EXTERNAL DEBT-GDP NEXUS IN GHANA: AN APPLICATION OF THE AUTOREGRESSIVE DISTRIBUTED LAG (ARDL) MODEL

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ABSTRACT

This paper examines empirically the impact of External debt on the Economic growth in Ghana using annual time series spanning 1970 to 2014 and by using the newly developed approach to co-integration by Pesaran et al (2001) that performs well with small data and regardless of the order of integration. First, the order of integration was tested using Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) unit root tests. The ADF and PP unit root tests revealed that while some of the variables were stationary at level, others were after first differencing justifying the use of Autoregressive Distributed Lag (ARDL) Model postulated by Pesaran et al (2001). The second stage involved testing for the existence of long-run equilibrium relationship among the variables using bounds-test and this revealed the existence of long-run relationship among the variables when normalizing on the GDP. The study revealed significant positive impact of External debt on the Economic growth in Ghana while Total debt service has significant negative impact. The study further revealed the existence of Debt overhang and Crowding-out effects due to increasing External debt accumulation and its service.

Keywords: External debt, Co-integration, ARDL, Economic Growth, Debt overhang.

INTRODUCTION

There have been numerous theoretical studies in support of External debt as one of the major variables of economic growth. Most developing and transitional economies are facing acute saving-investment gap. This gap could be bridged with funds from industrialized nations and other international financial institutions. The success story of Marshal Plan is used to justify the relevance of external resource or funds to developing world. If Marshal Plan worked for Western Europe, then it could equally work for developing countries (Todaro and Smith, 2009). External debt is used to provide social and economic infrastructure that tremendously enhance investment and economic growth. Increasing volume of investments increase output and employment and hence economic growth (Diego, 2009). Again, External debt makes available sufficient foreign exchange with which to import not only consumer goods but also machines and raw materials to speed up the rate of industrialization in the country (Todaro and Smith,2009; Diego et al, 2009).

The oil price shock of 1973-1974 provided huge sums of deposits to the Euromarkets. While the oil price hike brought unprecedented pressure and crisis on the non-oil producing countries due to increased cost of energy, the surplus petrol-dollars at the Euromarkets also provided inexpensive loans to many developing countries. These cheap loan facilities did not last long as cost of borrowing immediately rose in the early 1980's in an attempt to reduce the inflation that

gripped the West. Coincidentally, export earnings for many developing countries declined partly due to the global recession as a result of the 1973-1974 oil price shock and partly due to the inability of developing countries to increase their volume of export. It was after the default of Mexico that Multilateral and Bilateral creditors together with IMF and World Bank became aware that external debt servicing was a serious problem bedeviling many developing countries and something needed to be done (IMF, 2000 in Rolf, 2005).

The levels of external debts for some countries were becoming highly unacceptable and this continues to attract academic and policy discussions globally on the negative effects of external debt on many nations including Greece, Spain, and Portugal. There have been several empirical works with mixed findings. While some reveal positive impact of external debt on economic growth others reveal otherwise. Many cross-sectional studies of developing and Sub Saharan Africa assert significant positive impact of external debt on economic growth (Siddique et al, 2015; Diego et al, 2009; Rolf, 2005; Schclarek, 2004; Elbadawi et al, 1996). Some however reveal that there has been negative impact of external debt on economic growth, especially when the debt level exceeds certain threshold ((Saddique et al, 2015; James et al, 2014; Chowdhury, 2010; Diego et al, 2009; Rolf, 2005; Schclarek, 2004; Iyoha, 1999; Fosu, 1996; Elbadawi, 1996; Cunningham, 1993).

Furthermore, some country-specific findings reveal positive impact of external debt on economic growth ((Eravwoke and Oyovwi, 2013; Faradi and Mamake, 2013; Daud, 2013; Sulaiman and Aziz, 2012; Nor'Azmin,2008; Adepoju, 2007; Were, 2001 and Mwamba, 2001) while others maintain contrary view ((Syed and Tanzeela, 2012; Mutasim, 2005 and Folorunso and Felix, 2008).

Ghana has been experiencing a consistent rise in its debt level and this has attracted a lot of debate amongst politicians, academics and policy think thanks. For instance, in 1970 the total external debt of Ghana at current US dollar rate stood at US$558,719,000 and at 1990 it stood at US$3,734, 252,000. By the year 2002 when Ghana joined HIPC countries, its external debt at current US dollar stood at US$7,196,914,000 and despite some of its debt cancellation, the country's external debt as at 2014 stood at US$17,611,828,000 (WDI, 2015). No wonder that Dino et al (2003) revealed that there were about eight HIPC countries (of which Ghana was one) who, soon after joining HIPC countries, were beginning to have rapid rate of debt accumulation that could return them to their pre-HIPC debt levels in only a few years.

Problem statement

The concern of stakeholders on the rising debt is often premised on the potential negative consequences such as debt overhang and crowing out effect of the rising debt on private sector investments. Given the very high level of the current debt it is important to empirically investigate the impact it is having on the Ghanaian economy. The only known study that has sought to do this in Ghana is the work of Frimpong and Oteng-Abeyie (2006) based on time series data from 1970 to 1999. It has been about 17 years since this study was conducted. From the year 2000 till date, there have been numerous economic and social interventions such as debt relief to HIPC countries of which Ghana has been a beneficiary. Other interventions include African Growth and Opportunity Act (AGOA), Millennium Development Goal (MDG) that gave

birth to GPRS I and GPRS II, the Presidential Special Initiative (PSI) to empower the private sector to accelerate Ghana's growth through increased exports, the Millennium Challenge Account (MCA), the Ghana Youth Employment and Entrepreneurial Development Agency (GYEEDA) and the discovery and utilization of oil revenue. All these social and economic interventions could offset the potential negative impact of the rising debt on economic growth in that all these social and economic interventions could stimulate local production, increase exports, reduce unemployment and eventually stimulate economic growth. . It is thus the aim of this current study to determine whether the findings of Frimpong and Oteng-Abeyie (2006) on the impact of external debt on economic growth are still relevant given the changing economic environment and the new data and variables introduced into the model.

This study further modifies the work of Frimpong and Abayie (2006) by extending the data to cover the period 1970 to 2014 (which is far more expansive). The rest of the paper is organized as follows: section two proceeds to present the theoretical and empirical literature on external debt and economic growth. The methodology is outlined in section three. In sections four and five the findings and conclusions are outlined respectively.

LITERATURE REVIEW
Theoretical Perspective on External Debt

The traditional classical development economists as well as neoclassical growth models recognize the importance of capital as far as economic growth and development is concerned. National output is a function of capital and labour productivity shown as $Y = f(K, L)$. Capital formation is also a function of consumption and savings shown as $K = f(C, S)$. Given the level of consumption, capital formation (C) is influenced by savings (S). The low domestic savings in developing world affects investment (assuming all or most of is saved is invested) significantly. The dual- gap model provides a framework that asserts that a country's development depends largely on its ability to carry out sufficient investment and in the absence of sufficient domestic savings, external debt becomes substitute (Sulaiman and Azeez, 2010).

Chenery and Strout (1966) argue that there is the need for additional resources in developing countries to fill the savings and investment gap. The insufficient domestic capital formation calls for external borrowing to supplement the inadequate domestic capital. While some believe that external borrowing is important in the growth of developing countries (Saddique et al,2015; James et al, 2014 and Chowdhury,2010) others see external borrowing as a sheer waste and has no impact on economic growth of developing countries (Diego et al,2009; Rolf,2005 and Schclarek,2004). Those in support of foreign debt argue that foreign capital plays a complementary role to domestic savings. The supplementary foreign capital increases the amount of total domestic capital for investment and industrialization. It is also argued that capital from industrialized countries to the developing countries benefit both the giver and the recipient. After Second World War, Western Europe, one of the major allies and trading partners of US was destroyed by the war and US felt morally and economically obliged to raise sufficient funds for the reconstruction of Europe: thus foreign capital played a central role in the reconstruction of Europe (Todaro and Smith, 2009). Therefore, Todaro and Smith (2009) observe that since the Marshall plan worked for Europe, it could also work elsewhere. The argument goes that marginal product of capital for the capital-rich countries is low and the capital-constrained (developing

countries) economies have high marginal product of capital. As more capital moves away from the capital-rich countries, the relative marginal product of capital increases and the recipient (developing) countries also experience high marginal product of capital. Such reallocation therefore becomes economically efficient, as well as desirable on humanitarian grounds (Krueger, 1987).

Those who oppose foreign capital do so based on the fact that inflow of foreign capital crowds out domestic saving This is because as external debt accumulates, there is the possibility that taxes would be high in order to raise sufficient revenue to service the debt. This makes many private investors to find safe haven in other countries. Again, when a country's external debt is sufficiently high, its credit rating would not be that good. So, local private firms could only source more external funds at relatively high interest rate and this affect the profitability of local private firms (Chowdhury, 2001). They again argue that the Marshall Plan worked for Europe because the European countries receiving aid had in place adequate and efficient structural, institutional and attitudinal conditions that could not be found in most developing countries ((Todaro and Smith, 2009). Foreign capital is believed to impact significantly on the economies of developing countries. According to Hjertholm (2000) and Eaton (1989) in the neoclassical growth model, foreign capital is growth-enhancing because marginal product of capital is assumed to be above the world interest rate and the optimal level of debt will be reached where the marginal benefit of external debt equals the marginal cost of the external debt.

Majority, though believe in the relevance of external debt, also recognize the presence of "Direct Effects of Debt Hypothesis" (DEDH) which could work to lower economic growth of the recipient nations. This occurs where high level of external debt makes a country to substitute a superior foreign capital (or capital equipment) for inferior local capital that could decrease output growth (Krugman, 1988; Sachs, 1989). In the presence of Direct Effect of Debt Hypothesis (DEDH), there could also be "Debt Overhang Hypothesis" (DOH) and "Liquidity Constraints Hypothesis" (LCH) all of which work to reduce the output growth of highly indebted countries. The DOH scares and deters private investment because of piling up or accumulated national debt which could lead to future increase in taxes to raise sufficient revenue to service the huge accumulated debt. The fear of future increase in tax with its negative effects could lead to capital flight as private investors begin to look for safe haven in other neighbouring countries. At best these private investors would only be prepared to invest in short term projects so that in the long run they might not be in the country. The LCH on other hand reduces funds for investment as a result of trying to meet the country's external debt obligations. The national output grows at initial low level of external debt but as the debt increases beyond the optimal level, output falls due to the impact of DEDH, DOH and LCH (Hoffman and Reisen, 1991). These hypotheses have been illustrated diagrammatically using Debt Laffer Curve below.
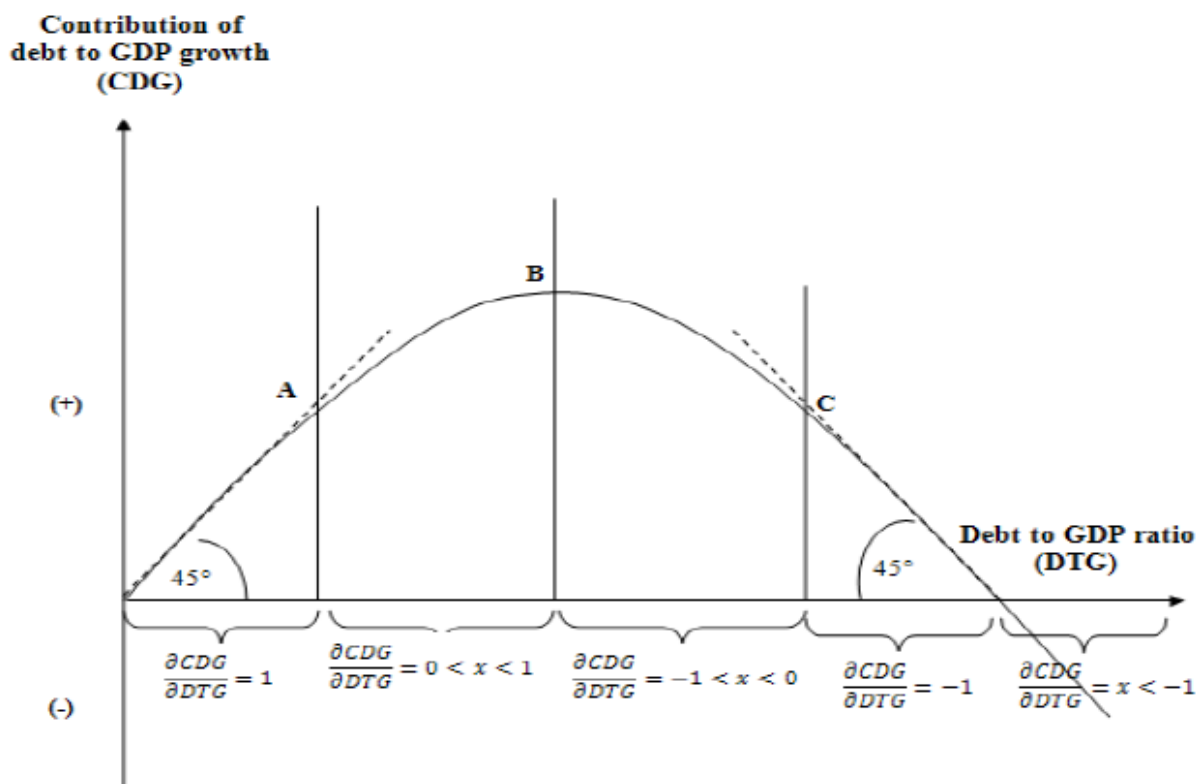
Fig 1: The Debt Laffer Curve; Source: Diego et al (2009)

From figure 1 above it could be seen that at the initial debt level (region A), output rises sharply until it reaches the optimal level at point B, and beyond B, any additional debt contracted results in the decline of national output hence revealing the nonlinearity of external debt (Diego et al, 2009)

Empirical Perspective
External debt and economic growth

The study reviews in great detail both the country specific studies and cross-country studies of both developing and developed countries. Majority of studies reveal positive impact of current external debt on economic growth while accumulated debts have significant negative impact. For cross-country studies, research based on HIPC countries, Pacific island countries and a number of developing, transitional and developed nations reported a positive impact of external debt on the economies of these countries (Siddique et al., 2015; Jayaraman and Lau 2009; Scharek, 2004; and Elbadawi et al., 1996). For country specific studies various studies report a significant positive impact of external debt on the economic growth in Malaysia, Tanzania, Nigeria and Ghana (Daud et al., 2013; Faradi and Faradi and Makame (2013), Sulaiman and Azeez, 2012; and Frimpong and Abayie, 2006). A few works have also observed a negative impact of external debt on the economic growth in Pakistan, Turkey, Sudan and Kenya (Syed and Tanzeela, 2012; Zahoor and Ahmed, 2005; Mutasim, 2005; and Were, 2001). Majority of both cross-sectional and country specific studies reviewed assert that accumulation of external debt and its servicing have negative impact on economic growth while current external debt has positive impact.

The work of Butts (2009) reveals that there has been bidirectional causality between short term external debt and economic growth for several of the Latin American and Carribean countries over the period 1970-2003 while the work of Choong et al (2010) reveals that there exists short run causality linkage between all debt measures and economic growth in Malaysia for the period 1970 to 2006. This includes among others external debt, external debt servicing. The study of Wadad (2012) using a time series data spanning 1970 and 2010 reveals that there exists bidirectional causality between GDP and external debt servicing in Labanon. Also, Siddique et al (2015) using panel data reveal that there exists short and long run causality running from external debt service to GDP for the period of 1970-2007 for the heavily indebted poor (HIPC) countries. In addition, the finding of Cunningham (1993) reveals significant negative relationship between external debt and the economic growth of heavily indebted developing countries. She considered 16 heavily indebted developing countries during the 1970s and 1980s, a period within which the debt burden of many developing countries played significant role in influencing labour and capital productivity and for that matter economic growth.

The finding of Elbadawi et al (1996) using non-linear fixed effect panel estimation for 99 developing countries reveal that current external debt inflow promotes economic growth while past (lagged) accumulated debt exerts negative influence on economic growth of the countries under consideration. The works of Mwaba (2001) in Uganda and Were (2001) in Kenya all support the findings of Elbadawi et al (1996). These suggest that external debt per se contributes to economic growth but excessive use or pile of external debt can be detrimental to economic growth. Iyoha (1999) using a simulation approach to investigate the impact of external debt on the economic growth in Sub-Saharan Africa countries for the period 1970 to 1994. His finding reveals that mounting external debt depresses investment through both a "disincentive effect" and a crowding-out effect". He again reveals that external debt stock reduction would have significant positive impact on investment and economic growth. It has been proven by Folorunso and Felix (2008) that there have been negative impact of debt and its servicing on the economic performance in Nigeria and South Africa.

Other determinants of economic growth
Export and Economic Growth

Though quite a large number of reviewed works reveal significant positive relationship between Export and economic growth, some findings also assert that export has no significant impact on economic growth. Fosu (1996) asserts that there has been positive impact of export on economic growth of the Least Developed Economies. His finding however reveals that primary exports have no impact on economic growth of the sampled countries and that export instability has very weak or even negative impact on the economies of some African countries. Radelet (1999) considered the impact of manufactured exports and export platforms on economic growth of some developing countries and his findings reveal positive impact for most countries. Pahlavani and Worthington (2005) reveal that exports have positive impact on the economy of Iran. Vohra (2001) maintains that exports have positive and significant impact on economic growth when a country attains certain level of economic development. This view supports the finding of Ram (1985) that the impact of exports on economic growth is small for least-developed economies. The work of Dadaro (1993) used a panel data in which he ranked some developing countries according to their per capita income and he concludes that a large number of countries in the

sample experience insignificant impact of exports on their economic growth. Vohra (2001) reveals that India's export has insignificant negative impact on its economic growth for the panel data between 1973 and 1993 period. This, he said, might be due to political upheavals and long history of inward-oriented policies. Hence, in the case of Ghana one would expect a positive relation between exports and economic growth

Gross Domestic Investment and Economic Growth

Non availability of capital formation for many countries make researchers to use of Gross Domestic investment-output ratio as a measure of capital formation. Balassa (1978) opines that capital investment is significant in promoting economic growth especially for countries with consistent export- orientation policy. This view is further supported by Ram (1985) that for period between 1970 to 1977, capital investments is significant in explaining economic growth and this is found to be positive with and without dummies. Gyimah-Brempong (1991) also asserts that capital investment has significant positive impact on the economic growth of Sub-saharan Africa. The work of Frimpong and Abayie (2006) establish significant positive impact of capital investment on the economic growth in Ghana. We thus expect a positive relationship between gross domestic investment and economic growth.

Foreign Direct Investment (FDI) and Economic Growth

Several findings reveal that there is significant positive impact of FDI on economic growth and few studies however maintain that FDI impacts negatively on economic growth. The studies of Hermes and Lensink (2003) reveal that FDI has significant impact on economic growth for countries with well-developed financial system. They used sixty seven (67) countries of which thirty seven (mostly Latin American and Asian countries) showed significant impact of FDI on their economic growth as a result of having well-developed financial system. The studies of Frimpong and Abayie (2006) using time series data from 1970 to 1999 reveal that there exists significant negative impact of FDI on the economic growth in Ghana. They assert that this surprising and unexpected finding could be explained by the dominance of mining- related FDI which does not generate direct growth impact on the wider economy of Ghana. Their work thus suggested the need for more FDI in export-oriented industrial and agricultural sectors of Ghanaian economy. Contrary to the findings of Frimpong and Abayie (2006), Insah (2013) using time series from 1980 to 2010 and by using Dynamic OLS reveals that there exists significant positive impact of FDI on the economic growth in Ghana. Insah's finding however reveals that the effect of a three year lag of FDI on the economic growth in Ghana shows significant negative impact. He therefore suggests that policy makers should concentrate on the effect of past FDI inflows on the current level of economic growth in Ghana.

METHODOLGY

The study used time series data from 1970 to 2014 procured from the Bank of Ghana (BoG) Statistical Bulletin, Ghana Statistical Service (GSS), World Development Indicator (WDI) and economy-watch-site that gathers data from UN, World Bank, IMF and other sources. As stated earlier the study is based on a modification of the work of Frimpong and Oteng-Abeyie (2006). The variable used are the standard ones found in the literature as indicated in Table 1 below. The

dependent variable is economic growth (using GDP growth rate as a proxy). A priori, explanatory variables such as external debt, Gross Domestic Investment, Export and Foreign Direct Investment should have positive impact on economic growth while Total Debt Service should have negative impact on economic growth.

The econometric model is:

$$lnGDP_t = \beta_O + \beta_1 lnEDT_t + \beta_2 lnTDS_t + \beta_3 lnGDI_t + + \beta_4 lnEX_t + \beta_5 FDI + \beta_6 ECT_{t-1} + \varepsilon_t \dots (1)$$

Where lnGDP is natural log of annual growth rate of Gross Domestic Product; lnEDT is natural log of External Debt; lnTDS is the Total Debt Servicing as a percentage of total export and primary income; lnGDI is the natural log of Gross Capital Formation as percentage of GDP; lnFDI is natural log of Foreign Direct Investment(net inflows in current dollar terms); lnEX is the log of Export as percentage of GDP and ECT_{t-1} is the Error Correction Term, one period lagged and $\varepsilon = uncorrelated$ stochastic error term.

where $\beta_o, \beta_1, \beta_2 \beta_3, \beta_4, \beta_5, \ and \ \beta_6$, are the parameters to be estimated and t

The data is analyzed using the descriptive statistics, Stationarity test, estimation of short-run and long-run coefficients and tests for co-integration using ARDL model which runs thus:

ECM-ARDL model:

$$\Delta \ln GDP = \alpha_0 + \sum_{j=1}^{n} b_j \Delta lnGDP_{i-j} + \sum_{j=0}^{n} c_j \Delta lnEDT_{i-j} + \sum_{j=0}^{n} d_j \Delta lnTDS_{i-j} +$$

$\sum_{j=0}^{n} e_j \Delta lnGDI_{i-j} + \sum_{j=0}^{n} f_j \Delta lnEX_{i-j} + \sum_{j=0}^{n} g_j \Delta lnPOP_{i-j} + \sum_{j=0}^{n} h_j \Delta lnFDI_{i-j} + \delta_1 lnGDP_{t-1} + \delta_2 lnEDT_{t-1} + \delta_3 lnTDS_{t-1} + \delta_4 lnGDI_{t-1} + \delta_5 lnEX_{t-1} + \delta_6 lnPOP_{t-1} + \delta_7 lnFDI_{t-1} + \delta_8 lnINF_{t-1} + \varepsilon_{1t} \dots (2)$

The i=1, 2, 3, 4,5,6,7 and 8 when δ is the long-run multiplier. The b, c, d, e, f, g and h parameters are the short-run dynamic.

RESULTS AND DISCUSSIONS

From Table 1 below, it could be seen that only external debt (EDT) and total debt service (TDS) are stationary at level and the other remaining variables are stationary at first differencing. Again, ADF is lag sensitive and any mistake in the choice of lag could seriously affect result or the t-statistic. To overcome this difficulty PP is used concurrently since PP is not lag sensitive. After first difference majority of the non-stationary variables are stationary at one percent significant level under both ADF and PP.

Table 1 Unit Root Test

Variable	ADF Test Statistics		PP Test Statistics	
	Constant	Constant + Trend	Constant	Constant+ Trend
$\ln EDT_t$	-14.06***	-13.24***	-8.98***	-8.72***
$\ln EX_t$	-1.39	-2.15	-2.11	-2.34
FDI_t	-0.68	-1.86	-0.55	-1.89
$\ln FGDP_t$	-1.69	-1.98	-1.88	-1.76
$\ln GDI_t$	-1.32	-2.66	-1.45	-2.78
$\ln TDS_t$	-9.71***	-9.02***	-7.44***	-7.10
$\ln RGDP_t$	2.61	-0.97	3.19	-0.30

$\Delta \ln EDT_t$	-20.39***	-27.25***	-26.76**	-27.08***
$\Delta \ln EX_t$	-5.64***	-4.63***	-4.67***	-4.94***
ΔFDI_t	-7.29***	-8.52***	-8.92***	-9.05***
$\Delta \ln FGDP_t$	-8.79***	-8.84***	-8.26***	-9.21***
$\Delta \ln GDI_t$	-6.27***	-7.76***	-6.58***	-6.87***
$\Delta \ln TDS_t$	22.28***	22.63***	22.87***	-35.00***
$\Delta \ln RGDP_t$	-3.69***	-5.74***	-4.10***	-7.02***

Note that ***,**,* stand for 1%, 5% and 10% respectively.

External debt and Total debt service were stationary at level while the remaining variables were after first differencing hence warranting the use of ARDL approach to cointegration.

Table 2: Bound Test for Cointegration Relationship

Test Statistics	Value	Level	Critical value bounds of the F-Statistics: Unrestricted Intercept and no Trend	
			I(0)	I(1)
F-Statistics	**9.86***			
		1%	3.644	5.464
		5%	2.676	4.130
		10%	2.260	3.534
K=6	F_{RGDP}(GDP/ EDT, EX, FDI, GDI, TDS)			
$F_{EDT}(.) = 2.34$	$F_{EX}(.) = 2.64$	$F_{FDI}(.) = 2.56$	$F_{GDI}(.) = 3.45$	$F_{TDS}(.) = 3.52$

Source: Critical values are obtained from Narayan (2005) p.1988

The bounds test reveals that there is cointegration among the variables when normalizing on RGDP as can be seen in Table2 above. The values for the other variables lie below the 5% of the upper bound I(1), meaning that there is no cointegration. This is clealy seen in Table2 above.

Table 3 Estimated Long-Run Coefficients using the ARDL Approach

ARDL (1,1,2,2,0,2,2,1) selected based on AIC		Dependent Variable: $\ln RGDP_t$		
Regressor	**Coefficient**	**Standard Error**	**T-Ratio**	**Prob**
CONSTANT	-6.5026	0.6022	-10.7983	0.000***
$\ln EDT_t$	-0.0438	0.0188	-2.3301	0.030**
$\ln EX_t$	0.2061	0.2263	0.9107	0.310
FDI_t	0.0195	0.0039	5.0508	0.000***
$\ln FGDP_t$	-0.0152	0.0151	-1.0083	0.325
$\ln GDI_t$	0.0089	0.0332	0.2683	0.791
$\ln POP_t$	-0.9826	0.0399	-24.6347	0.000***
$\ln TDS_t$	-0.1062	0.0148	-7.1573	0.000***
$\ln INF_t$	-5.7138	0.2034	-28.0914	0.000***

Note: *, **,*** denotes significance at the 1%, 5% and 10% levels respectively.

Table 3 above reveals that while External debt has significant positive impact on economic growth in Ghana, Total debt service has significant negative impact on the economic growth in Ghana. The positive impact of External debt on economic growth is supported by the works of Sulaiman and Aziz (2012), Nor'Azmin (2008), Adepoju (2007), Frimpong and Abayie (2006) and Elbadawi (1996). The negative impact of Total debt service on the economic growth in Ghana is also supported by the works of Presbitero (2012), Adesola (2010), Diego et al (2009), Nor'Azmin (2008), Were (2001), Chowdhury (2000), Iyoha (1999) and Elbadawi (1996). The negative TDS and insignificant EX suggest debt overhang and crowding-out effects.

Table 4: Results of Short-Run Dynamic Model

ARDL (1,1,2,2,0,2,2,1) selected based on AIC		Dependent Variable: $\Delta \ln GDP_t$		
Regressor	**Coefficient**	**Standard Error**	**T-Ratio**	**Prob**
Δ Constant	-8.6246	1.2653	-6.8165	0.000***
$\Delta \ln EDT_{t-1}$	0.1065	0.0362	2.9390	0.007***
$\Delta \ln EX_t$	0.1072	0.0334	3.2063	0.003***
$\Delta \ln EX_{t-1}$	-0.1171	0.0439	-2.666	0.013**
$\Delta \ln FDI_t$	0.0071	0.0055	1.2815	0.211
$\Delta \ln FDI_{t-1}$	-0.0089	0.0044	-2.0315	0.052*
$\Delta \ln FGDP_t$	-0.0202	0.0199	-1.0164	0.318
$\Delta \ln GDI_t$	0.0798	0.0332	2.4042	0.023**
$\Delta \ln GDI_{t-1}$	0.0550	0.0248	2.2226	0.035**
$\Delta \ln POP_t$	-31.0966	7.1390	-4.3559	0.000***
$\ln POP_{t-1}$	-32.2019	6.8692	-4.6879	0.000***
$\Delta \ln TDS_{t-1}$	-0.0475	0.0204	-2.3294	0.028**
$\Delta \ln INF_t$	-6.0625	0.9243	-6.5590	0.000***
$\Delta \ln INF_{t-1}$	-5.0811	1.3253	-3.8339	0.001***
ECM_{t-1}	-0.7863	0.2335	-3.3674	0.003***

$ECM = \ln RGDP + 0.0438*\ln EDT - 0.2061*\ln EX - 0.0195*FDI + 0.0152*\ln FGDP - 0.0089*\ln GDI - 0.9825\ln POP + 0.1062*\ln TDS$ -

Model criteria/ OLS

R^2	0.87	R^2 - adjusted	0.67
S.E. of regression	0.027	F-stat,F(12, 27)	8.23[0.000***]
AIC	81.252	SBC	65.2
DW-Statistics	2.01		

Note: *, ** denotes significance at the 1% and 5% levels respectively.**

In the short run model, External debt shows significant positive impact on economic growth in Ghana. The low elasticity coefficient of the external debt however suggests that Ghana's economic growth is less sensitive to any debt injection in the economy in the short run. In the short-run, the one period lag of total debt service has significant adverse impact on the growth of

the economy of Ghana. This also proves the presence of debt overhang in Ghana in the short-run. Unlike the findings of Frimpong and Abayie, investment has positive impact on the economic growth in Ghana in the short run. The low elasticity coefficient of investment suggests that Ghana's economic growth is insensitive to any short term investment.

Finally, the error correction term comes with expected negative sign and low P value. This means that all the variables are co-integrated in the long run. More technically, any short run disequilibrium gets adjusted in the long-run at the speed of 89 percent per year. Thus in the short-run, the variables can wander apart but will quickly converge to the long run equilibrium. This confirms the bound test for co-integration discussed above.
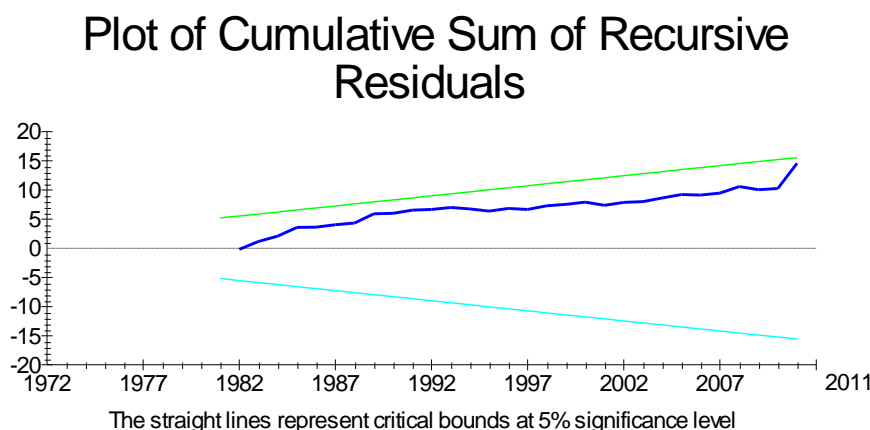
The R-squared and the F-statistic are quite high suggesting that the model is good. The R-squared of 87% means the 87% variation in the dependent variable (GDP) is jointly caused by the explanatory variables. The DW statistic of about 2.01 suggests absence of serial correlation and which is further authenticated by the Breusch Godfrey test for serial correlation.

Table 5 Diagnostic Test

Serial Correlation	0.4494[0.503]
Functional Form	2.0878[0.148]
Normality	1.0309[0.597]
Heteroscedasticity	1.9150 [0.275]

The model is good because of the absence of both serial correlation and heteroscedasticity as can be seen in Table 5 above. The model has also passed test of normality as is depicted in Table5. Again, there has been long run stability in the data set as suggested by the Cusum (stability) test in Figure 2 below. The blue line lives within the two bands at 5% critical value indicates stability in the variables in the long-run.

Figure 2 Cusum test

Plot of Cumulative Sum of Recursive Residuals

The straight lines represent critical bounds at 5% significance level

CONCLUSION AND POLICY PRESCRIPTIONS

This study aimed at investigating the impact of external debt on the economic growth in Ghana and it was established that external debt has significant positive impact on the economic growth in Ghana, suggesting or implying that sourcing of more external debt could lead to economic growth in Ghana. Government of Ghana could therefore count on external debt as one of the major sources of boosting economic growth. It should however be used judiciously and effectively in order to sustain the country's economic growth and to mitigate any negative consequence of debt accumulation and repayment.

Again, total debt service was found to have significant negative impact on Ghana's economic growth. Despite the fact that external debt positively influences Ghana's economic growth, continued and excessive reliance on it exposes the country to shocks and long run macroeconomic instability if the rising trends continue. Ghana therefore needs to diversify its debt composition (that is, domestic and external) to avert these shocks. Also, effort should be made to increase the country's volume of export and strictly adhere to prudent fiscal discipline and prudent financial management practices.

Again, to mitigate the negative effect of total debt service, any borrowed funds must be invested wisely to generate sufficient returns to pay off the debt and its accumulated interest. If this is cautiously observed debt overhang and crowding out effects could be controlled or minimized. Furthermore, export promotion strategy could be embarked on to help generate adequate foreign exchange to meet external debt obligation. Prudent financial management practices coupled with export promotion strategies could help reduce the liquidity constraint effect, debt overhang effect, crowding-out effect and direct effect of debt.

Also, overambitious spending by politicians should be curtailed or reduced to the minimum. This could reduce external debt accumulation and its negative consequences.

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