Innovations

Impact of External Debt on Budget Deficit and Inflation in Ethiopia

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Abstract
Most developing countries suffer from a budget deficit. Detecting the impact of public finance on inflation is the main objective of fiscal policy for both developing and developed nations. Regarding this, the researchers were focused on seeing the long-run and short-run impact of external debt on-budget deficit, and its short-run impact on the inflation rate in Ethiopia from the period of 1974/75 to 2019/2020. An autoregressive distributed lag model and a vector autoregressive model were used to see the long-run, short-run, and causal relationships in this study. The study passed all tests like Augmented Dickey-Fuller, Phillips-test statistic, a diagnostic test of residual for ARDL model, "F" and "t" bound test. The depicted result tells that there is a long-run and short-run negative relationship between budget deficit and external debt. Economic growth also affects budget deficit positively, which is consistent with Keynesians School. The impact of the inflation rate and tax revenue is insignificant in both the long run and short run. In the short run, both external debt and economic growth have a negative relationship, which asserts the Freidman and neo-classical paradigm. The short-run ARDL model verified budget deficit and government expenditure have a positive impact, but tax revenue and external debt have a negative impact on the Ethiopian inflation rate. Depending on the study results, the government should spend on productive economic activity to generate enough revenue and raise economic growth by reducing the inflation rate. Moreover, other interested researchers can improve this study by including other macroeconomic variables, the long-run impact of public finance on the inflation rate, and looking at this study with a longitudinal investigation.

Key Words: *1.ARDL model 2.Budget Deficit 3.Ethiopia 4.Economic Growth 5. Inflation Rate*

1. Introduction

Developing a proper budget plan has been key to making countries influential in most aspects since strategies that can change the living standards of people are tied to the budget of a country. In most developing countries' economies, the budget deficit is a common phenomenon and it is a persistent problem. For third world economies, government expenditure is greater than its receipts, which is the government running a budget deficit by spending more than its income. As we consider budget deficits, policymakers are also eager to see the role budget deficits play in economic growth. This is noted in every developing economy, drawing interest from every interested party. Practically both the budget deficit and economic growth are the main issues that lead to a debate with economic policymakers. Fundamentally, the word budget simply means a plan of government finance submitted for the approval of the legislature. The budget of a government defines what is

performed in a country for a given period of time. It has become a pronounced role for fulfilling the rudimentary objective of government(Abdrahman, 2012).

The budget goes into effect only if the parliament approves it. A powerful decision concerning the provision of capital to mollify diverse societal needs asks substantial thoughtfulness and preparation. Scholars agree that approved budget should be productive with proper allocation of scheduled resources in order to narrate outlay conclusions to stated course of action aims and to present and upcoming resources, for unbiased dissemination of income and wealth and Safeguarding economic strength and minimizing high unemployment in that country. In Ethiopia typically, the government budget is equipped for a year, known as a financial year or fiscal year. The fiscal year is from July 7 of this year to July 6 of the coming year (1- 30, in the Ethiopian calendar). Having the advantage of the budget deficit and the long period experience of budget deficit in Ethiopia, the researcher is eager to see the relationship between budget deficit and economic growth. It is very crucial to look at the connection which exists between those two variables. In Ethiopia a budget deficit is common, but here the basic question is whether the budget deficit happens without economic growth or not. Plus a budget deficit leads a given government to face many economic crises. If a government faces a budget deficit it invokes a higher tax rate. This also has an adverse effect on people's lives. A conducted research proved that it will cause to upsurge the taxes in the next years and falling spending by the government, the motive why the government wants to more money to pay an interest rate on the bonds. A higher budget deficit causes greater aggregate demand, which means using more than a definite amount of taxes so the rising inflation rate on the economy and higher real GDP for the country. In the long run, increasing the budget deficit will reason to a slighter segment of the private sector in economics (Al-Qudah & Jaradat, 2018).

Macroeconomic policy in Ethiopia seeks to improve people's living standards through moderate price increases. Economists have been concerned about inflation due to the fact that it leaves a record that the real earnings of nations are negatively impacted by inflation. This is because the government does not take steps to address the problem. A low productivity economy may create another economic problem like inflation inclination. The reason for this is also due to the low purchasing power of money. Therefore this empirical study objective is to see the impact of public finance on the inflation rate.

According to Keynes (1936) and his followers, the increase in aggregate demand is caused by demand-pull inflation, i.e. where the supply of goods and services into the economy is less than aggregate demand. In this case, the aggregate demand is a function of consumption (C), investment (I), and government expenditure (GE). In the 1950s and 1970s, there was a theory known as inflation cost-push theory; it is also referred to as new inflation. This is the result of an increase in wages or increases in the price of inputs, which leads to a rise in the cost of production. Still, a number of economists delineate inflation in dissimilar means, but there is one common agreement. With common sense, inflation means a sustainable rise in all goods and services prices. According to various schools of thought, there are many sources of inflation. But the source of inflation in a given country may not be a source of inflation for other countries. The dissimilarities can be found in the mastery, the sources, the time, and their principal economic circumstances.

Moreover, Ethiopia’s government aims to reach lower-middle-income status by 2025. To continue Ethiopia’s successful path towards becoming a middle-income country, it is unquestionable to look at the relationship between the budget deficit and budget deficit, and the short-run impact of public finance on the inflation rate. It may be that the budget deficit and inflation will be the biggest

obstacles to achieving the country's goals in the future. Ethiopia experienced a persistent budget deficit from 1974/75 to 2019/2020. As a result, the main objective of this study is to unravel three things; long-run and short-term relationships, as well as causality among variables.

2. Theoreticaland Empirical Literature Review

There are some theories concerning the relationship between budget deficit and economic performance. According to Freidman if there is a budget deficit in a given country's economy, a government takes some measures to solve the problem. Each step was taken to counterbalance the deficit, which had definite consequences for the economy. Issuing cash to the economy increases both the money supply and inflation. In another way, when monetary policy and fiscal policy were compressed to moderate inflation, at the same time they embarrassed economic growth. According to Freidman and Neo-classical theories, there is a negative correlation between the budget deficit and growth. The Keynesian School also concludes that there is a positive relationship between budget deficit and economic growth. However, this idea was first applied in the 1960s, but it failed to gain acceptance in the 1970s and 1980s. Lastly, the equivalence theory concludes that there is no relation between those variables (Onwioduokit & Inam, 2018).

Abdrahman (2012) examines the relationship between economic growth and the budget deficit for Malaysia's economy. The study considers four variables those are real gross domestic product, debt, non-productive and productive expenditure. The autoregressive distributed lag model approach was also used for the study. Mainly the study was focused on the long-run relationship between all-quarterly time series variables from 2000 to 2011. According to this study, Malaysia's economy has no long-run relationship between economic growth and budget deficits, proving the existence of an equivalence hypothesis. Tung (2018) investigates fiscal deficit and economic growth from Vietnam's perspective. The study applied an error correction model for quarterly data which was assert from 2003-2016. In Vietnam, the fiscal deficit has a negative effect on economic growth in both the long run and short run. The study result is consistent with Freidman and neoclassical idea.

Theory of inflation stated that more demand or less demand, supply decreases, and supply increases. These are considered as economic structure factors, which is more formally known as structural inflation theory. Fast economic growth comes along with structural improvement. Furthermore, when developing countries try to change their undeveloped structure, the developed countries can find them because they are not worried about inflation. The anti-inflationary measure could take the same form as reducing monetary policy expansion (Totonchi, 2011). In many cases, policy prescriptions of this kind end up stagnating the economic growth of less developed economies. In the 1970's,70’s the idea of rational expectation became a dominant one, which was also considered a macroeconomic revolution (Lucas, 1972; McCallum, 1987). Based on current and past relevant information, households, firms, and governments should form their macroeconomic expectations rationally. An updated neo-classical synthesis of inflation; explained that monetary and demand factors are major determinants of economic business cycles. .

According to the cited empirical studies, some researchers found that economic growth, external debt, and budget deficit have a positive relationship. Some studies also proved that there is a negative relationship between economic growth, external debt, and the budget deficit. Additionally, some studies found that the listed variables had no relationship To see the relationship of those listed variables researchers used different models like VAR, VECM, ECM, and ARDL model.

3. Methodology of the Study

Table1 Description and Data Source of Variables

Short form ofVariables	Long form of variables	Unit	Time	Data Source
BD	Budget deficit	%of GDP	1974/75-2019/2020	WDI and NBE
ED	External debt	%of GDP	1974/75-2019/2020	WDI and NBE
INFR	Inflation	Percentage	1974/75-2019/2020	WDI and NBE
RGDP	Real gross domestic product	percentage	1974/75-2019/2020	WDI and NBE
TR	Tax revenue	% of GDP	1974/75-2019/2020	WDI and NBE
GE	Government Expenditure	percentage	1974/75-2019/2020	WDI and NBE

The researcher used (Farajova, 2011) and (Saima & Uddin, 2017) studies to develop a model explaining the relationship between budget deficit and external debt and economic growth. The general, functional, mathematical, Econometric, and logarithmic form is placed as follows respectively:

$Y_{ij1974/75\text{-}2020} = f\ (X_{ij1974/75\text{-}2020},\ X_{ij1974/75\text{-}2020},\ X_{ij1974/75\text{-}2020}, X_{ij1974/75\text{-}2020})(1)$
Where t= time (1975-2019), i = raw vectorand j= column vector.
$BDijt = f(aij, ED_{ijt}, RGDP_{ijt}, INFR_{ijt}, TR_{ijt})(2)$
$BD = \alpha ij + \beta_{ij}ED_{ijt} + \beta_{ij}RGDP_{ijt} + \beta_{ij}INFR_{ijt} + \beta_{ij}TR_{ijt}(3)$
$BD = \alpha ij + \beta_{ij}ED_{ijt} + \beta_{ij}RGDP_{ijt} + \beta_{ij}INFR_{ijt} + \beta_{ij}TR_{ijt} + \mu_{ij}(4)$
$LnBD = \alpha ij\beta_{ij}ED_{ijt}\beta_{ij}RGDP_{ijt}\beta_{ij}INFR_{ijt}\beta_{ij}TR_{ijt}\mu^{\varepsilon ij}(5)$
$LnBD = \alpha ij + \beta_{ij}LnED_{ijt} + \beta_{ij}LnRGDP_{ijt} + \beta_{ij}LnINFR_{ijt} + \beta_{ij}LnTR_{ijt} + \varepsilon_{ij}(6)$

The quantity theory of money, inflation monetary theory, modern quantity theory of money and inflation, inflation cost-push theory, structural inflation theory, a revised neo-classical synthesis of inflation, neo-political macroeconomics of inflation, and Phillips curve explanation has been used as a guideline to develop a model. (Phillips, 1958) maintained the empirical arrangement as follows;
INF =f (UNR) (7)

Though, once valued the importance of other factors in explaining inflation rate, the model is stated as below.
INFR = f (BD, ED, GE, TR) (8)
Where F is a function of and all other variables are explained with table 1. Moreover, the above functional form has the following econometric form(Sirah and Woldetensay, 2021):
$LnINFR = \beta_{ij} + \beta_{ij2}LnBD_{ijt} + \beta ij_3LnED_{ijt} + \beta_{ij4}LnGE_{ijt} + \beta_{ij5}LnTR_{ijt} + \varepsilon_{ij}(9)$

3.1. Long Run Autoregressive Distributed Lag Model

Co-integrating testing for X, Y variables through using the ARDL $(P, q_1, q_2, \dots\dots\dots\dots\dots, q_k)$ model approach:

$$\Delta X_t = \delta_{0i} + \sum_{i=1}^{pi} a_i \Delta X_{t-1} + \sum_{i=1}^{qi} a_2 \Delta Y_{t-i} + \delta_1 X_{t-1} + \delta_2 Y_{t-1} + V_{1t} \quad (10)$$

$$\Delta Y_t = \delta_{0i} + \sum_{i=1}^{p} a_i \Delta Y_{t-1} + \sum_{i=1}^{qi} a_2 \Delta X_{t-i} + \delta_1 Y_{t-1} + \delta_2 X_{t-1} + V_{1t} \quad (11)$$

$P_i$and $q_i$are the ARDL model maximum lag order for dependent and independent variables, V_{1t} is the vector error term, δ_{0i} is vector intercept term. Variable $\delta_1 X_{t-1}$, $\delta_1 Y_{t-1}, \delta_2 Y_{t-1}$ and $\delta_2 X_{t-1}$ correspond to the long run relationship. While $(a_i \; to \; a_2)$ represent the short run dynamics of the model. The hypothesis that the coefficients of the lag level variables are zero is to be tested (Pesaran et al., 2001). The null of non-existence of the long-run relationship is defined by;

H_0: $\delta_1 = \delta_2 = 0$ (Null, i.e. the long run relationship does not exist)

H_1: $\delta_1 \neq \delta_2 \neq 0$ (Alternative, i.e. the long run relationship exists)

Having the above intimations, the general ARDL model for this study is appearsas follows:-

$$D\left(Ln\left(DEFt\right)\right) = \beta 1 + \alpha 11\, Ln(DEFt-1) + \alpha 21\, Ln(RGDPt-1) + \alpha 31\, Ln(INFRt-1) + \alpha 41\, Ln(EXDt-1) + \alpha 51\, Ln(TRt-1) + \Sigma pi1\, \theta 1i\, D\left(Ln(DEFt-1)\right) + \Sigma qi1\, \theta 2i\, D\left(Ln(RGDPt-1\right) + \Sigma^{q}_{i1}\, \theta_{3i}\, DLnINFR_{t-1} + \Sigma^{q}_{i1}\, \theta_{4i}\, DLnEXD_{t-1} + \Sigma^{q}_{i1}\, \theta_{5i}\, DLnTR_{t-1} + \epsilon_{1t} \quad (12)$$

If there is long run relationship between variables, the researchers develops the following model to answer the first objective;

$$D\left(Ln\left(DEFt\right)\right) = \beta 1 + \Sigma pi1\, \theta 1i\, D\left(Ln(DEFt-1)\right) + \Sigma qi1\, \theta 2i\, D\left(Ln(RGDPt-1)\right) + \Sigma qi1\, \theta 3i\, D\left(Ln(INFRt-1)\right) + \Sigma qi1\, \theta 4i\, D\left(Ln(EXDt-1)\right) + \Sigma qi1\, \theta 5i\, D\left(Ln(TRt-1)\right) + \epsilon 1t \quad (13)$$

This is done in each of the models, as specified by the number of variables, on the joint null hypothesis that the coefficients of the lags are the same. This can also be expressed as;

$F_x(X_1 | Y_1, \dots\dots\dots\dots, Y_k)$(14)

$F_y(Y_1 | X_1, \dots\dots\dots\dots, X_k)$(15)

The F- statistic (Wald test) is used in Equations 14 and 15 to test the hypothesis. The variables are co-integrated when the computed F-statistic is greater than the upper bound critical value. F-statistics below the lower bound critical value indicates no co-integration. F-statistics are expressed as follows in equation (14) above:

FLnDEFt(LnDEFt|LnRGDPt, LnTRt, LnEXDt, LnINFRt) (16)

3.2. Short Run Autoregressive Distributed Lag Model

As per the second objective it is impartial to develop error correction modeljust as follows:-

$\Delta Y_t = a_0 + b_1 \Delta X_t - \varphi \mu_{t-1} + \varepsilon_t$ (17)

b_1= impact multi-plier, φ= adjustment effect. According to (Sirah and Woldetensay, 2021) impact multiplier measures the instant impact that change in $X_t$will have on change in Y_t and adjustment effect show how much of disequilibrium is being corrected. From equation (17)β_2 being the long run response.

$\mu_{t-1} = Y_{t-1} - \beta_1 - \beta_2 X_{t-1}$(18)

$$D\left(Ln\ (INFR_t)\right) = \beta_1 + \alpha_{11}Ln(INFR_{t-1}) + \alpha_{21}Ln(ED_{t-1}) + \alpha_{31}Ln(BD_{t-1}) + \alpha_{41}Ln(GE_{t-1}) + \alpha_{51}Ln(TR_{t-1}) + \sum_{i=1}^{p}\theta_{1i}\,D(Ln(INFR_{t-i})) + \sum_{i=1}^{q}\theta_{2i}\,D\left(Ln(ED_{t-i})\right) + \sum_{i=1}^{q}\theta_{3i}\,D\left(Ln(BD_{t-i})\right) + \sum_{i=1}^{q}\theta_{4i}D\left(Ln(GE_{t-i})\right) + \sum_{i=1}^{q}\theta_{5i}D\left(Ln(TR_{t-i})\right) + \varepsilon_{1i}\ (19)$$

$$\mathrm{D\left(Ln\ (DEF_t)\right) = \theta_0 + \sum_{i=1}^{p}\theta_{1i}\ D(Ln(DEF_{t-i})) + \sum_{i=1}^{q}\theta_{2i}\ D\left(Ln(RGDP_{t-i})\right) + \sum_{i=1}^{q}\theta_{3i}\ D\left(Ln(INFR_{t-i})\right) + \sum_{i=1}^{q}\theta_{4i}D\left(Ln(EXD_{t-i})\right) + \sum_{i=1}^{q}\theta_{5i}D\left(Ln(TR_{t-i})\right) + \varphi ECT_{t-1} + et} \quad (20)$$

Here D is the difference operator; θ_i's the coefficients relating to the short -run dynamics of the model's convergence to equilibrium, φ measures the speed of adjustment, where ECT_{t-1} is the error correction term (Pesaran et al., 2001). ECM_{t-1} also defined as:

$$\mathrm{ECT_{t-1} = Ln(INFR_{t-i}) - [\theta_0 + \sum_{i=1}^{q}\theta_{1i}\left(Ln(INFR_{t-i})\right) + \sum_{i=1}^{q}\theta_{2i}\left(Ln(ED_{t-i})\right) + \sum_{i=1}^{q}\theta_{3i}\left(Ln(BD_{t-i})\right) + \sum_{i=1}^{q}\theta_{4i}\left(Ln(GE_{t-i})\right) + \sum_{i=1}^{q}\theta_{1i}\ (Ln(TR_{t-i}))} \quad (21)$$

$$\mathrm{ECT_{t-1} = Ln(DEF_{t-i}) - [\theta_0 + \sum_{i=1}^{q}\theta_{1i}\left(Ln(DEF_{t-i})\right) + \sum_{i=1}^{q}\theta_{2i}\left(Ln(RGDP_{t-i})\right) + \sum_{i=1}^{q}\theta_{3i}\left(Ln(INFR_{t-i})\right) + \sum_{i=1}^{q}\theta_{4i}\left(Ln(EXD_{t-i})\right) + \sum_{i=1}^{q}\theta_{1i}\ (Ln(TR_{t-i}))} \quad (22)$$

To answer the third objective the researchers also develops the following vector model (Sirah and Woldetensay, 2021):

$$D\left(Ln\ (DEF_t)\right) = \theta_0 + \sum_{i=1}^{p}\theta_{1i}\ D(Ln(DEF_{t-i})) + \sum_{i=1}^{q}\theta_{2i}\ D\left(Ln(RGDP_{t-i})\right) + \sum_{i=1}^{q}\theta_{3i}\ D\left(Ln(INFR_{t-i})\right) + \sum_{i=1}^{q}\theta_{3i}\ D\left(Ln(TR_{t-i})\right) + \sum_{i=1}^{q}\theta_{3i}\ D\left(Ln(EXD_{t-i})\right) + \varepsilon_t \quad (23)$$

$$D\left(Ln\ (RGDP_t)\right) = \theta_0 + \sum_{i=1}^{p}\theta_{1i}\ D(Ln(RGDP_{t-i})) + \sum_{i=1}^{q}\theta_{2i}\ D\left(Ln(DEF_{t-i})\right) + \sum_{i=1}^{q}\theta_{3i}\ D\left(Ln(INFR_{t-i})\right) + \sum_{i=1}^{q}\theta_{3i}\ D\left(Ln(TR_{t-i})\right) + \sum_{i=1}^{q}\theta_{3i}\ D\left(Ln(EXD_{t-i})\right) + \varepsilon_t \quad (24)$$

$$D\left(Ln\ (INFR_t)\right) = \theta_0 + \sum_{i=1}^{p}\theta_{1i}\ D(Ln(INFR_{t-i})) + \sum_{i=1}^{q}\theta_{2i}\ D\left(Ln(RGDP_{t-i})\right) + \sum_{i=1}^{q}\theta_{3i}\ D\left(Ln(DEF_{t-i})\right) + \sum_{i=1}^{q}\theta_{3i}\ D\left(Ln(TR_{t-i})\right) + \sum_{i=1}^{q}\theta_{3i}\ D\left(Ln(EXD_{t-i})\right) + \varepsilon_t \quad (25)$$

$$D\left(Ln\ (TR_t)\right) = \theta_0 + \sum_{i=1}^{p}\theta_{1i}\ D(Ln(TR_{t-i})) + \sum_{i=1}^{q}\theta_{2i}\ D\left(Ln(RGDP_{t-i})\right) + \sum_{i=1}^{q}\theta_{3i}\ D\left(Ln(INFR_{t-i})\right) + \sum_{i=1}^{q}\theta_{3i}\ D\left(Ln(DEF_{t-i})\right) + \sum_{i=1}^{q}\theta_{3i}\ D\left(Ln(EXD_{t-i})\right) + \varepsilon_t \quad (26)$$

$$D\left(Ln\ (EXD_t)\right) = \theta_0 + \sum_{i=1}^{p}\theta_{1i}\ D(Ln(EXD_{t-i})) + \sum_{i=1}^{q}\theta_{2i}\ D\left(Ln(RGDP_{t-i})\right) + \sum_{i=1}^{q}\theta_{3i}\ D\left(Ln(INFR_{t-i})\right) + \sum_{i=1}^{q}\theta_{3i}\ D\left(Ln(TR_{t-i})\right) + \sum_{i=1}^{q}\theta_{3i}\ D\left(Ln(DEF_{t-i})\right) + \varepsilon_t \quad (27)$$

4. Result of the study

4.1. Stationery Test

Table 2 Unit Root Test by Augmented Dickey-Fuller and Phillips-Perron Statistic

Variables	t-statistics	ADF-value	Lag (AIC)	PP-value	Adj. t-Stat	Stationary	
						ADF	PP
LNDEBT	4.350873	2.931 (5%)	2	2.931 (5%)	4.3570	I(1)	I(1)
LNDEF	3.369215	2.929 (5%)	2	2.929(5%)	3.3297	I(0)	I(0)
LNGEX	3.071487	2.931 (5%)	2	2.931 (5%)	5.5839	I(0)	I(0)
LNINF	4.159796	2.941(5%)	2	2.929(5%)	8.3383	I(0)	I(0)
LNRGDP	5.479654	2.941(5%)	3	2.929(5%)	5.0766	I(1)	I(0)
LNTR	7.107228	2.931(5%)	1	2.929(5%)	3.0472	I(1)	I(0)

Note:- AIC is Akaike Information Criteria, 5% Indicates Significance Level

Source: Authors.

According to the ADF stationary test, LNDEBT, LNGEX, LNRGDP, and LNTR are stationary at their difference, and the remaining variables are stationary at their level. PP test statistic results, however, show that, except for LNDEBT, all variables are stationary at their levels.

Table 3"F"and "t" Bounds Test

Model								F-statistic		t-statistics		Inference	
F_{LNDEF}(LNDEF|LNRGDP, LNTR, LNEXD, LNINFR)								5.181595*		4.961771*		YES	
Critical value bounds of the F-statistic and T-statistic: unrestricted intercept and no trend													
		F-statistic						t-statistic					
K=4	SIGN-LEVEL	99%		95%		90%		99%		95%		90%	
		I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(10	I(0)	I(1)	I(0)	I(1)
		3.74	5.06	2.86	4.01	2.45	3.52	3.43	4.6	2.86	3.99	2.57	3.66
Note: 1) K is the number of Independent Variables. 2) * denote statistically significance at one, five and ten percent levels of significance.													

Source: Authors.

Under table 4.2 the "f" and "t" test verify that there is long run relationship, so the test ordered the researcher to against the null hypothesis (H_0: $\delta_1 = \delta_2 = 0$ (Null, i.e. the long run relationship does not exist)(Sirah and Woldetensay, 2021).

4.2. Long run relationship of variables

The results illustrate the long run impact of explanatory variables on budget deficit in an equation form as follows;

LNDEF = -0.317166LnDEBT -0.011073LnINF + 0.190416LnRGDP - 0.660095LnTR (28)
(0.0290) (0.7301) (0.0074) (0.1768), Where ( ) are the p-values.

The long-run regression explained that there is a positive relationship between budget deficit and economic growth. It can be understood as other things being constant; a percentage change in the real gross domestic product causes the long-run budget deficit increase to change by about 19% and this is acceptable at a one percent significance level. The study result is inconsistent with

Freidman and the Neo-classical paradigm, but it supports the Keynesians postulates. The study results are also consistent with (Farajova, 2011; Murwirapachena, Maredza, & Choga, 2013; Al-Qudah & Jaradat, 2018), but it is inconsistent with the study of (AbdRahman, 2012; Tung, 2018). As the study, the result shows when economic growth increases, budget deficit also increases but Ethiopian economic growth is not much response to increasing the budget deficit, as the time-series data shows Ethiopia highly experienced with a budget deficit from 1974/75 -2019/202, this budget deficit is not due to economic growth. From this minor economic growth, a government does not generate enough revenue. Another explanation is also when external debt increases by 1%, the budget deficit is reduced by 31%. From time to time Ethiopia's external debts increase dramatically but still, it has no good contribution to reducing the budget deficit. This may be due to poor management of external debt, the dalliance of projects, and employing external debt on nonproductive economic activity.

Table 4 Short Run Relationship of Variables

Dependent variable: D(LNDEF)				
ECM(-1)	Coefficient	Std. Error	t-Statistic	Probability
	-0.769875	0.142843	-5.389651	0.0000
CON	0.431388	0.096700	4.461118	0.0001
Independent Variables	Short run elasticity's at various lag length			
	y_{t-1}	y_{t-2}		
D(LNRGDP)	0.037685	-0.078925		
	t-statistics = 1.472556)	t-statistics = -2.759611)		
	P-value =0.1503	P-value = 0.0094]		
D(LNTR)	0.436600			
	t-statistics = 0.934559)			
	P-value = 0.3568]			
D(LNDEBT)	-0.744350			
	t-statistics = -2.425991)			
	P-value = 0.0209]			
R-sq. = 0.47 Adjusted R-sq. = 0.40	F-statistic = 6.652708	Durbin-Watson stat = 1.868709		
	PROB (F-statistic) = 0.000165	Sum squared residual = 4.659918		
	S.E. of regression = 0.354886	AKAIKE info criterion = 0.894745		

Source: Authors.

The constant terms indicate that if all the assumed to be constant, 42% is the projected value of the budget deficit. The short-run relationship of variables explained that the first lag of real gross domestic product has a positive and insignificant impact on the budget deficit level in Ethiopia. It asserts the equivalence theory. But, there is a statistically negative relationship between GDP and budget deficit at lag two. The results show that an increase in the lag two of RGDP by one percent leads to a 7.8% decrease in the budget deficit in the short run. Freidman and Neo-classical explained that there is a negative relationship between budget deficit and economic growth. This may be when economic growth is recorded in Ethiopia, the government generates more revenue and spends less. The result is inconsistent with (Al-Qudah & Jaradat, 2018). But, just like the long-run result, the short-run finding suggests that economic growth is not in a good position to reduce

the budget deficit in Ethiopia. Contrary to the long run, the short-run result indicates external debt has a significant contribution to reducing the budget deficit. It is consistent with the study of (Saima & Uddin, 2017). Another variable has no significance in the long run and short run. The coefficient of error correction is significant at a one percent significance level with a negative sign. It shows a high speed of adjustment from short-run fluctuations to long-run equilibrium.

Table 5 Short Run Relationship of Variables

Dependent variable: D(LNINFR)				
Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	-9.150530	1.116902	-8.192777	0.0000
D(LNINF(-1))	0.333035	0.127949	2.602869	0.0144
D(LDEFI)	2.673023	1.149518	2.325342	0.0273
D(LDEFI(-1))	4.096499	1.291672	3.171469	0.0036
D(LEXP)	14.97026	5.076051	2.949193	0.0062
D(LEXP(-1))	12.76234	5.292917	2.411211	0.0225
D(LTR)	-18.11255	3.698661	-4.897055	0.0000
D(LTR(-1))	-11.01167	3.817145	-2.884791	0.0073
D(LDEBT)	-3.969198	2.033087	-1.952301	0.0606
Speed of Adjustment	-1.757494	0.210644	-8.343419	0.0000
R-squared	**0.836403**	Adjusted R-squared		**0.791786**

Source: Authors.

The above table indicates that there is a positive relationship between budget deficit, government expenditure, and inflation rate. Furthermore, there is a negative relationship between tax revenue, external debt, and inflation in Ethiopia. The current and lag budget deficits increased by 267% and 407% respectively when inflation rates increased by one unit, other things being equal. This is highly acceptable at 1% and 5% significance levels. Similarly, when current and lag government expenditure increased by a unit inflation rate also increased by 1497% and 1276% respectively. This output is also highly significant at 1% and 5%. This specific result is as expected and supports economic hypotheses. If there is high government expenditure this produces the problem of the budget deficit and high inflation rate by creating high job opportunities. This output is akin to the study of (Cosimo, 2011).

Conversely, when current and lag tax revenue increased by one percent, the inflation rate decreased by 1811% and 1101%, respectively. This may happen when the government hikes taxes to get more revenue. Moreover, external debt was found to be highly relevant to explain the inflation rate i.e. when this variable increased by 1%, the inflation rate decreased by 40%. This is also significant at 10%. This outcome indicates the government may use part of external income to control the inflation rate in Ethiopia. Lastly, the included independent variables explained the dependent variable by 84%.

Table 6 Pairwise Granger Causality Tests

Null Hypothesis	Observation	F-Statistic	Probability
LDEBT does not Granger Cause LDEFI LDEFI does not Granger Cause LDEBT	43	0.40635 1.87078	0.6689 0.1679
LNINF does not Granger Cause LDEFI LDEFI does not Granger Cause LNINF	43	0.30212 0.84878	0.7410 0.4359
LNRGDP does not Granger Cause LDEFI LDEFI does not Granger Cause LNRGDP	43	2.26202 1.64770	0.1180 0.2059
LTR does not Granger Cause LDEFI LDEFI does not Granger Cause LTR	43	0.20778 0.29208	0.8133 0.7484
LNINF does not Granger Cause LDEBT LDEBT does not Granger Cause LNINF	43	1.27564 1.80536	0.2909 0.1782
LNRGDP does not Granger Cause LDEBT LDEBT does not Granger Cause LNRGDP	43	1.92130 0.92284	0.1604 0.4061
LTR does not Granger Cause LDEBT LDEBT does not Granger Cause LTR	43	0.56106 0.35434	0.5753 0.7039
LNRGDP does not Granger Cause LNINF LNINF does not Granger Cause LNRGDP	43	1.91531 4.37632	0.1612 0.0195
LTR does not Granger Cause LNINF LNINF does not Granger Cause LTR	43	3.40251 0.42264	0.0437 0.6584
LTR does not Granger Cause LNRGDP LNRGDP does not Granger Cause LTR	43	0.90405 2.03622	0.4135 0.1445

Source: Authors.

The study found that there is no Granger cause that links economic growth to budget deficit or from budget deficit to economic growth. The findings of these studies disagree with those in (Saima & Uddin, 2017). External debt does not directly contribute to the budget deficit or inflation rate.

4.3. Diagnostic Test of Residual for ARDL Model

Table 7 Diagnostic Test of Residuals

Diagnostic test	**F-statistic**	**Probability**
Heteroscedasticity Test(Breusch-Pagan-Godfrey)	0.504229	0.8607
Autocorrelation Test(breusch-Godfrey Serial Correlation LM Test)	0.245817	0.7836
Ramsey RESET Test	0.228166	0.6361

Source: Authors.

We do not reject the null hypothesis. Consequently, we have enough confirmation to conclude that there is no autocorrelation, and misspecification problem with the residual.

4.4. Normality test

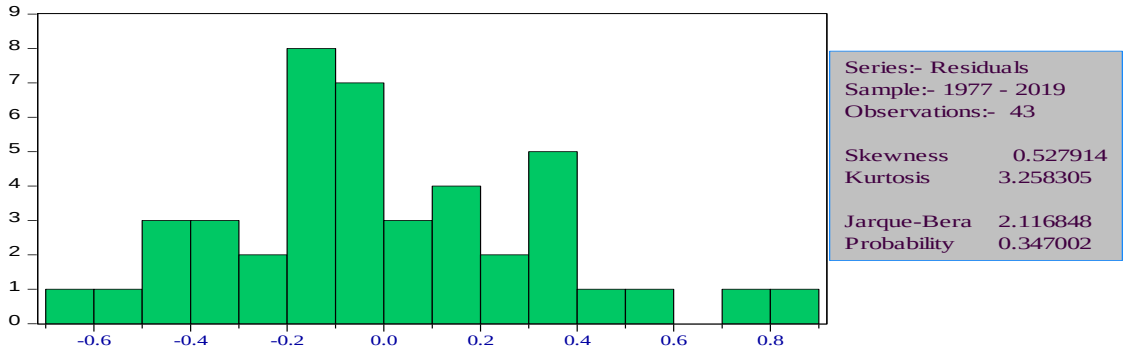

Figure 1 Normality testof residual for ARDL model
Source: e-viwes-v-10

4.5. Stability of ARDL Model

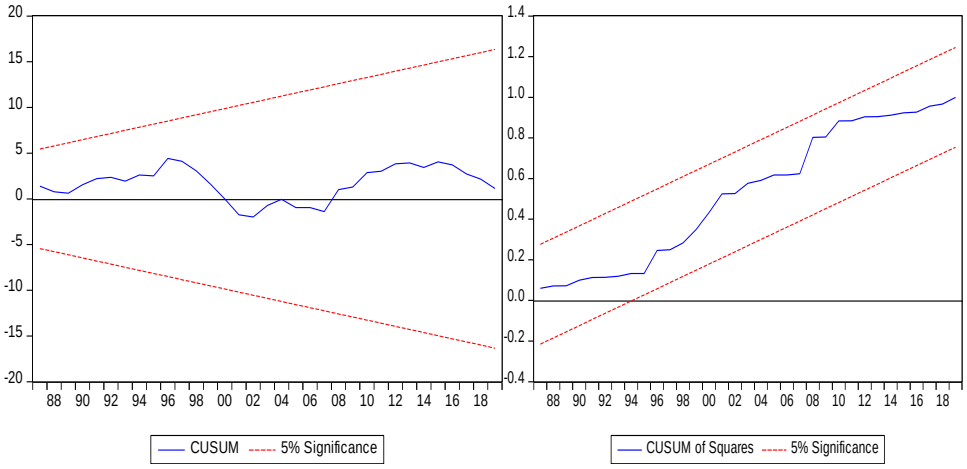

Figure 2 Model stability test
Source: Authors.

In the two plots, it can be seen that CUMSUM and CUMSUMSQ stay within the lines. Therefore, this confirms the equation is correctly specified and the ARDL model is stable.

5. Conclusion

The researchers have used ARDL and VAR models to address the stated objective of the study. The "F" and "t" tests proved that variables are co-integrated, so the researcher got a chance to see the long-run and short-run impact of external debt on-budget deficit, and the short-run impact of external debt on the inflation rate. Moreover, the study touched on the pairwise granger causality test which exists between dependent and explanatory variables. The result also displays that there is a negative relationship between budget deficit and external debt in the short-run and long run. And external debt affects the inflation rate in the short run positively. Moreover, external debt does not granger cause inflation and budget deficit. To increase the acceptability of the study result the

researcher tested the considered model by using diagnosis tests like the Heteroskedasticity test (Breusch-Pagan-Godfrey), Autocorrelation test (Breusch-Godfrey Serial Correlation LM Test), Ramsey RESET Test, normality test of residual for ARDL model, and stability of ARDL model. The studies pass all the listed tests; hence the ARDL model and the study result are confidentially acceptable.

6. Recommendation

According to the study results, the researchers advised a responsible body as follows: a responsible body should minimize excess budget deficits, and to do that, government expenditures should be productive. Improve investor confidence so they will invest their capital in the economy to generate more revenue. Reducing high inflation, which affects investment and saving habits, strengthening the external debt management system, and allocating it more efficiently to productive economic activity. A researcher can also improve this study by incorporating other macroeconomic variables, looking at the long-run impact of public finances on inflation, and studying longitudinally.

7. References

1. *AbdRahman, N. H. (2012). The Relationship between Budget Deficit and Economic Growth from Malaysia's Perspective: An ARDL Approach. International Conference on Economics, Business Innovation, vol.38.*
2. *Al-Qudah , A. M., & Jaradat, M. A. (2018). Economic Growth, External Debt and Budget Deficit in ordan: ARDL Approach. International Journal of Academic Research economics and management sciences, 7(4), 151–165.*
3. *Cosimo , M. (2011). The nexus between public expenditure and inflation in the Mediterranean countries.Online at mpra.ub.uni-muenchen.de Paper No. 28493, posted 29 Jan 2011 19:59 UTC.*
4. *Farajova, K. (2011). Budget Deficit and Macroeconomics Fundamentals: The case of Azerbaijan. International Journal of Economic Sciences and Applied Research, 4 (2), 143-158.*
5. *Keynes , J. M. (1936). The general theory of employment, interest and money. London: Macmillan publication.*
6. *Lucas , R. E. (1972). Expectation and the neutrality of money. J. Econ Theory, 4, 103-124.*
7. *Lwanga, M. M., & Mawejje, J. (2014). Macroeconomic Effects of Budget Deficits in Uganda: A VAR-VECM Approach. The Economic Policy Research Centre.*
8. *McCallum, B. (1987). Inflation: Theory and Evidence.New York. The American National Bureau of Economic Working Paper No. 2312.*
9. *Onwioduokit , E. A., & Inam, U. S. (2018). Budget Deficit and Economic Growth in Liberia: An Empirical Investigation. American Journal of Humanities and Social Sciences Research (AJHSSR), 2(6), pp-68-78.*
10. *Pesaran, M. H., Shin, Y., & Smith, R.J. (2001). Bounds testing approaches to the analysis of level relationships. Journal of Applied Econometrics, 16 (3), pp. 289-326.*
11. *Phillips , A. (1958). The Relationship between Unemplyment the rate of change of Many Wage Rates in the United Kingdom, 1861-1957 . Economica, pp.283-299.*

12. *Saima, U., & Uddin, K. (2017). The Relationship between Budget Deficit and Public Debt in Bangladesh: A Vector Error Correction Model (VECM) Approach. Imperial Journal of Interdisciplinary R esearch, 37(7).*
13. *Sirah, E.S., &Woldetensay, W.A. (2021). An Empirical Study of the Long and Short Run Causation between Being without a job and Inflation in Ethiopia. Innovations, Number 67 (03).*
14. *Totonchi , J. (2011). Macroeconomic theories of inflation. Int. Conf. Econ. Finan, 4, 459-462.*
15. *Tung, L. T. (2018). The effect of fiscal deficit on economic growth in an emerging economy:Evidence from Vietnam. Journal of International Studies, 11(3).*
16. *Murwirapachena, G., Maredza, A., & Choga, I. (2013). The Economic Determinants of Budget Deficit in South Africa. Mediterranean Journal of of S ocial Science, 4(13).*