Assessing the Relationship between External Debt Financing and Gross Domestic Product in Ghana

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ABSTRACT: The level of external debt of a country is of fundamental importance in every economy, as external debt may reflect the effectiveness and efficiency of an economy. The study was motivated by the ever-increasing rate at which Ghana has consistently borrowed from external sources. This study aimed to assess the relationship between external debt financing and gross domestic product and establish the determinants of external debt financing in Ghana. Using selected time series data (Gross domestic product, external debt, population growth, inflation, Literacy rate, export of goods and service, general government expenditure, and interest on external debt, 1978 - 2017) based on literature reviewed on the macro economy of Ghana, the study employed Autoregressive Distributed lag model (ARDL) after the Augmented Dickey-Fuller test statistic and Philip Perron proofs not to be stationary at levels but stationary at first difference. For that matter, ARDL was used to assess the impact of external debt financing on GDP to establish the determinants of external debt. Diagnostic tests which include auto-correlation, heteroscedasticity, and normality were also performed. Based on the results of the study, it was concluded that, variables were related only in the short run but not related in the long run. It was recommended that, external borrowing, population growth, inflation, general government expenditure and literacy rate should be control since their coefficients proves to have negative impact on GDP and on external debts.

BACKGROUND TO THE STUDY

The major goal of developing countries is economic growth and development. Hence, different resources are mobilised from various sources, including external borrowing, which are used for investments into viable developmental projects. Sustainable development and growth are of concern to developing economies that frequently face increasing fiscal deficits, which are supported mainly by high rates of debt, specifically external debt servicing (Senadza et al., 2018). Most less developed nations heavily rely on debt acquired from other developed countries and international financial organisations to finance development due of low income of these less developed countries. The overreliance on external debts has also resulted in large sums of unpaid debts which consequently constrain development (Ayadi & Ayadi, 2008; Abdalla & Jaradat, 2018).

Among West African nations, external debt increased by 4.05%, approximately US $416.3bn in 2015, an expansion from 2014 public debt stock. Interest payments rose from US$3.8bn in 2010 to US$9.3bn in 2015. Out of this amount, the total debt accumulated by 46 nations, namely Kenya, Uganda, Malawi, South Africa and Nigeria, contributed 46.49% to the total external debt stock in 2015 (Shittu & Nawaz, 2018). From the debt stock of these 46 countries, Malawi had her debt stock increased to 69.9%, and that of Kenya increased to 116.4%. However, South Africa had the most minor increment, estimated at 27.27% (Shittu & Nawaz, 2018).

The public debt of Ghana amounted to GH¢173,068.7 million at the end of 2018, representing 57.9% of the gross domestic product. A more significant part of the debt was incurred due to the government's restructuring of the banking industry. The high cost involved in restructuring the financial sector increased the country's total debt stock by 32% points at the end of 2018 (MOF, 2018). According to MOF (2018), domestic debt and external debt reported amounted to approximately 50.3% and 49.7%, respectively,

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by the end of 2018. The Central Government's external debt to be serviced at the end of the year totalled US$2,493.8 million in 2018.

In 2018, the World Bank redefined external debt as the unsettled sum required to pay creditors. These payments include principal payments and interest payments by a debtor country on an agreed future date. It is debt owed to non-nationals or international financial organisations, usually paid in goods and services or in foreign currency (World Bank 2018). Khaled Abdalla and Jaradat (2019) posited that the impact of external debt may be positive or negative. They stated that the impact could be positive if external debts are used for infrastructural purposes. It could be damaging if external debts are used for consumption and other current expenditure purposes. This suggests that external debt financing determines, to a large extent, the economic growth of a country depending on how and where funds are channelled. Therefore, the level of external debt of the country is of fundamental importance in every economy, as external debt may reflect the effectiveness and efficiency of an economy.

PROBLEM STATEMENT

Successive governments have executed strategies to mitigate the debt stock of Ghana, but there remains a huge amount of external debt stock to be serviced. Ghana Annual Public Debt Report (2018) indicate that, as at the end of December, 2018, outstanding external debt increased by 13.6 percent resulting to GH¢86,169.0 million over GH¢75,847.5 million (US$17,174.1 million) reported in 2017 (MOF, 2018). The overwhelming upsurge in the country's external debt is attributed to expenditure on projects funded through loans, the 2018 Eurobond and exchange rate instability among trade countries (MOF, 2018). In 2019, Ghana's government, to meet the country's financial requirement, accessed the international capital market to issue a sovereign bond programme 2019 (ABRP 2019; MOF, 2019). According to MOF (2019), the share of external debt stock increased from 50.2% in December 2018 to 52.8% at the end of the first half of 2019, mainly driven by the issuance of Eurobonds of US$ 3.00 billion in March 2019. The upsurge of external debts in Ghana has attracted a plethora of studies. Findings from Matuka and Asafo (2018) revealed that in Ghana, economic growth is stimulated by external debts in both long-run and short-run periods. The work of Senadza et al. (2017) on 39 Sub-Saharan African Countries using the GMM approach on data from 1990 to 2013 revealed an inverse and a nonlinear relationship between variables. In a related study, Siddique et al. (2015) found that during the period 1970 -2007, Heavily Indebted Poor Countries experienced short- and long-run causality between external debt and GDP. Even though much research has been done, there is inadequate study of the subject of the lower middle-income status of Ghana. There are also limited studies on the causal effect of external debt on other variables of the macroeconomy and other variables on external debt. This is what the study seeks to achieve.

Research Objectives

To measure the relationship between external debt and gross domestic product (GDP), population growth, inflation, export of goods and services, general government expenditure, interest paid on external debt, and literacy rate in Ghana.

Research Hypothesis

Null Hypothesis (H$_o$): No relationship exists between external debt and gross domestic product, population growth, inflation, export of goods and services, general government expenditure, interest paid on external debt, and literacy rate in Ghana.

Null Hypothesis (H$_o$): Gross domestic product, population growth, inflation, export of goods and services, general government expenditure, interest paid on external debt, and literacy rate do not determine external debt financing in Ghana.

LITERATURE REVIEW

Definition of External Debts

In the year 1998, external debt was defined by the World Bank as "the total sum of money at any given time, paid or outstanding liabilities of nationals of a country to another country or international financial institution, paid with or without interest (World Bank 1998). They indicated that external debt, at any time, is the outstanding amount of actual current and not contingent liabilities that require payments of interests and/or principal by the debtor in future and that are owed non-residents by residents of an economy. It is debt owed to foreign countries repayable in goods and services or currency (World Bank 2018).

According to (SNA 2008), external debt of a country at a given time is the unsettled amount of money out of the present amount borrowed including other liabilities that require payment. This includes principal amount and payment and interest to be defrayed by the debtor on an agreed time in the future, owed to non-nationals by nationals of an economy (IMF 2014). These liabilities are incurred when services, financial and nonfinancial assets are provided by public institutions through a contract agreement that spells out conditions or terms of payment. According to SNA (2008) and IMF (2014), liabilities incurred through external borrowings can be initiated by law and economic transactions that require payments in the future. These liabilities include; unpaid principal amount and interest accrued. SNA (2008) and IMF (2014) stated that, a commitment by nationals to non-nationals to

offer anything of economic value in the future cannot represent debt liability, unless there is an amendment of ownership, kind and type of transaction undertaken or income accrued. Thus an amount yet to be settled by a debtor under a credit commitment does not constitute an external debt (IMF 2014).

Among West African nations, external debt increased by 4.05%, an approximate amount of US $416.3bn in 2015. This represents a growth from 2014 stock of public debt. Interest payments rose from US$3.8bn in 2010 to US$9.3bn 2015 and out of this amount, the total debt accumulated by 46 nations namely, Kenya, Uganda, Malawi, South Africa and Nigeria contributed 46.49% to total external debt stock in 2015 (Shittu & Nawaz, 2018). From the debt stock of those 46 countries, Malawi had her debt stock increased to 69.9% and that of Kenya increased to116.4%. However, South Africa had the least increment with an estimation of 27.27% (Shittu & Nawaz, 2018).

Ghana's External Debt Stock as at 2018

Ghana Annual Debt Report (2018) indicates that as at the end of December, 2018, outstanding external debt increase by 13.6 percent resulting to GH¢86,169.0 million over GH¢75,847.5 million (US$17,174.1 million) reported in 2017 (MOF 2018). The overwhelming increase in the country's external debt is attributed to expenditure made on projects funded through loans, the 2018 Eurobond and exchange rate instability among trade countries (MOF 2018). The degree to which Ghana's debt increased without the expenditure made on the financial sector reorganization amounted to 14% of the total debt. The total external debt stock undisbursed in December 2018 was GH¢86,169.0 million.

Ghana's Macro-Economic Growth.

According to the MOF (2018), Ghana's macroeconomic performance in the domestic market was quite remarkable, having a growth rate that remained resilient and strong in the first three months of the 2018 fiscal year. In 2018, real GDP growth recorded 6.1% in the first quarter with persistent decline in inflation rate from 11.8% at end December, 2017 to 9.4% at the close of December 2018 (MOF 2018). Fiscal deficit declined from 4.8 percent of GDP in 2017 to 3.9% percent of GDP in 2018. In the subsequent years, the economy made progress in trade balances to a provisional surplus of 2.7% of GDP. Current account balances declined from a deficit 3.4% in 2017 to 3.2% of GDP in 2018 (MOF, 2018). At the close of 2018, the credit rating of Ghana was upgraded from B- to B with a stable outlook, for the first time in 10 years (Ghana Annual Debt Report 2018). The Annual Debt Report (2018) also reveals that inflation declined to 9.4%.

The Ghana cedi also depreciated at 8.4% against the USD as at the end of 2018, compared to 4.9 percent in 2017. This was attributed to the high demand for the USD largely motivated by external factors such as the high yields on US Treasury instruments which negatively impacted the currency markets in emerging market like Ghana. The cedi depreciated at a slow rate against most major currencies eg. 3.9% against the Euro (EUR) and 3.3% against the British Pound Sterling (GBP), (BOG, 2018).

THEORETICAL FRAMEWORK
Debt Overhang Theory

Debt overhang theory was foremost postulated by Myers Stewart in 1997. This theory was postulated through the valuation of companies in corporate finance and the impact of debiting financing in these organisations. The theory was based on research on why corporate bodies do not fund their operations with the required debt instrument when all indications point to a tax advantage and interest rate deductibles. Results from the study show that high debt prevents organisations from making sound investment decisions in the future (Myers, 1997). According to Myers (1997), debts prevent present-value projects from being executed because proportions of the future return are paid to creditors of the organisation in the form of outstanding payments. There are several definitions to the Debt Overhang. Krugman (2006) defined it as the existence of an already existing debt huge enough such that the creditor losses trust in the repayment schedules.The debt overhang theory can be applied to this study since it plays a major role in explaining the impact of the debt burden on Ghana's credit rating. Even though Ghana recorded high levels of debt due to the financial sector reforms, government commitment to debt management, with the approach of regular meeting with the credit rating agencies constantly informing them on the economy of Ghana have yielded a positive improvement in the rating perception of Ghana in 2018 (MOF, 2018). The midst of the increasing debts, the country attained a positive credit rating after many years, with credit rating agency S&P elevating Ghana to a B/stable rate, agreeing with Fitch's rating of B/stable (MOF, 2018).

James Buchanan's Theory of Debt

Buchanan's debt theory was first credited to Henry Adams, Charles Bastable, and Paul Leroy-Beaulieu, who were classical economists but later advanced by James Buchanan. The Buchanan debt theory states that the principle of debt is generally related to the assertion that debt allows the cost of public debt to be shifted to the next generations. The theory gained its roots from the questions: who pays for the huge public debts of an economy, and when will the debts be defrayed? He stated that theory allows

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the cost of debt to be shifted in time and also explains the nature of debt financing, which shows that an economy is better off instead of worse off if it subscribes to external debt financing. Buchanan posits that the weight of external debt always shifts to present and future taxpayers. James Buchanan's theory of debt is relevant and applies to Ghana's annual borrowing and recovery plan. The annual borrowing and recovery plan normally takes the form of a budget statement and economic policy of the government of Ghana and intermediate debt management policies. The policy explains the borrowing and recovery operations of the government, the borrowing instruments, recovery strategies and the indicative timing of such borrowings (MOF, 2018). According to a report by the Institute of Economic Affairs (IEA), the government of Ghana lost 30% of its revenue to debt settlement, paying loans contracted based on speculation on commodity prices and increasing interest rates. They also stated that the country's debt to GDP stood at GH¢145billion, representing 60 per cent, a decline from 69.8 per cent recorded at the end of 2017 (IES 2018).

IEA's report suggests that GH¢17billion was used to finance debt, leaving the economy with just GH¢34billion in 2018 (IES 2018). In a related report, the Institute for Fiscal Studies (IFS) also stated that of every cedi collected in taxes by the Ghana Revenue Authority (GRA), 42 pesewas is used to pay interest on the country's debt. Interest costs increased more than domestic-financed capital expenditure, threatening to equal or even overtake wages and salaries (IFS 2018). According to Kusi (2018), the year 2017 was the fifth successive year that total interest payment was more significant than total domestic-financed capital expenditure, suggesting that interest payments will probably be financed through additions to public debt or at the expense of other key government expenditures. These government debts are perceived to be paid by subsequent government regimes since they have short periods of staying in power.

The Relationship between Debt Financing and Economic Growth

Saungweme and Odhiambo (2019), in their work "the impact of Public Debt on Economic Growth", revealed that the relationship between external debt and growth differs from country to country, based on the diverse macroeconomic determinants, the size of GDP, the structure of the public sector, the control variables used, the research design adopted, among others. They, however, concluded that the relationship between these variables is not specific and that the perception of a converse association between external debt and GDP is not always the case (Saungweme & Odhiambo, 2019). Findings from Inna Shkolnyk and Koilo (2018) in Ukraine and other emerging economies reveal that inappropriate policies on the use of external funds contribute to the negative impact on the development of an economy. They concluded a nonlinear relationship exists between external debt and economic growth among developing countries. They also found out that external debt has a marginal impact on GDP. This statement states that external funds can be properly used by restructuring institutions responsible for external debt management (Shkolnyk & Koilo, 2018).

Findings from Clements et al. (2003) revealed that the economic depression experienced by lower-income countries is a result of high dependency on external sources of finance. They concluded that external debt may lead to a thriving economy if resources are put to judicious use, but will rather lead to a depressing effect on the private sector is resources are mismanaged. They also stated that a nonlinear relationship exists between the two variables and that the effect of external debt on gross domestic product is indirect (Clements et al., 2003).

The results of Affum (2016) indicates that Ghana's rising debt prevents prospective investors from investing in the country due to high business risks, exchange rate risk and other finance risk. This was evidenced by a negative coefficient associated with external debts. It was inferred from the analysis that any additional unit of external debts will lead to a proportionate decrease in foreign direct investment in analyzing the effect of Ghana's increasing external debt on foreign direct investment, thus very high debt is detrimental to foreign direct investment (Affum 2016). In a related study, the results of Siddiquea and Selvanathan (2016) show that, external debt has a direct association with economic growth in the short run to some level. They also justified that, external debt was necessary for most highly indebted poor countries because the level of savings, incomes and economic growth cannot finance development. They also found out that proceeds from exports, which are mostly unprocessed, cannot finance the needed capital expenditure, but in the long run, had an adverse effect on economic growth. This is mainly caused by the low returns in public investments and inefficiencies in managing resources. They stated that for a nation to get the best out of external loans, countries must reform debt management (Siddiquea & Selvanathan, 2016).

In a related study by Ijirshar et al. (2016), estimations using the ARDL model revealed that there is a long-term relationship between external debt and economic growth but an inverse relationship in the interim (Ijirshar et al., 2016). A study by Casares (2015) demonstrated logically that the growth of external debt may reflect positively on economic growth in the trade sector. Two side conflicting effects on exchange rates were found as the relationship between variables had an invented shape (Casares, 2015). In a study by Suna Korkmazin (2015) using VAR analysis to study the relationship between external debt and economic growth, it

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was found that external debt and growth had a positive relationship. It was also revealed from the causality test that, external debts have a direct association with economic growth over the given period.

Siddique and Selvanathan (2015) found the relationship between external debt and economic growth to be conflicting, using a sample of 40 poor countries and a period of 38 years. Findings also reveal that ineffective and inefficient debt management policies are the main cause of debt over hung among poor countries. But, Rifaqat and Usman (2012) using annual income, annual education expenditures, labor force, as control variables, found that there is an inverse relationship between external debt and economic growth, indicating that a low economic growth is caused by an increasing rate of external debts. The findings of Emerenini and Nnanna (2015) using the neoclassical growth model show the presence of non-linear effect of debt on economic growth in Nigeria. In a related study, Soldatova (2006) concluded that external debt may have an influence on growth to some extent, after which they become inversely related. Reinhart et al. (2012) indicated in a study concentrating on 55 low-income countries that high external debt can negatively affect a nation's GDP through both a direct and an indirect effect. Using the VEC model estimate, Chinaemerem and Anayochukwu (2012) found that financing entrepreneurship development through external debts positively impacts entrepreneurship development and economic growth. However, results in Nigeria show a negative impact on entrepreneurship development (Chinaemerem & Anayochukwu, 2012).

Determinants of Government Debt

A study undertaken by Swamy (2015) revealed that countries that practice multiparty democracy have higher external debts compared to others that do not because democratic nations mostly experience the negative effects of fixed capital formation on debt. This is because governments of these nations have very unhealthy monetary and fiscal environments. This situation affects significantly their fixed capital formation which mostly fails to attract investors. They also stated that, high population growth in poor countries have no negative effect in these countries. They attributed this to be reason which increasing population among poor countries may not necessarily economically problematic. Swamy (2015) concluded that the causation of countries debts is due to its final consumption expenditure, trade openness, real GDP growth, gross fixed capital formation, inflation, age dependency, real interest rate, and population growth

In Thailand and the Philippines, the findings of Lau and Syn-Yee Lee (2013) show the existence of a long-run relationship between the External Debt and the endogenous variables in both Thailand and the Philippines. They also found out that in the short run, inflation - consumer price index and real interest rate are significant factors determining Thailand's external debt. According to the findings, external debt and consumer price index are the correlated variables that explain the long-term economic growth in Thailand and the Philippines. Chiminea and Nicolaidou's (2012) empirical findings support the role of economic factors on debt accumulation, but most importantly, they provide evidence of the role of political factors as well. They specified that governments that are not constrained or accountable accumulate more debt for longer periods and that democratic governments accumulate more debt than autocratic regimes. They suggested that democratic governments are rewarded by the international financial markets (in the sense that they can borrow more money). They also suggested that governments in SSA countries strive to reduce inequality, and governments become accountable to voters through the provision of social amenities and infrastructure, which may result in high debt levels. Their result implies that improving institutions and accountability by governments is critical in reducing indebtedness in the region (Chiminya & Nicolaidou 2012). In a related research in Nigeria, Imimole et al. (2014), found out that GDP, debt services and exchange rate are the core dynamics of public external debts. Abdul Waheed (2017) also concluded that increased GDP is an important factor in reducing external debt.

RESEARCH METHODOLOGY

This research followed the quantitative research framework system. The research adopted a co-relational study in that analysis was made on selected macroeconomic indicators controlling external debt financing and economic growth. A multi-regression analysis was developed to explain the relationship between variables. The research work was conducted considering the entire current population of Ghana. The research adopted a longitudinal study approach to collect 40 years of time series data from 1978 to 2017. Historical data was retrieved from the World Bank and IMF databases. Data was extracted from the databases of these institutions on some macroeconomic variables based on the conceptual literature. Eview and Excel data sheets were used for processing and presenting data, analysis and presentation of results. Line graphs were presented for trends of selected variables. Data analysis was based on the outcomes obtained from stationarity tests of variables. F-test, t-test, and Probability Value (P - values) and other relevant statistical tests were used to make decisions and inferences on the null hypothesis.

Model Specification and Justification

The nonlinear form of the model specifications is given in the form:

y= f (EDGNI, PPG, INF, EXPT, LRSE, GGEC, INTEDGNI) ....Equation 1

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This is to explain and help identify the variables used in the measurement of the dependent variables. Since linear functions have indisputable advantages over nonlinear functions, the non-linear function above is reduced to linear functions in the form $y = \alpha + \beta X$……………………………… Equation 2

The general regression model based on the linear function is in the form;

$Y = \alpha + \beta_0 X_O + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \ldots NXN + \xi$, ……………Equation 3

Where y = dependent variable (GDP), β_0, β_1, β_2, β_3, β_4 are the coefficients of the regression equation, and α is the intercept or the constant of the regression equation, X1, X2, X3, X4,…XN = explanatory variables of GDP, ξ = error term. First, the difference of variables is introduced for variables that do not observe stationarity. The function is in the form;

In y = α + β_0 In X_O + β_1 In X_1 + β_2 In X_2 + β_3 In X_3 + ….NXN +ξ..Equation 4

Where Y = economic growth, and Xo – Xn are vectors of potential explanatory variables.

In GDP (it) = α - In EDGNI it + In PPG it - In INF it + In LRSE it + In EXPT it +/- In GGEC it - In INTEDGNIit………………………………………Equation 5

Where ln GDP (it) – log of the Gross domestic product (i) between year (t), is the intercept parameter; In GDP it - log of Gross domestic product, In In EDGNI it - log of external debt (% of GNI), In PPG it – log of population growth, In In INF it - log of inflation, In LRSE it - log of Literacy rate (School Enrollment), In EXPT it – log of export of goods and service, In GGEC it – log of general government expenditure, and In INTEDGNI it – log of interest paid on external debt (% of GNI). In defining the determinants of external debts, regression function is in the form;

y = α + β_0 In X_O + β_1 In X_1 + β_2 In X_2 + β_3 In X_3 + ….NXN +ξ...Equation 6 Where Y = External Debt, and Xo – Xn are vectors of potential explanatory variables.

In EDGNI = + In GDP it + In PPG it - In INF it + In LRSE it + In EXPT it +/- In GGEC it - In INTEDGNIit………………………………………….Equation 7. In order to prevent a spurious regression, a unit root test or stationarity test was carried out. The problem of serial correlation, heteroscedasticity, and non-normality was corrected using the Breusch-Godfrey Serial Correlation LM test, BreuschPagan-Godfrey Heteroskedasticity test, Jarque – Bera Probability test, respectively. Also, the use of transformational variables, thus use of lag values or first difference, addition of new variable, deletion of variables was employed to make data and results reliable and valid.

RESULTS AND DISCUSSIONS

Table 4.1.1 Summary of Descriptive statistics

| Variables	Mean	Std. Dev.	Variance	Skewness	Kurtosis
GDP	4.0126	4.288609	18.39217	-1.02442	4.93409
EDGNI	62.419	32.48053	1054.985	.6667037	2.557104
PPG	2.608975	.3390354	.114945	.6621897	3.934621
INF	29.30937	25.99676	675.8315	2.267187	8.136777
LRSE	43.86373	11.7425	137.8863	1.49118	3.617389
EXP	25.01838	12.04095	144.9845	-0.064591	2.102628
GGEC	10.30628	2.087304	4.356837	.1862791	3.001691
INTEDGNI	1.534475	.715073	.5113294	.0913329	2.265536

Source: Authors Estimations, 2019

Trend Analysis of Gross Domestic Product (GDP) and Predictors

From the graph on general government expenditure and inflation, it is observed that general government expenditure was quite

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stable with fluctuations over the years. However, inflation was very unstable over the years, with very high values between 1978 and 1985. Generally, inflation was very unstable, with very high values until the year 2000, when the country experienced some decreasing rates of inflation, with 2012 having single-digit inflation. The low inflation rate has increased but decreased from 2012 to 2017. Population growth was also stable over the years. The rate of population growth remained stable, with little fluctuations from 1978 to 2017. However, the literacy rate, which is measured by secondary school enrolment, increased and became quite stable until year 200, when school enrolment began to increase at a very high rate. External debts (% of GNI) had very high rates from 1978 to 2000. From the year 2000, external debts decreased steadily to 2008. From year 2008, external debts increased until 2016. But interest paid on external debts remained very low with little fluctuations over the years. Interest on external debts (% GNI) increased generally from 1978 to the 1990s where it declined but later increased in 2000. From the year 2000, it declined with a decreasing rate until 2012/2013, when it increased until 2017. Unstable general government expenditure and goods and services exports are also observed from 1978 to 2017. The figure below illustrates the trend analysis of selected variables.

Figure 4.1
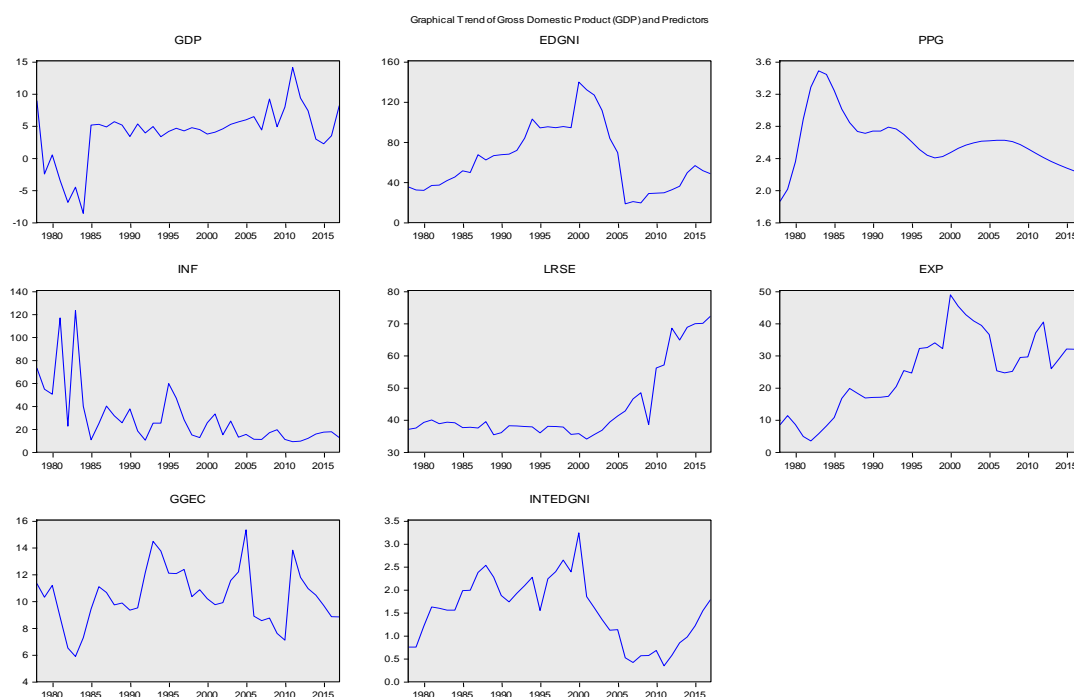
Source: Authors Estimations, 2019

Pairwise Correlation

The table below represents the pairwise correlation between variables. In the correlation analysis above, it is observed that the results reflect all dimensions of correlation analysis. From the analysis, we observe no perfect independent correlation (0), a strong correlation (very close correlation (1), a low or weak correlation (1- 0.499), a medium correlation (0.5-84) and a strong or high correlation (0.85 – 0.99). There were also negative correlations indicating how widely independent some variables are disassociated from others. The table below shows how selected variables are correlated.

Pairwise Correlation

Variables	EDGNI	GDP	PPG	INF	LRSE	EXP01	GGEC	INTEDGNI
EDGNI	1.0000	0.0157	-0.0405	-0.0791	-0.4222	0.5331	0.3716	0.6978
GDP	0.0157	1.0000	-0.5142	-0.5147	0.2858	0.5489	0.4580	-0.2077
PPG	-0.0405	-0.5142	1.0000	0.2288	-0.3811	-0.4585	-0.3426	0.2437

INF	-0.0791	-0.5147	0.2288	1.0000	-0.3171	-0.5347	-0.2207	0.0848
LRSE	-0.4222	0.2858	-0.3811	-0.3171	1.0000	0.2692	-0.0891	-0.4323
EXP01	0.5331	0.5489	-0.4585	-0.5347	0.2692	1.0000	0.3430	0.0321
GGEC	0.3716	0.4580	-0.3426	-0.2207	-0.0891	0.3430	1.0000	0.1180
INTEDGNI	0.6978	-0.2077	0.2437	0.0848	-0.4323	0.0321	0.1180	1.0000

Source: Authors Estimations, 2019

Tests for Stationarity (Unit Root Test)

The stationarity test was performed using both Augmented Dickey-Fuller Test Statistic and Philip Perron at levels and at first (1st) Difference. From the ADF test first (1st) difference, P Values = 0.0366, 0.5580, 0.5744, 0.0004, 0.9986, 0.5042, 0.0239, 0.3239 were observed for GDP, EDGNI, PPG, INF, LRSE, EXPT, GGEC, INTEDGNI respectively. It is observed that 0.05 level of significance, only GDP recorded a P value = 0.0366. It can be inferred form results that at level, none of the variables is stationary (P > 0.05), except for GDP (P value = 0.0366 < 0.05). However, at first (1st) difference, all variables were stationary at 0.05 significant levels. At first (1st) difference, observed P values are; 0.0000, 0.0002, 0.0445, 0.0000, 0.0000, 0.0000, 0.0000, 0.0000 for GDP, EDGNI, PPG, INF, LRSE, EXPT, GGEC, INTEDGNI respectively.

In order to avoid a biased conclusion on the stationarity test, the Philip Perron Adjusted test was carried out at level and at first 1st difference. At level, the P values for variables are; 0.0210, 0.4048, 0.0870, 0.0003, 0.9926, 0.5060, 0.0191, and 0.3139 for GDP, EDGNI, PPG, INF, LRSE, EXPT, GGEC, INTEDGNI respectively except for GDP (P value = 0.0210 < 0.05), INF (P value = 0.0003) and GGEC (P value = 0.0191 < 0.05). However, at first (1st) difference, all except one variable is stationary at 0.05 confidence. At first (1st) difference, observed P values are; 0.0000 0.0001, 0.1634, 0.0001, 0.0000, 0.0000, 0.0000, and 0.0000. Since all variables were not stationary or had unit roots, for the Augmented Dickey-Fuller test statistic and Philip Perron Adjusted test, the research adopts the Autoregressive Distributed Lag Model (ARDL MODEL). The panel below shows the result of the stationarity test.

Test for Stationarity of Dependent and Independent Variables

Variable	ADF level Test Stat (5%)	ADF P - Value	ADF 1st Difference Test Stat (5%)	ADF 1st Difference P - Value
GDP	-2.938987	0.0366	-2.941145	0
EDGNI	-2.938987	0.558	-2.941145	0.0002
PPG	-2.951125	0.5744	-2.951125	0.0445
INF	-2.938987	0.0004	-2.941145	0
LRSE	-2.941145	0.9986	-2.941145	0
EXPT	-2.938987	0.5042	-2.941145	0
GGEC	-2.938987	0.0239	-2.941145	0
INTEDGNI	-2.938987	0.3239	-2.941145	0
Variable	**P.Perron t-Stat**	**P- Value**	**P. Perron 1st D. Stat**	**P. Perron P - Value**

GDP	-2.938987	0.021	-2.941145	0
EDGNI	-2.938987	0.404 8	-2.941145	0.0001
PPG	-2.938987	0.087	-2.941145	0.1634
INF	-2.938987	0.000 3	-2.941145	0.0001
LRSE	-2.938987	0.992 6	-2.941145	0
EXPT	-2.938987	0.506	-2.941145	0
GGEC	-2.938987	0.019 1	-2.941145	0
INTEDGNI	-2.938987	0.313 9	-2.941145	0

Autoregressive Distributed Lag Model (DV: GDP):1978- 2017

The Autoregressive Distributed Lag Model (ARDL MODEL) was selected because the selected variables were not stationary at the first (1st) difference. The table below represents the general Autoregressive Distributed Lag Model (ARDL MODEL) of our selected variables at the level. The panel represents the best model of the selected variables of the research. From the panel, we above the R-squared = 0.915426 and Adjusted R-squared = 0.843538. The R-squared and Adjusted R-squared indicate the degree to which the explanatory variables explain the outcome (GDP).

It is observed that explanatory variables explain about 91.5426% or 84.3538% of the dependent variable. The R-squared and Adjusted R-squared indicate that the model is somewhat valid since it explains more than 60% of the dependent variable. The F-statistic = 12.73407, and Prob (F-statistic) = 0.000000 measures the overall significance of all variables used for the model. From the panel, Prob (F-statistic) = 0.000000 < 0.05 significant level, shows that generally, the variables are significant since the probability of the F-statistic = 0.000000. The S.E. of regression = 1.659131 is the standard error of the regression model. The table below shows the general Autoregressive Distributed Lag Model (ARDL MODEL) of selected variables at level.

Selected Regression Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GDP(-1)	0.060946	0.144850	0.420750	0.6784
EDGNI	-0.099602	0.043614	-2.28372	0.0335
EDGNI(-1)	0.083171	0.047927	1.735367	0.0981
EDGNI(-2)	-0.074001	0.032715	-2.26198	0.0350
PPG	-10.91397	4.210191	-2.59228	0.0174
PPG(-1)	6.400749	3.047098	2.100605	0.0486
INF	-0.027881	0.016058	-1.73625	0.0979
INF(-1)	-0.062388	0.017230	-3.62092	0.0017
INF(-2)	0.020953	0.018758	1.117051	0.2772
LRSE	0.123639	0.106101	1.165297	0.2576
LRSE(-1)	0.049497	0.089003	0.556124	0.5843

LRSE(-2)	-0.317736	0.119381	-2.66154	0.0150
EXP01	0.125290	0.078305	1.600033	0.1253
GGEC	0.191479	0.258601	0.740441	0.4676
INTEDGNI	1.218412	1.184126	1.028954	0.3158
INTEDGNI(-1)	-1.481751	1.447068	-1.02397	0.3181
INTEDGNI(-2)	2.279656	1.275590	1.787139	0.0891
C	21.03171	8.028713	2.619562	0.0164

R-squared	0.915426		
Adjusted R-squared	0.843538		
S.E. of regression	1.659131	Akaike info criterion	4.155979
Sum squared resid	55.05429	Schwarz criterion	4.931678
Log likelihood	-60.96360	Hannan-Quinn criter.	4.431967
F-statistic	12.73407	Durbin-Watson stat	1.806459
Prob(F-statistic)	0.000000		

Source: Authors Estimations, 2019

An additional test was conducted to verify whether the short-run and long-run relationship of variables exist in the model. The ARDL Bounds Test below tests if long run or short-run relationship exists with a stated hypothesis for the test as;

Null Hypothesis (H_O): No cointegration equation

Alternate Hypothesis (H_1): The cointegration equation exists

ARDL Bounds Test for Sample: 1978 - 2017

The panel above represents the ARDL Bounds Test used to or long-run relationships. From the panel, we observe an F-statistic = 1.625690 and a slope or gradient = 7. With this stated hypothesis, it is concluded that there is no cointegration in the long run because the calculated F- statistics is lower than the critical value for the lower bound I(0) = 2.32 at 5% confidence interval. In this case, we do not reject the Null Hypothesis: No cointegration equation, but rather accept the Null Hypothesis. The results suggest that only the short-run model of the Autoregressive Distributed lag model (ARDL) be estimated. The ARDL Bounds Test is illustrated below.

ARDL Bounds Test for Sample: 1980 2017

Test Statistic	Value	K	
F-statistic	1.625690	7	
Critical Value Bounds			
Significance	I0 Bound	I1 Bound	
10%	2.03	3.13	
5%	2.32	3.5	

Source: Authors Estimations, 2019

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Short-Run Relationship between Economic Growth and External Debt

From the ARDL Bounds test, the short-run relationship between external debt and economic growth is determined. The model below explains the short-run relationship between the GDP external debt, and other variables. It can be observed that, among all variables, D (EDGNI), D (EDGNI (-1)), D (PPG), and D (LRSE (-1)) had P values 0.0335, 0.0350, 0.0174, and 0.0150 respectively. It is also noted that D (EDGNI), external debt at first difference had an inverse association with economic growth in the interim (-0.099602), but a positive impact (D (EDGNI (- 1)) = 0.074001) at lag 1. It can be inferred that external debt has a positive impact on economic growth only after one (1) year. Also, it is observed that population growth at first difference (D (PPG) = -10.913974) has an inverse relationship with economic even though significant in the model. Literacy rate, measured by school enrollment at secondary school had a positive relationship on GDP in the short run (lag 1). This means the effect of literacy rate on the economy can only be felt after one (1) year. Since the P values for these variables are less than the 0.05, we reject the null hypothesis. The results suggests that there exists a relationship between D(EDGNI), D(EDGNI(-1)), D(PPG), D(LRSE(-1)) and GDP. There exists no relationship between the other variables since P values are greater the significant level of 0.05. Since the results of the ARDL Bounds Test leads credence to accepting the Null Hypothesis, because F- statistics is lower than the critical value for the lower bound I(0) = 2.32 at 5% confidence interval, only the short run cointegration equation is accepted as;

Cointeq = GDP - (-0.0963*EDGNI - 4.8061*PPG - 0.0738*INF - 0.1540*LRSE + 0.1334*EXP01 + 0.2039*GGEC + 2.1472*INTEDGNI + 22.3967).

There is plectra of literature that supports the results above and also contradicts the results. In the work of Saungweme and Odhiambo (2019), they stated that the impact of public debt on economic growth is not even but varies depending on a set of heterogeneous factors, including the level of development of the sampled countries, institutional quality, the relative size of the public sector, the composition and structure of the government debt, data sets and research methodology used, and the selected control variables, among other factors. They, however, concluded that the impact of public debt on economic growth is not clear-cut and that the notion that public debt is bad for economic growth is merely based on hearsay (Saungweme & Odhiambo, 2019). Findings from Inna Shkolnyk and Koilo (2018) in Ukraine and other emerging economies reveal that, inappropriate policies on external debt use of external funds contribute to the negative impact on the development of the economy. They concluded that there is nonlinear relationship between external debt and economic growth among developing countries. They also found out that external debt has a marginal impact on GDP (Shkolnyk & Koilo, 2018). Clements et al. (2003) also concluded that external debt can lead to increased GDP if resources are put to judicious use, but will rather lead to a depressing effect on the private sector if resources are mismanaged. They also stated that there exists an indirect or a nonlinear relationship between the two variables. In a related study, the findings of Siddiquea and Selvanathan (2016) show that external debt relates positively to GDP in the interim at specific levels. They also justified that external debt was necessary for the most highly indebted poor countries because the level of savings, incomes, and economic growth could not finance development. They also found out that proceeds from exports, which are mostly unprocessed, cannot finance the needed capital expenditure but have an adverse influence on the economy in the long term (Siddiquea & Selvanathan, 2016). A related study by Ijirshar et al. (2016) found that there is a long-run relationship between external debt economic growth and an inverse relationship in the short run (Ijirshar et al., 2016). A study by Casares (2015) demonstrated that an increase in external debt increases GDP growth contributed by the trade sector. Also, Suna Korkmazin (2015), in using VAR analysis, studied the relationship between external debt and GDP.

Siddique and Selvanathan (2015) found an inverse relationship between external debt and economic growth using a sample of 40 poor countries and a period of 38 years. Findings indicate that ineffective and inefficient debt management policies are the main cause of debt over hung among poor countries. But, Rifaqat and Usman (2012) using annual income, annual education expenditures, labor force, as control variables, found that there is an inverse relationship between external debt and economic growth, indicating that a low economic growth is caused by an increasing rate of external debts. Reinhart et al. (2012) indicated in a study concentrating on 55 low income countries that high external debt can negatively affect the economic growth of a nation through both a direct and an indirect effect. The panel below gives details of the short-run relationship between economic growth and external debt.

Short Run Relationship between Economic Growth and External Debt

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EDGNI)	-0.099602	0.043614	-2.283723	0.0335
D(EDGNI(-1))	0.074001	0.032715	2.261975	0.0350

D(PPG)	-10.913974	4.210191	-2.592275	0.0174
D(INF)	-0.027881	0.016058	-1.736249	0.0979
D(INF)	-0.020953	0.018758	-1.117051	0.2772
D(LRSE)	0.123639	0.106101	1.165297	0.2576
D(LRSE(-1))	0.317736	0.119381	2.661535	0.0150
D(EXP)	0.125290	0.078305	1.600033	0.1253
D(GGEC)	0.191479	0.258601	0.740441	0.4676
D(INTEDGNI)	1.218412	1.184126	1.028954	0.3158
D(INTEDGNI(-1))	-2.279656	1.275590	-1.787139	0.0891
CointEq(-1)	-0.939054	0.144850	-6.482921	0.0000

Cointeq = GDP - (-0.0963*EDGNI -4.8061*PPG -0.0738*INF -0.1540

*LRSE + 0.1334*EXP01 + 0.2039*GGEC + 2.1472*INTEDGNI + 22.3967)

Source: Authors Estimations, 2019

Long Run Relationship between Economic Growth and External Debt.
Even though the ARDL Bounds test leads credence that only short-run relationships exist, the long-run relationship was also tested. From the results, it is observed that P values for EDGNI, PPG, INF, and LRSE with P values 0.0284, 0.0245, 0.0402, and 0.0050, respectively. The null hypothesis is rejected since P values for EDGNI, PPG, INF, and LRSE were all less than 0.05. From the results, it may be concluded that there exists a long-run relationship between variables since some P values were greater than a significant level of 0.05. However, the ARDL Bounds test shows that there exists no long run cointegration. With the results of the ARDL Bounds Test, it is concluded that no long-run relationships exist. The table represents the long-run coefficients of explanatory variables and the dependent variables (gross domestic product).

Long Run Relationship between GDP and External Debt

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EDGNI	-0.096301	0.040767	-2.362228	0.0284
PPG	-4.806139	1.975861	-2.432428	0.0245
INF	-0.073814	0.033648	-2.193697	0.0402
LRSE	-0.153985	0.048866	-3.151170	0.0050
EXP	0.133421	0.080153	1.664577	0.1116
GGEC	0.20391	0.267661	0.761805	0.4551
INTEDGNI	2.14718	1.260853	1.702957	0.1041
C	22.39670	8.527173	2.626509	0.0162

Source: Authors Estimations, 2019

Further diagnostic tests were performed to test for serial correlation or autocorrelation, Heteroskedasticity, and normality among variables.

4.3.4 Breusch-Godfrey Serial Correlation LM Test:

From the Breusch-Godfrey Serial Correlation LM test, the Prob. F (1, 19) = 0.8574 > 0.05 and Prob. Chi-Square (2) = 0.04450.7968 < 0.05. The null hypothesis is failed to be rejected, meaning there exists no serial correlation among variables. Even though Prob. Chi-Square (2) = 0.04450.7968 < 0.05, the Prob. F (1, 19) = 0.8574 > 0.05, which measures the overall significance of the test, suggests the model has no serial correlation. This suggests that, in the short run, there is no serial correlation between external debt and GDP. The short-run model can be concluded to be good to explain the relationship between dependent and independent variables.

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.763339	Prob. F(2,18)	0.1998
Obs*R-squared	6.225474	Prob.Chi-Square(2)	0.0445

Source: Authors Estimations, 2019

Heteroskedasticity Test

Test for Heteroskedasticity indicate that, Prob. F (17, 20) = 0.2901 and Prob. Chi-Square (17) = 0.2805 leads credence to accepting the null hypothesis that, there is no Breusch-Pagan-Godfrey Heteroskedasticity in the model. The Prob. F (17, 20) = 0.2901 > 0.05 and Prob. Chi-Square (17) = 0.2805 > 0.05 means that the residuals do not suffer from Heteroskedasticity. Below is the Heteroskedasticity test.

Table 4.3.5 Heteroskedasticity Test

F-statistic	1.29041	Prob. F(17,20)	0.2901
Obs*R-squared	19.8775	Prob. Chi-Square(17)	0.2805
Scaled explained SS	6.64894	Prob. Chi-Square(17)	0.9877

Source: Authors Estimations, 2019

Normality Test

A normality test was conducted to test how well data is distrusted. From the figure, Jarque-Bera of 0.279383 and Probability of 0.869627 are observed. The Probability of 0.869627 > 0.05 means that the model's residuals follow a normal distribution. The figure below illustrates the Normality test of the model.

Normality Test
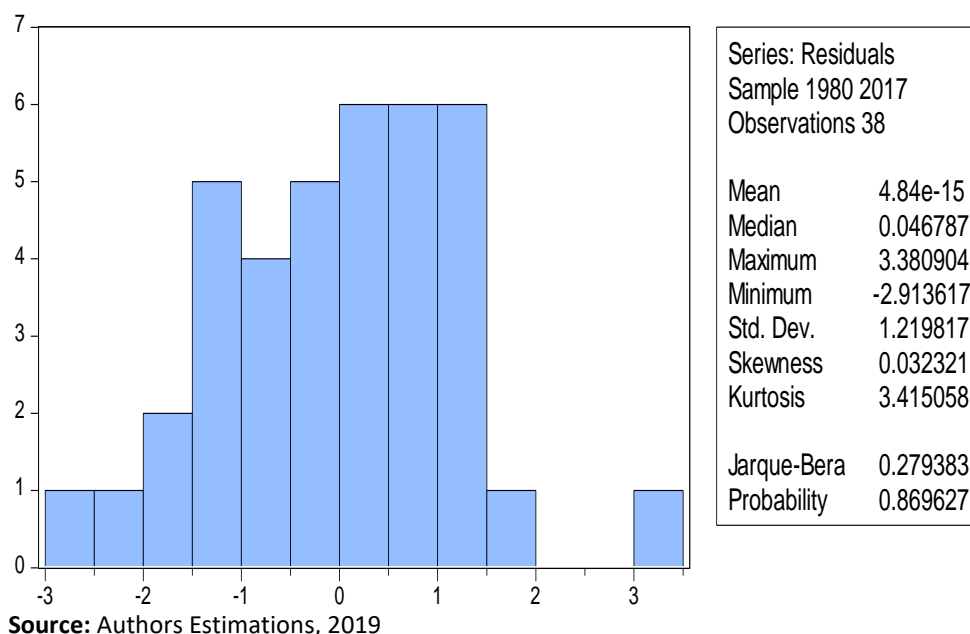
Source: Authors Estimations, 2019

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Summary of Findings

In the assessment of the relationships, results show that explanatory variables explain about 91.5426% or 84.3538% of the dependent variable (GDP). The R-squared and Adjusted R-squared indicate that the model is valid. The F-statistic = 12.73407, and Prob (F-statistic) = 0.000000 < 0.05, which measured the overall significance of all variables in the model, show that generally, the variables are valid. Results from the ARDL Bounds Test indicated an F-statistic = 1.625690, which led to a conclusion that there is no cointegration in the long run because the calculated F- statistics is less than (<) the critical value for the lower bound I (0) = 2.32 at 5% significance level.

In the assessment of the relationships, results from the ARDL model suggest that there exists a short-run relationship between D (EDGNI), D (EDGNI (-1)), D (PPG), D (LRSE (-1)) and gross domestic product (GDP). The cointegration equation for the model is estimated as;

Cointeq = GDP - (-0.0963*EDGNI - 4.8061*PPG - 0.0738*INF - 0.1540*LRSE + 0.1334*EXP01 + 0.2039*GGEC + 2.1472*INTEDGNI + 22.3967). The ARDL Bounds Test indicated an F-statistic = 1.625690, which led to the conclusion that there is no cointegration in the long run. Also, results from the diagnostic tests reveal that there is no serial correlation among variables. Also, the Breusch-Pagan-Godfrey Heteroskedasticity test leads credence to accepting the null hypothesis that, there is no Breusch-Pagan-Godfrey Heteroskedasticity in the model, thus the residuals do not suffer from Heteroskedasticity. In addition, the Normality Test indicated that the residuals of the model follow normal distribution.

CONCLUSION

The study measured the relationship between gross domestic product (GDP), population growth, inflation, export of goods and services, general government expenditure, interest paid on external debt, and literacy rate on external debt in Ghana. Findings from the results show that, variables are related to external debts only in the short run but not related in the long run.

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