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Effect of Public External Debt on Economic Growth in Ethiopia

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Abstract
This study is an effort to determine the effect of public external debt on economic growth in Ethiopia. In doing this, the study used an Autoregressive Distributive Lag model (ARDL modeling) to analyze Ethiopian data from 1981 to 2014 with GDP per capita as a function of stock of public external debt, public external debt servicing, human capital, physical capital, labor force, trade openness and policy change dummy. The empirical result reveals that in the long-run high level of stock of public external debt has a significant negative effect on economic growth. Therefore, there is an evidence for the "Debt overhang" and "Conventional view" of public debt in Ethiopia. On the other hand, public external debt servicing has a negative coefficient but insignificant in affecting economic growth. That is, there is no evidence for the "Crowding out" effect of public external debt in the country. Besides, human capital is found to have negative impact on GDP per capita. Moreover, Labor force has a significant positive impact but private capital formation and trade openness are insignificant in explaining the Ethiopian economy. Hence, the study's implication is that the government and policy makers should improve the existing policies on public external debt management through investing in productive activities and sectors. Moreover, the government should implement structural change, public sector and tax reform, and diversifying the economy so as to generate more revenue in domestic.
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1. Introduction

External borrowing is considered as a common phenomenon for all developing countries in their early stages of development, as they are often faced with limited domestic resources for development and growth. Hence, Governments of emerging economies often borrow to complement the fiscal gap between proposed expenditure and expected revenue (Carroll, 2013). Consequently, developing countries government have accumulated huge public external debts over the years since they have low per capita income, inadequate saving, low tax base and incompetent tax collection system. According to World Bank (2014), it is important to consider for developing countries including Ethiopia that most of the external debt of these countries is foreign currency denominated and causes the 'Original sin[1]' in the international market. Then a fluctuation in real exchange rate of these developing countries not only increases the debt ratios, but also it affects the interest rate that the country can negotiate on international markets and economic growth which can also affect the sustainable fiscal path (Martinez *et al.*, 2009).

In line with this, according to the World Bank classification of Highly Indebted Economies, the country is one of the severely indebted low-income countries. Ethiopia's public external debt has changed significantly in magnitude and composition over the last three decades. In 1981, it stood at about US$ 1.6 Billion which is equivalent to 22.4% of GDP, and US$ 9.8 Billion (127.7% of GDP) in 1995. Following the debt relief granted to benefit the Heavily Indebted Poor Countries (HIPCs) in 2008, it declined to US$ 2.9 Billion (10.45% of GDP) and in 2014 this figure increased to US$ 15.9 Billion (28.5% of GDP). This indicates that the country is one of highly indebted poor country in the world as public external debt is increasing from time to time (World Bank, 2015).

The analysis of total external debt can be divided in two sub categories – that are public external debt[2] and private external debt[3]. Both types of external debts have their own side effects on the economy (Cecchetti *et al.,* 2011). Therefore, in order to determine debt effect on economic growth, the channels through which the economy is affected have to be specified. That is, the total external debt should be decomposed to private external debt and public external debt in order to analyze their effect on the output level. This separation of debt will bring the real effects of debt level on the economy and it will also identify the channels through which debt can affect the economy (Vosyliute, 2014).

There are some studies conducted in the past mainly on the relationship between external debt and economic

[1] The original sin implies when the borrower countries borrow money from the international market and obliged to pay this debt in terms of foreign currency or a situation where countries could not borrow and make payments in terms of their own domestic currency (Obstfeld and Taylor, 2004).
[2] As Schclarek (2004) Public external debt comprises long-term external obligations of public debtors, including the national government, political subdivisions or an agency of either, and autonomous public bodies.
[3] Private external debt is Private nonguaranteed external debt comprises long-term external obligations of private debtors that are not guaranteed for repayment by a public entity.

growth in Ethiopia, e.g., Jonse (2002), Melese (2005) and Hailemariam (2011). But, these studies lack the following aspects. *First*, they did not distinguish between public external debt and private external debt. However, this is crucial given that the transmission channels are substantially different and there should be separation between public external debt and private external debt. *Second,* most of them failed to separate the debt burden into external debt stock and external debt servicing. In this paper, the effect of public external debt on economic growth is separated into total stock of public external debt and servicing of public external debt effect. Thus, the main objective of the study is to examine the effect of public external debt on economic growth using ARDL model.

2. Empirical Review

A study by Mulugeta (2014) investigated the impact of external debt on economic growth in Ethiopia which covers the time series data for the period 1983/84 to 2012/13 by using the Johansen Maximum Likelihood approach of VAR model. The study revealed that real GDP is influenced negatively by the past stock of external debt and debt servicing. But, it is affected positively by the current external debt inflows. A study by Wosene (2014) indicated that the relationship between external debt and economic growth both in the short run and long run is significant with a negative sign and the debt servicing variable has insignificant effect on economic growth.

A study by Rahman (2012) examines the impact of federal government's debt on the level of economic growth in Malaysia using quarterly data from 2000 to 2011 and found that high public domestic debt has negative impact on the level of economic growth in the long-run. However, the level of public external debt has no significant influence in changing the economic growth within the same time frame. From the short-run perspective, both domestic and external debts have no statistically significant impact on the level of economic growth. In the same case area, Peng Lee and Ling Ng (2015) examined whether public debt contributed to the economic growth over the period 1991 to 2013. The result of their study indicates that public debt over time has a negative impact on GDP. In addition, they found that external debt service[4] is a decreasing function of GDP.

Blake (2015) also investigated the impact of public debt on economic growth in Jamaica using quarterly data from 1990 to 2014. The study employed an ARDL approach which jointly captures both short-run and long-run effects. The results of his study indicate that the public debt has a non-linear impact on economic growth. Another study by Al-Zeaud (2014) investigated the effect of public debt on growth using the per capita income as an index for economic growth of Jordanian economy using Ordinary Least Squares regression method. The results show that population growth and public debt have played very crucial positive role towards economic growth.

Okechukwu and Anele (2012) empirically have done the effects of public external debt on the economic growth of Nigeria by using multiple regression analysis. The result shows that there is a positive relationship between public external debt stock and GDP. A study by Winifred (2014) also investigated the impact of external debt on economic growth in Nigeria using time series data on external debt stock and external debt service for the period 1980-2012 and found the external debt burden has insignificant relationship with economic growth. Apere (2014) also examined the impact of public external debt on private investment in Nigeria over the same period using an instrumental variable technique of estimation. External public debt has a non linear U-shaped impact on private investment and the study recommended that, for Nigeria to benefit from government external borrowings such funds should be large enough compared with the country's GDP and should be invested in productive ventures.

There are also studies on this area which are investigated in cross country cases. A study by Dereje (2013) examined whether external debt affects economic growth of selected heavily indebted poor African countries through the debt overhang and debt crowding out effect. He carried out his study using panel data for eight heavily indebted poor African countries including Ethiopia from the period 1991 to 2010. The result shows that external debt affects economic growth by the debt crowding out effect rather than debt overhang. Another study by Siddique, Selvanathan, and Selvanathan (2015) analyzed the extent to which the external debt burden impacts on a country's GDP using data from a 38 year panel dataset of 40 highly indebted poor countries (HIPCs) over the period 1970-2007 and they found that an inverse relationship between external debt burden and economic growth in the short-run as well as in the long-run, that is a reduction in external debt stock would have significantly increased the growth performance of the indebted nations.

Shabbir and Yasin (2015) examined the behavior of seven developing Asian countries and analyzed the impact of public external debt on social sector spending using a 31 year panel dataset from 1980 to 2010. Their empirical analysis is conducted using the General Method of Moment (GMM) estimation and they reveal that the outstanding external debt and its servicing liability have an adverse impact on public spending, particularly on social sector spending. They suggested that developing countries need to mobilize their own resources and minimize their dependence on external borrowing as far as possible.

We can conclude from the above empirical studies that the empirical finding on the relationship between

[4] Debt servicing in this paper context represents the payment of debt amortization (liquidation of the principal) and accumulated interest attached over time; it is a contractually fixed charge on domestic real income and savings.

public external debt and economic growth is inconclusive. Hence, from the literature review we understand that the effect of public external debt on economic growth has a significant positive, negative and an inverted 'U' shaped relationship or it has no significant effects. As we have discussed earlier, studies in Ethiopia on external debt and economic growth are not clear and sometimes even inconsistent. All studies in Ethiopia did not separate public external debt from the total external debt and this results difficulty in specifying the right relationship between economic growth and public external debt. According to Cecchetti et al., (2011), public external debt and private external debt have their own side effects on the economy. Therefore, in order to determine the real effects of debt level on the economy, public external debt and private external debt should be considered separately. This separation helps to specify channels how public external debt affects the economy. Moreover, Mankiw , Romer and Weil (1992), and Barro and Sala-i-Martin (1995; 2004), Checherita and Rother (2010) indicates that real GDP per capita is taken as the best proxy for economic growth since it considers the standard of living of the society. Hence, this study will contribute to the literature by filling the above mentioned gaps observed in previous studies in Ethiopia.

3. Model Specification and Methodology of the Study

The theoretical foundation of the study is based on the augmented Solow model and endogenous growth model for economic growth equation which aims to show the impact of public external debt on economic growth of Ethiopia with a modification that extends the basic production function framework to permit human capital as an additional input in to the production function following Romer (1996) and Debt burden following Cunningham (1993). As implied by Solow's formulation, economic growth is a function of capital accumulation, an expansion of labor force and exogenous factor, technological progress which makes physical capital and labor more productive. According to the endogenous growth model, human capital influences economic growth as:

$$Y = f(K, HK, LF, A) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

Where Y= is a proxy for economic growth, K= Capital stock, HK= Human Capital, LF =Labor force and A= technology.

Endogenous growth model does not consider the impact of external debt burden on the economic growth. But, Cunningham (1993) revealed debt burden is vital determinant of economic growth specially for those who are developing and highly indebted economies and in his model debt burden was originally included as a primary factor of production in order to examine the effect of external debt on economic growth in sixteen heavily indebted nations. Then after including Debt burden as a new variable, the growth model can be expressed as:

$$Y = f(K, HK, LF, DB, A) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

Where Y= is a proxy for economic growth, K= Capital stock, HK= Human Capital, LF =Labor force, DB= debt burden and A= technology

According to Karagol (2002) if a country has significant debt burden, the need to service its debt will affect the employment of labor and capital in the production function and through its effect on the productivity of capital and labor economic growth will be affected. Therefore, it is necessary to know the magnitude of relationship of growth with the debt service liabilities and the debt burden should be decomposed to public external debt stock and public external debt servicing. Then the extended model is given by:

$$Y = f(K, LF, HK, PED, PEDS, A) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3)$$

Where Y = A proxy for economic growth, K = Capital stock, HK = Human Capital, LF =Labor force, PED = Public external debt stock, $PEDS$ = Public external debt servicing and D = a variable for a policy change. The economic growth models made by different writers including Mankiw, Romer and Weil (1992), and Barro and Sala-i-Martin (1995; 2004), Checherita and Rother (2010) indicates that real GDP per capita is taken as the best proxy for economic growth since it considers the standard of living of the society. Other variables that are believed to be important in explaining the economic growth model better in the context of the country Ethiopia can be included such as trade openness and policy change. Changes in economic policies can influence the performance of the economy through investment on human capital and infrastructure, improvement in political and legal institutions and so on (Easterly, 1993). The time period 1981-2014 is chosen on the basis of the data availability on all the variables that also broadly includes two regimes, Derg and the present regime. The year 1991 has been chosen as the break year on the basis of regime change.

Therefore, the final model of the economic growth equation can be expressed as:

$$GDPpc = f(K, LF, HK, PED, PEDS, TOP, D) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (4)$$

Where $GDPpc$ = Real GDP per capita, K = Capital stock, LF =Labor force, HK = Human Capital, PED = Public external debt stock, $PEDS$ = Public external debt servicing, TOP = Trade openness and D = a variable for a policy change.

Most of the time serious studies in this area previously conducted are used the Eangle Granger Approach following Engle and Granger (1987) and the Johnson's Co-integration technique following Johansen (1988) and Johansen and Juselius (1990). But its outcome could not be reliable for small sample size (Narayan, 2005; Udoh *et al*., 2012).

Fortunately, a new Autoregressive Distributed Lag (ARDL) model is developed by Pasaran, Shin and Smith (2001) which have more advantages than the Johnson co-integration approach. *First,* the ARDL approach can be applied irrespective of whether the regressors are I(1) and I(0). *Second,* while the Johansen co-integration techniques require large data samples for validity, the ARDL procedure provides statistically significant result in small samples (Pesaran et al., 1999; Narayan, 2005; Udoh et.al, 2012). *Third,* the ARDL procedure provides unbiased and valid estimates of the long run model even when some of the regressors are endogenous (Harris and Sollis 2003, Pesaran *et al.*, 1999, Ang, 2007). Moreover, the ARDL procedure employs only a single reduced form equation, while the other co-integration procedures estimate the long-run relationships within a context of system equations. *Further*, in using the ARDL approach, a dummy variable can be included in the co-integration test process, which is not permitted in Johansen's method (Rahimi *et al.*, 2011). Therefore, in order to achieve the targeted objectives of the study, the model of economic growth equation is estimated using ARDL model of econometric technique

The simple generalized ARDL (p,q) model can be shown as follows (Green, 2003):

$$Y_{t=}C + \gamma T + \alpha_1 Y_{t-1} + \cdots + \alpha_p Y_{t-p} + \beta_0 X_t + \beta_1 X_{t-1} + \cdots + \beta_q X_{t-q} + \theta D + U_t \ldots. (9)$$

Then one can include a constant, a trend and dummy variables to the above model to obtain the final short run or error correction representation of ARDL (p, q) model. Therefore, the following ARDL approach is specified in order to determine or test the long-run co-integration relationships between variables which first proposed by Pesaran and Shin (1999) and Pesaran, Shin, and Smith (2001). In other word the following ARDL equation is the final equation to check for the long-run co-integration relationships between the variables of interest.

$$\Delta lnGDPpc_t = \beta_0 + \theta_1 lnGDPpc_{t-1} + \theta_2 lnK_{t-1} + \theta_3 lnLF_{t-1} + \theta_4 lnHK_{t-1} + \theta_5 lnPED_{t-1} + \theta_6 lnPEDS_{t-1} + \theta_7 lnTOp_t + \sum_{j=1}^{n} \beta_{1j} \Delta lnGDPpc_{t-j} + \sum_{j=1}^{n} \beta_{2j} \Delta lnK_{t-j} + \sum_{j=1}^{n} \beta_{3j} \Delta lnLF_{t-j} + \sum_{j=1}^{n} \beta_{4j} \Delta lnHK_{t-j} + \sum_{j=1}^{n} \beta_{5j} \Delta lnPED_{t-j} + \sum_{j=1}^{n} \beta_{6j} \Delta lnPEDS_{t-j} + \sum_{j=1}^{n} \beta_{7j} \Delta lnTOP_{t-j} + \beta_8 T + \beta_9 D + U_t \ldots\ldots (19)$$

Where:

$\boldsymbol{lnGDPpc_t}$ = Natural logarithm of real GDP per capita at time t,
$\boldsymbol{lnK_t}$ = Natural logarithm of capital stock proxied by private capital formation as share of GDP at time t,
$\boldsymbol{lnLF_t}$ = Natural logarithm of labor force as share of total population at time t,
$\boldsymbol{lnHK_t}$ =Natural logarithm of human capital proxied by secondary, tertiary and vocational school enrolment as a share of population at time t,
$\boldsymbol{lnPED_t}$ =Natural logarithm of public external debt as a percentage GDP at time t,
$\boldsymbol{lnPEDS_t}$ = Natural logarithm of public external debt servicing as a percentage of export of goods and services at time t,
$\boldsymbol{lnTOP_t}$ =Natural logarithm of trade openness at time t,
$\boldsymbol{D}$ = Dummy variable for the policy change,
$\boldsymbol{U_t}$ = The usual white noise residuals,
$\boldsymbol{n}$, denotes lag length of the auto regressive process,
T, is the time trend of the model,
Δ, Denotes the first difference operator,
$\boldsymbol{\theta_1, \theta_2, \theta_3, \theta_4, \theta_5, \theta_6, \theta_7}$, are coefficients that measure long run relationships,
$\boldsymbol{\beta_{1j}, \beta_{2j}, \beta_{3j}, \beta_{4j}, \beta_{5j}, \beta_{6j}, \beta_{7j}}$, are coefficients that measure short run relationships.

After checking the co- integration relationship among the variables and estimating the long run model, the next step is to estimate the short run dynamic parameters and the adjustment parameter that measure the speed of correction to long-run equilibrium after a short-run disturbance by using the vector error correction model. The standard error correction model can be estimated as follows:

$$\Delta lnGDPpc_t = \beta_0 + \sum_{j=0}^{n} \beta_{1j} \Delta lnK_{t-j} + \sum_{j=0}^{n} \beta_{3j} \Delta lnHK_{t-j} + \sum_{j=0}^{n} \beta_{2j} \Delta lnLF_{t-j} + \sum_{j=0}^{n} \beta_{4j} \Delta lnPED_{t-j} + \sum_{j=0}^{n} \beta_{5j} \Delta lnPEDS_{t-j} + \sum_{j=0}^{n} \beta_{6j} \Delta lnTOP_{t-j} + \beta_7 T + \beta_8 D + \delta ECT_{t-1} + U_t \ldots\ldots (21)$$

$\boldsymbol{\beta_{1j}, \beta_{2j}, \beta_{3j}, \beta_{4j}, \beta_{5j}\ and\ \beta_{6j}}$ are coefficients that represents the short run dynamics of the model,
$\boldsymbol{ECT_{t-1}}$, is error correction term lagged by one period,
$\boldsymbol{\delta}$, is error correction parameter that measure the speed of adjustment towards the long run equilibrium after a short-run disturbance.

4. Results and Discussion

4.1. Unit Root test

Testing for existence of unit roots is of major interest in the study of time series models and co-integration. In the ARDL model, the presence of I(2) variables are no more valid because they are based on the assumption that the variables are I(0) or I(1). Therefore, the implementation of unit root test in the ARDL procedure is necessary in order to ensure that none of the variables are integrated of order two or beyond. The standard Augmented Dicky-

Fuller (ADF) and Philips-Perron unit root (PP) tests are conducted to check the order of integration of the variables. The results from the ADF and PP unit root test show that all variables are stationary in their first difference; with intercept and/or intercept and trend. In other words there is no variable that is stationary in second difference and such result is one justification for using the ARDL approach (bounds test approach of co-integration) developed by Pesaran, Shin, and Smith (2001).

4.2. Diagnostic testing and model stability

To check the reliability and verifiability of the estimated long-run and short-run models, diagnostic tests are undertaken.

Table 4.3: Diagnostic tests for the selected full ARDL model

Test statistics	LM version	F version
Serial Correlation	CHSQ(1)= 1.2024[.273]**	F(1, 13)= .62469[.441]**
Functional Form	CHSQ(1)= .011370[.915]**	F(1, 15)= .0053317[.943]**
Normality	CHSQ(2)= 1.5745[.455]**	Not applicable
Heteroscedasticity	CHSQ(1)= 1.3321[.248]**	F(1, 30)= 1.3031[.263]**

A:Lagrange multiplier test of residual serial correlation
B:Ramsey's RESET test using the square of the fitted values
C:Based on a test of skewness and kurtosis of residuals
D:Based on the regression of squared residuals on squared fitted values

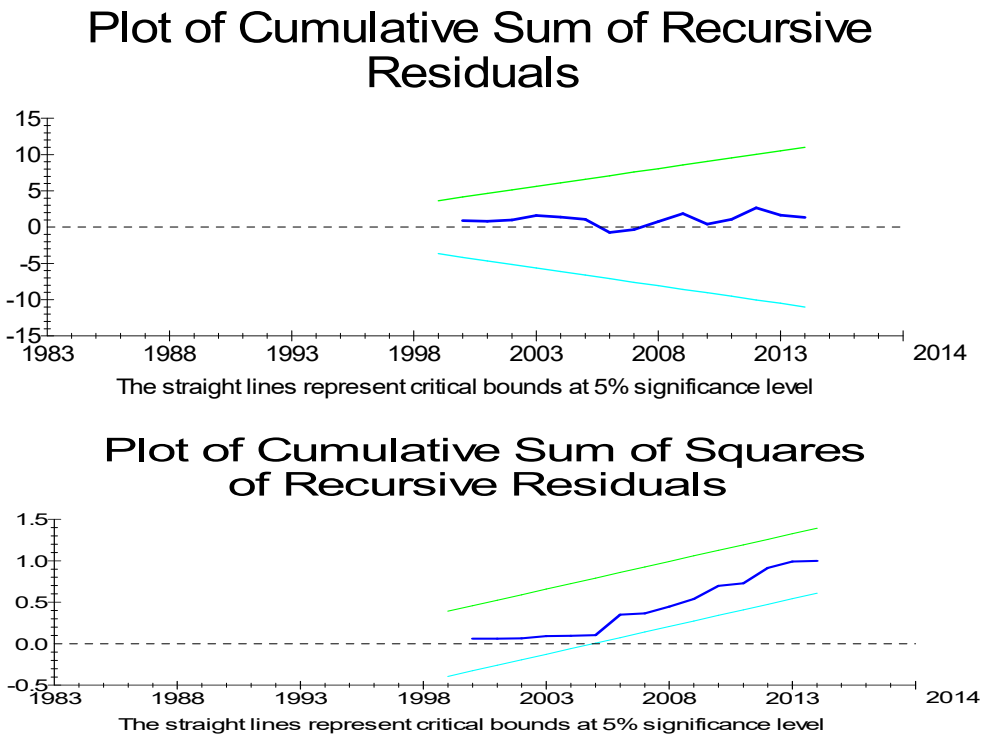
** indicates the significance each test at 5% level of significance.

Source: Microfit 4.1 ARDL (1, 0, 0, 2, 2, 0, 2) result.

The results indicate that both the LM version and the F version of the statistics are unable to reject the null hypothesis specified for each test. Hence, there is no serial correlation problem and the Ramsey functional form test confirms that the model is specified well. Likewise the errors are normally distributed and the model doesn't suffer from heteroskedasticity problem.

The stability of the model for the long run and short run relationships is detected using the scenario CUSUM and CUSUM square test as suggested by Pesearon and shin (1999). The test statistics of these stability tests can be graphed and hence we can identify not only their significance but also at what point of time a possible instability or structural break is occurred. If the plot of CUSUM recursive residual and CUSUMSQ recursive residual statistic moves between the critical bounds at 5% significance level, then the estimated coefficients are said to be stable and efficient.

Figure 5.2: Plot of CUSUM and CUSUMSQ tests



Source: Microfit 4.1 ARDL (1, 0, 0, 2, 2, 0, 2) result.

Therefore, the plot of CUSUM recursive residual and CUSUMSQ recursive residual shows that there is no

structural instability in the model during the period under investigation. From this, the model appears to be stable and efficient in estimating short run and long run relationship between the dependent variable and the included explanatory variables.

4.3. Tests for Long Run Relationship

To apply the bounds test approach of co-integration, first estimating the ARDL model specified is needed. Then the value of F-statistics is found through the Wald-test by restricting the long run equation coefficients to be equal to zero. Then, the computed F-statistic value is compared with the lower bound and upper bound critical values tabulated in tables of Pesaran, Shin, and Smith (2001) and Narayan (2005). Since, the lower bound and upper bound values of Narayan (2005) is appropriate for small sample sizes (30-80 observations), in this study these upper and lower bound critical values are used for scenario of comparison with the F-statistic value.

Table 4.4: Bound test for co-integration analysis:

Description	Values
Number of observations	34
Optimal lag length of the model	2
Calculated F- statistics	4.964699

Source: EVIEWS 9 and Microfit 4.1 ARDL (1, 0, 0, 2, 2, 0, 2) result.

Table 4.5: The critical values for bound test with unrestricted intercept and trend:

Description	At 1% level		At 5% level		At 10% level	
	Lower bound	Upper bound	Lower bound	Upper bound	Lower bound	Upper bound
Pasaran *et al.*(2001) critical Values	3.60	4.90	2.87	4.00	2.53	3.59
Naryan(2005) Critical Values	3.800	5.643	2.797	4.211	2.353	3.599

Source: Pesaran, Shin, and Smith (2001) and Narayan (2005) tables.

As Table 4.4 indicates, the calculated F-statistics is 4.97 and this value is higher than the upper bound critical values at 5% level of significance. The results indicate that there is strong evidence of long-run relationship or co-integration between log of GDP per capita and the remaining macro variables. This represents a co-integrated GDP per capita equation in Ethiopia. Thus, the null hypothesis of no co-integration between GDP per capita and its fundamentals is rejected.

4.4. Dynamic long-run ARDL estimates

Once we confirmed the long run relationship for the GDP per capita equation in Ethiopia; the next step is estimating the long-run coefficients of log of GDP per capita on its regressors. The results are reported in Table 4.6.

Table 4.6: Estimated long run coefficients for the selected Long run ARDL model

Dependent variable is lnGDPpc				
Regressors	Coefficients	ST. Error	T-Ratio	Prob. Value
lnHK	-0.45923	0.17379	-2.6424	0.0180**
lnK	0.010504	0.082456	0.12739	0.900
lnLF	16.4727	2.7575	5.9738	0.000***
lnPED	-0.20542	0.093220	-2.2036	0.043**
lnPEDs	0.059752	0.066283	0.90147	0.381
lnTOP	0.16399	0.21502	0.76265	0.457
Dummy (D)	0.44018	0.12420	3.5441	0.003***
Constant (C)	-56.7286	10.4269	-5.4406	0.000***
Trend (t)	0.035743	0.014184	2.5199	0.023**

***, ** and * indicate the significance level at 1%, 5% and 10% respectively.

Source: Microfit 4.1 ARDL (1, 0, 0, 2, 2, 0, 2) regression result

The growth model is specified in a log-linear form; hence, the coefficient of the dependent variable can be interpreted as elasticity with respect to economic growth. As we observe from the long-run ARDL regression result (see Table 4.6), stock of public external debt has a significant negative impact on GDP per capita. This implies a one percent increase in the stock of public external debt, holding other things constant, leads to a 0.205 percentage decline in GDP per capita. The result partly reflects the use of public external borrowing (except capital linked loans) to non-productive activities and sectors. In addition, a significant portion of public external debt proceeds to repay other past external debts rather than to boost capital investment in domestic. Moreover, a higher tax burden on capital is required to service this stock of public external debt leading to a lower rate of return on capital and hence lower investment and economic growth. Therefore the result reveals that the "debt overhang" theory and the "conventional view" of public external debt holds true for Ethiopia. It is inconsistent with the findings of studies made by Rahman (2012) for Malaysian economy, Okechukwu and Anele (2012) for Nigeria's economy,

Al-Zeaud (2014) for Jordanian economy and Uzun *et al.,* (2012). But it is consistent with the results specifically those related to developing countries such as a study made by Peng Lee and Ling Ng (2015) for Malaysian economy, Shabbir and Yasin (2015) for developing countries, Kumar and Woo (2010) for advance and emerging economies.

On the other hand, there is no evidence to support the theory of a long-run "crowding-out" effect of public external debt since the coefficient of public external debt servicing is insignificant in explaining GDP per capita in Ethiopia (see Table 4.6). The result reveals that public external debt servicing, that is fraction of the scarce resources which is transferred to foreign public debt payment, does not affect the development spending and hence economic growth in Ethiopia. It is inconsistent with a study made by Shah and Pervin (2012) for Bangladish economy. Another variable employed in explaining the economic growth equation is labor force. In the long run labor force brought a very significant positive impact on GDP per capita. Holding other things constant, a one percent increase in labor force leads a 16.4 percent increase in GDP per capita. This result supports the theory that an expansion and utilization of labor force is important in production.

On the other side, human capital has a significant negative impact on GDP per capita of Ethiopia in the long-run. According to Romer (1996), human capital accumulation that is the ability of individuals to solve problems and to think critically is believed to promote higher growth. However, in this study this theory does not hold true and a one percent increase in human capital leads to 0.459 percent decline in GDP per capita. This happens may be due to the fact that the quality of education, that is the government of Ethiopia is showing a strong commitment to expand the number/coverage of educational institutions in the country rather than giving attention for its quality.

Moreover, the dummy variable for policy change (D) and the time trend (T) are found to be significant in affecting GDP per capita in Ethiopia. Other things remain constant, a policy change from Derg regime to post Derg regime leads to a 0.44 percent increase in GDP per capita of the country. This result is due to structural adjustment policies, relatively favorable political condition, departure from the previous socialist system and good economic performance over the regime. On the other hand, a time trend also has a positive significant impact on the economy and a one year change of the time trend also causes real GDP per capita to increase by a 0.036 percent. But, Private investment and trade openness are found to be insignificant in the model.

4.5. Dynamic short run error correction estimates

Table 4.7: The short run error correction representation for the selected ARDL model

Dependent variable is DlnGDPpc				
Regressors	Coefficients	ST. Error	T-Ratio	Prob. Value
DlnHK	-0.31515	0.14656	-2.1503	0.045**
DlnK	0.0072085	0.056604	0.12735	0.900
DlnLF	3.5935	6.7731	.53056	0.602
DlnLF1	-15.0003	6.2079	-2.4163	0.026**
DlnPED	-.090976	0.072328	-1.2578	0.224
DlnPED1	0.10367	0.055576	1.8653	0.078
DlnPEDs	0.041005	0.048714	0.84175	0.410
DlnTOP	-0.31480	0.12467	-2.5251	0.021**
DlnTOP1	-0.42860	0.13076	-3.2778	0.004***
Dummy (dD)	0.30207	0.098611	3.0633	0.006***
DConstant (dC)	-38.9306	8.7405	-4.4541	0.000***
DTrend (dt)	0.024529	0.012366	1.9836	0.062
ECM	-0.68626	0.14430	-4.7557	0.000***
R-Squared 0.89557		R-Bar-Squared 0.79767		
F-stat. F(12,19) 11.4346[.000]		DW-statistic 2.6601		

***, ** and * indicate the significance level at 1%, 5% and 10% respectively.

Source: Microfit 4.1 ARDL (1, 0, 0, 2, 2, 0, 2) regression result.

The short-run ARDL estimate above indicates that, unlike that of the long-run analysis, stock of public external debt is insignificant and it does not have an impact on GDP per capita. This short-run finding is consistent with the study made by Shah and Pervin (2012) for Bangladish economy. Similarly, from the dynamic short-run result we observed that, public external debt servicing is insignificant and it has not observable effect in economic growth in Ethiopia.

In the short-run, both trade openness and human capital indicate a negative significant effect on economic growth. This negative coefficient of openness indicates when it is changed positively by 1 percent point; GDP per capita is declined by 0.31 percent which suggests that openness can be pain for an economy and invoke a call for protectionism. This may arise in line with poor quality of institutions and weak exporting capacity of the country or large share of import content of the countries international trade participation. The short run coefficient of

human capital also has a significant negative impact on economic growth. Holding other things constant, a 1 percent increase in human capital leads to a 0.32 percent decline in GDP per capita of the country. This short-run result is consistent with its long-run effect on economic growth in Ethiopia.

The speed of adjustment of any disequilibrium towards long-run equilibrium or the equilibrium error correction coefficient (ECM), estimated (-0.68626) is highly significant and has the correct sign. It implies a very high speed of adjustment to equilibrium after a shock. Approximately 68.62 percent of the disequilibrium from the previous year's shock converges back to the long-run equilibrium in the current year and such highly significant error correction term is another proof for the existence of a stable a long-run equilibrium relationship among the variables. The dummy variable for policy change is significant in the short run also.

5. *Conclusion*

Ethiopia is being a developing country and compliments its revenue through exports of primary commodities. In attempting to add on the available domestic resources, successive governments have acquired huge amount of external debt which is used to finance the national development projects. Therefore, the main objective of this study is to investigate the impact of public external debt on economic growth of Ethiopia by proxy the debt burden into public external debt and public external debt servicing. The study probes whether the conventional view or Ricardian equivalence theory holds for Ethiopia and if public external debt adversely affects the economy; the study also announced the existence or absence of debt overhang and crowding out effect of public external debt. To specify the debt overhang and crowding out effect of public external debt the debt burden has been segmented into two part; public external debt stock and public external debt servicing.

The long-run coefficient of stock of public external debt variable is negative and quite significant which indicate that, high level of public external debt stock in Ethiopia poses great challenges on the economy of the country. Because it is used for non-productive activities and the funds are not always channeled to the real productive sectors. Moreover, a significant portion of public external debt proceeds to repay other debts rather than to boost capital investment in the country and higher tax burden on capital is required to service this stock of public external debt, leading to a lower rate of return on capital, and hence lower investment and economic growth. Generally, this means the conventional view of public external debt holds true and any increase in stock of public external debt would worsen economic growth in Ethiopia. Therefore, it is better to reduce the stock of public external debt in the country. But the long-run impact of stock of public external debt servicing is insignificant indicating it is not a threat for economic growth in Ethiopia which implies there is no evidence for crowding out effect public external debt to occur.

The short-run dynamic ARDL regression result also reveals that, the speed of adjustment of any disequilibrium towards long-run equilibrium or the equilibrium error correction coefficient estimated (-0.68626) is highly significant suggesting about 68.62 percent annual adjustment towards long run equilibrium. It implies a very high speed of adjustment to equilibrium after a shock.

6. Implications

This study confirmed the overwhelming negative impact of stock of public external debt on economic growth of Ethiopia. This increasing public external debt stock may lead the country towards high debt ratio regimes associated with lower economic growth. Since the dependence on external resource is both risky and unreliable, the government needs to mobilize its own resource and pursue policies geared towards reducing its exposure to external debt stock. Besides, the government and policy makers should expeditiously seek to implement structural reforms geared towards public sector reform and public external debt sustainability. Moreover, there is a need for the government and policy makers to know the threshold level of public external debt since reasonable borrowing can enhance economic growth through capital accumulation. Furthermore, the government should pay more attention to the debt management profile particularly in its expenditure. Borrowed funds should be tied to productive ventures and invested in self liquidating developmental projects investing including basic infrastructural developments that facilitate the productivity of other sectors of the economy rather than for social consumption.

The main focus of this study was the effect of public external debt on economic growth, it is the author's view that the future researchers could disaggregate stock of public external debt particularly in to portion of public external borrowing that used for social consumption and portion of public external debt that have been changed to public capital formation in order to gate more valid and clear effect of public external debt on economic growth.

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