

Budget Deficit and Economic Growth in Ethiopia: Evidence from ARDL-VAR Model Approach

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Abstract

Budget deficit is the major problem of most developing countries. As depend on the theory economic growth and budget deficit relationship has no clear conclusion. The conducted studies shows in different developing countries the relation between budget deficit and economic growth is vary as depend on their economy. Regarding to this, the researcher is focus to see the relation between budget deficit and economic growth in Ethiopia from the period of 1974/75 to 2019/2020. Under this study the researcher used Autoregressive distributed lag and vector autoregressive model to see the long run, short run relationship and causality of budget deficit and economic growth. The study pass all tests like Augmented Dickey-Fuller, Phillips-Perron test statistic, diagnostic test of residual for ARDL model, “F” and “t” bound test. The depicted result told that there is long run positive relationship between budget deficit and economic growth, which is consistent from Keynesians School. Moreover negative relationship between external debt and budget deficit is recorded. The impact of inflation rate and tax revenue is insignificant in both long run and short run. In short run both external debt and economic growth has negative relationship which assert the Freidman and neo-classical paradigm. Depend on the study result the researcher forward some recommendation for the government. The government should spend on productive economic activity to generate enough revenue and rise up economic growth. Moreover, other interested researcher can improve this study by including other macroeconomic variables and looking the study with longitudinal investigation.

Keywords: - ARDL model, Budget Deficit, Ethiopia, Economic Growth

DOI: 10.7176/IAGS/82-01

Publication date: May 31st 2020

1. Introduction

Proper budget plan has been a powerful role to make countries influential in most aspects, because strategies that have the prospective to make a change to people’s living standard have linkage from the budget of a given country. In most developing countries’ economies, budget deficit is a common phenomenon and it is a persistence problem. For third world economies government expenditure is greater than its receipts, which is the government running budget deficit by spending more than its income. Additionally when we consider budget deficit, at the same time policy makers are eager to see the responsibility of budget deficit on economic growth which recorded in each developing economies and it is ringing in every interested mind. Practically both budget deficit and economic growth are the main issues which lead a debate with economic policy makers. Fundamentally, the word budget simply means a plan of government finance which submitted for the approval of the legislature. The government budget shows the plan which is performed in the country with a specific period of time. It has become a pronounced role for fulfilling the rudimentary objective of government (AbdRahman, 2012).

In Ethiopia it goes to action merely if the parliament approved the proposed budget. A powerful decision concerning provision of capitals to mollify diverse societal needs asks substantial thoughtful 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 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 (Hamle 1-Sene 30, in Ethiopian calendar). Having the advantage of 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 looking the connection, which exist 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 to that budget deficit leads a given government to face many economic crises, if a government face budget deficit it invoke higher tax rate, this also has an adverse effect on peoples life. A conducted research proved that it will cause to upsurge the taxes in the next years and falling spends by government, the motive why government want to more money to pay interest rate of the bonds. Higher budget deficit cause to greater aggregate demand, it means using more than definite amount of taxes so the rising of inflation rate on the economy and higher real GDP for the country. In the long run, increasing in budget deficit will reason to the slighter segment of private sector in the economics (Al-Qudah & Jaradat, 2018).

Moreover, Ethiopia's government has 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 the relation of budget deficit and economic growth. For the future budget deficit may become as a main obstacle to achieve the objective of the country. Hence the main objective of the researcher on this study is to see three things, those are; long run relationship, short run relationship and causality among variable. The following bar graph shows, as Ethiopia experienced a persistent budget deficit since 1974/75 to 2019/2020.

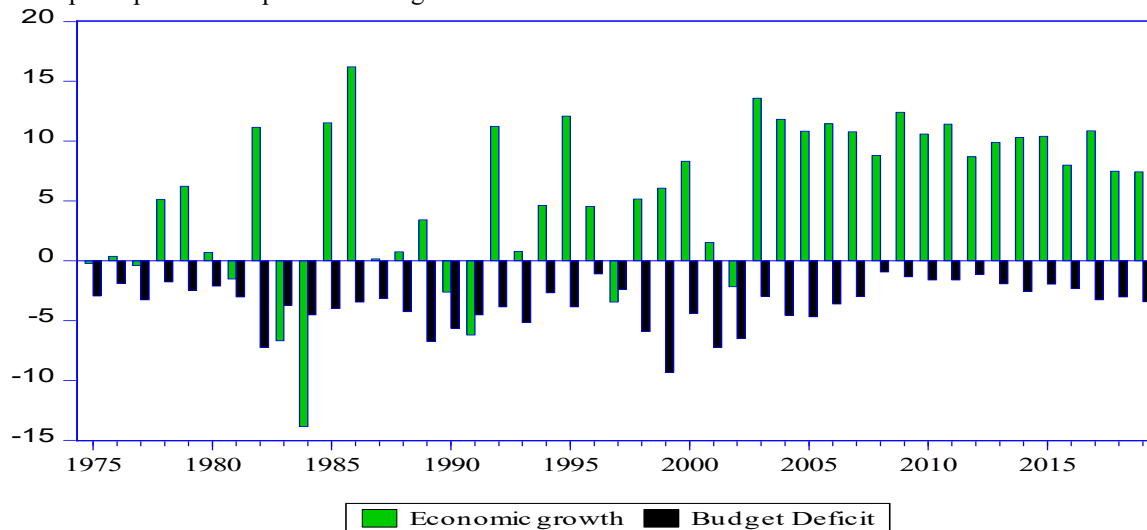


Figure 1.1 Graphical views of Economic Growth and Budget Deficit in Ethiopia from 1974/75-2019/2020
 Source: Stata/IC-v-15, by using WDI and NBE as an Input

2. Theoretical and Empirical Literature review

There are some theories concerning the relationship between budget deficit and economic performance. According to Freidman if there is budget deficit in a given country economy; a government take some measurement to solve the problem. But, each action was executed to counterbalance the deficit which creates definite consequences for the economy. By issuing of cash which is increase both the money supply and inflation. With other way, when monetary policy and fiscal policy were compression to moderate inflation, at the same time they embarrassed economic growth. So to sum up the theory, according to Freidman and neo-classical there is negative relationship between budget deficit and economic growth. And Keynesians School concludes that there is positive relationship between budget deficit and economic growth, but this suggestion is applied till the end of 1960s, in 1970s and 1980s its acceptability was failed. Lastly, the Ricardian equivalence theory concludes that, there is no any relation between those variables (Onwioduokit & Inam, 2018).

AbdRahman (2012) examines the relationship between economic growth and budget deficit for Malaysia economy. The study considers four variables those are real gross domestic product, debt, non-productive and productive expenditure. Autoregressive distributed lag model approach 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. As the study result shows there is no long run relationship between economic growth and budget deficit for Malaysia economy, the study proved the existence of Ricardian equivalence hypothesis in this country. Tung (2018) investigates fiscal deficit and economic growth for Vietnam perspective. The study applied error correction model for quarterly data which assert from 2003-2016. In Vietnam fiscal deficit has negative effect on economic growth in both long run and short run. The study result is consistent from Freidman and neoclassical idea.

From the above listed empirical studies the researcher concludes that some of the researchers found that the economic growth, external debt and budget deficit has positive relationship. Another some studies also proved that there is negative relationship between economic growth, external debt and budget deficit. Moreover some of the studies result display that the listed variables has no any relationship relationships. Additional to see the relationship of those listed variables researchers used different models like VAR, VECM, ECM and ARDL model.

3. Methodology of the study

Table 3.1 Description and Data source of variables

Short form of Variables	Long form of variables	Unit	Time	Data Source
BD	Budget deficit	% of GDP	1974/75-2019/202	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

To develop model which shows the relationship between budget deficit and economic growth the researcher used (Farajova, 2011) and (Saima & Uddin, 2017) study with a minor modification. The general, functional, mathematical, Econometric and logarithmic form placed as follows respectively;

$$Y_{ij1975-2019} = f(X_{ij1975-2019}, X_{ij1975-2019}, X_{ij1975-2019}, X_{ij1975-2019}) \dots \dots \dots (1)$$

Where t= time (1975-2019), i = row vector and j = column vector.

$$BD_{ijt} = f(\alpha_{ij}, ED_{ijt}, RGDP_{ijt}, INFR_{ijt}, TR_{ijt}) \dots \dots \dots (2)$$

$$BD = \alpha_{ij} + \beta_{ij}ED_{ijt} + \beta_{ij}RGDP_{ijt} + \beta_{ij}INFR_{ijt} + \beta_{ij}TR_{ijt} \dots \dots \dots (3)$$

$$BD = \alpha_{ij} + \beta_{ij}ED_{ijt} + \beta_{ij}RGDP_{ijt} + \beta_{ij}INFR_{ijt} + \beta_{ij}TR_{ijt} + \mu_{ij} \dots \dots \dots (4)$$

$$LnBD = \alpha_{ij}\beta_{ij}ED_{ijt}\beta_{ij}RGDP_{ijt}\beta_{ij}INFR_{ijt}\beta_{ij}TR_{ijt}\mu^{eij} \dots \dots \dots (5)$$

$$LnBD = \alpha_{ij} + \beta_{ij}LnED_{ijt} + \beta_{ij}LnRGDP_{ijt} + \beta_{ij}LnINFR_{ijt} + \beta_{ij}LnTR_{ijt} + \varepsilon_{ij} \dots \dots \dots (6)$$

3.1. Long run Autoregressive Distributed Lag Model

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

$$\Delta X_t = \delta_{0i} + \sum_{i=1}^{p_i} \alpha_i \Delta X_{t-1} + \sum_{i=1}^{q_i} \alpha_2 \Delta Y_{t-i} + \delta_1 X_{t-1} + \delta_2 Y_{t-1} + V_{1t} \dots \dots \dots (7)$$

$$\Delta Y_t = \delta_{0i} + \sum_{i=1}^{p_i} \alpha_i \Delta Y_{t-1} + \sum_{i=1}^{q_i} \alpha_2 \Delta X_{t-i} + \delta_1 Y_{t-1} + \delta_2 X_{t-1} + V_{1t} \dots \dots \dots (8)$$

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 (α_i to α_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 appears as follows:-

$$D(Ln(DEFt)) = \beta_1 + \alpha_{11} Ln(DEFt - 1) + \alpha_{21} Ln(RGDpt - 1) + \alpha_{31} Ln(INFRt - 1) + \alpha_{41} Ln(EXDt - 1) + \alpha_{51} Ln(TRt - 1) + \sum p_i \theta_{1i} D(Ln(DEFt - 1)) + \sum q_i \theta_{2i} D(Ln(RGDpt - 1)) + \sum q_i \theta_{3i} D(Ln(INFRt - 1)) + \sum q_i \theta_{4i} D(Ln(EXDt - 1)) + \sum q_i \theta_{5i} D(Ln(TRt - 1)) + \epsilon_{1t} \dots \dots \dots (9)$$

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

$$D(Ln(DEFt)) = \beta_1 + \sum p_i \theta_{1i} D(Ln(DEFt - 1)) + \sum q_i \theta_{2i} D(Ln(RGDpt - 1)) + \sum q_i \theta_{3i} D(Ln(INFRt - 1)) + \sum q_i \theta_{4i} D(Ln(EXDt - 1)) + \sum q_i \theta_{5i} D(Ln(TRt - 1)) + \epsilon_{1t} \dots \dots \dots (10)$$

The F-statistic is carried out on the joint null hypothesis that the coefficients of the lagged. This is tested in each of the models as specified by the number of variables. This can also be denoted as follows;

$$F_x(X_1|Y_1, \dots, Y_k) \dots \dots \dots (11)$$

$$F_y(Y_1|X_1, \dots, X_k) \dots \dots \dots (12)$$

The hypothesis is tested by means of the F- statistic (Wald test) in equation 11 and 12 respectively. When the computed F-statistic is greater than the upper bound critical value then the variables are co-integrated. If the F-statistic is below the lower bound critical value, then there is no co-integration among the variables.

The researcher use the following way of expression to use F-statistics as stated with equation (11) above;

$$FLnDEFt(LnDEFt|LnRGDPt, LnTRt, LnEXDt, LnINFRt) \dots \dots \dots (13)$$

3.2. Short run Autoregressive Distributed Lag Model

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

$$\Delta Y_t = \alpha_0 + b_1 \Delta X_t - \varphi \mu_{t-1} + \varepsilon_t \dots \dots \dots (14)$$

b_1 = impact multi-plier, φ = adjustment effect. According to (Sisay, 2019) 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 (15) β_2 being the long run response.

$$\mu_{t-1} = Y_{t-1} - \beta_1 - \beta_2 X_{t-1} \dots \dots \dots (15)$$

$$D(\text{Ln}(DEF_t)) = \theta_0 + \sum_{i=1}^p \theta_{1i} D(\text{Ln}(DEF_{t-i})) + \sum_{i=1}^q \theta_{2i} D(\text{Ln}(RGDP_{t-i})) + \sum_{i=1}^q \theta_{3i} D(\text{Ln}(INFR_{t-i})) + \sum_{i=1}^q \theta_{4i} D(\text{Ln}(EXD_{t-i})) + \sum_{i=1}^q \theta_{5i} D(\text{Ln}(TR_{t-i})) + \varphi ECT_{t-1} + \varepsilon_t \dots \dots \dots (16)$$

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;

$$ECT_{t-1} = \text{Ln}(DEF_{t-1}) - [\theta_0 + \sum_{i=1}^p \theta_{1i} (\text{Ln}(DEF_{t-i})) + \sum_{i=1}^q \theta_{2i} (\text{Ln}(RGDP_{t-i})) + \sum_{i=1}^q \theta_{3i} (\text{Ln}(INFR_{t-i})) + \sum_{i=1}^q \theta_{4i} (\text{Ln}(EXD_{t-i})) + \sum_{i=1}^q \theta_{5i} (\text{Ln}(TR_{t-i}))] \dots \dots \dots (17)$$

To answer the third objective the researcher also develops the following vector model (Sisay, 2019);

$$D(\text{Ln}(DEF_t)) = \theta_0 + \sum_{i=1}^p \theta_{1i} D(\text{Ln}(DEF_{t-i})) + \sum_{i=1}^q \theta_{2i} D(\text{Ln}(RGDP_{t-i})) + \sum_{i=1}^q \theta_{3i} D(\text{Ln}(INFR_{t-i})) + \sum_{i=1}^q \theta_{3i} D(\text{Ln}(TR_{t-i})) + \sum_{i=1}^q \theta_{3i} D(\text{Ln}(EXD_{t-i})) + \varepsilon_t \dots \dots \dots (18)$$

$$D(\text{Ln}(RGDP_t)) = \theta_0 + \sum_{i=1}^p \theta_{1i} D(\text{Ln}(RGDP_{t-i})) + \sum_{i=1}^q \theta_{2i} D(\text{Ln}(DEF_{t-i})) + \sum_{i=1}^q \theta_{3i} D(\text{Ln}(INFR_{t-i})) + \sum_{i=1}^q \theta_{3i} D(\text{Ln}(TR_{t-i})) + \sum_{i=1}^q \theta_{3i} D(\text{Ln}(EXD_{t-i})) + \varepsilon_t \dots \dots \dots (19)$$

$$D(\text{Ln}(INFR_t)) = \theta_0 + \sum_{i=1}^p \theta_{1i} D(\text{Ln}(INFR_{t-i})) + \sum_{i=1}^q \theta_{2i} D(\text{Ln}(RGDP_{t-i})) + \sum_{i=1}^q \theta_{3i} D(\text{Ln}(DEF_{t-i})) + \sum_{i=1}^q \theta_{3i} D(\text{Ln}(TR_{t-i})) + \sum_{i=1}^q \theta_{3i} D(\text{Ln}(EXD_{t-i})) + \varepsilon_t \dots \dots \dots (20)$$

$$D(\text{Ln}(TR_t)) = \theta_0 + \sum_{i=1}^p \theta_{1i} D(\text{Ln}(TR_{t-i})) + \sum_{i=1}^q \theta_{2i} D(\text{Ln}(RGDP_{t-i})) + \sum_{i=1}^q \theta_{3i} D(\text{Ln}(INFR_{t-i})) + \sum_{i=1}^q \theta_{3i} D(\text{Ln}(DEF_{t-i})) + \sum_{i=1}^q \theta_{3i} D(\text{Ln}(EXD_{t-i})) + \varepsilon_t \dots \dots \dots (21)$$

$$D(\text{Ln}(EXD_t)) = \theta_0 + \sum_{i=1}^p \theta_{1i} D(\text{Ln}(EXD_{t-i})) + \sum_{i=1}^q \theta_{2i} D(\text{Ln}(RGDP_{t-i})) + \sum_{i=1}^q \theta_{3i} D(\text{Ln}(INFR_{t-i})) + \sum_{i=1}^q \theta_{3i} D(\text{Ln}(TR_{t-i})) + \sum_{i=1}^q \theta_{3i} D(\text{Ln}(DEF_{t-i})) + \varepsilon_t \dots \dots \dots (22)$$

4. Result of the study

4.1. Stationary Test

Table 4.1:- Unit root test by Augmented Dickey-Fuller and Phillips-Perron test statistic

Variables	t-statistics	ADF-value	Lag (AIC)	PP-value	Adj. t-Stat	Stationary	
						ADF	PP
LNDEBT	4.350873	2.931404 (5%)	2	2.931404 (5%)	4.357069	I(1)	I(1)
LNDEF	3.369215	2.929734(5%)	2	2.929734(5%)	3.329739	I(0)	I(0)
LNINF	4.159796	2.941145(5%)	2	2.929734(5%)	8.338355	I(0)	I(0)
LNRGDP	5.479654	2.941145(5%)	3	2.929734(5%)	5.076652	I(1)	I(0)
LNTR	7.107228	2.931404(5%)	1	2.929734(5%)	3.047256	I(1)	I(0)

Note:- AIC is AKAIKE INFORMATION CRITERIA, 5% INDICATES SIGNIFICANCE LEVEL

Source: e-viwes-v-10

The above table proved that LNDEBT, LNRGDP and LNTR are stationary at their difference and the remaining variables are stationary in level; this is according to ADF stationary test. But according to PP test statistic result shows except LNDEBT all variables are stationary at their level.

Table 4.2 “F” and “t” Bounds Test

Model		F-statistic	t-statistics	Inference									
F _{LNDEF} (LNDEF LNTR, LNRGDP, 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(1)	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: e-views-v-10

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) (Sisay, 2019).

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..... (23)
 (0.0290) (0.7301) (0.0074) (0.1768), Where () are the p-values.

The long run regression explained that there is positive relationship between budget deficit and economic growth. It can be understood as, other things being constant; a percentage change in real gross domestic product causes the long run budget deficit increase to change by about 19% and this is acceptable at one percent significance level. The study result is inconsistent from Freidman and Neo-classical paradigm, but it supports the Keynesians postulates. The study result also consistent from (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 result shows when economic growth increase budget deficit also increase but Ethiopian economic growth is not much responsible to increase budget deficit, as the time series data shows Ethiopia highly experienced with budget deficit from 1974/75 -2019/202, this budget deficit is not due to economic growth. From this minor economic growth a government not generates enough revenue. Another explanation also when external debt increase by 1% budget deficit reduced by 31%. From time to time Ethiopia external debts increase dramatically but still it has no good contribution to reduce 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 4.3 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	F-statistic = 6.652708		Durbin-Watson stat = 1.868709		
Adjusted R-sq. = 0.40	PROB (F-statistic) = 0.000165		Sum squared residual = 4.659918		
	S.E. of regression = 0.354886		AKAIKE info criterion = 0.894745		

Source: e-views-v-10

The constant terms indicate as if all the regressor assumed to be constant, 42% is the projected value of 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 budget deficit level in Ethiopia. It asserts the Ricardian equivalence theory. But, there is a statistically negative relationship between GDP and budget deficit at lag two. The results show that increase in the lag two of RGDP by one percent leads to 7.8% decrease budget deficit in the short run. Freidman and neo-classical explained that there is negative relationship between budget deficit and economic growth. This may be when economic growth recorded in Ethiopia, government generate more revenue and spent

less. The result is inconsistent from (Al-Qudah & Jaradat, 2018). But, just like the long run result, short run finding suggests that economic growth is not at its good position to reduce budget deficit in Ethiopia. Contrary to long run, the short run result indicates external debt has a great contribution to reduce budget deficit. It is consistent from the study of (Saima & Uddin, 2017). Another variable has no significant in long run and short run. The coefficient of error correction is significant at one percent significance level with negative sign. it shows high speed of adjustment from short run fluctuations to long run equilibrium.

Table 4.4 Pairwise Granger Causality Tests

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

Source: e-views-v-10

Pairwise Granger causality tests result shows that there is no granger cause which runs from economic growth to budget deficit and budget deficit to economic growth. It is inconsistent from the study of (Saima & Uddin, 2017).

4.3. Diagnostic Test of Residual for ARDL Model

Table 4.5 Diagnostic test of Residuals

Diagnostic test	F-statistic	Probability
HETEROSKEDASTICITY 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: e-viwes-v-10

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

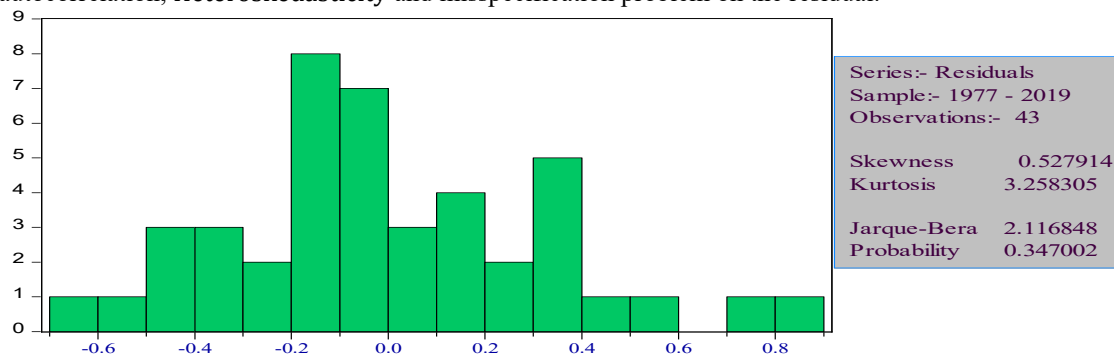


Figure 4.1 Normality test of residual for ARDL model

Source: e-viwes-v-10

4.4. Stability of ARDL Model

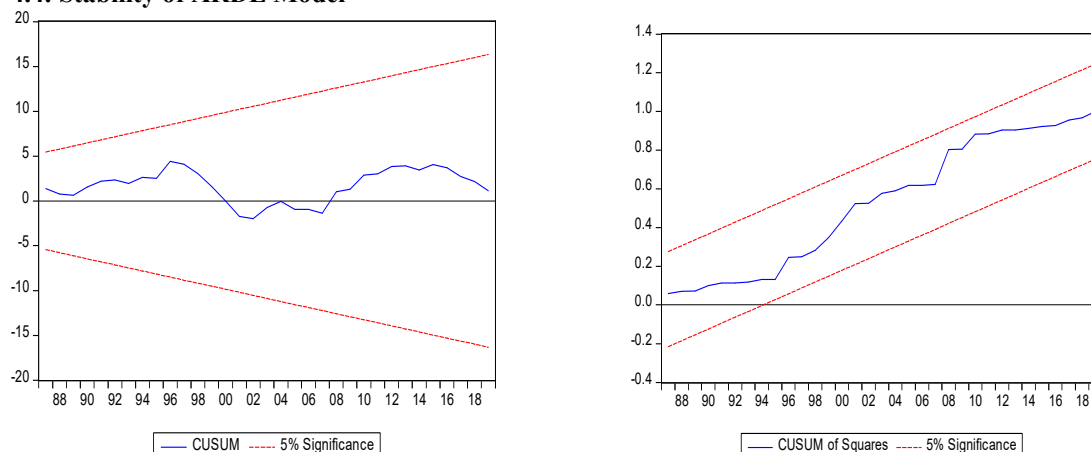


Figure 4.2 Model stability test

Source: e-viwes-v-10

The two plots disclose that, the plots of CUMSUM and CUMSUMSQ stay within the lines, and, therefore, this confirms the equation is correctly specified and the ARDL model is stable.

Conclusion and Recommendation

Conclusion

The researcher has been used ARDL and VAR model to address the stated objective of the study. The “F” and “t” test proved that variables are co-integrated, so the researcher was get a chance to see both the long run and short run relationship of budget deficit and economic growth. More over the study touched the pairwise granger causality test which exists between dependent and explanatory variables. To increase the acceptability of the study result the researcher test the considered model by using diagnosis tests like 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.

Recommendation

There is long run positive relationship between budget deficit and economic growth; but it is contrary for short run. The result also display that there is negative relationship between budget deficit and external debt in short run and long run. As depend on the result of the study the researcher advised a responsible body as follows;

- A responsible body should minimize excess budget deficit, to do that government expenditure should be productive.
- The government should increase the confidence of investors to invest their capital on the economy to generate more revenue.
- The government should reduce high inflation which affects investment and the saving habit of population.
- The government should build strong external debt management system and properly allocate it on productive economic activity.
- Moreover, other interested researcher can improve this study by including other macroeconomic variables and looking the study with longitudinal investigation.

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