory of growth) and (Gebru, 2015).

The inflation rate is positively associated with economic growth in the long run based on the analysis[7] while it has a negative association with economic growth in the short run at 5% level of significance. One percent rise in the inflation rate causes statistically significant 0.16 percent increases in economic growth in the long run and in short run, a one percent increment in the inflation rate causes a 0.29 percent slowdown in the economic growth. In the short run, not only the current coefficient, but also a one lag in the inflation rate significantly affects the economic growth of the country. Pertinent to this, a one lagged value of the inflation rate negatively affects economic growth by 0.24 percent. In the case of the long run, the positive relationship implies that the Ethiopian macroeconomic activity is similar to that of Keynesian explanation of the relationship between inflation and economic growth.

4.5 Diagnostic Test and Model Stability

Some diagnostic tests are important to check the verifiability of the estimated model. The most important thing before doing a conclusion for analysis is checking the standard property of the model. This study, carried out a number of diagnostic checking and model stability, which includes Serial Brush & Godfrey LM test to check serial correlation, Ramsey's RESET test to check the functional form of the overall model, Jarque-Bera test to check the normality of the error terms and Heteroscedasticity test to check whether the error terms are constant over a time taken. Besides diagnostic tests, for parameter stability check in the long run the cumulative sum of recursive residuals (CUSUM)[8] is applied. In order to decision making on hypothesis test, we can make a decision by looking at the p-values associated with the test statistics. As Table 4.5 shows, the long-run ARDL bounds model applied in this study passes all the diagnostic tests. When all respective test statistics are compared to their probability value (0.05), all the test statistics values are higher than the standard significant level

[7]From software output, in the long run, inflation and economic growth in Ethiopia is associated positively. Very higher inflation may affect the economy. So a threshold level up to which both have a positive association should be set.

[8]The tests mentioned to check diagnostic and model stability recommended by Pearson 2001.

Table 5: Diagnostic tests for ARDL models

Testing methods	Result	P-value
Breusch-Godfrey Test	0.4993	0.05
Jarqua-Bera test	0.0968	0.05
Heteroskedasticity	0.4093	0.05
Ramsey Test	0.0659	0.05

Source: Compiled by the author.

(0.05). It indicates that there is no enough evidence to reject the null hypothesis of the model in all tests.

In line with these tests specifically, in the test of the serial correlation, the test statistic associated with the probability value is greater than the 5 percent level of significance (i.e. $0.4993 \succ 0.05$). So we accept the null hypothesis that there is no serial correlation in the model.

For normality of the residuals, 5% level of significance is less than the Jarqua-Bera test result (I.e. $0.0968 \succ 0.05$).In this regard, the result indicates that we accept the null hypothesis which says the residuals are normally distributed with zero mean and constant variance implying there is no problem of normality issue regarding the model used.

In the case of the heteroscedasticity test, the result in the above table indicates that there is no enough evidence to accept the alternative hypothesis which says there is heteroscedasticity in the model since 5% significant level significance is less than the calculated test statistic value (i.e. $0.4093 \succ 0.05$).It implies that error terms are homoscedastic over time. In other cases, there is no enough evidence to reject the null hypothesis test for Ramsey's RESET test. The probability value is less than 0.0659, so we accept the null hypothesis and the ARDL model is correctly specified with the given variables.

To test the constancy of coefficients in the model, checks by using the cumulative sum of recursive residuals (CUSUM). The parameter is unstable when the cumulative sum lies outside of the area or if it crosses the two critical boundaries. As we see from the graph in Appendix D, the plot of the CUSUM test does not cross the critical limits. This indicates the parameters are constant in the model.

4.6 Granger Causality Test

Since co-integration exists, we need to test the direction of causality by the Granger method. If there is co-integration, Granger causality must exist at least in one direction according to Granger (1988). After knowing the direction of Granger causality, it is easy to know which variable directs the other or whether both influence them-

selves. Table 4.6 presents the pairwise Granger causality test among the variables. The results show that there is no Granger causality between the dependent variable and the budget deficit. From the test result at a 5 percent level of significance, the budget deficit do not Granger causes economic growth and economic growth do not also Granger causes budget deficit. This result designates that the previous values of economic growth do not predict the current and future values of the budget deficit and the previous values of the budget deficit, do not predict the current and future values of economic growth[9]. And in the case of the short-run budget deficit and economic growth have a weak association, so there is no direct influence of the budget deficit on economic growth and economic growth has no direct influence on the budget deficit.

Table 6: Result of the Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob. value
LBD does not Granger Cause LRGDPG	27	0.224	0.802
LRGDPG does not Granger Cause LBD		0.040	0.960
LGCF does not Granger Cause LRGDPG	27	2.405	0.114
LRGDPG does not Granger Cause LGCF		0.528	0.597
LINFL does not Granger Cause LRGDPG	27	58.232	0.000
LRGDPG does not Granger Cause LINFL		0.284	0.756
LTRO does not Granger Cause LRGDPG	27	3.352	0.054
LGDPG does not Granger Cause LTRO		1.420	0.263
LNEX does not Granger Cause LRGDPG	27	1.122	0.344
LRGDP does not Granger Cause LNEX		13.615	0.000
LLIR does not Granger Cause LRGDPG	27	4.016	0.033
LRGDPG does not Granger Cause LLIR		4.045	0.032

*Note: 1) ***, ** and* denotes statistical significance at 1% , 5% and 10% level, respectively; 2) Computed at lags of 3.*

Source: Compiled by the author.

Economic growth does not Granger causes the gross capital formation and gross capital formation also does not Granger causes economic growth. Trade Openness does not Granger the causes of economic growth and vice versa is also true. However, inflation Granger causes economic growth and economic growth does not Granger cause inflation. Meaning, the past values of inflation determine the present and future values of economic growth. This sheds light that it is very important to wisely regulate inflation, thereby economic growth will be managed as well.

[9]In the case of statistical relationship, economic growth and the budget deficit had a negative relationship in Ethiopia during the study period, but the direction of the influence or Granger causality indicate that both variables do not Granger causes each other in either direction.

This indicates a statistical relationship in itself cannot logically imply Granger causality. The existence of a relationship between variables does not prove granger causality or the direction of influence (Gujarati D. , 2004).

The nominal exchange rate does not Granger cause economic growth and on the reverse, economic growth Granger causes the nominal exchange rate. It indicates the past year's economic performance determines the present and future values of the nominal exchange rate and it is not vice versa. The lending rate has Granger causality on economic growth and economic growth also has Granger causality on the lending interest rate. This designates the existence of bi-directional between the variables. In the meanwhile, the past values of one variable determine the present and future values of the other variable.

5 CONCLUSIONS AND RECOMMENDATIOS

5.1 Conclusion

The objective of this study is to identify the relationship between budget deficit and economic growth in the case of Ethiopia by covering time-series data from 1991 to 2019. The World Bank data index is used to achieve the objective of the research as a data source. The study employed the ARDL bounds testing approach to analyze the long-run and short-run effects of budget deficits on economic growth in Ethiopia during the study period.

From interview results, the study concludes that there are major challenges in administering the budget deficit. The major challenges are a delay of mega projects, natural disasters, climate change, world prices rising, and political situations. There are three major types of sources for the budget deficit; forecasting error, external shocks, and internal changes. However, the source of the budget deficit in Ethiopia is not determined. The government of Ethiopia takes policy actions to manage the budget deficit of the country in two directions. The first one is to reduce expenditure through controlling aggregate expenditure to ensure affordability and effective use of public expenditures. The second case is increasing revenue by broadening the tax base and improving tax administration. There is systematic government budget management in the country like a program-based budget system and system-based to manage and control government expenditure. But, not well functionalized in all budgetary institutions.

The empirical results of this study reveal that budget deficit was found to have a negative association with the economic growth of Ethiopia in the long run. A 1 percent increase in the budget deficit causes a 1.43 percent decline in real GDP, other variables remain constant. This result tends to follow the Neo-classical economists' arguments, which assume that budget deficits negatively affect the economic growth of the country by discouraging investors and lowering investment, which also crowds out private investment. This negative effect of budget deficit on economic growth shows an increase in government spending in Ethiopia does not stimulate aggregate demand which leads to the employment of idle resources and thus increases output. However, in short run budget deficit has a weak positive association with the economic growth. The magnitude (Beta value) in the long run is greater than the beta value in the short run, i.e. the effect of budget deficit on economic growth in the long run higher than the short-run effect. However, the negative impact of the budget deficit on economic growth can be reduced by focusing on the results of the long run.

In the case of other variables, in the long run, trade openness has a positive effect on economic growth, while it has a negative association with economic growth in the short run at a 5% level of significance. The nominal exchange rate has a negative association with economic growth in the long run and it has no immediate association in the short run. This indicates that a devaluation of the birr against the dollar has no positive impact on Ethiopian economic growth. Apart from this, both gross

capital formation and lending interest rate has no significant effect on the real GDP of Ethiopia. Lastly, the inflation rate has a positive effect on economic growth in the long run and is negatively associated with economic growth in the short run.

5.2 Recommendations

After a thorough analysis of data, the following recommendations are hereby made by the researcher. The Ethiopian government should be worried about the existence of a budget deficit, because it has a negative impact on economic growth in the long run, and take into consideration both short-run and long-run effects.

The government should reduce the budget deficit by mobilizing domestic resources more through either/or combination of different measures like advancing the tax system, tax reforms, broadening tax bases, improving efficiency of tax administration, and the efficiency of government spending or making it more productive.The government should functionalize the systematic government budget management in all budgetary institutions to manage and control government expenditure and to reduce unwarranted public expenditure.

There are different sources of budget deficits; policymakers/government should identify these sources of the budget deficit of the country to manage the budget deficit easily. The government should strengthen the monitoring and evaluation of the project, and also strengthen the management of State-owned enterprises to improve the failure of megaprojects that causes for budget deficit.

In addition, the government should have to consider the effect of devaluation seriously and set a remedial policy that encourages output growth and contains the impact linked with the devaluation on other macro variables before making a devaluation of the local currency. The government of Ethiopia should also have to sketch more trade openness policies to make a profit by integrating the country's economy with the regional/world economy as it exerts a visible positive impact on the economic growth of the country.

The government should identify the level of threshold of the inflation rate that positively affects economic growth and should reduce the high inflation that affects the saving habit of the population and increase government expenditure by affecting private investment.

References

[1] Abel M et al. (2018). Budget deficits, investment and economic growth: a panel cointegration. Investment Management and Financial Innovations, 182-189.

[2] Adam and Bevan. (2005). Fiscal deficits and growth in developing countries. . Public economics,89, 571-597.

[3] Ahmad, N. (2013). The role of budget deficit in the economic growth of Pakistan . Global Journal of Management and Business Research, 13 (5), 1-4.

[4] Aisen and D. Hauner. (2008). Budget Deficits and Interest Rates: A Fresh Perspective. IMF Working Paper, Fiscal Affairs Department, International Monetary Fund, WP/08/42.

[5] Akoto, D. (2019). Deficit Financing in Ghana and Its Impact on the Economy. Journal of Finance and Economics, 2020, 8(1), 6-12.

[6] Aleksandar N.and Pece N. (2017). Influence Of Budget Deficit On Economic Growth: The Case Of The Republic Of Macedonia. The Journal of Accounting and Finance, 116-126.

[7] Aliona Cebotari et al. (2008). Fiscal risks: sources, disclosure, and management. Washington, DC: International Monetary Fund.

[8] Al-Tamimi, K. A. (2020). The Effect of Budget Deficit on the Economy of Jordan. WSEAS TRANSACTIONS on BUSINESS and ECONOMICS, 1-6.

[9] Amwaama, N. (2018). An assessment of the relationship between budget deficit and economic growth in Namibia. Windhoek: UNAM, University of Namibia.

[10] Anayochukwu, O. (2012). Fiscal deficits and inflation in Nigeria: The causality approach. . International Journal of Scientific & technology research, 1 (8), 6-12.

[11] Antwi et al. (2013). Impact of foreign direct on economic growth: Empirical evidence from Ghana. International Journal of Academic Research in Accounting, Finance and Management Sciences, 3(1), 18-25.

[12] Arjomanda et al. (2016). Growth and Productivity; the role of budget deficit in the MENA selected countries. . Procedia Economics and Finance, 36,, 345-352.

[13] Aslam, A. (2016). Budget deficit and economic growth in Sri Lanka: An econometric dynamic analysis. . World Scientific News, 46.

[14] Asnakew, A. (2016). Challenges and Success Factors of Railway Megaprojects in Ethiopia. Journal of Business and Administrative Studies Volume 8 No.1, 50-82.

[15] Assefa, T. (2015). Budgeting System in Ethiopia: Program Budget System " Two Birds with One". Journal for Studies in Management and Planning Volume 1 issues 11, 50-67.

[16] Awe & Funlayo . (2014). The short and long run implication of budget deficit on economic growth in Nigeria. . 10 (5),doi:10.3968/4517.

[17] Aweke, G. (2016). Addis Ababa University. Retrieved January 12, 2021, from Addis Ababa University website: http://www.aau.edu.et

[18] Bernheim. (1999). Taxation and Saving. Working Paper 7061.

[19] Bernheim, D. (1989). Neoclassical Perspective on Budget Deficits. Economic persepectives. Journal of Economic Perspectives, 3(2), 55-72.

[20] Biplob, M. N. (2019). DOES BUDGET DEFICIT IMPEDE ECONOMIC GROWTH? EVIDENCE FROM BANGLADESH. Journal of Management, Economics, and Industrial Organization, 3(2), pp.66-94.

[21] Bose, N., Haque, E., & Osborn, D. (2007). Public expenditure and economic growth: A disaggregated analysis for coutries. . The Manchester School (5), 533-556.

[22] Buscemi, A., & Yallwe, A.H. (2012). "Fiscal deficit, national savings and sustainability of economic growth in emerging countries:A dynamic GMM panel data approach. International Journal of Economics and Financial Issue, 2(2), 126 – 140.

[23] Dalyop, G. (2010). Fiscal deficit and growth of domestic output in Nigeria, . Jos Journal of Economics, 4 (1), 153-173.

[24] Douglas, B. (1999). Taxation and Saving . Working Paper 7061, 7-18.

[25] Duokit, E. &. (2016). Budget deficit and economic growth in Sierra Leone: An empirical re - Examination. Journal of Business and Human Resource Management, 2 (1),, 1-17.

[26] Emmanuel A et al. (2018). Budget Deficit and Economic Growth in Liberia: An Empirical ionnvestigat. American Journal of Humanities and Social Sciences Research (AJHSSR), 68-78.

[27] Fatima, G., & Rehman, W. (2012). Consequential effects of budget deficit on economic growth of Pakistan. International Journal of Business and Social Science, 3(7), 203-208.

[28] Fisher, S. (1993). The role of macroeconomic factors in growth. Journal of Monetary Economics, 32 (1), pp. 484. Gaber, S. (2010). Economic Implications from Deficit Finance. BERG Working Paper Series, 1-20.

[29] Gebru, T. (2015, January 06). ATMIRE. Retrieved January 27, 2021, from Addis Ababa University: http://localhost/xmlui/handle/123456789/14980

[30] Girma, T. (2013, June). GRIN Verlag. Retrieved January 5, 2021, from GRIN Verlag website: https://www.grin.com/document/355036

[31] Grimsey, D. L. (2004). public private partenerships, the worldwide revolution in ifrastructure provision and project finance . Cheltenham: Edward Elgar Publishing Ltd.

[32] ujarati, D. (2004). Basic Econometrics: 3rd Edition. . McGraw Hill Inc.

[33] Gujarati, D. (2004). Basic Econometrics 4th ed. New york, United States: McGraw-Hill Companies,.

[34] Gupta and Baldacci . (2005). Fiscal policy, expenditure composition and growth in low income countries. Journal of International Money and Finance, 24(1), 440-460.

[35] Gurgul, H., Lach, L. . (2012). Two Deficits and Economic Growth: Case of CEE Countries in Transition. AGH Managerial Economics, No. 12, 79-108.

[36] Hubbard, G. (2012). Consequences of Government Deficits and Debt. International Journal of Central Banking, 8(S1), 203-235.

[37] Huynh, N. (2007). Budget deficit and economic growth in developing countries: The case of Vietnam.. Kansai Institute for Social and Economic Research.

[38] IMF. (2002). Trade and Finance. Washington D.C: International Monetary Fund.

[39] Keho.Y. (2010). Budget deficit and economic growth; Causality evidence and policy implications for WAEMU countries. European journal of Economics, Finance and Administrative Science, 100-105.

[40] Kneller et al. (1999). Fiscal policy and growth: evidence from OECD countries. Journal of Public Economics, 170-192.

[41] Laurence Ball, N. Gregory Mankiw. (1995). WHAT DO BUDGET DEnCrrS DO? NBER WORKING PAPER SERIES,5263, 1-38.

[42] Lwanga, M. &. (2014). . Macroeconomic effects of budget deficits in Uganda: A VAR-VECM approach. Economic Policy Research Centre.117, 1-27.

[43] Maji et al. (2010). An Investigation of Causal relationship Between fiscal deficits, Economic growth and Money supply in nigeria. Canadian Social Science Journal, 219-226.

[44] Maru, Y. (2018, June). Addis Ababa University. Retrieved June 7, 2021, from Addis Ababa University Web site: http://etd.aau.edu.et

[45] MoFEC. (2017). Overview of Fiscal policy and recent fiscal development in Ethiopia. Addis Ababa: MoFEC.

[46] Mohanty, R. (1997). Fiscal deficit - Economic growth nexus in India: A cointegration analysis. Doctoral dissertation, Jawaharlal Nehru University, New Delhi, India. Retrieved from http://punjabiuniversity.ac.in.

[47] Murwirapachena et al. (2013). The economic determinants of budget deficits in South Africa. Mediterranean Journal of Social Sciences, 4 (13), 561-569.

[48] Navaratnam, R. &. Mayandy, K. (2016). Causal nexus between fiscal deficit and economic growth: Empirical evidence from South Asia. International Journal for Innovation Education and Research. 4(8), 1-19.

[49] Nayab, H. (2015). The relationship between budget deficit and economic growth of Pakistan . Journal of Economics and Sustainable Development, 6 (11), 85-90.

[50] Noveski, M. (2018). Macroeconomic effects of the budget deficit in the Republic of Macedonia. Croatian Review of Economic, Business and Social Statistics (CREBSS),4(2), 5-14.

[51] Odhiambo et al. (2013). The relatioship between fiscal deficits and economic growth in Kenya. Greener journal of social sciences, 3(6), 306-323.

[52] Oladipo, S. &. (2011). Budget deficit and inflation in Nigeria: A causal relationship. Journal of emerging trends in economics and management sciences, 2(1), 1-8.

[53] Oluwafadekemi and Adeyemi . (2015). Fiscal Deficit and Economic Growth in Nigeria: Ascertaining a threshold. International Journal of Economics and Financial Issues, 8(3), 296-306.

[54] Onwioduokit and Bassey. (2013). Fiscal deficit and Economic growth in the gambia. International Journal of Current Research and Review, vol 5 .

[55] Osoro, S. (2016). Effects of budget deficit on economic growth in Kenya. Unpublished Master of Arts in Economics thesis. University of Nairobi, Kenya.

[56] Pelagidis, T., & Desli, E. . (2014). Deficits, growth, and the current slowdown: what role for fiscal policy? Journal of Post Keynesian Economics, 26(3) , 461-469.

[57] Rahman, N. (2012). The relationship between the budget deficit and Economic growth for Malaysia perspective. International Conference on Economics and Business Innovations, IPEDR, (pp. 54-71).

[58] Risti et al. (2013). Budget Deficits Effects on Economic Growth. Journal of Economics and Business Research, XIX(1), 162-170.

[59] Shojai, S. (1999). Budget deficits and debt: Global perspective. USA, Greennood publishing group, 1-18.

[60] Siddiqi.W and M Ilyas M. (2011). the impact of revenue gap on budget deficit, debt burden and economic growth: evidence from Pakistan. international journal of human and Social sciences 6:2.

[61] Siegel, J. (1979). Inflation-Induced Distortions in Government and Private Savings Statistics. Review of Economic. Cambridge, Massachusetts.

[62] SIRERE, S. S. (2015, semptember). Sematic Scholar. Retrieved January 22, 2021, from Semantic Scholar website: https://www.semanticscholar.org

[63] Tulakemel, M. (2015, November). Nairobi Universite. Retrieved December 23, 2020, from Nairobi University website: http://hdl.handle.net/11295/93375

[64] UNDP. (2014). ANNUAL REPORT UNITED NATIONS DEVELOPMENT PROGRAMME-ETHIOPIA. Addis Ababa: United Nations Development Programme.

[65] Velnampy, T., & Achchuthan, S. (2013). Fiscal deficit and Economic growth: A study in Sri Lankan economic perspective. Developing Country Studies, 3(3), 166-174.

[66] William and Klaus . (1993). Fiscal Deficit and Macroeconomic performance in Developing Countries. The World Bank Research Observer, 8(2), 211-237.

[67] World Bank. (2021). Overview of Ethiopian economy. Washiton DC: World Bank Group.

[68] World Bank, Economist and program team. (2014). Ethiopia's Great Run,the growth acceleration and how pace it. Washington D C: World Bank.

A Appendix: Questions for Interviewers

The research objective is to determine the relationship between the budget deficit and economic growth in Ethiopia from 1991-2019.

1. When you prepare the government budget and budget deficit do you use any model? If not, how to prepare it?

2. Is there any systematic government budget management in the country and what are the policies that the Government of Ethiopia can adopt to manage budget deficit?

3. How would you calculate the budget deficit? Is it only the difference of the total revenue minus total expenditure or is there any analysis of the impact of this budget deficit on economic growth?

4. Does any evaluation of last year's budget deficit impact the macro-economic variables? If there is analysis of the impact of the last year's budget deficit, have you getting the direction of impacts on macro-economic variables? If yes, in which variables?

5. How do you monitor and evaluate the budget deficit of the country? Do you have any model to administer a budget deficit?

6. Do you know the source of the budget deficit of the country?

    - Forecasting error (Experts do not fully understand the economic activities of the future)
    - External shocks; droughts, wars, floods, locust, and the other unexpected
    - Internal shocks; corruption, unwarranted expenditure, high noncompliance rate among the taxpayers generally shock come in case of public finance issues.

7. If you identify the sources of the budget deficit, what type of action to be taken by the institution to correct high budget deficit?

8. Ethiopia has registered high economic growth in the budget deficit for the last decade. Do you think this economic growth comes from high government expenditure or a high budget deficit? Do you know the relationship between budget deficit and economic growth in Ethiopia?

9. Does Ethiopia have documented Fiscal rules regarding budget deficit? If yes what does it say? And IMF advises the country's budget deficit should not exceed 3% of GDP. Do you think, is this really important for Ethiopia and when you register below this threshold is it really performing good economic growth?

10. How do you budget domestic and external financing? Do you do any analysis on the impact of these two financings? Which one is mostly used in the country and why if specifically known?

11. What are the major challenges in administering the budget deficit?

B Appendix

VARIABLES	ADJ	LR	SR
LnBDI		-1.436**	
		(0.584)	
ltradeop		0.783**	
		(0.274)	
lNEX		-0.637**	
		(0.248)	
llIR		0.208	
		(0.223)	
linflation		0.161**	
		(0.0627)	
LGCFR		0.216*	
		(0.108)	
L.lRGDPG	-1.208***		
	(0.0681)		
D.LnBDI			1.081*
			(0.611)
D.ltradeop			-0.728***
			(0.238)
D.llIR			-0.461*
			(0.255)
D.linflation			-0.295***
			(0.0546)
LD.linflation			-0.240***
			(0.0268)
Constant			4.088***
			(0.923)
Observations	27	27	27
R-squared	0.987	0.987	0.987

Figure 4: Estimated Long Run Coefficients using the ARDL Approach
Source: Compiled by the author

C Appendix

Pesaran/Shin/Smith (2001) ARDL Bounds Test							
Ho: no levels relationship				F=81.932			
				t=-17.722			
Critical Values (0.1-0.01), F-statistic, Case 3							
	[I_0]	[I_1]	[I_0] [I_1]	[I_0]	[I_1]	[I_0]	[I_1]
	L_1	L_1	L_05 L_05	L_025	L_025	L_01	L_01
K_6	2.12	3.23	2.45 3.61	2.75	3.99	3.15	4.43
accept if F< critical value for I(0) regressors							
accept if F> critical value for I(1) regressors							
Critical Values (0.1-0.01), t-statistic, Case 3							
	[I_0]	[I_1]	[I_0] [I_1]	[I_0]	[I_1]	[I_0]	[I_1]
	L_1	L_1	L_05 L_05	L_025	L_025	L_01	L_01
K_6	- 2.57	-4.04	-2.86 -4.38	3.13	-4.66	3.43	-4.66
accept if t>critical value for I(0) regressors							
accept if t> critical value for I(1) regressors							
K: # of non-deterministic regressors in long run relationship							
Critical values from Pesaran /Shin/smith (2001)							

Figure 5: ARDL Bounds Test
Source: Compiled by the author

D Appendix

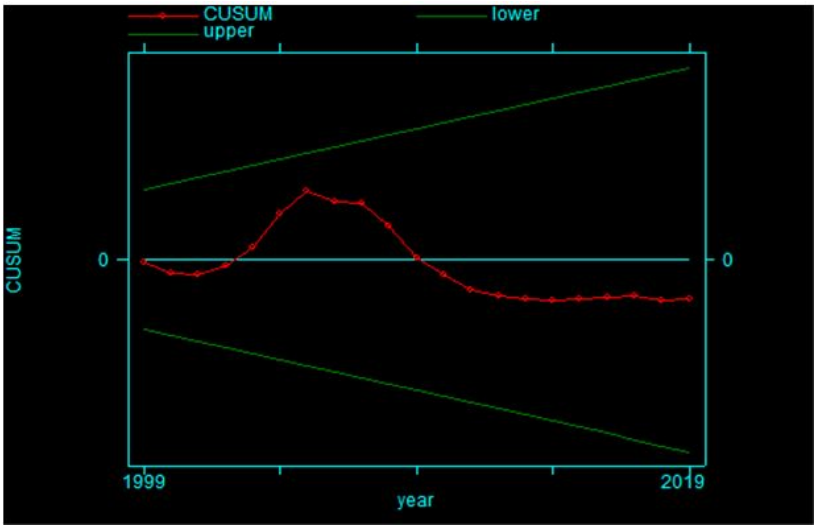

Figure 6: The graphs of cumulative recursive residuals
Source: Compiled by the author