



ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES
COLLEGE OF BUSINESS AND ECONOMICS
DEPARTMENT OF ECONOMICS

**THE IMPACT OF BUDGET DEFICIT ON INFLATION IN
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BY: AMANUEL TAFESSE

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**A THESIS SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES, ADDIS
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Declaration

I hereby declare that this MSc. thesis titled “*The Impact of Budget Deficit on Inflation in Ethiopia*” was carried out by me for the masters of economics under the guidance and supervision of Dr. Assefa Admassie, Addis Ababa University, College of Business and Economics, Department of Economics.

The interpretations put forth are based on my reading and understanding of the original texts and they are not published anywhere in the form of books, articles and reports. The other books, articles and websites, which I have made use of are acknowledged at the respective place in the text.

For the present thesis, which I am submitting to the University, no degree or diploma or distinction has been conferred on me before, either in this or in any other University.

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APPROVAL

This is to certify that the thesis paper presented by Amanuel Tafesse, titled: “*The Impact of Budget Deficit on Inflation in Ethiopia*” in partial fulfillment of the requirement for the degree of Master of Science (MSc.) in Economics (Economic Policy Analysis) compile with the regulation of the university and confirms to the acceptable standards with the respect to originality and quality.

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Abstract

Ethiopian economy is one which has experienced consistently a high budget deficit with unstable inflation rate for the last many periods. The main objective of the study was to examine the impact of budget deficit on inflation in Ethiopia by using annual time series data over the period from 1980 to 2019. For this purpose both descriptive and econometrics methods of analysis, such as the Classical OLS long run regression, Johansen Co-integration and Error correction models were employed. The result of the study revealed that budget deficit has positive and significant impact on CPI in Ethiopia, in the long run. Also, money supply has a direct and significant impact on CPI in Ethiopia. Unlike the long run, budget deficit has an insignificant impact on the CPI in Ethiopia, in the short run. Moreover, the result revealed that there are 4 co-integrating equation in the model. Based on these results, the following recommendations are proposed. The central government should improve its revenue generation capacity through a comprehensive tax reform and reduce the irrational allocation of the budget to the unproductive sectors in order to narrow the budget gap. In addition, government should improve the financial sector and rely on it, as a source of deficit financing.

Key words: Inflation, Budget Deficit, Error Correction Model, Government Expenditure and Fiscal Policy

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Acronyms

ADF = *Augmented Dicky Fuller*

AIC = *Akaike Information Criterion*

BOP = *Balance of Payment*

CBE = *Commercial Bank of Ethiopia*

CPI = *Consumer Price Index*

DBE = *Development Bank of Ethiopia*

ECM = *Error Correction Model*

ESA = *European System of Accounts*

EU = *European Union*

GDP = *Gross Domestic Product*

GTP = *Growth and Transformation Plan*

IMF = *International Monetary Fund*

LDC's = *Less Developing Countries*

MOF = *Ministry of Finance*

M2 = *Broad Money Supply*

NBE = *National Bank of Ethiopia*

REER = *Real Effective Exchange Rate*

RGDP = *Real Gross Domestic Product*

SOE's = *State Owned Enterprises*

VAR = *Vector Autoregressive*

VECM = *Vector Error Correction Model*

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

To influence an aggregate demand in the economy, there are two kinds of economic policy instruments (monetary policy and fiscal policy). Fiscal policy contains changing the government expenditures and taxation. Fiscal policy has two components, government revenue and government expenditure. Government expenditures are categorized into either current (non-developmental) expenditures or capital (developmental) expenditures. On the other hand, national budget revenue includes all kinds of taxes and other levies (Makochekanwa, 2008). Monetary policy involves changing the interest rate and influencing the money supply and it has two components, expansionary and contractionary monetary policy. Expansionary monetary policy means central banks increase the money supply and reduce interest rate to expand the growth. On the other hands, contractionary monetary policy means central bank reduces money supply and raises an interest rate to slow the growth.

Monetary and fiscal authorities are connected through the growth of money stock in the method of printing money (seigniorage), which provides income to the fiscal authority. Developing countries that experience large public sectors, inefficient tax systems, underdeveloped financial markets and limited access to external borrowings, tend to increase reliance on seigniorage income in financing fiscal deficits. Monetary authorities, on the other hand, are left with limited choices, at least in the case where seigniorage income is the only way to avert government from being bankrupt. The influence of seigniorage financing of a budget gap on the inflation rate was first formalized by Sargent and Wallace (1981). Since then, attention has progressively been given to the role of budget deficits impacts on inflation.

Budget deficit is one of the most important parts of macroeconomics problems and it arises when the demand for government expenditure far exceeds government revenue in a particular period of time, usually a year. However, the revenue side of the budget is directly dependent upon the performance of economic activities at any given time. If the economic performance is on the

boom circumstance, the government revenues will improve without increase of the fiscal burden. While the government expenditure has often been considered in the economic literature as the instrument of economic policy (exogenous variable), even in stable economies, the spending part of government appear to be much more slow. Given this direct linkage, it follows that if a country is in the period of economic stagnation, substantive changes occur in the budget sphere. Government revenue reduces due to erosion of the tax base, while government spending raises due to increase in the government transfers to public (social welfare, unemployment benefits, etc.).

Budget deficit is a common phenomenon in most of developing countries like Ethiopia because much of the government spending is directed towards recurrent or non-developmental expenditures. In addition, they have limited capacity to collect the optimal amounts of taxes and levies. That's why the budget deficit is a common problem in third world countries like Ethiopia. But the government incomes are always less than the government expenditures. Therefore, the government will take some measures to finance the deficit (gap) between the expenditures and revenues; by borrowing from internal and external sources and seigniorage.

The fiscal budget gap is a priori harmful for the overall functioning of the country's economic activities. The most frequent arguments are crowding-out effect on gross investments; inter-temporal effects of budget deficit and its impact on inflation. According to another argument, budget deficit today persistently implies the necessity of running a surplus budget for tomorrow, which simultaneously means heavier tax burden for next generations. It is important to note that, higher budget deficit policies may, however, implies higher inflation even without affecting the growth money supply. Ackay et al (1996) mentioned that there are two ways through which higher budget deficits influence inflation. Firstly, the government's borrowing requirements normally increase the net credit demands in the economy, driving up the crowding out private investment and interest rate. The crowding out effect on private investment will reduce the production of goods and services in the economy. Then, the reduction in the amount of goods and services available for a given level of cash balances leads to an increase in the price level.

Secondly, the budget deficits can also lead to higher inflation when the private sector monetizes the budget deficits but not a Central Banks monetize the debt. It means that, higher interest rates induce the financial sector to develop new interest bearing financial instruments that are almost as liquid as cash and are risk free. Thus, the government debt although not monetized by the Central Bank it is monetized by the private sector.

Ethiopia is also facing a negative budget balances for the last many years due to massive government expenditure to support a rapid economic growth and development. Meanwhile, the government revenue was growing at lower rate compared to the demand. The debt burden can have a depressing effect on growth through government budget by crowding out private investment. Persistent budget deficits and its domestic source of financing were the foctors behind the inflationary pressure in Ethiopian economy (Tsegay, 2016). Therefore, this paper analyses the impact and cause-effect relationship between budget deficit and inflation in Ethiopia over 1980 to 2019.

1.2 Statement of the Problem

In most of the developing countries like Ethiopia, the government sector dominants in initiating and financing of economic growth and development; and would be widening the gap through increasing the expenditures side. In addition, there is inefficiency of expenditures distribution problems (such as lacks of project feasibility, mismanagement of budget allocation, corruption by the government higher officials). On other side, the government revenues are inadequate to attain the government budgetary demand, because it is not able to collect properly as per the fiscal need. Contrary to the potential, government revenue is too low and inconsistent due to high level of informal sectors, narrow tax base, high rate of tax evasion and corruption of government officials, while the government expenditures are quickly rising due to a huge participation of the public sector in the economy (Ekanayake, 2014).

The high degree of the public sector in encouraging and financing economic development makes budget deficit unavoidable. In developing countries the mounting public pressure to spend coupled with the incapacity of these countries to generate the required tax amount due to

underdeveloped financial markets and weak tax collection mechanism. This has not only contributed to persistent budget gaps but also forced many third world countries to finance these gaps mainly through money printing thereby cause persistent inflation (Tsegay et al, 2013).

The budget deficit in Ethiopia showed increment overtime. It increased from 0.51% of GDP in 1980 to 4.2% of GDP in 2000, and also increased further to reach at 6.34% of GDP in 2015. Then, in 2016, 2017 and 2018 it stood at 2.92%, 4.55% and 4.92% of GDP respectively (MoF annual bulletin of each year). Higher government expenditures and low performance in tax revenue collection are the reasons behind the consistent fiscal deficit in Ethiopia. During the periods of 1982, 2000 and 2007 the percentage growth of government revenues was 6.81 percent, 2.30 percent and 11.61 percent, respectively. On the other side, during the same period the percentage growth of government expenditures stood at 15.26 percent, 19.45 percent and 21.42 percent, respectively (MoF annual bulletin of each year).

As the fiscal deficit is widening overtime and the tax revenue collection is low, the government has to look for other fiscal financing options to meet its budget obligation. The common trend and easy for the government is a direct borrowing from the Central Bank. Every year the MoF borrows a large sum of money from the National Bank of Ethiopia as a means to fill the fiscal needs of the government.

The NBE is engaged in large direct and indirect quasi- fiscal operations to finance the government budget deficit. Muluneh, (2019) showed that, as of end- September 2018, the NBE's outstanding claims on the central government amounted to birr 166.7 billion (corresponding to 7.6 percent of GDP or 95.3 percent of the monetary base or reserve money). Moreover, the National Bank of Ethiopia also offers indirect financing to the government by extending credit to DBE to purchase treasury bills and provides indirect financing of SOEs by granting liquidity to the Commercial Bank of Ethiopia (CBE) in the form of 5- year bonds, which amounted to birr 27 billion in 2016/17. All these direct and indirect quasi fiscal operations show that NBE is the main source of money to financing the budget gap and it considered as one of the instruments to achieve the targets of the fiscal authority. Because, direct borrowing from the central bank to

meet the fiscal deficit will increase the money supply and it can create inflation. Sometimes money injection by the Central Bank may cause inflation without bringing economic growth.

In Ethiopia, for the last two decades inflation rate has been rapidly galloping from time to time and it is far from the single digit target of the national bank of Ethiopia. During the periods of 2003, 2008, 2011, 2012 and 2020 the headline inflation rate stood at 17.8%, 55.2%, 38.0%, 20.8% and 20.6% respectively (NBE's annual bulletin of each year). Furthermore, the extreme lowest and highest rates of inflation rates were recorded in the last two decades. During the period of 2001 the lowest rate which stood at 10.8% below zero was recorded and in 2008 the highest level which stood at 55.2% was observed because of the global economic crises (NBE's annual bulletin of each year).

Many scholars in different countries have examined the relationship between budget deficits and inflation. However, there is no consensus among the studies on the relationship between the two. Some scholars such as Durgati (2020), Darrat (1985), Tsegay Mebratu (2016), argued that government budget deficit does have impact on inflation in the long run, while others stand in the opposite (see Tiwari, Bolat et al (2015), McMillin and Beard (1982), Yemane W/Rufael (2008)).

This study, however, differs from the previous studies in the following ways. First, this study covers a recent period which captured some of the most important and recent economic, political and social dynamics. Second, most of the previous studies did apply single methodological techniques as co-integration or VECM approaches; this study, however, applied diverse methodological tools to check the long-term and short term impact of budget deficit on inflation. Third, this study also considered additional explanatory variables those ignored by the previous studies such as dummy on one time devaluation and dummy on election periods. Thus, this study examined the impact of budget deficit on inflation rate, given that it provides recent evidence and improves the weakness of the previous studies.

1.3 Objectives of the Study

1.3.1 General Objective

The main objective of the research was to investigate the quantitative impact of fiscal deficit on inflation in Ethiopia over the period 1980-2019. In this regard, the study intended particularly to investigate the following specific objectives.

1.3.2 Specific Objectives

- ✓ To show the trends of the budget deficit and inflation in Ethiopia over the periods from 1980 to 2019.
- ✓ To examine the budget deficits impact on the inflationary pressure in Ethiopia.
- ✓ To examine the presence of long run co-integration in the model by using Johansen co-integration test.

1.4 Research Questions

Fiscal deficit coexists with poor macroeconomic performance in Ethiopia, including high and unstable price level; the study will answer the following questions:-

- What does the trends between budget deficit and inflation in Ethiopia look like?
- Is there a significant and positive impact of the budget deficit on inflation in Ethiopia?
- Is there a long run co-integration among variables in the model?

1.5 Significance of the Study

The findings of this research are important to the government; by providing the direction of how much significant of budget deficit to influencing inflation in Ethiopian economy. it helps the government to effectively implement fiscal and monetary policies and hence to control inflation. Furthermore, it will assist the policy makers in the drive towards achieving the objective of sustainable fiscal policy, an issue of strong relevance to the ministry of finance. In addition, the study will make a useful contribution to the proper understanding of the impact of budget deficit on inflation in Ethiopia.

1.6 Scope of the Study

This study mainly concentrates on the impact of budget deficit on inflation in the case of Ethiopia. The study will cover around forty (40) years' annual time series data a period from 1980 to 2019 G.C. Because, the shortage of data availability and accessibility this study will use only forty years' of time series data to capture the study.

1.7 Organization of the Study

The study is organized as follows: The next chapter, chapter two deals with the theories related to the issues and empirical works which are related to relationship budget deficits and inflation. The third chapter presented the research methodology part which incorporated research procedure, types of data source, model specification and variables description. Then, the fourth chapter presented the findings of the descriptive and econometrics analysis. Lastly, chapter five also presented a conclusion and policy recommendation.

CHAPTER TWO

LITERATURE REVIEW

In this study, both the theoretical and empirical literature review focuses on the impacts of budget deficit on inflation. The theoretical literature review considered the well-known concepts and theories which deals the relationship between budget deficits and inflation. Besides, an empirical review will be presented.

2.1 Theoretical Reviews

2.1.1 The Link between Budget Deficit and Inflation

In this section different theories on the linkage between budget deficit and inflation, such as fiscal theory of inflation, monetarist theory, neoclassical theory, Keynesian theory and Ricardian equivalent theory will be discussed.

The fiscal theory of inflation is one of the well-known theory on focused the linkage between budget deficit and inflation. The theory deals about the mechanism channels from budget deficit to inflation through changing the stock of money and without affecting the stock of money. The theory also has two main versions. The first version deals the budget deficit will influencing the inflation through its impact on the supply of money is known as the weak form, while the other version is deals about inflation would influenced by budget deficits through without affecting the stock of money and it is named as the strong form fiscal theory of inflation. The first version is based on ‘unpleasant monetarist arithmetic’, a seminal paper by Sargent and Wallace (1981), who argued that the interaction between monetary and fiscal authorities is the main cause for the highest rate of inflation. Using two coordination strategies, they theoretically explain that even when the monetary base and price level are closely connected, as in the monetarist approach, the monetary authority’s control over inflation is limited under certain conditions. In at event when the monetary authority is more dominant than fiscal authority, it freely to set monetary targets for the current and future periods. Hence, the monetary authority decides the seigniorage revenue that can be delivered to the government and it is up to the fiscal authority to balance the

remainder of its budget using bond sales to the population. Sargent and Wallace (1981) argue that, in this coordination scheme, inflation is totally under the control of the monetary authority. In contrast, when the dominance is taken by fiscal it sets the present and future budget balances and determines the amount of seigniorage revenue required from the monetary authority. Therefore under the second coordination scheme, the monetary authority may not only create extra money but also additional inflation, which in turn, weakens its control over price stability. Therefore, this version does not deny that the growth of money supply is the immediate cause of inflation, yet it puts forward the importance of the fiscal authority in determining the inflation. Therefore, the first version fiscal theory of inflation is known as the weak-form and it is accepted mainly as the right way of interpreting the fiscal-monetary interaction in the determination of price level.

The second version also called the strong-form of fiscal theory of inflation; deals the budget deficit influencing inflation through without affecting the growth of money supply. This is introduced by the work of Leeper (1991), Sims (1994), and Woodford (1994, 1995). The main message of these studies is that the inflation or price level will determined mainly by fiscal components i.e. government debt, present and future revenue and expenditure plans, and monetary variables have not role in price determination. Price levels adjust to safeguard the government's inter-temporal budget constraint and the adjustment is determined by individuals' wealth effect. Basically, the second version of fiscal theory of inflation argues for non-Ricardian equivalence and, as a result, when there is a budget deficit, individuals consider it to be growing their wealth. This, in turn, increases the total demand thereby generating inflation and leaving no role for the monetary authority. In contrast, the Ricardian equivalence hypothesis proposed by Barro (1989) suggests that an increase in fiscal deficit does not affect the total demand, price level or interest rate in the economy.

In the monetarist perspective money supply drives inflation. If monetary policy is helpful to a fiscal deficit, the stock of money continues to increase for a long period. Then an aggregate demand rises as a result of this budget gap financing, causing production (output) to increase

beyond the natural level. Growing labour demand increase wages, this leads to the shift in aggregate supply in a downward. After some period the economy returns back to the natural level of output. However, this occurs at the expense of permanent higher price level.

As monetarist perspective, the fiscal deficit causes to the higher inflation, but only to the extent that they are monetized (cited in Hamburger and Zwick, 1981). In the monetarist and neo-classical models, changes in the inflation rate closely depend on changes in the stock money. Normally, the budget deficit pursue does not cause inflationary pressures, but rather affects the price level through the impact on money aggregates and public expectations, which in turn trigger movements in prices.

According to M. Freidman, Inflation is always and everywhere a monetary phenomenon in the sense that it is and can be produced only by a more rapid increase in the money supply than in output. However, there are many different possible reasons for monetary growth, including gold discoveries, financing of government spending, and financing of private spending (M. Friedman and Charles A.E, 2002). Friedman (1968) argued that the monetary authorities can control the rate of inflation through the control of the stock money in the economy. But, when it is monetized the budget deficit would leads to inflation. He further argued that the effect of bond financing depends on whether interest rates are pegged or not. When interest rates are pegged, bond financing would require, at least in the long run, an increase in money supply, leading to inflation (Sergent and Wallace, 1981). He further argued that, bond-financed fiscal deficits causes interest rate to be so high that the financing method would eventually be monetization, thereby leading to inflation in the long run. Miller (1983) argued that whether deficit is monetized or not it leads to inflation. It leads to inflation through the crowding out effect of private investment once it is bond-financed (that is, bond financing increases interest rate and this crowds out private sector investment, thereby reducing output growth and hence causing rising price level.

The Neoclassical, Keynesian and the Ricardian equivalence theories are the others thoughts

which deal about the relationships between budget deficit and inflation. According to the neoclassical theory, individuals plan their consumption over their life cycle. Hence, budget deficit increases consumption while shifting taxes to future generations and the increase in consumption decreases saving (under the assumption of full employment). This leads to higher interest rate and decline in private investment and income (cited in Robert, 2014). The Ricardian equivalence considers budget deficits and taxation to have equivalent effects on the economy (Barro, 1989). Hence national saving does not change since the increase in private saving is matched by an equivalent decline in public saving. To the extent that national saving, investment and aggregate demand do not change, budget deficit does not affect the price level. Therefore, the Ricardian hypothesis postulates that an increase in budget deficit does not affect aggregate demand, interest rate or price level (Barro, 1989). According to the Keynesian theory, budget deficit increases domestic production as there are unemployed resources and liquidity constraint. Thus, investors become more optimistic and raise the private investment, which rises income.

Except the Ricardian equivalence theory, all the above theoretical discussion reveals that there is a direct channel from budget deficit to inflation (price level), depending on the way of deficit financing and the consequence of the crowding out effects of private investment.

2.2 Empirical Reviews

There are numerous empirical studies in the literature that explains the linkage between budget deficit and inflation in advanced and less developed countries. The majority researches on the relationship between budget deficits and inflation are focused on the case of advanced countries. In developing countries also many researchers investigated the linkage between budget deficit and inflation by different researches.

Durgati, E.A. (2020) investigated the effect of budget deficit and others determinant variables on inflation in Western Balkans Countries, by using panel data for the period of 2001-2017. The study employed multivariate time series and vector error correction model (VECM). The results revealed that budget deficit has a significant impact on inflation rate.

Darrat A.F. (1985) examined the potential link between federal budget deficits and inflation in U.S.A, the post-1960 period. The results suggest that both growth money supply and budget deficits exert a significant impact on inflation during the 1960s and 1970s. The results revealed, relative to the growth of money supply, the budget deficits have had a stronger and more reliable impact on inflation.

Tiwari, Bolat et al (2015) (revisited Darrat A.F., 1985) and examined the interrelations between budget deficits and inflation for nine EU countries during the period of 1990-2013. The study employed the bootstrap causality and Granger causality test in the frequency domain analysis which enables them to distinguish short and long-run causality. Unlike Darrat (1985), the result shows that there is no relationship causality from budget deficits to inflation for all countries, causality from inflation to budget deficits indicates a permanent (long-run) relationship for Belgium, and France.

Hamburger and Zwick (1981) investigated the relationship between fiscal and monetary policy. Specifically, it seeks to determine whether fiscal deficits influence the growth of money stock. The result shows that budget deficits have had a significant impact on the growth money supply a case in U.S.A. Whereas, McMillin and Beard (1982) re-examined the fiscal policy-money growth linkage analyzed by Hamburger-Zwick (1981), by using the newly revised national income accounts data and the periods extended to 1976 and then to 1978. Unlike Hamburger-Zwick, McMillin and Beard (1982) does not find any strong evidence of a direct linkages between fiscal deficit and money growth over the period 1961–1974. Therefore, the study concluded that no relationship between deficits and money growth.

Hondroyannis and Papapetrou (1997) investigated the direct and indirect effects of budget deficit on inflation in Greece from 1957 to 93, co-integration tests was employed. The results indicated that the indirect effects of budget deficits on inflation exist while the direct effects are not present. Contrary, Darrat (2000) also examined the impacts of budget deficit on inflationary consequences in Greece, by employing error correction mechanism for the same data set. He suggested that the growth of money supply and fiscal deficits have direct and significant impacts

on inflation in Greece. Darrat justified that the paper by Hondroyiannis and Papapetrou (1997) lacks weight owing to several modelling and estimation problems.

Edwards and Tabellini (1991) examined the determinants of seigniorage, inflation and budget deficits in developing countries. They implemented a numbers of tests based on the political economy approach to macroeconomic policies. The result indicated that political instability and political polarization play a significant role in explaining cross countries differences in inflation, seigniorage, government borrowing and budget deficits. Roubini (1991) suggested that the co-movement of budget deficits and inflation in developing countries is underpinned by political instability. This view is supported by the results of Edwards and Tabellini (1991).

Jha R. (2007) presented a broad overview of fiscal deficit issues confronting in developing countries. Finally, he suggested that the widely accepted norm on tax and expenditure needs to be reformed in developing countries. Moreover, Jha (2001) explains that when a country has no credible and stable policy regimes, it incurs high costs in borrowing from abroad. As a result, it relies on monetary financing of the deficit thereby weakening the independence of monetary policy from fiscal policy.

Cottarelli, et al. (1998) investigated inflation performance by looking at policy makers' incentives to inflate the economy in a sample of industrial and transition economies. They found a significant impact of budget deficit on inflation in countries where the government securities markets is not well developed. This implies that limited access to financial markets drives governments to resort to central banks during times of fiscal distress.

Choudhary M. and Parai A. (1991) investigated the role of huge budget deficits on near-hyperinflation in Peru, by using quarterly data for the period 1973:1 to 1988:1. The result indicated that the fiscal deficits and money supply growth do have significant impact on the inflation rates in Peru.

Sowa (1994) examined the linkages between fiscal deficits, output growth and inflation targets in Ghana. The result revealed that inflation in Ghana is influenced more by output volatility or

supply side factors than by monetary and fiscal factors. Chaudhary and Ahmad (1995) explained that financing a budget deficit from domestic sources leads to an increase in the money supply, which creates inflation in the long run, using a simultaneous equation in a case Pakistan. This opinion was also supported by Khan and Agha (2006).

Many studies have also investigated the relationship between budget deficit and inflation in Ethiopia. For instance, Yemane W/Rufael (2008) has investigated the causal link among budget deficit, money and inflation in Ethiopia for the period over 1964 to 2003 using the bounds test approach to co-integration and used a modified version of the Granger causality test. The finding shows that there was a unidirectional Granger causality running from money supply to inflation and from budget deficits to inflation as well as a long run co-integrating relationship among the series. In contrast, fiscal policy does not seem to have any impact on the growth of money supply. The implication is that the budget balance and the control of the money supply are important policy instruments for macroeconomic stability of Ethiopia in the long run.

Shibeshi Ghebre (1994) investigated the relationship between fiscal deficits and public debt, money supply and price level. The data for the period 1976-1991 shows that the root cause of money supply growth, inflation and increasing debt burden is budget deficit in Ethiopia. The result showed that in the short and medium term, such imbalances may be redressed through setting restrictions on state owned bank and external borrowing while simultaneously reforming the spending part of the government budgets.

Negash Haile (2013) showed that the analysis of equilibrium relationship among government budget deficit, money supply and inflation in Ethiopia from 1975 to 2012. The study employed co-integrated VAR, vector error correction model (VECM) and granger causality test. The results show that budget deficit affects both money supply and inflation in the long run. But, both money supply and inflation does not granger cause government budget deficit.

Tsegay Mebratu (2016) examined the causal link among budget deficit financing, money supply and inflation in Ethiopia using annual time series data from 1974/75 to 2013/14. In analyzing the

data, co-integration approach under the framework of the vector error correction model was employed. The study concluded that domestic source of budget deficit financing and money supply growth were long term determinants of inflation. Tewolde Girma (2013) also has investigated the effect of budget deficit on monetary aggregates and the foreign sector of Ethiopia over the period from 1970/71 to 2010/11 by using vector error correction model (VECM). The implication is that there is a significant relationship between budget deficit, money supply and the external sector in Ethiopia. Budget deficit is at the root of monetary expansion and inflation in particular.

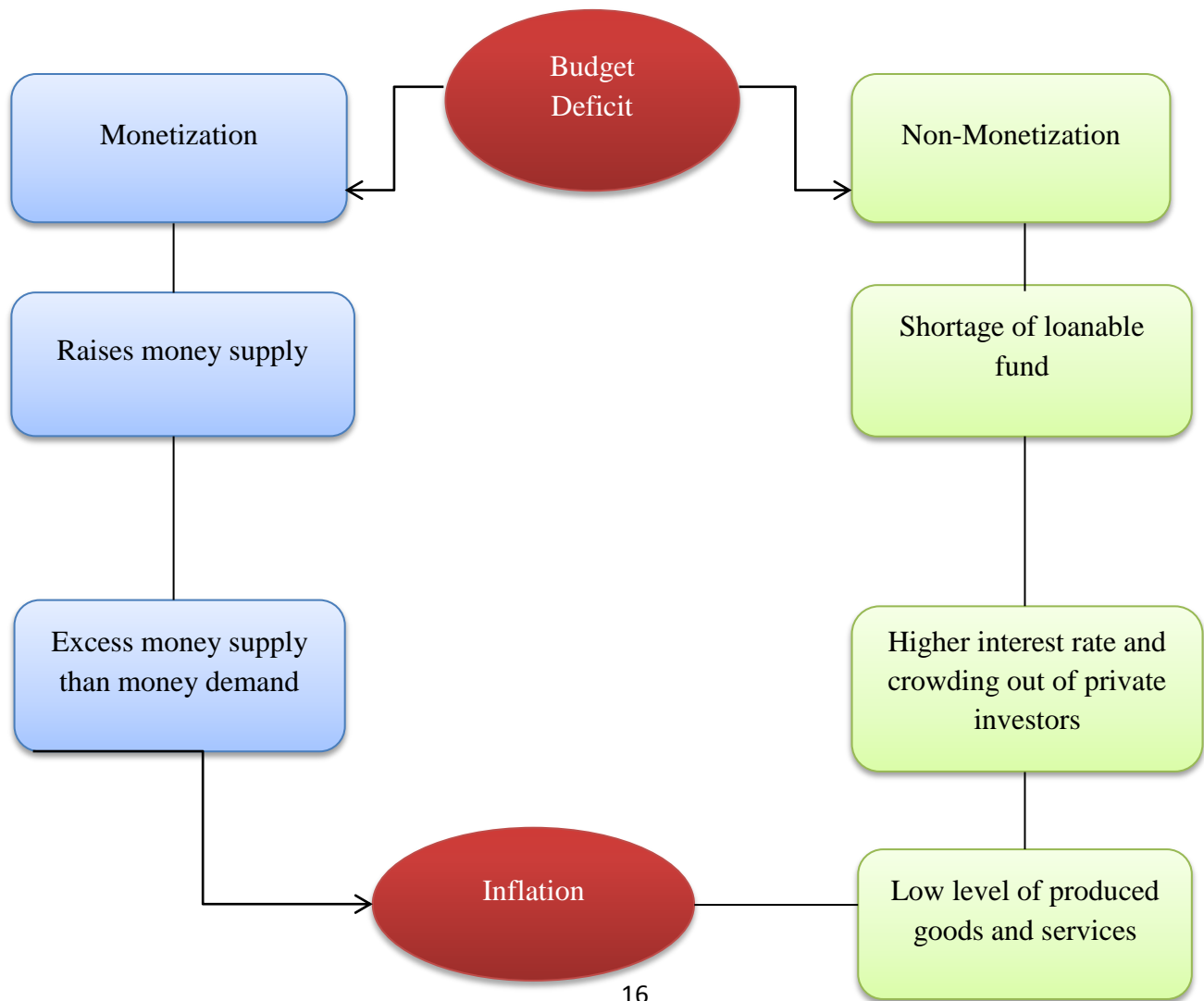
This study learns and takes in to account different lessons from the discussed empirical works. Most of the empirical works discussed in the above, analyzed the budget deficits effect on inflation by using the money supply as a transmission mechanisms; and the results shows that a significance relationship between budget deficits and inflation exist (Durgati, E.A., 2020, Darrat A.F., 1985, Hamburger and Zwick, 1981). On the other hand, many researchers found results which show that there is no linkage among the variables (Tiwari, Bolat et al 2015, McMillin and Beard 1982, Hondroyiannis and Papapetrou 1997). It means that, there is no consensus. Even though the researchers used the same data set the results are contradicting one another because of the use of different methodological techniques. In Ethiopia, many researchers' result shows that a significant relationship between fiscal policy, budget deficit in particular and monetary aggregates and inflation exist (Sileshi, 1994, Tewole, 2013 & Negash, 2013). Conversely, some studies result shows that fiscal policy does not have any impact on money supply and inflation (Yemane, 2008). Therefore, in Ethiopia also there is no consensus and the findings are contradicting one another.

2.3 Conceptual Framework

Budget deficit can be influencing the level of inflation rate into two channels. As indicated from fig. 1, the first channel shows that the central government manipulating the economy through the way that the central bank easily printing notes and changing the stock of money in the economy. The additional stocks of money will creates excess money supply than money demand then it

will leads to higher inflation rate. The second channel shows that how budget deficit influencing inflation through without affecting the money supply (non-monetization). In this channel, the central bank does not inject an additional stock of money to the economy. But, the budget deficit will imply the increments of interest rate and shortages of loanable fund in the economy. Thus, higher interest rate might be discouraging the private investors to borrow money and it reducing the level of investment (it is called crowding out effect of private investors). The crowding out effect of private investors also leads a shortage of produced goods and services and then higher price level in the economy.

Figure 1: Channels of budget deficit affects inflation rate



CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Research Procedure

The research design used for this study is a time-series analysis and covers a period of 40 years, from 1980 to 2019. Data is collected on nine variables which are Consumer price index (CPI) taken as a proxy of inflation as a dependent variable, and Real Gross Domestic Product (RGDP), Budget Deficit (BD), Broad Money taken as a proxy of Money Supply (M2), Export of goods (EXP), Import of goods (IMP), Real Effective Exchange Rate (REER) and Dummy variables on exchange rate devaluation (DM_EX) and election periods (DM_Elec) are incorporated as explanatory variables.

3.2 Data Source and Analysis

In this study, all macroeconomic data were collected from secondary sources. Data on Consumer price index, Money Supply, Export of Goods, Import of Goods and Real Effective Exchange Rate are collected from the National Bank of Ethiopia (NBE), and remains data on Real Gross Domestic Product (RGDP) & Budget Deficit (BD) was obtained from the Ministry of Finance (MoF).

In this study, both descriptive and econometric types of data analysis were used. In the descriptive part to analysis the trends and relationships between the variables such as line graphs, growth rates and percentages have been used to analyze the data. On the other hand, econometrics methods of regression analysis (such as ADF unit root and diagnosis test, Classical OLS linear regression, Johansen co-integration and error correction model) have been used as methods of empirical data analysis.

3.3 Model Specification

3.3.1 Unit Root Test

Unit root test is the starting point of the analysis of time series variables. Before conducting the time series analysis it is first needed to check whether the data set is stationary or not. This is tested using unit root tests. When specifying a unit root test, the decision of including appropriate

deterministic components is vital since the resulting test statistic is dependent and influenced by them. A testing strategy is required in order to decide whether an intercept or an intercept with a trend should be included. Including too many of these deterministic explanatory variables causes weaker results and increased probability of committing a Type 2 error. On the other hand including too few of them causes a bias in the test towards the null hypothesis and increases probability of committing a Type 1 error (Elder and Kennedy, 2001). As proposed by Wolters and Hassler, (2006), a trend in the regression test should be included whenever a series is suspicious of a linear trend after a visual interpretation, since decision may not rely on the standard t-statistic of the estimated coefficient of the time regressor. The test of unit root will stated as following:

$$\Delta Y_t = \rho * Y_{t-1} + \alpha + \beta * t + \epsilon_t \dots\dots\dots (1)$$

Where: $\Delta Y_t = Y_t - Y_{t-1}$

In the estimated equation ρ , indicates the presence of a unit root and confirms non stationarity. Next, by examining if the coefficients α and/or β are equal or differ from 0 we can see if there is a trend in the model. The null and alternative hypotheses are presented as follow:

$$H_0: \rho = 1 \text{ for all } i, \quad H_1: \rho < 1 \text{ for at least one } \dots\dots\dots (2)$$

3.3.2 The Long Run and Short Run Model

The most commonly used model for linear regression analysis is known as ordinary least square (OLS) model. Ordinary least square (OLS) is a kind of linear least squares method for estimating the unknown parameters in a linear regression model. Moreover, by minimizing the sum of the squares of the differences between the observed dependent variable and those predicted by the linear function of the independent variable, the OLS chooses explanatory variable parameters of a linear function.

In order to investigate the underlying impact of budget deficit on inflation, the inflation equation will have the following forms:

$$CPI_t = f(\text{Budget Deficit, conditional variable}) \dots \dots \dots (3)$$

$$CPI_t = f(BD_t, RGDP_t, M2_t, EX_t, IM_t, REER_t, DM_E_t, DM_Elec_t) \dots \dots \dots (4)$$

Finally, the above equation can be expanded and specified as follows:

$$CPI_t = \beta_0 + \beta_1 RGDP_t + \beta_2 BD_t + \beta_3 M2_t + \beta_4 EX_t + \beta_5 IM_t + \beta_6 REER_t + \beta_7 DM_E_t + \beta_8 DM_Elec_t + \varepsilon_t \dots \dots \dots (5)$$

Where:-

CPI_t is as a dependent variable consumer price index at time t.

IM_t is Import of goods & services at time t.

RGDP_t is Real Gross Domestic Product at time t.

REER_t is Real Interest Exchange Rate at time t.

BD_t is the Budget Deficits at time t.

DM_E_t is a dummy variable for devaluation at time t.

M2_t is Money Supply at time t.

DM_{Elect} is a dummy variable for election at time t

EX_t is Export of goods & services at time t.

ε_t is a stochastic error term at time t and,

β₀ Is an intercept and β_i's the coefficients of the explanatory variable, respectively.

The prevalence of long run co-integration relationship implies there is an adjustment from short run disequilibrium towards its equilibrium state. This requires the estimation of error correction model (ECM) to measure short run effects along with the speed of adjustment.

$$\Delta CPI_t = \beta_0 + \sum_{i=1}^n \beta_1 \Delta CPI_{t-i} + \sum_{i=0}^n \beta_2 \Delta RGDP_{t-i} + \sum_{i=0}^n \beta_3 \Delta BD_{t-i} + \sum_{i=0}^n \beta_4 \Delta M2_{t-i} + \sum_{i=0}^n \beta_5 \Delta EX_{t-i} + \sum_{i=0}^n \beta_6 \Delta IM_{t-i} + \sum_{i=0}^n \beta_7 \Delta REER_{t-i} + \sum_{i=0}^n \beta_8 \Delta DM_E_{t-i} + \sum_{i=0}^n \beta_9 \Delta DM_Elect_{t-i} - \gamma ECM_{t-1} + vt \dots \dots \dots (6)$$

Where:- ECM_{t-1} is the lagged value of the error term from the long run estimation and γ is

the speed of adjustment and expected to satisfy the condition $-1 < \gamma < 0$.

3.4 Variables Description and Prior Expectations

Consumer Price Index (CPI):- The Consumer Price Index (CPI) is a measure that examines the weighted average of prices of a basket of consumer goods and services, such as transportation, food, and medical care. It is calculated by taking price changes for each item in the predetermined basket of goods and averaging them. Changes in the CPI are used to assess price changes associated with the cost of living.

Gross Domestic Product (RGDP):- is the monetary value of all the finished goods and services produced within a country's borders in a specific time period, usually calculated on an annual basis. GDP includes all public and private consumption, government expenditures, investments and net export that occur within a defined territory. Put simply, Gross Domestic Product is a broad measurement of a nation's overall economic activity. Moreover, expected that the positive relationship between GDP and inflation. For the reason that, when GDP growth will increase the per capita income of the public, and then it will improve the levels of demand. Finally, higher demand with stable supplies will raise the price level. Therefore, the expected coefficient sign between GDP and inflation will be positive.

Budget Deficit (BD):- A nation's budget balance is measured by its government's expenditure and its revenue in a given fiscal year. When the government spending exceeds from government revenue is called budget deficit. Budget deficit is calculated in absolute terms as well as a percentage of the country's GDP. Besides, expected that a positive relationship between budget deficit and inflation. Because, the effect of budget deficit on inflation, we can see in two ways. First, the increase in budget deficits leads to an increase in money supply and as a result, inflation rates rise. In other way, increasing budget deficits leads to increases government loans thus causes interest rates to rise and consequently inflation rises. Therefore, the expected coefficient sign between budget deficit and inflation is positive.

Broad Money Supply (M2):- Broad money supply or M2 is a proper proxy of a given country's

money supply. The money supply is the totality of assets that households and businesses can use to make payments or to hold as short-term investments, such as currency, funds in bank accounts and anything of value resembling money. The formula for calculating broad money supply (M2) is the sum of Narrow Money (M1) and Quasi Money (saving deposit + time deposit). According to Friedman (1960), inflation is always and everywhere a monetary phenomenon. When increasing the money supply faster than the growth in real output will cause inflation. The reason is that there is more money chasing the same number of goods and services. Therefore, the expected sign between money supply and inflation is a positive.

Export of goods (EX):- Export of goods occurs when economic ownership of goods changes from residents to non-residents. This applies irrespective of corresponding physical movements of goods across frontiers. In this study, the value of export goods measured in terms Ethiopian birr. The improvement of export of goods will increase gross domestic product by rising the net export account. The growth of GDP leads the demands of the public, and consequently raises the price level. Therefore, the expected sign of the export of goods affects the inflation is a positive.

Import of goods (IM):- comprise all transactions between residents of a country and the rest of the world involving a change of ownership from nonresidents to residents of general merchandise. In addition, the value of imports of goods incorporated in terms of Ethiopian birr. Unlike export, the improvement of import of goods and services will decrease gross domestic product by reducing the net export account. The reduction of GDP leads declining of per capita income and the demands of the public, and consequently declines the price level. Therefore, the expected sign of the import affects the inflation is a negative.

Real Effective Exchange Rate (REER):- is the weighted average of a country's currency in relative a group of other major currencies. It describes the strength of a currency relative to a basket of other currency. Moreover, the weights are determined by comparing the relative trade balance of a country's currency against that of each country in the index (Nakorji et al, 2019). When increment of REER means a currency become stronger and it leads the domestic currency would raise the purchasing power to buy commodities, and consequently reduces the price level.

Therefore, the expected sign of the REER affects inflation is a negative.

Dummy Variables (DM):- the study incorporated as a dummy variable on the periods of exchange rate devaluation and election periods in Ethiopia. In this study, a one-time devaluation (big-bang effect) on inflation will be controlled as fixed and the periods in 1992, 2010 and 2017 was recorded the policy changes that was the devaluation of the domestic currency relative to foreign major currencies. In most of developing countries including Ethiopia, as known, on at events of election season the government expenditures reached at peak level due to the government only needs to meet it is short run goals rather than long run macroeconomic stability. The only short run goal is to win the election and to extend the period of governing that country. So, this unnecessary and excessive spending of the government and monetization of money supply would be distorting the economy. Therefore, 1992, 2005, 2010 and 2015 has been taken as the election periods to controlling as fixed on the influencing of inflation rate in Ethiopia.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

In the preceding chapter methods of analyzing (both descriptive and econometric) and particularly the long run and short run relationships between budget deficits and inflation have been discussed. Econometric techniques that are discussed in the last section are employed in this chapter and the results are discussed in detail. The initial part of this chapter deals with descriptive analysis using growth rate, percentage changes and line graphs. In the next, unit root tests are performed using the augmented dickey fuller (ADF) test. The results of these stationarity tests will then lead to the testing of long-run relationships between the variables under study. The error correction model captures the short-run dynamics in the relationship between inflation and budget deficits. The another part of the chapter deals with the residual and diagnosis tests, Johansen co-integration tests are carried out using stata version 15 statistical software.

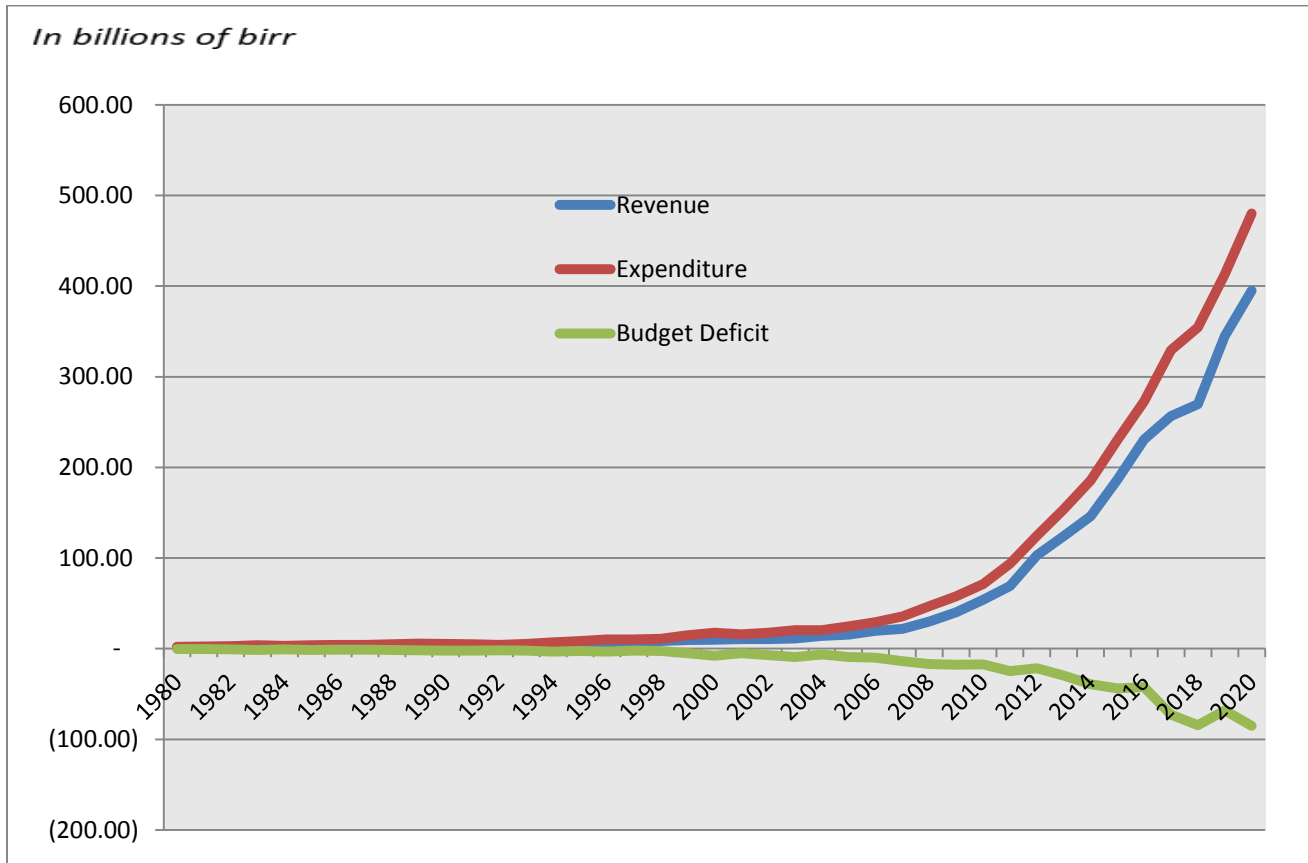
4.1 Descriptive Analysis

This section of the paper describes the trends of the main variables that have been used in the econometrics estimation. The variables being described here include government (revenues, expenditures, credit), money supply, inflation, government budget deficits. Simple line graph is used to show the annual trends of those variables for the last forty one years (1980 - 2020).

During the period 1980's to 90's the growth in both government revenues and expenditures were steady. That might be because of the tax base of the socialist government was limited. The economy was controlled by the government and government owned institutions and few private businesses were operating in the country. Hence the tax base was limited (see fig.2 below).

Since early 20's the government expenditure starts surging and the gap between government revenue and expenditure also start to widen. The reason here might be because government was involved in ambitious infrastructure projects and the low tax collection performance.

Figure 2: Trends on government expenditure and revenue in Ethiopia



Source: Author's computation (MoF)

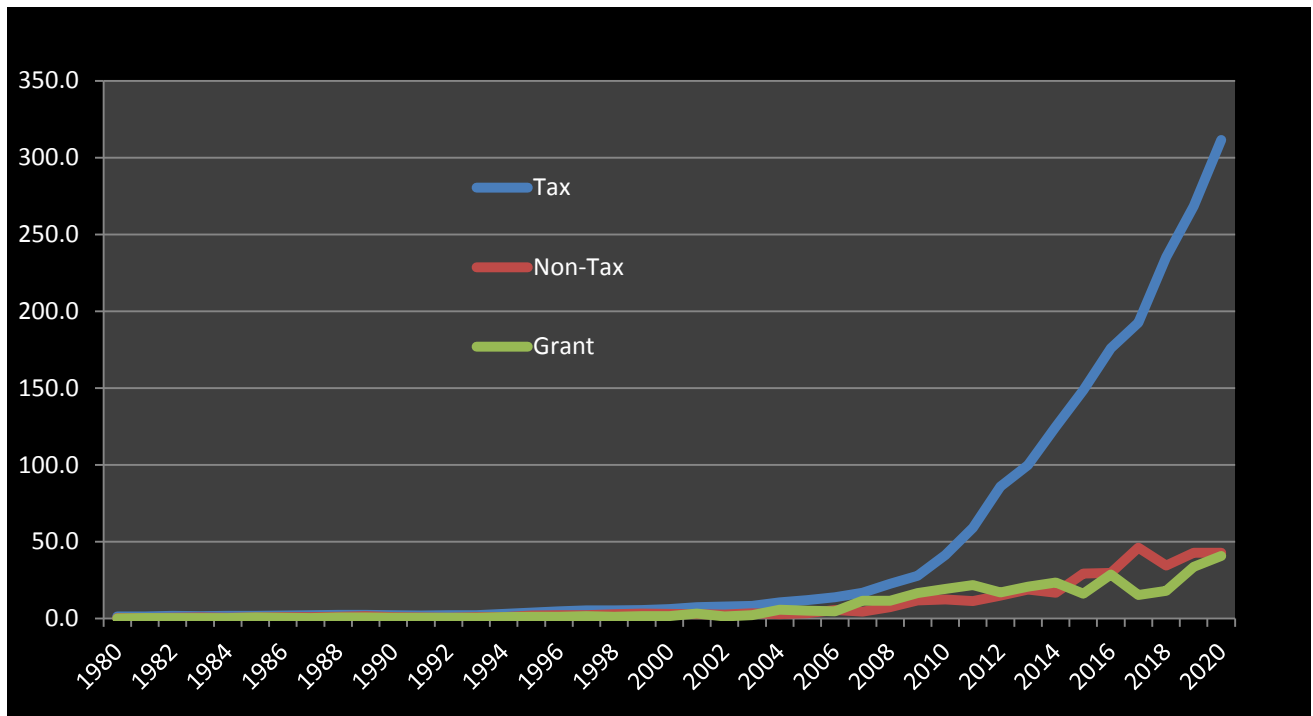
From the budget deficit trend in fig.2 we can distinguish three periods. The first period is from 1980 up to 1992. During this period the budget deficit was not as high as what we are observing today and the growth was steady. The second period is from 1992 to 2010. This period marks the downfall of the socialist government and the power shift changes the expenditure trend somewhat. The new government involved in the reconstruction and ultimately government expenditure starts rising.

The last period is 2010 onwards, where the surge in government expenditure is higher and the government deficit becomes bigger. In this period the government was implementing the growth and transformation plan (GTP I & II) and spending in ambitious infrastructure projects

regardless of the low revenue performance.

Numerically, the government budget deficit in 1998, 2007 and 2012 was 2.5 billion birr, 13.8 billion birr and 21.5 billion birr, respectively. For the latter periods in 2016, 2018 and 2020 the government deficit reached at 42.3 billion birr, 84.6 billion birr and 85.2 billion birr, respectively. Since the growth of budget deficit is higher especially in the recent years, it takes only eight years for the budget deficit to grow by about 372.3 percent.

Figure 3: Trends on disaggregated government revenues (Tax, non-tax and external grants)



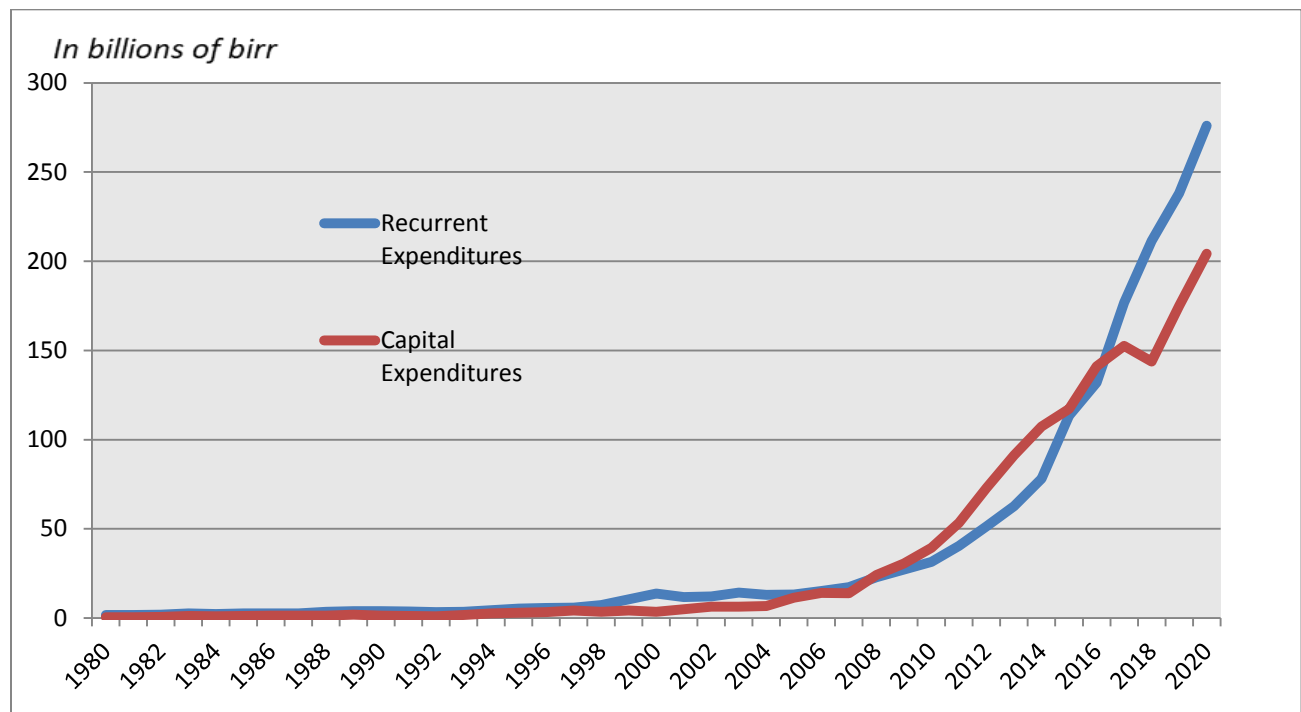
Source: Author's computation (MoF)

In the above figure 3 indicated that the government revenue components (such as tax, non-tax and grants) collected from 1980 to 2020 in Ethiopia. Tax revenue is the major income of the central government to finance the budget allocation and distribution. In addition, non-tax and grants also the other revenues for the government budget. As indicated in the above figure, the tax revenue is the major income and, afterward 2005 the graph showed that it became higher and

higher overtime. Since the growth of tax revenue is higher especially in the recent years. Numerically, the tax revenue in 2005, 2012, 2017 and 2020 was 12.0 billion birr, 85.9 billion birr, 192.7 billion birr and 311.5 billion birr, respectively.

On the other hand, non-tax revenue and external grants seems insignificant values to fill the budget gap relative to tax revenue. The graph showed that both non-tax revenue and external grants were steady movement. Non-tax revenue stood at 12.6 billion birr, 29.2 billion birr and 42.8 billion birr in 2010, 2015 and 2020, respectively. External grants also were 19.2 billion birr, 16.2 billion birr and 40.7 billion birr in 2010, 2015 and 2020, respectively.

Figure 4: *Disaggregated government expenditures (recurrent and capital)*

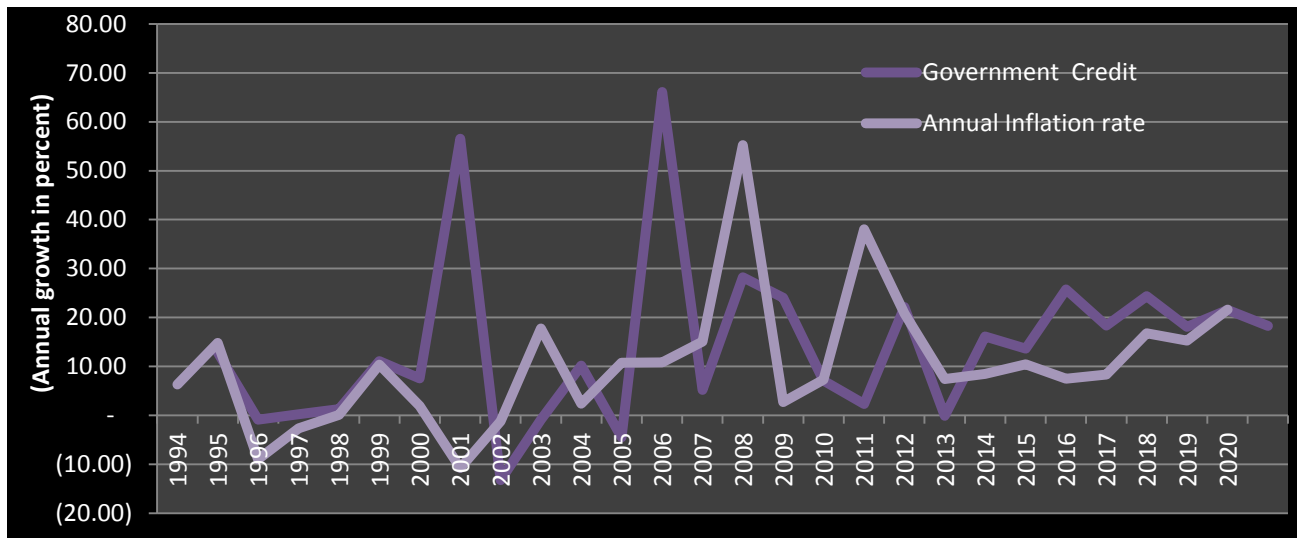


Source: Author's computation (MoF)

In LDC's, much of the government spending is directed towards recurrent or non-developmental than capital expenditures. The above figure 4 indicated that, the recurrent expenditure is greater than the capital expenditures except the periods between 2008 and 2016. Numerically, recurrent

expenditures stood at 31.5 billion birr, 113.4 billion birr and 276.0 billion birr in 2010, 2015 and 2020, respectively. And capital expenditure was 39.3 billion birr, 117.1 billion birr and 204.2 billion birr in 2010, 2015 and 2020, respectively.

Figure 5: *Government credit and inflation rate*



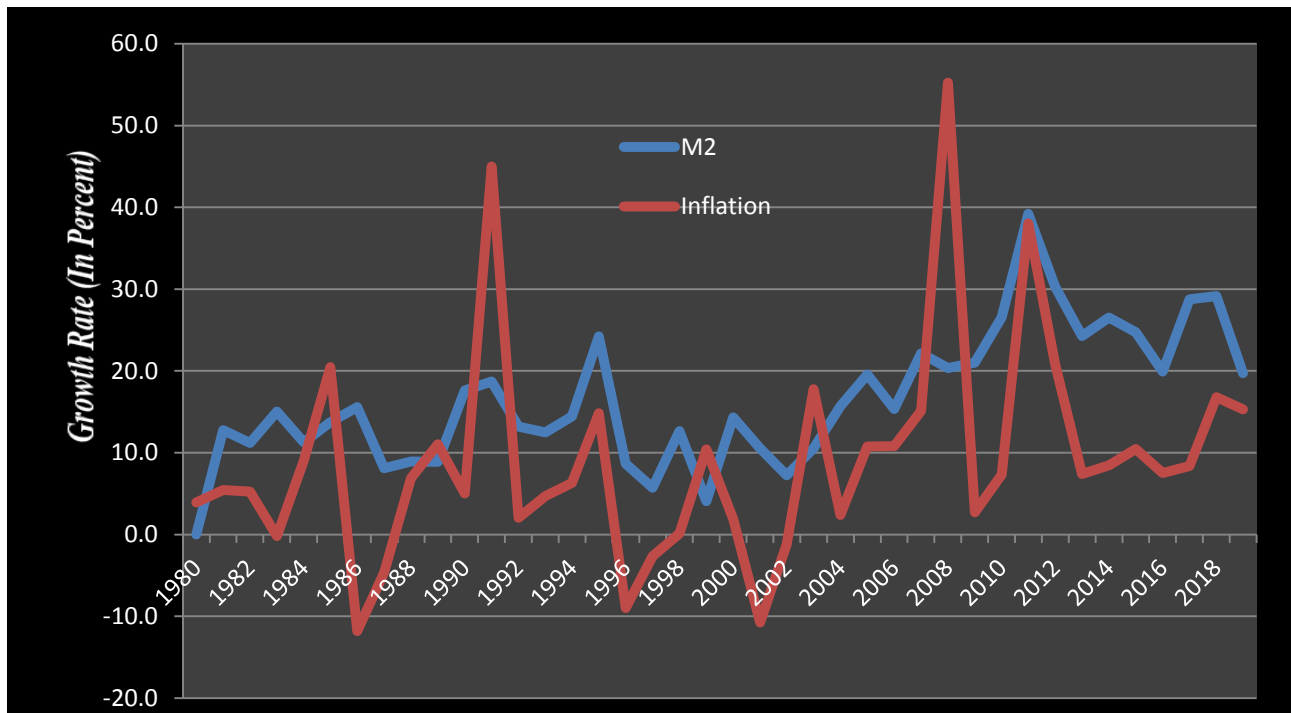
Source: *Author’s computation (NBE)*

The figure above (figure 5) depicts the relationship between government credit growth and inflation rate from the year 1994-2020. The growth of government credit here is defined as the annual growth of credit that the central government borrows from National Bank of Ethiopia, in other word it is NBE’s claim on government. Since the large portion borrowings of government from NBE is in the form of direct advance, it is believed to have significant effect on aggravating the price level.

As it is evidenced from the graph, the trend for the annual growth rate of government credit from the National Bank of Ethiopia bear a resemblance to the inflation rate, meaning the correlation between the two is higher. In the years where inflation rate was higher (see for instance 2008, 2012 and the years following 2015), it was accompanied by higher annual growth rate of Government credit. Thus, the resemblance in the trend of annual growth rate of government

credit and inflation rate tells that borrowing central bank could worsen the price level.

Figure 6: Trends of annual inflation rate and money supply growth rate in Ethiopia



Source: Author's computation (NBE)

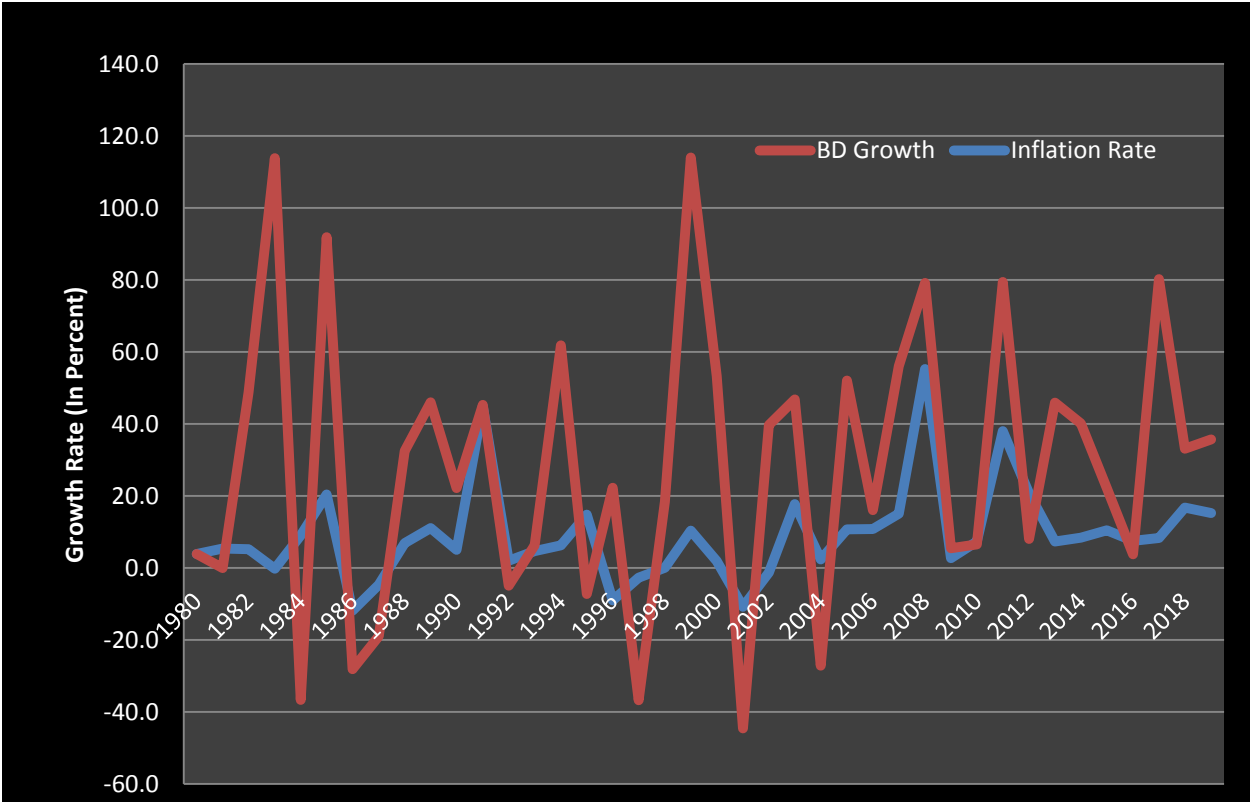
Economic theories suggest that money supply and inflation has a positive and strong relationship. The well-known quote of the famous monetarist Friedman read as *"inflation is always and everywhere a monetary phenomenon"*. According to Freidman the monetary authorities could control the rate of inflation directly through the control of money supply, reflecting an increase in money supply, leading to inflation (cited in Sargent and Wallace, 1981).

As inflation threatens everyone it is a subject of discussion for everyone being literate or not. Currently the government of Ethiopia fails to achieve stable price level; hence price gets higher and higher through time.

As it can be seen from the above figure (fig. 6), the overtime trend in growth of money supply

resembles the inflation trend. Inflation recorded at the highest peak in the years 1991/92 (45 %), 2008 (55.2%) and 2011 (38.8 %). Apart from the natural dynamics such as drought, the expansionary nature of the money supply is believed to have an impact on the higher price level recorded during those years. Looking at the growth of Money supply growth the highest level was recorded in 1995 (24.2%), 2011(39.0%) and 2018 (29.2%). Generally speaking we can observe a higher correlation between inflation and money supply, as the trend in inflation follows the movements in money supply growth rate.

Figure 7: Trends of annual inflation rate and budget deficits growth rate in Ethiopia



Source: Author’s computation (MoF & NBE)

Whether it is monetized or not budget deficit is believed to have inflationary pressure. Miller (1983) argued that higher budget deficit impacts inflation through the crowding out effect of private investment (since deficit financing may increase interest rate and cost of borrowing for

the private sector will be higher). Crowding out effect of deficit financing will reduce output growth and ultimately create inflationary pressure.

Looking at the annual trends for the growth inflation in Ethiopia, it somewhat resembles the budget deficit trend (fig.7). The years where deficit rate was at its peak, during 1985, 1992 and 2000, 2008 and 2012 were accompanied by higher growth in the price level. This resemblance might be an indicator that higher growth in budget deficit in Ethiopia could cause the price level to surge.

4.2 Econometrics Estimation

4.2.1 Unit Root Test

Unit root test is the starting point of the analysis of time series variables. To the extent that macroeconomic variables are often not stationary, and regression with non-stationary variables leads to misleading results, we tested the variables for unit root. Accordingly, Augmented Dickey Fuller (ADF) unit root test is used to see if the variables have unit root or not. In this study all variables passed the portmanteau test at lag one. Portmanteau test is the method to choose the number of lag order in the ADF unit root test should be residuals are white noise.

As indicated from table 1, ADF unit root test results are tested at lag one of portmanteau lag orders test. At level, Except DM_EX and DM_Elec all variables result show that the test statistic is less than the test critical values and hence the p-values are greater than conventional significance levels (1 percent, 5 percent and 10 percent). Therefore, Except DM_EX and DM_Elec we can conclude that all included variables are non-stationary in their levels. Thus, the next step is to transform the non-stationary variables into stationary process by differencing of each variable. Finally, at first difference, all variables are stationary at 5% of critical value. Furthermore, if residuals tested the ADF unit root test and then at level the residual series is stationary. It indicated that there is a long run relationship among variables. As seen from table 2 the residual series are stationary at 5% level of significance. Therefore, it is possible to conclude that there is a linear combination among the included variables and hence the time series analysis is free from the problem of spurious regression.

Table 1: ADF (1) Unit Root Test Result

Variable	Level/first difference	ADF test statistics	P-Value
Consumer price index (CPI)	Level	1.288	0.9965
	First diff.	-5.476	0.0000***
Budget deficit (BD)	Level	-0.113	0.9481
	First diff.	-9.060	0.0000***
Real gross domestic product (RGDP)	Level	3.313	1.0000
	First diff.	-4.414	0.0003***
Money supply (M2)	Level	5.438	1.0000
	First diff.	-4.414	0.0003***
Export of goods (EXP)	Level	0.297	0.9772
	First diff.	-5.519	0.0000***
Import of goods (IMP)	Level	1.061	0.9949
	First diff.	-5.797	0.0000***
Real effective exchange rate (REER)	Level	-1.504	0.5315
	First diff.	-5.618	0.0000***
Dummy on devaluation (DM_E)	Level	-5.965	0.0000***
	First diff.	-11.803	0.0000***
Dummy on election (DM_Elec)	Level	-6.823	0.0000***
	First diff.	-10.392	0.0000*

Note: - The ADF critical values for 1%, 5%, and 10% significance are 3.655, 2.96, and 2.61, respectively. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Source: Author's computation using Stata 15 software

Table 2: Engle granger test for the residual

	Level/first difference	ADF test statistics	P-Value
Residual	Level	- 4.248	0.0005***

Note: - The ADF critical values for 1%, 5%, and 10% significance are 3.655, 2.96, and 2.61, respectively. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Source: Author's computation using Stata 15 software

4.2.2 Lag Length Selection Criteria

There are many approaches that can determine the maximum lag period for the Johansen co-integration model. Appendix 6 shows the lag length selection criterion and the result shows that the lag length 1 was selected based on lag length selection criteria of Akaike information criterion (AIC). It can be found that the optimal lag order for the Johansen co-integration model is one (1).

4.2.3 Diagnosis Testing

Additionally, there are different pre conditions before we run the OLS long run regression model. One of the assumptions of regression is homoscedasticity; it means the variance of the errors is constant across observations. Typically, residuals are plotted to measure this assumption. Standard estimation methods are inefficient when the errors have non-constant variance (heteroscedasticity). As seen as from appendix 3, heteroscedasticity white test result accepts the null hypothesis that there is no heteroscedasticity problem at 5% level of significance. As seen as from the appendix 3 result $\text{prob} > \chi^2 0.4284$; the probability result is accepted the null hypothesis at 5% level of significance. Hence, the variance is constant (called homoscedasticity). The other, Normality tests are used to determine if a data set is well-modeled by a normal distribution and to compute how likely it is for a random variable underlying the data set to be normally distributed. Appendix 4 indicated that Shapiro-Francia W' test for normal data; the result shows that the most variables probability have to accepted the null hypothesis for normality and it means that the residual series of the model is normally distributed. Moreover, appendix 7 shows that the histogram of residual is normally distributed. Finally, appendix 5 also indicated that, the serial correlation LM test result is 0.0865 it means that acceptance of null hypothesis that there is no serial correlation among variables at 5% level of significance. The cumulative sum test for parameters stability also shows the acceptance of null hypothesis that there is no structural break. Therefore, the study accurately passed all the necessary pre-condition to run the long run ordinary least square regression model.

Furthermore, the time series analysis of the study 1991/92 regime change period taken as to

testing the structural break problem. So, in this study chow test mechanism was employed to checking the existence of structural break on the period of 1991/92. Therefore, the calculated result of chow test by using the residuals of pre and post structural break period of 1991/92 the result rejected the null hypothesis that there is no structural break. Thus, the regression analysis has been incorporated the structural break effect by applied the dummy variable before and after of the 1991/92 periods.

4.2.4 The Long-run Model

After confirming of the existence of long-run co-integration relationship among the variables, the next step is running the appropriate long run regression model to find out the coefficients. The regression result presented in the following table.

Table 3: *Long Run Model*

Dependent Variable: CPI		
Sample: 1980 to 2019 (40 Years)		
Variables	Coefficient	t-statistic
Constant	-187.6239***	-4.76
Budget deficit	0.0007283***	6.81
ln (Real GDP)	28.17207*	1.86
ln (import of goods)	-21.15442***	-2.97
ln (export of goods)	16.82906***	3.96
Dummy on devaluation	-7.3085**	-2.00
ln (money supply)	7.861561**	1.46
Dummy on election	2.372136	0.73
Dummy on structural break	2.860573	0.62
Real effective exchange rate	0.1195669***	4.40
R-Square	0.9867	
Adjusted R-Square	0.9827	
F (9, 30)	247.61	
D-W Statistics	1.56246	

Note: - ***, ** and * implies that the variables are stationary at 1%, 5% and 10%, respectively.

Source: Author's computation using Stata 15 software

From table 3, it can be shown that 98.67 percent of the variation in consumer price index is explained by the included independent variables. The Durbin -Watson value of 1.56246 which is approximately 2 shows the absence of auto correlation in the model. Generally, the R^2 , the adjusted R^2 , the F value and the Durbin-Watson value shows that the model is strong.

As indicated in table 3, in the long run model most of the explanatory variables (budget deficit, export of goods, import of goods, money supply, real effective exchange rate and constant term) are significant at 5% level of significance and the other two variables which are Real GDP and dummy on devaluation of local currency are also significance at 10% level of significance. While, both dummy of election and dummy of structural break are totally insignificance. Therefore, it means that budget deficit, export of goods, import of goods, money supply and real effective exchange rate have a significant impact to influence the price level (inflation) in Ethiopia for the periods from 1980 to 2019. Contrary, dummy on election and dummy on structural break does not have a significant impact to influencing the CPI in Ethiopia.

As seen from the table 3, the coefficient of budget deficit shows there is a positive impact on CPI in Ethiopia at 5% level of significance. An increase in budget deficit by one millions of birr ceteris paribus will increase the CPI by 0.073 percent on average, at 5% level of significance in the long run. This result is similar to different economic theories as discussed in literature review section. For instance, fiscal theory of inflation argued that the budget deficit can be affect inflation into two channels.

The first channel is called the weak form of fiscal theory. This channel is highly adapted to financing the budget gap, in most of developing countries including Ethiopia. In this form, in the time of budget deficit the government is simply borrowing from the central bank through printing additional money (monetization) to financing the gap. This will lead to the excess money stock beyond the demand in the economy and consequently, the price level will increase. Second channel is called the strong form of fiscal theory; it posits the budget deficit will affect inflation without affecting the supply of money in the economy in which case, prices are

determined by the willingness of the public to hold money. Central government is highly participant and involved in Ethiopian economy. So, it would lead the crowding out of private investors through mop up the loanable funds in the economy. Consequently, it implies to reduce the output and rising price level. Generally, the fiscal theory of inflation concluded that there is a positive impact of budget deficit on inflation. Therefore, the finding of this study is also in line with the fiscal theory of inflation.

According to the monetarist perspective in budget deficit financing, if the central bank is accommodative to fiscal policy, money supply rises for long time. Aggregate demand also will rise as a result of this deficit financing causing output to increase above the natural level of output. Growing labor demand increase wages, this in turn leads to the shift in aggregate supply in a downward direction. After some time the economy returns to the natural level of output. However, this happens at the expense of permanent higher prices. Therefore, the monetarist also postulated that there is the positive and significant impact of budget deficit on price level.

The finding of this study also provided supportive result to the fiscal theory of inflation and monetarists view. The result revealed that, in the long run budget deficit has found a direct and significant impact on inflation in Ethiopia a period from 1980 to 2019. Furthermore, this study finds the same finding and it supported by various researchers such as, Grossman et al 1982, Parai et al 1991, Negash 2013 and Tewelde, 2013. Therefore, the changes of budget deficit have an impact on the change of inflation in Ethiopia, in the long run.

As discussed above, the basic difference of the two channels in the fiscal theory of inflation is the change of money supply in the economy. It is a crucial variable and served as a transmission mechanism to affecting the inflation rate. In addition, according to monetarist view money supply should be roles as transmission mechanisms to influencing inflation. On the linkage of money supply and inflation, most of studies have concluded that money supply is the main determinant variable to affects inflation in case of Ethiopia. For instance, Fitsum S., Yilkal W. and Teshome A. (2016) concluded that inflation is a monetary phenomenon in Ethiopia for the period 1970/71-2010/11. Teamrat (2017) also revealed the same finding and concluded that the

money supply is one of the main determinants of inflation in Ethiopia for the period from 1975 to 2014. Likewise, this study revealed that money supply has a positive and significant impact on inflation in Ethiopia. The estimated coefficient (10.12) and probability value (0.015) of money supply shows that there is a positive and significance effect of money supply on inflation rate. An increase in money supplies by 1 percentage other things remains constant, leads to an increase in CPI by 0.1012 percent, at 5% level of significance. Therefore, this study concluded that in the long run money supply is positively influencing the CPI in Ethiopia, from 1980 to 2019. In Ethiopia, the NBE's is the main source of financing the budget gap through direct advance with low interest rate.

Import of goods has a negative and significant impact on CPI in Ethiopia. A rise by 1 percent of Import of goods, holding other factors constant, results in a 0.212 percentage decline in CPI at 5% level of significance. Because, high inflow of import of goods might lead to the excess supply in domestic market and then it leads to stable or decline in the price level. On the other way, an increase of import goods leads to reduce GDP, net export in particular. It implies declines of per capita income and it consequently, will stable or reduce the price level. Therefore, the result indicated that import of goods have found a negative and significant impact on CPI in the long run.

Export of goods has a positive and significant impact on CPI in the long run. A rise by 1 percent of export of goods, holding other factors constant, results in a 0.168 percent increase in CPI at 5% level of significance. An increase in export would raise the net export and GDP in general. Finally, it leads to a rise in the price level through improved demands and per capita income of the population. Therefore, export of goods also has a positive and significant impact on CPI at 5% level of significance, in the long run.

In addition, this study result revealed that there is a positive and significant impact of real GDP on CPI at 10% of level of significance, in the long run. A rise by 1 percent of Real GDP, holding other factors constant, results in a 0.282 percent increase in CPI at 10% level of significance. An increase in an output level will increase the income of the population; and consequently, it will

improve the standard of living and then price level. Therefore, Real GDP also has a positive and significant impact on CPI at 10% level of significance, in the long run.

Additionally, on structural break and election time of dummy the study result revealed that both have insignificant impact to influence CPI at 5% level of significance. Dummy of election estimated coefficient shows a positive impact on CPI in Ethiopia, but it is insignificant. At an event of election, the CPI will raise up by 2.4 percent than the normal time (no election). Most of developing countries like Ethiopia, at an election lag period the government must spend excess amount of money to meet his short run goal; that is to win the election. But, the study result shows that the injected money supply on election periods has not a significant impact on CPI in Ethiopia.

As a conclusion, except Real GDP, dummy on devaluation, structural break and on election, the estimated coefficient of all variables were found to have significant impact on CPI in the long run, in Ethiopia. Particularly, on this study budget deficit is the vital and interest variable and the finding revealed that budget deficit has a positive and significant impact on CPI in the long run.

4.2.5 The Short-run Error Correction Model (ECM)

Although there is a long-term equilibrium relationship between dependent and independent variables i.e. (co-integration), in the short-run there may be disequilibrium. The error correction model is employed to correct for disequilibrium and determine the short-run relationship between variables. The analysis of short run dynamics is often done by first eliminating trends in variables usually by differencing. The ECM model incorporates the equilibrating error (ECM $t-1$) to capture the adjustment towards the long-run equilibrium.

Table 4 below indicated that, the result of the short run model shows that money supply, export of goods, dummy of currency devaluation, real effective exchange rate (REER) and ECM are significant variables in explaining the variation of CPI in the short run. Whereas, budget deficit, Real GDP, import of goods, dummy for structural break and dummy for election time are insignificant variables to influence the CPI in the short run. Moreover, R-square and adjusted R-square for the short run model are 88.23% and 84.02%, respectively. It means that 88.23% and

after adjustment 84.02% of the variation in CPI is explained by the variation in the explanatory variables in the short run model.

Table 4: *The short run error correction model*

Dependent Variable: DCPI		
Observation: 39	R-Square: 0.8823	
Variables	Coefficient	t-statistic
ECM_Lag	-0.227**	-2.37
D(budget deficit)	0.0000877	0.74
D(real GDP)	0.0135623	0.76
D(money supply)	0.0000563***	3.03
D(import of goods)	0.0000251	0.72
D(export of goods)	0.0003551***	3.31
D(dummy on devaluation)	-2.617095**	-2.30
D(real effective exchange rate)	0.0388065***	2.80
D(dummy on election)	-0.6835505	-0.71
D(dummy on structural break)	-0.7938784	-0.33
Constant	0.4833904	1.00

Note: - ***, ** and * implies that the variables are stationary at 1%, 5% and 10%, respectively.

Source: Author's computation using Stata 15 software

The error correction coefficient, estimated at -0.227, has the correct negative sign and reasonable magnitude. The coefficient of the error correction term is negative and less than one. This result ensures that there is high speed of adjustment return to the long run equilibrium point. Therefore, the lagged ECM coefficient indicates that 22.7% of the disequilibrium in CPI in one period is corrected in the next period. In other words, it indicates the speed of adjustment of about 22.7% from the actual price level in the short run to the long run equilibrium level. Moreover, it shows 22.7% of the discrepancy between the actual and the long run or equilibrium value of CPI is corrected each year or it takes more than four years to adjust the disequilibrium on consumer

price index.

As seen from the table 4, the coefficient of budget deficit shows that there is a positive impact on CPI in the short run. The result indicated that, an increase in budget deficit by one percent *ceteris paribus* will increase the CPI by 0.009 percent on average, in the short run. But the probability shows that budget deficit has insignificant impacts to influencing the CPI at 5% level of significance. Therefore, in the short run budget deficit does not have a significant impact on CPI in Ethiopia, from 1980 to 2019.

Like the long run model, the result revealed that money supply has a positive and significant impact on CPI in Ethiopia, in the short run. The estimated coefficient (0.006%) and probability value (0.005) shows that there is a positive and significance effect of money supply on CPI. In the short run, an increase in money supplies by 1 percentage other things remains constant, leads to an increase in CPI by 0.006 percent, at 5% level of significance. Therefore, this study concluded that in the short run money supply is positively influencing CPI in Ethiopia, from 1980 to 2019. Because, NBE's monetary policy framework emphasized that broad money supply (M2) is an intermediate target to connect operational target with final target. The operational target is managing the reserve money while final target also is to maintaining the stability of price level or inflation. In the short run, therefore, money supply has a direct relationship with consumer price index.

In the short run, Export of goods has a positive and significant impact on CPI in Ethiopia. A rise by 1 percent of export of goods, holding other factors constant, results in 0.04 percent increase in CPI, at 5% level of significance. An increase in export of goods would raise the net export and GDP in general. Then, it leads to raising the price level through improved demands and per capita income of the population. Therefore, export of goods also has a positive and significant impact to influence the CPI at 5% level of significance, in the short run. The short run result also indicated that REER has positive and significant impact to influencing CPI at 5% level of significance. An increase in REER by 1 percentage other things remains constant, leads increase in CPI by 3.9 percent, at 5% level of significance. Thus, there is a direct and significant

relationship between real effective exchange rate and CPI at 5% level of significance, in the short run.

As a conclusion, the estimated coefficients of most variables were found to have significant impact on CPI in the short run, in Ethiopia over a period from 1980 to 2019. Predominantly, on this study budget deficit is the interest variable to examined its impact on CPI in Ethiopia over a periods from 1980 to 2019. But, the finding revealed that budget deficit has found an insignificant impact on CPI in the short run. In the long run, budget deficit has found a significant impact to affecting CPI in Ethiopia; but it has found insignificant impact on CPI in the short run. Because, the ways to financing it might be takes time to affecting the CPI in Ethiopia.

4.2.6 Johannsen Co-integration Test

The ML estimator is based on papers by Anderson (1984) and Johansen (1995) who derived the ML estimator for the parameters and LR test for inference on r . These LR tests are known as the trace statistics and the maximum-eigenvalue statistic. For the trace statistics as derived in Johansen (1995), large values are evidence against the null hypothesis that there are r or fewer co-integrating relations in the model.

In the below table 5, the trace statistics at $r=0$ of 451.2453 is exceeds than its critical value of 156.00, so we reject the null hypothesis that state there is no co-integrating equations. The trace statistics at $r=1$ of 276.2379 is exceeds its critical value of 124.24, we again reject the null hypothesis of no co-integrating equations. Ultimately, at $r=4$ the trace statistics of 44.0902 is less than its critical value of 47.21, we accept the null hypothesis that there is no co-integrating equations. Therefore, as seen from the above table 5, the asterisk indicated that there are 4 co-integrating equation in the model.

In addition, the another alternative to the determination of the rank of the model is the use of LR test that there are $r+1$ co-integrating equations, which is the maximum statistics. As indicated from table 5, the maximum statistics at $r=0$ of 175.0074 is exceeds its critical value of 51.42, we reject the null hypothesis of no co-integrating equation. The maximum statistics at $r=1$

CHAPTER FIVE

CONCLUSSION AND RECOMMENDATION

5.1 Conclusion

For the last decades, Ethiopia has been experiencing high and persistent budget deficits and price instability (or inflation) due to various reasons. So, it is one of the main motivations for researcher to investigate the relationship between budget deficit and inflation in Ethiopian context.

Budget deficit is when the total government expenditures exceed from the total revenue in a given particular period of time, usually a year. It is one of the most important variables to stabilizing the macroeconomic performance of a country. Meanwhile, inflation is a sustained raise in general price level of goods and services. It also takes a vital role in the healthy functioning of a countries internal economic performance. Ethiopia has experienced highly increasing and persistent both of budget deficits and inflation rate for the past decades. Hence, this research paper aims at examining the relationship and cause effect analysis between budget deficits and inflation in Ethiopia, periods from 1980 to 2019.

Data used in this study was collected from secondary source; more data from National Bank of Ethiopia (NBE) and the remains from Ministry of Finance (MoF). Empirically, all variables have passed the testing of ADF unit root test at 5% level of significance and integrated with order one $I(1)$. So, this indicated that there is linear combination among the included variables and hence the time series analysis is free from the problem of spurious regression.

The findings of the study revealed that most of the explanatory variables (budget deficit, constant term, money supply, export of goods, import of goods and real effective exchange rate) are significant at 5% level of significance, in the long run. The other two variables (Real GDP and Dummy of currency devaluation) are also significant at 10% level of significance in the long run. But, dummy of election and structural break are an insignificant variable to influencing CPI in the long run model. In addition, R^2 and adjusted R^2 , F-value and Durbin-Watson value shows

that the model is strong.

In this study, the result concluded that budget deficit has a positive and significant impact on consumer price index. A rise in budget deficit by one millions of birr other factors remains constant would lead to by 0.073% raises CPI in the long run. This is consistent with different theoretical framework and it is also compatible with the empirical evidences found from other countries (Grossman, 1982 (U.S.A), Darrat 2000 (Greece) and Tewolde, 2013 (Ethiopia)).

In the long run, money supply is positively and significantly influencing CPI in Ethiopia, from 1980 to 2019. Most studies have concluded that there is direct linkage between money supply and inflation in Ethiopia (for instance, Fitsum S. et al, 2016, Teamrat, 2017). Similarly, this study revealed that money supply has a positive and significant impact on inflation in Ethiopia. An increase in money supplies by 1 percentage other things remains constant, leads to an increase in CPI by 0.079 percent, at 5% level of significance. Moreover, Johansen co-integration test shows that there are 4 co-integrating equation in the model.

Unlike the long run, the finding revealed that budget deficit has insignificant impact on consumer price index, in the short run. Conversely, money supply has a positive and significant impact on consumer price index, in the short run. A rise in money supply by one percent other factors remain constant, would lead to increase CPI by 0.006 percent. Furthermore, the lagged ECM coefficient indicates that 22.7% of the disequilibrium in CPI in one period is corrected in the next period. In other words, it indicates the speed of adjustment of about 22.7% from the actual price level in the short run to the long run equilibrium level. In the short run, the R2 and adjusted R2 are good, which is 88.2% and 84.0%, respectively.

5.2. Policy Recommendation

The finding of this study clearly shows that budget deficits have positive and significant impacts on consumer price index in Ethiopia, in the long run. Therefore, based on the finding the following recommendations are forwarded.

Basically, the central government should restrict and be tight a fiscal policy through effective revenue mobilization as well as enhancing the efficiency of its spending. From public finance perspective, therefore, the government can narrow the budget gap into two ways. Firstly, the government should apply a comprehensive tax reform (for instance, expanding the tax base, designing an inflation proof tax system, and improving tax administration and collection mechanisms) are the crucial actions to enhancing the government's revenue. Secondly, the government should narrow the budget gap through improving the efficiency of expenditures allocation. For instance, government should have to strictly control on the areas, such as corruption by government officials, lack of project feasibility and mismanagement of budget allocation. Additionally, the government should improve the financial market in Ethiopia and rely on it as a source of deficit financing rather than direct advance from NBE's.

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APPENDICES

Appendix 1:- Long run linear regression model

```
. reg CPI BDF ln_RGDP ln_MS ln_IMP ln_EXP DM_EX REER DM_Elec DM_SB
```

Source	SS	df	MS	Number of obs	=	40
				F(9, 30)	=	247.61
Model	51470.7494	9	5718.97216	Prob > F	=	0.0000
Residual	692.906061	30	23.0968687	R-squared	=	0.9867
				Adj R-squared	=	0.9827
Total	52163.6555	39	1337.52963	Root MSE	=	4.8059

CPI	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
BDF	.0007283	.0001069	6.81	0.000	.000051	.0009467
ln_RGDP	28.17207	15.17822	1.86	0.073	-2.825995	59.17013
ln_MS	7.861561	5.382973	1.46	0.155	-3.131937	18.85506
ln_IMP	-21.15442	7.134307	-2.97	0.006	-35.72462	-6.584218
ln_EXP	16.82906	4.250942	3.96	0.000	8.147477	25.51064
DM_EX	-7.3085	3.652477	-2.00	0.055	-14.76785	.1508528
REER	.1195669	.0271477	4.40	0.000	.0641239	.1750099
DM_Elec	2.372136	3.23609	0.73	0.469	-4.236841	8.981112
DM_SB	2.860573	4.621393	0.62	0.541	-6.577571	12.29872
_cons	-187.6239	39.38191	-4.76	0.000	-268.0524	-107.1953

Source: Author's computation using Stata 15 software

Appendix 3:- Breusch-Pagan test for heteroscedasticity

```
. estat hettest
```

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
```

```
Ho: Constant variance
```

```
Variables: fitted values of CPI
```

```
chi2(1)      =      0.63
```

```
Prob > chi2  =      0.4284
```

Source: Author's computation using Stata 15 software

Appendix 4:- Shapiro-Francia W' test for normal data

```
. sfrancia CPI ln_BDF ln_MS DM_Elec DM_EX IR REER ln_EXP ln_RGDP ln_IMP
```

Shapiro-Francia W' test for normal data

Variable	Obs	W'	V'	z	Prob>z
CPI	40	0.73269	11.715	4.587	0.00001
ln_BDF	40	0.96829	1.390	0.614	0.26969
ln_MS	40	0.95982	1.761	1.055	0.14580
DM_Elec	40	1.00000	0.000	-58.851	1.00000
DM_EX	40	1.00000	0.000	-58.851	1.00000
IR	40	0.95622	1.919	1.215	0.11225
REER	40	0.92172	3.431	2.298	0.01078
ln_EXP	40	0.90892	3.992	2.580	0.00494
ln_RGDP	40	0.89507	4.599	2.844	0.00223
ln_IMP	40	0.90900	3.988	2.579	0.00496

Source: Author's computation using Stata 15 software

Appendix5. Breusch-Godfrey LM test for autocorrelation

```
. estat bgodfrey, lag(1)
```

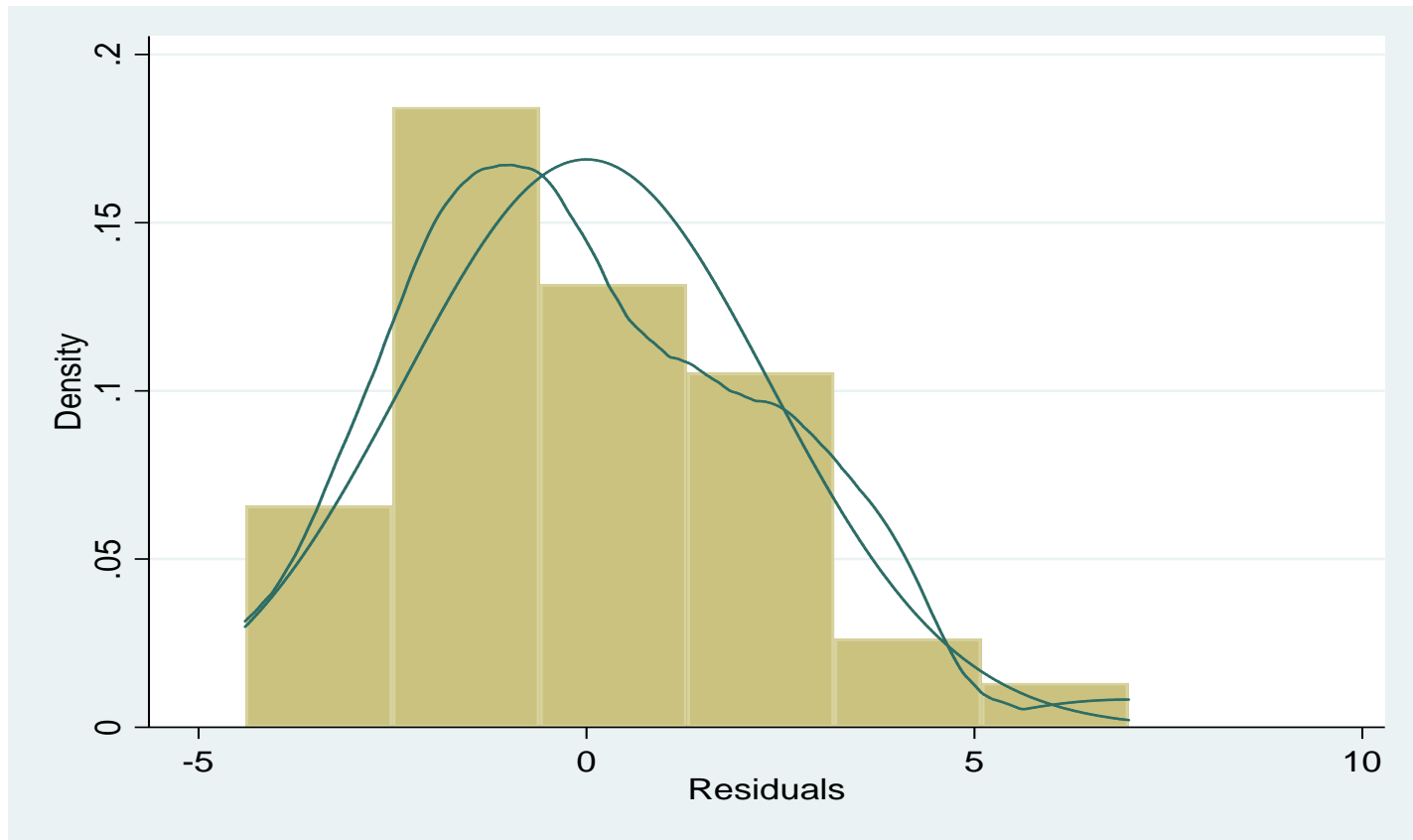
Breusch-Godfrey LM test for autocorrelation

lags (p)	chi2	df	Prob > chi2
1	2.939	1	0.0865

H0: no serial correlation

Source: Author's computation using Stata 15 software

Appendix 7:- Histogram for normal distribution



Source: Author's computation using Stata 15 software

Appendix 8:- Error Correction Model

. regress DCPI DBDF DRGDP DMS DEXP DIMP DREER DDM_EX DDM_Elec DDM_SB ECM_Lag

Source	SS	df	MS	Number of obs	=	39
				F(10, 28)	=	20.98
Model	897.473504	10	89.7473504	Prob > F	=	0.0000
Residual	119.756321	28	4.27701145	R-squared	=	0.8823
				Adj R-squared	=	0.8402
Total	1017.22982	38	26.7692059	Root MSE	=	2.0681

DCPI	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
DBDF	.0000877	.0001192	0.74	0.468	-.0001564	.0003319
DRGDP	.0135023	.0178098	0.76	0.455	-.0229795	.0499841
DMS	.0000563	.0000186	3.03	0.005	.0000183	.0000943
DEXP	.0003551	.0001073	3.31	0.003	.0001354	.0005748
DIMP	.0000251	.0000347	0.72	0.476	-.000046	.0000962
DREER	.0388065	.0138691	2.80	0.009	.0103969	.067216
DDM_EX	-2.617095	1.138632	-2.30	0.029	-4.949478	-.2847131
DDM_Elec	-.6835505	.9629916	-0.71	0.484	-2.656149	1.289048
DDM_SB	-.7938784	2.402972	-0.33	0.744	-5.716143	4.128386
ECM_Lag	-.2265196	.0955896	-2.37	0.025	-.4223261	-.0307131
_cons	.4833904	.4823273	1.00	0.325	-.5046122	1.471393

Source: Author's computation using Stata 15 software

Appendix 9:- Model Stability Test

```
. estat sbcusum
```

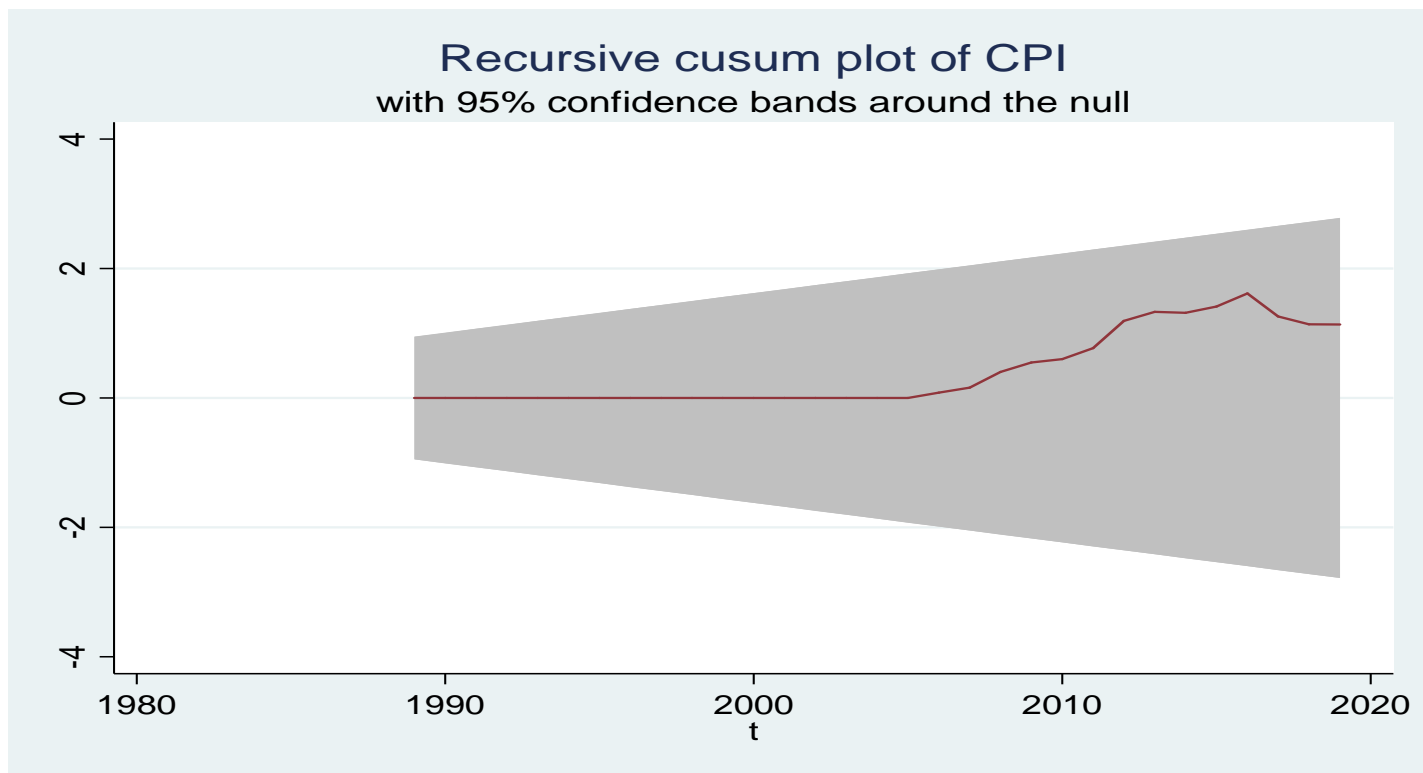
Cumulative sum test for parameter stability

Sample: 1980 - 2019

Number of obs = 40

Ho: No structural break

Statistic	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
recursive	0.5752	1.1430	0.9479	0.850



Source: Author's computation using Stata 15 software

Appendix 10:- Estimation of the pre-structure break point

```
. reg CPI BDF ln_RGDP ln_MS ln_IMP ln_EXP DM_EX REER DM_Elec if t<1991
note: DM_EX omitted because of collinearity
note: DM_Elec omitted because of collinearity
```

Source	SS	df	MS	Number of obs	=	11
				F(6, 4)	=	25.05
Model	9.87358823	6	1.64559804	Prob > F	=	0.0039
Residual	.262773553	4	.065693388	R-squared	=	0.9741
				Adj R-squared	=	0.9352
Total	10.1363618	10	1.01363618	Root MSE	=	.25631

CPI	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
BDF	.0005979	.0004457	1.34	0.251	-.0006396	.0018353
ln_RGDP	-8.005312	3.752802	-2.13	0.100	-18.42476	2.414136
ln_MS	3.626677	.7322607	4.95	0.008	1.593595	5.659758
ln_IMP	-1.373463	1.076134	-1.28	0.271	-4.36129	1.614365
ln_EXP	-.1978631	1.131295	-0.17	0.870	-3.338841	2.943115
DM_EX	0	(omitted)				
REER	-.0049952	.0102273	-0.49	0.651	-.0333907	.0234003
DM_Elec	0	(omitted)				
_cons	32.43768	19.0112	1.71	0.163	-20.34586	85.22123

Appendix 11:- Estimation of the post-structure break point

. reg CPI BDF ln_RGDP ln_MS ln_IMP ln_EXP DM_EX REER DM_Elec if t>=1991

Source	SS	df	MS	Number of obs	=	29
				F(8, 20)	=	251.71
Model	41362.0639	8	5170.25799	Prob > F	=	0.0000
Residual	410.806012	20	20.5403006	R-squared	=	0.9902
				Adj R-squared	=	0.9862
Total	41772.8699	28	1491.88821	Root MSE	=	4.5321

CPI	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
BDF	.0003755	.0001535	2.45	0.024	.0000552	.0006958
ln_RGDP	-25.51719	30.0906	-0.85	0.406	-88.28509	37.25071
ln_MS	44.75557	12.04822	3.71	0.001	19.62343	69.88771
ln_IMP	-23.02492	9.963304	-2.31	0.032	-43.808	-2.24183
ln_EXP	12.83371	4.619476	2.78	0.012	3.197648	22.46977
DM_EX	-5.908677	3.480542	-1.70	0.105	-13.16896	1.351605
REER	.1262846	.0382287	3.30	0.004	.0465409	.2060283
DM_Elec	.3621061	3.157518	0.11	0.910	-6.224361	6.948573
_cons	-185.8217	59.46333	-3.12	0.005	-309.8601	-61.78341