

Research Article

Analysis of External Debt and Economic Growth in Ethiopia Economy

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Abstract

Economic growth speculations suggest that reasonable levels of borrowing by countries are likely to enhance its economic growth. Hence, countries at early stages of development have small stocks of capital and are unlikely to have investment opportunities with rates of return higher than those in advanced economies. This paper intended to analyse external debt and economic growth nexus in Ethiopia by using annual time series data over the period of 1990-2022. To meet its objective the study employed Autoregressive Distributed Lag (ARDL). The empirical result revealed that there is the existence of long run relationship between external debt and Economic Growth in Ethiopia and reveals that external debts stock contribute negatively to the economic growth of Ethiopia. Thus, the evidence in this study also revealed that in the long run external debt and human capital have negative and significant effect on economic growth, while, external debt service and gross fixed capital formations has significant positive and effects on growth (real GDP) in Ethiopia. In addition, the Granger (1969) procedure of causality test result revealed that there is unidirectional causality between external debt and growth, with the causality from economic growth to external debt. In addition, in the short run effect, there is 67 percentage adjustment taking place at each year towards the long run periods. The study recommends that government of Ethiopia should create conducive environment that helps to mobilize domestic resource for developmental projects rather than to rely on borrowing of external finance only for productive and value adding projects. One of the major concern, in order to improve Ethiopia's economic growth, is to adopt policies which will permit favorable internal productive projects includes the lowering corruption, respect rule of law, government effectiveness, legal voice and accountability, regulatory quality and political stability should be encouraged.

Keywords

External Debt, External Debt Servicing, ARDL and Real GDP

1. Introduction

Developed countries are characterized by high level of foreign public debts, low level of foreign exchange reserve and low level of governance indicators (Solomon, et al.) [13]. In less developed countries like sub Saharan African (SSA)

countries public debt is considered as a potential remedy to finance budget deficit (Melkamu) [9]. In many developing countries, huge external indebtedness has been seen as a strong break on the road to economic growth and develop-

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ment (Sylvester) [14]. The rising stock of public and lack of steady improvement in macroeconomic indicators continued to generate disagreement among academics, policy makers and public analysts (Festus et al.) [6]. External borrowing is a common source of financing for developing countries, to fill in the savings and investment gap (Nechirwan, et al.) [12]. Low level of savings forced these countries to depend on foreign source of finance in the form of foreign public debts. Since SSA's external debt is equivalent to 45.99 percent of the region's GDP in 2020 while, its reserve holding of the same year covered only 6.17 months of import goods and services (Mohanty) [11].

In addition, the overwhelming of Ethiopian stock of public external debt may lead the country towards high debt ratio regimes associated with lower economic growth (Garedew and Taddele) [8]. Ethiopia's economy was primarily reliant on earnings from the sale of primary commodities, focused on a small number of export commodities and market outlays to finance the importation of desperately needed capital goods. As a result, the country's exports failed, resulting in a persistent trade imbalance (Alemayehu) [1]. External debt is the resources provided from a foreign country that is repaid with principal and interest at the end of a certain period. External debt has an increasing effect on national income when it is taken and vice versa has a decreasing effect on national income when it is paid (Aybarç) [3].

A study conducted by Chala [5] found that a major positive shock in debt is favorable to economic growth while the effect of a minor and negative shock to debt is unfavorable. The results further reveals that there is a threshold effect of debt such that it is beneficial to economic growth of Ethiopia when it is well below 66.75% of GDP or 36.27% of GNI. Additionally, a study by Mohammed [10] result from the study revealed that public external debt stock has an adverse significant impact to economic growth of Ethiopia both in the long run and short run. However, public external debt servicing has positive significant impact to real GDP both in short run and long run.' Additionally, a study conducted by Amsalu [2] result from the Growth equation shows that external debt stock has a significant and positive long run relation to economic growth as measured by the growth of real GDP. While external debt service on the other hand, has significant and negative relation to the long run growth of the country.

On the other hand, the empirical result study by Wondatir [16] reveals that in the long-run high level of stock of public external debt has a significant negative effect on economic growth and it poses great challenges on the economy. Increases in labour force, external public debt and institutional quality would lead to decrease in economic growth other things being equal (Festus et al.) [6]. A study conducted by Gachunga [7] employed, panel data econometric techniques of GMM and its result confirmed that, economies of Sub-Saharan Africa are negatively affected by external debt. In addition, external debt was found to be more deleterious to

middle income economies compared to their counterpart's low-income economies. A study conducted by Amsalu [2] using time series data and using Johansen co-integration test and Vector Error Correction Model (VECM) found that external debt stock improves the economic growth of Ethiopia.

Additionally, study by Mohanty [11] using VAR model, aimed to test the effect of external debt on economic growth of Ethiopia through Vector Error Correction model (VECM) between 1981-2014 and the empirical result found that there is existence of long run relationship between external debt and Economic Growth in and revealed that external debt contributes positively to the economic growth. The previous studies by Mohammed [10], Mohanty [11] focused on the impact of public external debt only rather than total external debt. While, this study rather focused on assessing the direction of causality between external debt-growth nexus if (bi-dimensional or one-dimensional). Additionally, they used VAR and Johanson co-integration method as the means of analysis. However, Co-integration procedure could not ravel dependable result for small sample size; especially for observations less than eighty years for the time series data (Udoh) [15].

Thus, impact of external debt on the economic growth is inconclusive. Therefore, given the lack of empirical evidence on causality between external debt and economic growth in Ethiopia to incorporate institutional quality variables indexes, the study aimed to analyses of nexus between external debt and economic growth in Ethiopia economy, via time series data. The study has two main objectives: (a) to investigate impact of external debt on Ethiopian economic growth between 1990 and 2022 through ARDL model; and (b) to examine a direction of causal relationship between external debt and economic growth in Ethiopia.

2. Methodology of the Study

2.1. Data Sources and Variables

The study intended to analyse external debt and economic growth in Ethiopia economy using time series data from 1990–2022 using ARDL model. The study was used secondary data obtained from different sources like FAO, World Bank, International Monetary Fund, World Bank and World Governance Indicators, and National Bank of Ethiopia.

2.2. Theoretical Framework and Analytical Model

The theoretical foundation of the study has pointed its base on the amplified Solow growth model and endogenous growth mode. Thus, national income identity model augmented with debt and monetary variables has employed via growth equation desired to explore the relationship between external debt burden indicators and economic growth in Ethiopia. Hence, the ideal economic output model via inclusion of external debt

and institutional quality expressed with the function;

$$\gamma = f(K, HK, L, EXD, A, Q) \quad (1)$$

Where γ is a proxy for economic growth, K= financial Capital stock, HK=Human Capital, L = Labor force, EXD=external debt, A= technology and Q= institutional

quality.

Based on both the theoretical and empirical literature on impact of external debt on economic growth, control variables such as term of trade, capital stock, human capital, labor force, inflation rate and Institutional quality were used in the study. Accordingly the regression equation is given by,

$$\ln RGDP_t = \beta_0 + \beta_1 \ln EXD_t + \beta_2 \ln EDS_t + \beta_3 \ln TOT_t + \beta_4 \ln GCF_t + \beta_5 \ln HCA_t + \beta_6 \ln LFO_t + \beta_7 \ln INF_t + \beta_8 \ln ISQ_t + U_t \quad (2)$$

Where; $\ln RGDP_t$ is Real Gross Domestic Product of Ethiopia at time t, $\ln EXD_t$ is Stock of external debt to GDP ratio; $\ln EDS_t$ is External debt servicing at time's. $\ln TOT_t$ is Terms of Trade at time t; $\ln GCF_t$ is Capital stock at time t; $\ln HCA_t$ is Human Capital at time t; $\ln LFO_t$ is Labor Force at time t. $\ln INF_t$ is Inflation Rate at time t and $\ln ISQ_t$ In-

stitutional quality at time t. U_t is white noise determining; and $\ln$ =Natural logarithm.

Based on these advantages of the ARDL model, this paper employed a bound test approach. The standard ARDL model is given by

$$\begin{aligned} \Delta RGP = & \beta_0 + \beta_1 \Delta EXD_t + \beta_2 \Delta EDS_t + \beta_3 \Delta TOT_t + \beta_4 \Delta GCF_t + \beta_5 \Delta HCA_t + \beta_6 \Delta LFO_t + \beta_7 \Delta INF_t + \beta_8 \Delta ISQ_t \\ & + \theta_1 (RGDP)_{t-1} + \theta_2 \Delta (EXD)_{t-1} + \theta_3 \Delta (EDS)_{t-1} + \theta_4 \Delta (TOT)_{t-1} + \theta_5 \Delta (GCF)_{t-1} + \theta_6 \Delta (HCA)_{t-1} + \theta_7 \Delta (LFO)_{t-1} \\ & + \theta_8 \Delta (INF)_{t-1} + \theta_9 \Delta (ISQ)_{t-1} + \delta ECT_{t-1} + U_t \end{aligned} \quad (3)$$

Where, ECT is an error correction term is the speed of adjustment parameter lagged by one period and U_t represents the white noise residuals obtained from the estimated co integration of long run model.

Optimal lag length import in auto regressive distributive lag

model, as a result the study was used Akaike information criteria the selected lag length (AIC). This followed unrestricted error correction model (UECM) through including the lag of dependent variable.

$$\begin{aligned} \Delta RGP_t = & \beta_0 + \sum_{i=0}^p \beta_1 \Delta (RGDP)_{t-i} + \sum_{i=0}^p \beta_2 \Delta (EXD)_{t-i} + \sum_{i=0}^p \beta_3 \Delta (EDS)_{t-i} + \sum_{i=0}^p \beta_4 \Delta (TOT)_{t-i} \\ & + \sum_{i=0}^p \beta_5 \Delta (GCF)_{t-i} + \sum_{i=1}^p \beta_6 \Delta (HCA)_{t-i} + \sum_{i=1}^p \beta_7 \Delta (LFO)_{t-i} + \theta_1 (RGDP)_{t-1} + \theta_2 (EXD)_{t-1} + \theta_3 (EDS)_{t-1} \\ & + \theta_4 (TOT)_{t-1} + \theta_5 (GCF)_{t-1} + \theta_6 (HCA)_{t-1} + \theta_7 (LFO)_{t-1} + \theta_8 INF + \theta_9 (NSQ)_{it} + V_t \end{aligned} \quad (4)$$

Where; coefficients with summation sign $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ and β_7 have to correspond to the Short Run dynamics of the model, symbole Δ represents change operator, while the remaining coefficients $\theta_1, \theta_2, \theta_3, \theta_4, \theta_5, \theta_6, \theta_7, \theta_8$ and θ_9 demonstrates the long run relationship. To test the presence of Long Run relationship between the underlying variables, the above equations has estimated using pooled OLS.

Bound test: the ARDL bound test was processed through F-test (Wald test) showing the significance levels of long run long run correlation among variables in this study, thus the F-test is a test of the hypothesis of no co-integration among the variables against the existence or presence of co-integration among the variables, denoted as;

$H_0: \theta_1 = \theta_2 = \theta_3 = \theta_4 = \theta_5 = \theta_6 = \theta_7 = \theta_8 = \theta_9 = 0$;

There is no co-integration between the variables.

$H_A: \theta_1 \neq \theta_2 \neq \theta_3 \neq \theta_4 \neq \theta_5 \neq \theta_6 \neq \theta_7 \neq \theta_8 \neq \theta_9 \neq 0$;

There is co-integration among variables.

2.3. Variable Description and Expected Sign

Real growth domestic product (RGDP): used as proxy for economic growth, which is the total market value of all final goods and services domestically produced products at constant price. It is the nation's total output of goods and services produced in the country at a constant price (Mohammed) [10].

Stock of external debt (EXD): is a total external debt owed to nonresidents repayable in currency, goods, or services, and the sum of public, publicly guaranteed, and private nonguaranteed long-term debt, use of IMF credit, and short-term debt of the country valued in USD. The effect of external debt stock has an adverse significant impact to economic growth of Ethiopia both in the long run and short run (Mohammed [10], Mohanty [11]). However, a study conducted by Chala [5] found that a major positive shock in debt is favorable to economic growth while the effect of a minor and negative shock to debt is unfavorable.

External debt service (EDS): is the total debt service paid

towards externally borrowed money of the country in US\$. External debt servicing had positive effect on economic growth in Ethiopia (Mohammed) [10]. Debt servicing to ratio of GDP have the negative impact on economic growth of Ethiopia in both long run and short run (Berhanu and Fikadu) [4].

Terms of trade (TOT): Is the value of a country's export relative to that of its imports. If the country's terms of trade value less than one, there is more capital flight out than coming in, but greater than one means the country is accumulating capital. As Berhanu and Fikadu [4] found that there is a positive relationship between economic growth and term of trade.

Gross Capital Formation (GCF): defined as the value of the existing supply of physical goods that are used in the production process at a given point of time and includes buildings, machinery, equipment and inventory, consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories in current USD (Mohammed) [10]. Gross capital formation is positive relationship with economic growth Mohammed [10], Mohanty [11].

Human capital (HCA): In this study human capital is peroxide by real literacy rate (% of youths) total population from people ages 15-24 (Mohammed) [10]. Human capital is found to have positive relationship with economic growth, in line with the conventional and modern growth theories (Melkamu) [9].

Labor force (LFO): is the proportion of the population ages ranges from 15-24 which are economically all active people who supply labor to produce goods and services during a specified period, it is fact that to expect a positive impact on

economic growth, while the vice versa could be exact (Mohammed) [10].

Inflation (INF): represents the change in consumer Price Index, a study by Mohammed [10], found that inflation rate, has positive and significant impact to economic growth of Ethiopia. Hence, it is expected to be negative influence on economic growth.

Institutional quality (ISQ): to institutionalisms view it relates to the entire governance structure of the societies that comprises rules, regulations and organizations that shape human interactions thereby determine the outcome of every activity, expected that basic intuitions that, a good institutional structure can adhere national investment particularly and economic growth generally. Study by Mohammed [10] examined the effects of public debt and institutional quality on the growth of Nigerian economy; found that absence of institutional quality had significant negative effect on economic growth and recommends that institutional quality should matter.

3. Result and Discussion

3.1. Descriptive Analysis Results

As a methodical investigation, the depiction for result of this study starts by describing the data of the study. The results described a variable that used in the study consists of 33 observations by the mean, median and standard deviation value.

Table 1. Descriptive analysis of the study variables.

Variable	Observation	Mean	Std. Dev.	Minimum	Maximum
Real GDP	33	35662.79	34432.44	7147.53	118981.9
External debt	33	12.71828183	33.681999	15.03	18.2635767
External debt service	33	24.09	27.3541	30.3228581	14.89867157
Labor force	33	73.45497	2.003686	69.085	75.53
Terms of trade	33	90.89928	16.49522	49.95575	110.2318
Gross capital formation	33	21.14516	15.48052	0	39.4
Human capital	33	0.8698431	0.4687721	0.5461896	2.399823
Inflation	33	11.39626	11.57504	-8.4842	44.3567
Institutional index	33	0.2824378	0.0706017	0.0241983	0.3464922

Source: authors work, 2025

3.2. Econometrics Results

3.2.1. The Unit Root Test Result of the Time Series Data

A Unit Root Test is a statistical method employed to check spurious regression problem that may arise from one or more regressing a non-stationary time series, then the study to transform non stationary time series to stationary. That is, if

any one of the variables found to be integrated of order two, we are not allowed to use ARDL bound test methods.

In this section, therefore, we shall address the unit root test, using the Augmented Dickey- Fuller (ADF) test of Stationary of the time series. Dickey and Fuller (1979, 1981) devised a procedure to formally test for non-stationary. Accordingly, the Augmented Dickey Fuller unit root test found that institutional quality is I(0) variable while all other variables included in the study were I(1) variables

Table 2. Unit Root test result using Augmented Dickey-Fuller Test.

Variable	ADF t-statistics at level I(0)			ADF t-statistics at level I(1)			Order of Co-integration
	Intercept (C) No (C & T)	Trend and Intercept	Not at Con- stant	Intercept (C) No (C & T)	Trend and Intercept	Not at Con- stant	
LGDP	4.586 (1.0000)	-0.098 (0.9951)	4.586 (1.000)	-2.359 (0.1536)	-5.182** (0.0001)	-2.359** (0.0129)	I(1)
LEXD	0.774 (0.9912)	-1.017 (0.9412)	-0.774 (0.7774)	-2.934 (0.0416)	-3.131** (0.0990)	-2.934** (0.0034)	I(1)
LEDS	1.147 (0.9956)	-0.945 (0.9511)	1.147 (0.8694)	-1.147 (0.9956)	-0.945 (0.9511)	-1.759 (0.0449)	I(1)
LLFO	2.003 (0.9989)	-0.348 (0.9884)	2.003 (0.9725)	-1.759 (0.4009)	-2.684** (0.02429)	-1.759 0.00449	I(1)
LTOT	-1.708 (0.4271)	-2.053 (0.5720)	-1.708 (0.0494)	-4.729* (0.0001)	-4.689* (0.0007)	-4.729* (0.0000)	I(1)
LGCF	1.4412 (0.5763)	-0.950 (0.9505)	-1.412 (0.0844)	-4.675* (0.0001)	-4.803* (0.0005)	-4.675* (0.0000)	I(1)
LHCA	3.725 (1.0000)	1.786 (1.0000)	3.725 (0.9996)	-3.004** (0.03461)	-4.367** (0.0025)	-3.004** (0.0028)	I(1)
LINF	-2.956 (0.0393)	-4.035** (0.0078)	-2.956* (0.0031)	-7095* (0.0001)	-7.017* (0.0000)	-7.095* (0.000)	I(1)
LISQ	-6.388* (0.0000)	-4.618* (0.0010)	-6.388* (0.00000)	-3.121* (0.0250)	-3.441** (0.0462)	-3.121** (0.0021)	I(0)

While * and ** imply the statistical significance at 1% and 5% level, respectively. Whereas the numbers square bracket denotes test probability values

Source: Author's own computation, 2024 using STATA-14

The of result ADF shows that every variable became stationary either of trend, trend, and intercept and without trend at 1% and 5% significant level at I(1). Thus, the stationary tests result summarized was that the dependent variable's GDP, and explanatory variables i.e., LFO, TOT, GCF, HCA variables are integrated of order one. Where the rest ISQ variable is stationary and integrated of order I(0). Thus, the order of co-integration is of different levels, and the necessary co-integration test could be only bound test proposed by Pesaran, Shin & Smith (2001).

3.2.2. Determination of Optimum Lag Length

The estimation of a vector error correction model requires the selection of an appropriate lag length. Thus, the order of lags in the ARDL model has been determined according to Akaike information criterion (AIC). As shown on blow Table 3 the optimal lags of the study variables were selected based on Akaike information criteria after test of each individualistic variable. For this purpose, AIC (Akaike Information Criteria) was employed. Hence, the appropriate lag length observed is 2 years. Accordingly a maximum lag length of '4' was se-

lected for the conditional ARDL model in this study.

Table 3. AIC test for identifying the optimum lag length.

Sample: 1992 - 2022 Included observations: 31								
Lag	LL	LR	DF	P	FPE	AIC	HQIC	SBIC
0	-1845.6	.	.	.	51.883	127.904	128.037	128.328
1	-1613.51	464.19	81	0.000	82.99	117.483	118.812	122.727
2	-1463.39	300.23*	81	0.000	58.115*	112.717*	115.242*	120.779*

Were, * indicating that the optimum lag length

Source: Own computations, 2025

Therefore based on the Akaike information criteria the selected lag length of ARDL model (LGDP LEXD LEDS LLFO LTOT LGCF LHCA LINF and LISQ) as ARDL (2, 2, 1, 2, 2, 2, 1, 2). From AIC, we have learned that '2' is the optimal lag length for the given data set; therefore, we apply this information to execute the bound test.

3.2.3. ARDL Bound Test for Co-Integration

The bound test procedure is based on the assumption that the variables are I(1) or I(0), in the presence of I (2) variables the computed F-statistics developed by (Pesaran et al 2001) are not valid. For various situations, those authors give lower

and upper bounds on the critical values. In each case, the lower bound is based on the assumption that all the variables are I(0), and the upper bound is based on the assumption that all the variables are I(1). If the estimated F-statistic falls below the lower bound, we cannot reject the null hypothesis, so no co-integration is possible. If the F-statistic exceeds the upper bound, we can reject the null hypothesis and conclude that the variables are co-integration. Finally, if the F-statistic falls between the bounds, the test is inconclusive. If the long-run relationship is established between the variables, the long-run and short-run coefficients can be obtained by using the ARDL approach.

Table 4. Bound test for existence of Co-integration.

F = 5.813 t = 3.230								
Critical values	10%		05%		025%		01%	
Levels	I(0)	(1)	I(0)	(1)	I(0)	(1)	I(0)	(1)
Pesaran et al.	1.95	3.06	2.22	3.39	2.48	3.70	2.79	4.10

Source: Own computation 2025

From the result from above table reveals that F-statistic (5.813) is insignificant at level, and more than the upper bound I(1), thus the study reject the null hypothesis and conclude that the variables are co-integration. Therefore, there is the existing long run relationship between the dependent and independent variables.

3.2.4. Diagnostic Checks

For model requirement examination the Ramsey's RESET-test, was employed to understand whether the model

suffers from omitted variable bias or not. In addition, the test result found that it is insignificant the p-value is below the conventional critical value (0.1781>0.05), thus the null hypothesis has rejected.

3.2.5. Normality Test

The study was use when the model is normally specified or not, normality test statistic was employed. Hence, the probability value of Chi2 value is above 0.05 critical value (0.09548>0.05), thus the null hypothesis of that residuals are

not normally distributed is rejected. Hence, confirmed that the residuals in the model are normally distributed and significant.

3.2.6. Serial Correlation Test (Using the LM Test)

The study employed Breush-Godfrey Serial Correlation LM test was employed for testing the serial correlation problem. If the probability value is less than 5% ($0.1019 > 0.05$), then the study can reject the null hypothesis that indicates that the model has serial correlation and otherwise, no serial correlation.

3.2.7. Heteroscedasticity Test

The last diagnostic test is heteroscedasticity test and as we can understand from the result, the null hypothesis of no heteroscedasticity is to be rejected, significant level due to its p-value associated is greater than the standard significance level ($0.7185 > 0.05$).

3.2.8. Long Run Coefficients Analysis

As evidenced from the estimation result of the long-run of ARDL model, external debt service and gross fixed capital formations positively and statistically significantly affect the Ethiopian economic growth. On the other hand, external debt and human capital negatively and statistically significantly affect the Ethiopian economic growth.

The regression coefficient also revealed that the explanatory variable external debt stock as the percentage of GDP has significant and negative relationship with real GDP in the long-run. The coefficient of LEXD is -1.46 implies that as one percent change in the stock of external debt stock will, leads to 146 percent decline in real gross domestic product. This might be due to inefficient utilization and use of public external borrowings on non-productive activities. The negative signal of the variable confirms a proof for the classical prospect that external borrowings negatively affect a country's economy. The fact that high public external debt levels are associated with low growth as a higher tax burden on capital is required to service this stock of external debt. The result is consistent with the findings of a studies conducted by Festus et al. [6], Gachunga [7], Wondatir [16] impact of external debt on economic growth.

However, the other debt burden indicator, total external debt service as percentage of export has positive and significant relationship with economic growth. The coefficient of LEDS 0.0000464, reveals that as one percentage addition in the debt servicing would leads to 0.00464 percent increases by real GDP. This is due to debt overhang hypothesis where debt beyond a certain threshold, higher external debt is associated with lower rates of growth. While an increase in external debt may initially stimulate growth, excessive debt accumulation can lead to diminishing rate of returns and negative effects on economic growth. Thus, the result is inconsistency with the study by Amsalu [2], Berhanu and Fikadu [4], Mohammed [10], Mohanty [11].

Table 5. Long-run Coefficients Estimations of the ARDL Result.

R-squared = 0.9036; Adj. R-squared = 0.7910 Log likelihood = -230.4377 Root MSE = 1846.8859 Sample: 1990-2022, Included Observations 31 Dependent Variable: D(LGDP) Selected Model: ARDL (2, 2, 1, 2, 2, 2, 2, 1, 2)			
Variables	Coefficients.	Std. Err.	T-ratio {Prob.}
LEXD	-1.46006**	6.680047	2.19 {0.049}
LEDS	0.000464***	0.0000138	3.35{0.006}
LGCF	560.4312***	140.4629	3.99{0.002}
LLFO	-6994.68	4345.744	-1.61{0.133}
LINF	281.7358	181.7924	1.55{0.147 }
LTOT	94.90267	71.40958	1.33{0.209}
LHCA	-19318.45**	7701.345	-2.51{0.027}
LISQ	485.5103	801.6575	0.61{0.556}
_Cons	329153.6	241630.6	1.36{0.198}

Note: ***, ** & * denotes significance at 1%, 5%, 10% respectively.

Source: Own computation 2025, using STATA-14

Additionally, gross fixed capital formations have positive and significant effect on economic growth in Ethiopia. The coefficient of LGCF 560.4312, indicating that as 1 proportionate increase in fixed gross capital formation cause real GDP to increase by 56,043.12%, this shows that capital accumulation influences output as it is included as an input in production and plays a major growth determinant in Ethiopian economy. This result supports the pioneer studies by Amsalu [2], Berhanu and Fikadu [4] that investment alters significantly boost economic growth.

Moreover, independent variables human capital priory hypothesized that desirable effect on economic growth. While, contrary to prior hypothesis it has negative but significant effect with real GDP. The coefficient of LHCA -19318.45 implies that, a 1% increase in human capital causes economic

growth to decline by 1,931,845%, ceteris paribus.

3.2.9. Short Run Error Correction Model

The coefficient of the error correction term shows the speed of adjustment to restore equilibrium in the model. The lagged error term ECT (-1) in our result is negative and significant at 5% level of significance confirms the existence of long run association between the variables. The error correction coefficient, which is also called speed of adjustment toward long run equilibrium after a short run shock, is -0.67533. This indicates that deviation from the long-run equilibrium is corrected at the speed of 65.53 percent over each year implies that there is “an over correction” toward long run equilibrium after a short run shock..

Table 6. Estimated Short Run Result of the ARDL-EC model.

ARDL Error Correction Regression Dependent Variable: Δ GDP-st				
Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	-2204254	914358.7	-2.41	0.073
D(LEXD) (-1)	-1.85172	4.55828	-2.49	0.068
D(EXD)	0.74828	10.61828	-2.49	0.067
D(LEDs) (-1)	-0.53172	.0000112	-0.29	0.786
D(GCF) (-1)	750.9928	377.4065	1.99	0.117
D(GCF)	528.4464	325.6245	1.62	0.180
D (LFO (-1)	-16040.37	8042.888	-1.99	0.117
D(LLFO)	-22743.1	5403.786	-4.21	0.014
D(LINF) (-1)	-265.7989	90.51931	-2.94	0.043
D(TOT) (-1))	90.25334	129.6786	0.70	0.525
D(TOT)	134.1995	125.4494	1.07	0.345
D(LHCA) (-1)	-38137.63	14687.46	-2.60	0.060
D(LHCA)	-28715.23	11824.26	-2.43	0.072
LISQ (-1)	81030.25	57882.87	1.40	0.234
D(LISQ)	130039.4	85394.28	1.52	0.202
ECT-1	-0.6753323	0.0615276	-2.96	0.034
R-squared = 0.9609 Adj. R-squared = 0.7265 Observations 31				
Log likelihood = 239.55053 Root MSE= 2519.7763 Sample: 1992- 2022				

While, * indicate level of significance at 5%

Source: Author's own computation 2024, using STATA-14

3.2.10. Causality Test Analysis

The step for causality test is mandatory, thus it can give us

the unique clue to know if there is the causality among the independent and targeted dependent variables, further it infers us even a direction of causality among the study varia-

bles. Hence, to investigate its direction of causality, this study estimated a VAR model using both the Toda and Yamato (1995) and Grange (1969) procedure. From our decision criteria, you reject the null hypotheses of no causality if P-value is lower than or equal to 0.05% level of significance, and we cannot reject null hypotheses of no causality if P-value is greeter. From the above causality test result we conclude; that the null hypotheses of that external debt does not granger cause economic growth be rejected but not null hypotheses of injection of external borrowing doesn't granger cause economic growth at 5 percent level of significance. Hence, we can conclude that there is unidirectional between external debt and real GDP, which runs from economic growth.

The causality test results also indicate that we can reject both the null hypothesis that real GDP doesn't granger cause external service, gross capital formations and inflation (INF) and the null hypotheses of that external debt service, gross capital formations and inflation (INF) does not granger cause real GDP debt at 5% level of significance. Thus, we can

conclude that there is bidirectional between external debt service, gross capital formations and inflation (INF) and real gross domestic product, which runs from economic growth to external service, gross capital formations & inflation and vice versa.

However, the results also indicate that we cannot reject the null hypothesis that real GDP does not cause labor force participation (LFO) but reject the null hypothesis labor force participation (LFO) does not granger cause economic growth (GDP). Therefore, we can conclude that there is unidirectional causality between economic growth (GDP) and labor force participation which runs from economic growth to la-bor supply. Similarly, the results also indicate that we cannot reject the null hypothesis that real GDP does not cause literacy (HCA), but reject the null hypotheses of literacy (HCA) does not cause GDP. Hence, we can conclude that there is unidirectional causality between economic growth (GDP) and liter-acy level which runs from economic growth to literacy.

Table 7. Toda-Yamamoto Causality Test result.

Null Hypotheses	Chi2	Prob. > Chi2	Direction of Causality
RGDP DOESN'T CAUSE EXD	8.2054	0.017	Unidirectional causality
EXD DOESN' CAUSE RGDP	3.8894	0.143	GDP → EXD
RGDP DOESN'T CAUSE EDS	5.3159	0.070	Bidirectional causality
EDS DOESN'T CAUSE RGDP	11.398	0.003	EDS ↔ GDP
LFO DOESN'T CAUSE RGDP	4.3002	0.116	Unidirectional causality
RGDP DOESN'T CAUSE LFO	15.6	0.000	GDP → LFO
RGDP DOESN'T CAUSE TOT	4.327	0.115	Unidirectional causality
TOT DOESN'T CAUSE RGDP	25.117	0.000	TOT → GDP
GCF DOSN'TCAUSE RGDP	19.271	0.000	Bidirectional causality
RGDP DOESN'T CAUSE GCF	5.2161	0.074	GDP ↔ GCF
RGDP DOESN'T CAUSE HCA	24.975	0.000	Unidirectional causality
HCA DOESN' CAUSE RGDP	1.95	0.377	GDP → HCA
INF DAOESN'T CAUSE RGDP	7.5822	0.023	Bidirectional causality
RGDP DASEN'T CAUSE INF	20.46	0.000	GDP ↔ INF
RGDP DOESN'T CAUSE ISQ	3.5895	0.166	Unidirectional causality
ISQ DOESN'T CAUSE RGDP	5.1621	0.076	ISQ → GDP

Source: Author's own constructs 2024

Also, the results also indicate that we can reject the null hypothesis that real GDP does not cause openness (TOT) but does not reject the null hypothesis of openness (TOT) does not granger cause economic growth (GDP). Therefore, we can

conclude that there is unidirectional causality between economic growth (GDP) and trade openness which runs from economic growth to trade openness. And result also show that we cannot reject that GDP does not granger causes ISQ but

not reject that ISQ does not cause GDP. Hence, we can conclude that there is unidirectional causality between economic growth (GDP) and ISQ which runs from institutional quality to economic growth.

4. Conclusion and Policy Implication

The study investigated the external debt and economic growth relationship in Ethiopia economy by using time series data from 1990-2022. The study employed Autoregressive Distributed Lag model through bound test to investigate the existence of long run and short run relationship. The study used real growth domestic product proxy for economic growth, total external debt stock, total external debt servicing (reflecting “crowding-out” effect). In additions, the study used control variables such as gross capital formation proxy for domestic investment, human capital is peroxide by literacy rate from (% of youths total population) from people ages 15-24, labor force, inflation rate, terms of trade(ratio of export to its import). Regarding the data on the institutional quality index (IQI), six indicators whose values range from -2.5 (weak governance) to 2.5 (strong governance) were used to develop a single institutional quality index whose value ranges from 0 (weak) to 1 (strong).

The result of the Autoregressive Distributed Lag model revealed that in the long run external debt stock and human capital have negative and significant effect on economic growth, while, external debt service and gross fixed capital formations has significant positive and effects on economic growth in Ethiopia during the sample period.

Based on the findings of our study, the following recommendations are forwarded. Besides, government should borrow limited external finance only for productive and value adding project utilizations (health sector, educational sector, and infrastructure developments), as it showed negative impact on economic growth of the country, unless should have to mobilize domestic resource for developmental projects rather than to rely on foreign direct investment. Additionally, government should revise the policy related to debt management, which helps to allocate the debt on productive activities and sectors and overcome mismanagement and inefficient utilization of the resources. In line with this, investment on efficient and productive capital should be encouraged. One of the major concern, in order to improve Ethiopia's economic growth, is to adopt policies which will permit favorable market environments includes the lowering corruption, respect rule of law, government effectiveness, legal voice and accountability, regulatory quality and political stability should be encouraged.

Abbreviations

ARDL	Auto Regressive Distributive Lag
FAO	Food and Agricultural Organization

GDP	Gross Domestic Product
GMM	Generalized Momentum Model
GNI	Gross National Income
IMF	International Monetary Fund
OLS	Original Least Square
SSA	Sub Saran Africa
VAR	vector Auto Regressive
VECM	Vector Error Correction Model

Author Contributions

Olamo Oltisha: Data curation, Formal Analysis, Investigation, Methodology, Resources, Software, Validation, Visualization

Abdi Alemayehu: Conceptualization, Formal Analysis, Methodology, Project administration, Resources, Supervision, Writing – original draft, Writing – review & editing

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Data Availability

Data will be provided on request.

Conflicts of Interest

The authors declare no conflicts of interest.

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