Debt-output gap nexus in Nigeria: Does inflationary pressure matter?

By Olatunji A. SHOBANDE [a†]
& Adebayo S. ADEDOKUN [b]

Abstract. The study examined the impact of external debt on economic growth in Nigeria using Extended Hausman Rodrick Valesco growth diagnostic framework and Three Gap Model. Annual time series data sourced from the Central Bank of Nigeria statistical bulletin between 1981-2018 was regressed using the Augmented Dickey Fuller test (ADF) to check the stationary properties of the series, and the Engel-Granger Co-integration test to estimate the long-run relationship of the variables. The results show that external debt had negative impact on the Nigerian economy.

Keywords. External debt, Economic growth, Economic development, Johansen Cointegration, Time series models, Nigeria.

JEL. F34, F43, F63, C01.

1. Introduction

In recent decades, many developing countries have resorted to huge borrowing from local and foreign nations, creating another burden for the future generation. Interestingly, many of these countries are hard hit by the recent financial crises, which forced them to bail out private interests to prevent a profound economic disaster. However, some economists have suggested it would be better to forgo growth rather than minimise the rate of debts (Shobande, 2018). Some further argued that when debt reaches a certain level, it begins to have adverse effect; debt servicing becomes a huge burden and the debtor nations find themselves on the wrong side of the debt-laffer curve, with debt crowding out investment and growth.

According to Omoleye, Sharma, Ngussam, & Ezeonu (2006), Nigeria is the largest debtor nation in the Sub-Saharan Africa. The genesis of Nigeria's external debt can be traced to 1958 when 28 million US dollars was contracted from the World Bank for railway construction. Between 1958 and 1977, the need for external debt was on the low side, however due to the fall in oil prices in 1978, which exerted a negative influence on government finances, it became necessary to borrow to correct balance of payments' difficulties and finance projects. The first major borrowing of

[a†] Business School, University of Aberdeen, UK.

☎. 07432818872 ✉. o.shobande.19@abdn.ac.uk

[b] Department of Economics, Faculty of Social Sciences, University of Lagos, Akoka, Yaba, Lagos, Nigeria.

☎. +2348032712230 ✉. brobayunilag@gmail.com

one billion US dollars referred to as Jumbo loan was contracted from the international capital market (ICM) in 1978 (Adesola, 2009). The spate of borrowing increased thereafter with the entry of state governments into external loan contractual obligation.

In 1986, Nigeria had to adopt a World Bank/International Monetary Fund (IMF) sponsored Structural Adjustment Programme (SAP), with a view to revamping the economy, making the country better-able to service her debt (Ayadi & Ayadi, 2008). Today, the increasing fiscal deficits driven by higher level of external debt servicing remains a major threat to national growth as the resultant effect of large accumulation of debt exposes the nation to high debt burden. According to statistics, Nigeria is about the richest on the continent of Africa, yet due to the numerous macro-economic problems, such as inflation, unemployment, sole dependency on crude oil as a major source of revenue, corruption and mounting external debt and debt service payment, majority of her citizenry fall below the poverty line.

This study therefore seeks to empirically investigate the consequential effects of external debt on output growth in Nigeria. In assessing this relationship, the study considered the theoretical appealing of the Hausman Rodrick Valesco Diagnostic Theory as a yardstick for investigating the trend, structure and causes of debt accumulation in Nigeria. On a second thought, the methodological issues surrounding debt–growth relationship and adapted model that was comprehensive enough in capturing external debt and other structural parameters that explained the economic behavioral patterns of external debt in Nigeria in recent years, were considered. The findings of this study provide better strategic options to tackle debt "bondage" in Nigeria and enhance macroeconomic reality.

The rest of this paper is presented in four sections. Section two focuses on the theoretical underpinnings as well as a review of previous studies while section three provides a robust description of the theoretical architecture and research methodology. Section four shows the analysis and empirical result of the study while discussion and possible policy recommendation were discussed in section five.

2. Previous work

According to Shobande (2015) the contributions of theoretical work in understanding the linked between external debt and output growth is not matched by empirical studies. Shobande (2018) noted that despite studies on relationship between external debt and economic growth has been exhaustively discussed, mixed results were reported. Thus, this underscores the importance and relevance of this subject. From the extensive literature, it is acknowledged that external debt affects economic growth through various channels. First, it could impact growth through the current stock of debt (Taylor, 2010). Second, it could impact growth through past accumulated debt and third, through debt service ratio. The second and third channels govern the debt overhang and crowding out

hypothesis. For instance, several studies have examined the debt-growth relationship through its link with investment. One of such studies is Bauerfreund (1989) estimated the computable general equilibrium model for external debt payment and investment in Turkey and reported that external debt payments obligations reduced investment levels.

Savvides (1992) analysed the impact of debt on the economic performance of 43 highly indebted less developed countries. He used cross-sectional data and employed the two-stage limited dependent variable model method. The study concluded that debt overhang has significant negative effect on investment rates and future economic growth. Cohen (1993) estimated an investment equation for 81 developing countries for the period 1965 to 1987 using the ordinary least square method, he found that debt servicing crowded out investment; but debt stock does not affect investment and GNP growth rates in highly rescheduling developing countries.

Warner (1992) analysed the effect of debt crisis on investment in 13 less developed countries for the period 1982 -1989 using ordinary least square estimation technique. He argued that external debt does not have a significant effect on investment; that the declining investment in these countries is partly due to declining export prices, high world interest rates and sluggish growth. Deshpande's (1997) study focused on the validity of the debt overhang hypothesis in Algeria, Argentina, Ivory Coast, Egypt, Honduras, Kenya, Mexico, Morroco, Peru, Philippines, Sierra Leone, Venezuela and Zambia. He argued that the adjustment measures applied by these countries often have negative impact on investment and growth potential.

The causality between external debt and economic retardation in Bangladesh was given attention by Chowdhury (1994). Using data from Indonesia, Malaysia, Philippines, South Korea. Sri Lanka, and Thailand for the period 1970-1988, he found that external debt has a positive effect on GNP growth rate in Bangladesh, Indonesia and South Korea. In the case of Philippines, the result indicated a positive effect of GNP growth rate on external debt accumulation. The results also show a bi-directional relationship between external debt and economic growth for Malaysia and Philippines. In a related study, Amoateng & Arnoako (1996) investigated the relationship between external debt and growth for 35 African countries using Granger causality test. Their results showed a positive relationship between foreign debt service and economic growth.

Karagol (2002) investigated the relationship between external debt and economic growth for Turkey during the period 1956-1996. The Granger causality test showed a one-way negative relationship from debt service to economic growth. Ajisafe *et al.*,'s (2006) work investigated the causal relationship between external debt and foreign private investment in Nigeria. They found using co integration test that there was no long run relationship between external debt and foreign private investment in

Nigeria. The causality result showed a bi-directional relationship between the two variables.

Smyth & Hsing (1995) examined the impact of federal government's debt on economic growth. They also investigated if the optimal debt ratio exists. They found that the debt/GDP ratio corresponding to the maximum GOP growth rate was found to be 38.4 percent. They posited that between the 1980s and early 1990s, debt ratio rose but was below 38.4 percent. They, therefore, concluded that external debt stimulates economic growth during this period, but it was expected to hurt economic growth after 1993. Karagol (2004) investigated the impact of debt on growth in a cross-country study and found that the decline in investment and growth performance of highly indebted countries could be attributed partly to the problem of debt overhang. The study added that there was no generalized conclusion on the impact of debt on economic growth as country-specific factors play important role in the relationship.

Cunningham (1993) examined the relationship between debt burden and economic growth for sixteen highly indebted nations during the period 1971-1987. He concluded that external debt burden had strong negative impact on economic growth during the period 1971-1979. Similarly, using data from 1970 to 1986, Osei (2000) analysed the impact of foreign debt on the economy of Ghana using data from 1983 to 1990. Using debt service ratio and debt-GNP ratio, the paper found that Ghana's external debt has negatively impacted on the growth of its economy. Clement, Bharttacharya & Nguyen (2003) examined the path through which external debt impacts economic growth in low income countries. They found that a substantial reduction in the stock of external debt would directly increase per capita income by 1 percent point per annum. They also noted that reductions in external debt service would boost economic growth through its effects on public investment. They further claimed that if half of debt service resources were directed towards public investment, economic growth would increase in some countries by an additional 0.5 percent point per annum.

Rais & Anwar (2012) examined the impact of public debt on economic growth in Pakistan from 1972 to 2010. They found that both domestic and foreign debt have negative effects on economic growth in the country. Essien & Onwioduokit (1998) tested the impact of foreign debt on economic growth in Nigeria. They posited that the debt burden and its servicing limits Nigeria's access to foreign exchange to finance importation of capital goods and other materials needed for economic growth. They found evidence for the validity of the debt overhang theory in Nigeria. Iyoha (1999) used simulation approach to investigate the impact of external debt on economic growth in sub-Saharan African countries for the period 1970 to 1994. The study found that debt overhang undermined investment through both a disincentive and crowding out effect. Simulation results showed that reducing debt stock by 20 would have increased investment and growth by 18 and 1 respectively during the 1987-1994 periods.

Audu (2004) performed a comprehensive study on the impact of external debt on economic growth and public investment in Nigeria using the ordinary least square and taking cognizance of the non-stationary nature of economic time-series. The results revealed that debt servicing has significant negative effect on economic growth in Nigeria. Contrary to expectation and in line with past studies (Cohen, 1993), the study also found that accumulated debt engenders growth in Nigeria thereby contradicting the debt overhang hypothesis.

Osinubi & Olaleru (2006) investigated the link between budget deficits, external debt and economic growth in Nigeria using data from 1970 to 2003. Like Smyth & Hsing (1995), the result confirmed that the effect of external debt on economic growth in Nigeria is not linear.

A dynamic study by Dinneya (2006) examined the impact of external debt on economic growth under different political regime. By examining the link between democracy, external debt and growth in Nigeria, he established that the political leadership under which external debts are contracted and utilized could have a significant influence on the impact of debt on economic growth. The result shows that the impact of external debt on economic growth is mixed. However, democracy and political conditionality does not have significant impact on the effectiveness of debt.

Adepoju, Salau & Obayelu (2007) examined the effect of external debt on sustainable economic growth and development in Nigeria. They found that access to external finance is important for the economic development of a nation. They, however, concluded that failure to service the debt obligations as in the case of Nigeria is inimical to economic growth and development and may also undermine efforts to access external finance and assistance in the future.

Adesola (2009) examined the impact of debt servicing on economic growth in Nigeria using data from 1981 to 2004. He disaggregated the payments made to the various multilateral financial creditors and regressed the resulting data on GDP and gross capital formation. He found that payment made to Paris Club and promissory notes holders have positive effect on economic growth and gross capital formation while payments made to London Club and other creditors exerts negative effects on GDP and gross capital formation.

Ayadi & Ayadi (2010) used the ordinary least square and generalized least square methods to investigate the impact of external debt and its servicing requirements on economic growth in Nigeria and South Africa. They found that external debt had a negative impact on economic growth in the two countries but added that South Africa was better than Nigeria in the application and utilization of loans. Their findings also supported Smyth & Hsing (1995) and Osinubi & Olaleru (2006) findings that debt promotes growth to a certain point after which its effect becomes counter-productive.

Ogunmuyiwa's (2011) examined whether external debt promotes economic growth in developing countries using Nigeria as a case study. He

used the Augmented Dickey Fuller test, Granger causality, Johansen co-integration test and error correction methods to analyze time- series data from 1970 to 2007. His study revealed that no causality exist between debt and economic growth and the relationship between the two variables was weak and insignificant. Abubakar (2011) added a new dimension to the literature on the effect of external debt and economic development, using Nigeria as a case study and causality and regression as the technique, the study examined the impact of external debt on population in poverty, life expectancy, unemployment, GDP per capita and literacy rates. The results indicate external debt improves life expectancy and reduce the population living below the poverty line. Further results show that external debt has a negative effect on literacy rate and GDP per capita. There was also found an evidence for unemployment -reducing effect of external debt, although not significant.

Okonkwo & Odularu (2012) considered the link between external debt, debt burden and economic growth in selected West African countries for the period 1970 to 2007. This study initially employed the vector autoregressive model and found that the relationship between debt and growth was difficult to estimate. Thus, the Engel-Granger cointegration technique shows external debt stock and burden exert negative effect on growth. Contrary to expectation, the result also shows that external debt stimulates investment.

Chauvin & Kraay (2005) sampled 62 low-income countries on the extent to which debt relief induces government to embark on social spending. They conclude that the marginal benefits of debt relief may not be same in Africa, Latin America and Asia. Lora & Olivera (2006) tested the crowding out effect of public debt on social services between 1985 and 2003 and found that the effect comes mostly from stock of debt and not debt service. Thus, if Lora & Olivera's (2006) results hold for Africa, beneficiaries of debt relief should have increased their expenditure in the social sector (Dessy & Vencatachellum, 2007).

Dessy & Vencatachellum's (2007) study showed that if a government has a high discount factor, it would rather consume than invest once debt relief was granted. This is particularly true of most developing countries that have high marginal propensity to import. Cooper & Sachs (1985) and Arslanalp & Henry (2004) who argued that the problem faced by debt-relieved countries is the lack of good institutions. Thus, if the status-quo remains the same, the new debt-relief initiative would not achieve their objectives to increase growth promoting expenditure in these countries. Similar studies that have found relationship between debt and growth include Cohen (1995), Bovensztem (1990), Elbadawi et al., (1997) and Patillo et al., (2002, 2003).

EI-Shibly & Thirlwal (1981) used the two-gap model to investigate the dominant resource constraints in Sudan on two alternative growth rate assumptions. First, 5.5 per cent per annum being the historical average between 1960-75 and second, 7.5 per cent, being the target of the Sudanese

six-year plan, 1977/1978-1982/83 was used. Their result was also consistent with the original Chenery hypothesis. However, in estimating the Investment-Savings gap and the Export-Import gap, the authors treated the two gaps as being mutually exclusive, whereas they are not.

The devaluation of the country's currency could not lead to continuously growing GDP growth rates. But after the year 2000, when the country's debt burden had substantially fallen, the country's falling GDP ratio could not be justified by high foreign debt burden. Dijkstra (2000), claimed that the World Bank has contributed to the debt overhang[2] in developing countries. She argued that this institution, by monopolizing the dual role of creditor and controller in the international finance framework, faces an obligation to finance failing economies. In Niall Ferguson's forward in *Dead Aid*, Moyo (2009) he supported this notion as he condemned concessional loans. He claimed that they are awarded under relatively easy terms, which reduced the distinction between these loans and aid. This distinction problem made government control difficult, and suppressed government's motivation to save and invest. He further suggested that aid provided in kind kills the motivation of developing countries to persist in the learning process which eventually enforces GDP growth.

Matuka & Osafo (2018) employed a co-integration analysis and an error correction methodology to examine the impact of external debt on economic growth in Ghana using annual time series from 1970-2017. Their estimates show that our normalized long-run co-integrating growth equation coefficients do not differ from our short-run vector error correction coefficients for our variables of interest. The study reported that external debt inflows stimulate growth in Ghana both in the long-run and short-run. Secondly, our study also confirmed the crowding out effect, debt overhang effect and the non-linear effect of external debt on economic growth in Ghana.

Complication arises from two sources. Firstly, that there are different opinions about the definition of terms such as debt, growth, exchange rate and condition for growth. Secondly, there are different interpretations about relationship between variables in growth theory especially those that are passive and active. Models usage has been subject to criticism.

3. Research method

3.1. Theoretical framework

The growth diagnostic theory developed by Hausman, Rodrick, Valesco (2008), Henceforth HRV, is the foundation of this work. The study proposed a pragmatic way of identifying the main reason for low level of economic growth in under-developed countries and possible transformation strategies. They observed that LDCs are faced with macroeconomics instability, unstable and stubborn fiscal problem, corruption, low productivity, financial instability, weak institution and

market failure. HRV argued that debt level must be manageable as well as reform institution, if a meaningful development must occur. The approach further suggested an analytical framework for identifying the most binding constraints that hamper economic growth in specific country at a specific point in time, thus allowing policymakers to prioritize those reforms that relax the binding constraints.

3.2. Empirical strategy

In this study, the three gap model developed by Solimano (1990) is used to examine the selected macroeconomic constrained. The model has been used by Bacha (1990), Taylor (1993), and Sogotemi (2000) to investigate debt cum growth relationship. However, the analysis used here drew heavily on the methodological framework by Redshirt (2005) who specified the three-gap model as: Fiscal, Saving and Exchange rate constrained. He further stated that fiscal constrained is intended to reflect the impact of availability of resource to finance public investment through external debt. Saving domestically and externally are also used to show low saving potential of the undeveloped economy. Foreign exchange also shows the gap in import and export (Matuka & Asafo, 2018).

The Model

Given the above and considering the work of Matuka & Asafo (2018) the baseline of this present study is in the stated below:

$$y = f(ed, ge, inf, pds) \tag{1}$$
$$y_t = \beta_0 + \beta_1 ed_t + \beta_2 ge_t + \beta_3 inf_t + \beta_4 pds_t + \mu_t \tag{2}$$

Where: the endogenous variable as y = real Gross Domestic Product while the exogenous variables are ed, = external debt stock, inf = inflation rate, pds = external debt service payment, ge = government expenditure and μ_t = error term. β_0 = constant and β_{1-4} = the marginal effect of each exogenous variables.

Estimation techniques

The time series properties of the variables incorporated in multiple regression model (2) is examined using the Augmented Dickey-Fuller unit root test in order to determine the long-run convergence of each series to its true mean. The test involves the estimation of equations with drift and trends as proposed by Dickey & Fuller (1988). The test equations are expressed as:

$$\Delta Z_t = \eta_0 + \eta_1 Z_{t-1} + \sum_{i=1}^{n} \pi_i \Delta Z_{t-i} + v_t \tag{3}$$

$$\Delta Z_t = \eta_0 + \eta_1 Z_{t-1} + \eta_1 t + \sum_{i=1}^{n} \pi_i \Delta Z_{t-i} + v_t \tag{4}$$

$$H_0: \quad \eta_1 = 0$$
$$H_1: \quad \eta_1 < 0$$

The time series variable is represented by Z_t and v_t as time and residual respectively. Equation (3) and (4) are the test model with intercept only, and linear trend respectively (Shobande & Etukomeni, 2018; Shobande, 2018).

The specified multiple regression model (2) is estimated through the use of Ordinary Least Square Estimator and other time series diagnostic tests are employed such as Ramsey RESET test for the entire structural stability of the model in line with underlining classical assumptions; residual diagnostic tests like Histogram normality test, Breusch Godfrey serial correlation LM test, Breusch-Pagan-Godfrey (BPG) and ARCH Heteroskedasticity tests; and Variance Inflation Factors (VIF) test to examine the level at which the estimated coefficient variance is inflated due to multicollinearity.

3.3. Descriptive statistics

The summary statistics indicated that the average value of gross domestic product growth rate (Y) stood at 14.11%. This implies that Nigerian economy grew at an average value of 14.11% annually between 1981 and 2012. Also, the average values of external debt (ED), government expenditure (GE), inflation rate (INF), and public debt servicing (PDS) stood at 12.8%, 12.37%, 2.75%, and 10.54% respectively.

Table 1. *Summary Statistics*

	ed	ge	inf	pds	y
Mean	12.75920	12.36740	2.747690	10.53561	14.11604
Median	13.28862	12.72848	2.541602	10.87894	14.80977
Maximum	15.40276	15.36564	4.287853	13.17530	17.04323
Minimum	7.754138	9.173313	1.541159	6.914809	10.77100
Std. Dev.	1.987552	2.093278	0.802419	2.083102	2.243677
Sum Sq. Dev.	118.5109	131.4544	19.31628	130.1794	151.0226
Observations	37	37	37	37	37

Source: Authors computation

Table 1. showed that the standard deviation of gross domestic product growth rate (Y) stood at 2.24%. It means that annual deviation of annual gross domestic product growth rate (Y) from its long-mean is 2.24% every year. Also, deviation of external debt and other macroeconomic indicators such as external debt (ED), government expenditure (GE), inflation rate (INF), and public debt servicing (PDS) from their long-run mean are 1.99%, 2.09%, 0.8% and 2.08% respectively.

Similarly, the time series plot of gross domestic product growth rate (Y), external debt (ED), government expenditure (GE), inflation rate (INF), and public debt servicing (PDS) are presented on Table 1. A closer look at GDP growth rate trend indicated a cyclical growth pattern between 1981 and 2018. That implying that GDP growth rate in Nigeria had not been consistent and indicating varying rate of growth. However, there is clear evidence from Table 1 that the GDP growth rate increased not in real value

during the post-2009 crisis, while the external debt was not impressive throughout the reviewed periods as its trend increased overtime.

3.4. Unit root test analysis

The stationary test results of the incorporated times series variables in the regression model is presented in Table 2 using the Augmented Dickey-Fuller (ADF) unit-root test. The test results indicated that the inflation rate (INF) is stationary, mean reverting and convergenced towards its long-run equilibrium. Then, the series was integrated of order zero i.e. I(0).

Table 2. *Pe-tests: ADF unit root test results*

Series	T-ADF Statistics	Critical Value	Order of Integration
ly	-4.065274	1% level: -4.309824	I(1)
	(0.0174)	5% level: -3.574244	
		10% level: -3.221728	
led	-4.485011	1% level: -4.296729	I(1)
	(0.0064)	5% level: -3.568379	
		10% level: -3.218382	
lge	-4.384070	1% level: -4.309824	I(1)
	(0.0084)	5% level: -3.574244	
		10% level: -3.221728	
inf	-3.880622	1% level: -4.296729	I(0)
	(0.0257)	5% level: -3.568379	
		10% level: -3.218382	
lpsd	-7.075995	1% level: -4.296729	I(1)
	(0.0000)	5% level: -3.568379	
		10% level: -3.218382	

Source: Extracted from Appendix.

The test result indicated that all the time series variable i.e. changes in gross domestic product growth rate (Y), external debt (ED), government expenditure (GE) and public debt servicing (PDS) were not stationary at levels i.e. first-difference of these series are *mean reverting* and stationary. Then, the series was integrated of order one i.e. I(1). Although, econometric literature has indicated that linearly combining or regressing both stationary and non-stationary series on non-stationary time series might yield spurious regression and render estimated parameters inefficient, this argument prompted the cointegration test to examine if the linear combination of our considered macroeconomic variables yielded stationary residual.

4.5. Cointegration and long-run estimates

The long-run relationship among external debt, other macroeconomic variables and economic growth in Nigeria between 1981 and 2018 was examined using the Engle-Granger cointegration technique and the test results are shown in Table 3.

Table 3. *Engle-Granger cointegration results*

Series	ADF Test at Level		Decision
	T-ADF Statistics	Critical Value	
$ECT = u = LNY - \begin{pmatrix} \alpha + \beta_1 LNGE + \beta_2 LNGE + \beta_3 INF \\ + \beta_4 PDS \end{pmatrix}$	1% level: -4.296729	-3.693569	Stationary
	5% level: -3.568379	(0.0385)	i.e.
	10% level: -3.218382		Cointegrated

Source: Extracted from Appendix

The cointegration result presented in Table 3 indicated that the estimated residual (ECM) from the main empirical model was found to be stationary at level. This showed that the null hypothesis "no cointegration" was rejected at 5% significance level. This implies that there existed long-run relationships among external debt (ED), government expenditure (GE), inflation rate (INF), public debt servicing (PDS) and real gross domestic product (Y) in Nigeria between 1981 and 2018. Thus, there was long-run relationship between external debt vis-à-vis economic growth in Nigeria.

The cointegrating equation was estimated using the ordinary least square (OLS) method and the long-run estimates are presented in Table 4.

Table 4. *Normalized long run regression estimates*

Dependent Variable: LNY				
Method: Least Squares				
Sample: 1981 2018				
Included observations: 31				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.234858	0.388104	3.181770	0.0038
led	-0.062758	0.045833	-1.369263	0.1826
lge	1.000577	0.086160	11.61299	0.0000
inf	0.001045	0.002557	0.408660	0.6861
lpds	0.121941	0.099356	1.227306	0.2307
R-squared			0.9908	
Adjusted R-squared			0.9894	
S.E. of regression			0.2306	
F-statistic			703.37	
Prob(F-statistic)			0.0000	
Durbin-Watson stat			1.3924	

Source: Extracted from Appendix.

The estimates of the long-run model that captured the effect of external debt on economic growth in Nigeria between 1981 and 2018 indicated that government expenditure (GE), inflation rate (INF) and public debt servicing (PDS) exert positive effect on real gross domestic product (Y) in Nigeria during the reviewed period. All the variables were found to be in line with the a priori expectation except for inflation rate and public debt servicing. In magnitude term, a 1% increase in inflation rate (INF), changed in government expenditure (GE) by 0.001%, and public debt servicing (PDS) by 10% enhanced economic growth proxy by real gross domestic product (Y) by 1.12% respectively. Thus, external debt (ED) was found to exert negative impact on economic growth (Real gross domestic product (Y)) which was not in line with theoretical expectation. In magnitude, a 1%

percentage increase in external debt (ED) deteriorates economic growth proxy (Real gross domestic product (Y)) by 0.63%.

In term of the significance of the estimated parameters for the considered variables, the t-statistics results are presented in Table 4. The results showed that the estimated parameter for government expenditure (GE) was found to be statistically significant at 5% critical level because their *p-values* are less than 0.05. Other variables' parameters i.e. inflation rate (INF), public debt servicing (PDS) and external debt (ED) were statistically insignificant at 0.05 and 0.10 critical regions.

Although, the F-statistic result indicated that the external debt and other indicators were simultaneously significant at 5%, this prompted the rejection of the null hypothesis (external debt has no significant effect on economic growth in Nigeria). The adjusted R-squared result revealed that 98.9% of the total variation in economic growth is accounted by changes in inflation rate (INF), government expenditure (GE), public debt servicing (PDS) and external debt (ED) during the review period. The Durbin-Watson test result reveals that there is presence of moderate positive serial correlation among the residuals, because of the d-value (1.3923) was less than two. Also, the result is not spurious since coefficient of determination was not greater than Durbin-Watson value.

3.6. Linear error correction mechanism (ECM) analysis

The short-run analysis of the relationship between external debt and economic growth in Nigeria between 1981 and 2018 was examined using error correction mechanism (ECM) model and the estimated results were shown in Table 5.

Table 5. *Short run linear error correction estimates*

Dependent Variable: DLNY				
Method: Least Squares				
Sample: 1981 2018				
Included observations: 37				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.142876	0.045422	3.145548	0.0044
D(LNED)	-0.113688	0.066117	-1.719493	0.0984
D(LNGE)	0.422712	0.175668	2.406310	0.0242
D(INF)	0.001186	0.001752	0.677081	0.5048
D(LNPDS)	0.041347	0.062563	0.660891	0.5150
ECM (-1)	-0.494606	0.196037	-2.523021	0.0187
R-squared			0.7881	
Adjusted R-squared			0.6398	
S.E. of regression			0.1711	
F-statistic			11.9428	
Prob(F-statistic)			0.0000	
Durbin-Watson stat			1.7387	

Source: Extracted from Appendix.

There is a clear evidence of reserve effect in the short-run compared to the long-run estimates presented in Table 5. All the variables still maintained their respective signs and statistical significance at both 5% except for external debt which became significant at 0.10. However, the

O.A. Shobande, & A.S. Adedokun, JEB, 6(4), 2019, p.340-356.

ECM reported that the model was free from autocorrelation problem since the value of Durbin-Watson was approximately two. However, the coefficient of determination with a value of 64.0% was still lower than the Durbin-Watson value, which denoted the non-spuriousness of the model.

The first-lag of the error correction term (ECT) was found to be statistically significant at 0.05 and correctly signed with the co-efficient of -0.4946 implying that there is long run relationship among the variables. Also, it further showed that 49.5% of the distortion in the short-run was corrected in the first year in attaining equilibrium or sustainable economic growth on the basis of the changes in external debt and its other macroeconomic indicators in Nigeria.

3.7. Higher-order test

The Breusch-Godfrey serial correlation test result from Table 6 reported that we do not reject the null hypothesis *"no serial correlation"* at 5% significance level, and likewise for the Breusch-Pagan-Godfrey heteroskedasticity test, the result indicated that we do not reject the null hypothesis "*no heteroskedasticity*" at 5% significance level.
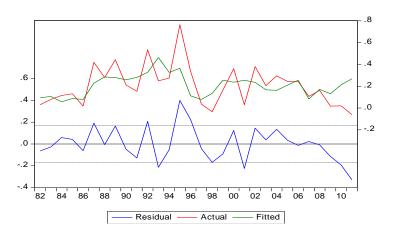

Table 6. *Post-test: Serial Correlation LM Test*

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.242526	Prob. F(2,22)	0.7867
Obs*R-squared	0.647167	Prob. Chi-Square(2)	0.7236
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	1.469073	Prob. F(7,36)	0.2367
Obs*R-squared	7.030096	Prob. Chi-Square(7)	0.2184

Source: Extracted from Appendix.

Table 6 below reports the probability value of the Jarque-Bera statistic (0.40975), which showed that the estimated residual series was normally distributed with zero mean and constant variance. This tended to improve the reliability of the estimated parameters and thus, necessitated other residual diagnostic test such as higher order serial correlation and heteroskedasticity tests.

4. Concluding remarks

Considering the observed nature of the effect of external debt on economic growth rate in Nigeria during the period under reviewed (1981-2018), the following strategic policy options are proffered: the government should be more careful on terms and agreement of interest on debt and cost of its debt service payments so that it would not retard the growth rate of the Nigerian economy. The federal government should ensure that debt is used in financing developmental projects meant for economic prosperity and standard of living improvement; and strategic macroeconomic policies should be instituted in order to encourage domestic private investment at home and abroad because of its significant capacity to enhance the growth of the Nigerian economy.

References

Abdelmawla, A., & Mohammed, B. (2005). The impact of external debt on economic growth: An empirical assessment of the Sudan: 1978-2001. *Eastern African Social Science Research Review*, 21(2), 53-66. doi. 10.1353/eas.2005.0008

Abubakar, N.A., & Hassan, S. (2008). Empirical evaluation on external debt of Malaysia. *International Business and Economies Research Journal*, 7(2), 95-108. doi. 10.19030/iber.v7i2.3226

Abubakar, S. (2011). External debt and Nigerian economic development: An empirical investigation, *The National Conference on Growth, Poverty and Human Development in Africa: An Agenda for Development in Post Crisis Era*. Nassarawa State University, Keffi, Nassarawa State.

Adepoju, A.A., Salau, A.S., & Obayelu, A.E. (2007). The effect of external debt management on sustainable economic growth and development, lessons from Nigeria, *MPRA Paper,* No.2147. [Retrieved from].

Adesola, W.A. (2009). Debt servicing and economic growth in Nigeria: An empirical investigation, *Global Journal of Social Sciences*, 8(2), 1-11. doi. 10.4314/gjss.v8i2.51574

Amoateng, K., & Amoaku, A.B. (1996). Economic growth, export and external debt causality: The case of African countries. *Applied Economics*, 28, 21-27. doi. 10.1080/00036849600000003

Audu, I. (2004). The impact of external debt on economic growth and public investment: The case of Nigeria, *African Institute for Economic Development and Planning* (IDEP), Dakar. [Retrieved from].

Ayadi, F.S., & Ayadi, F.O. (2008). The impact of external debt on economic growth: A comparative study of Nigeria and South Africa, *Journal of Sustainable Development in Africa*, 10(3), 234-264.

Bauerfreund, O. (1989). External debt and economic growth: A computable general equilibrium case study of Turkey 1985-1986. *Unpublished Ph.D. Thesis*, Duke University, Dubai.

Boopen, S., Kesseven, P., & Ramesh, D. (2007). External debt and economic growth: A vector error correction approach. *International Journal of Business Research*, 51(4), 211-233.

Borensztein, E. (1990). Debt overhang, debt reduction and investment: The case of Philippines. *IMF Working Paper*, No. WP/90/7. [Retrieved from].

Chauvin, N.D., & Kraay, A. (2005). *What Has 100 Billion Dollars Worth of Debt Relief Done for Low Income Countries?"* Mimeo, World Bank.

Cholifihani, M. (2008). A co-integration analysis of public debt service and GDP in Indonesia. *Journal of Management and Social Sciences*, 4(2), 68-81.

Choong, C., Lau, E., Liew, V.K., & Puah, C. (2010). Does debts foster economic growth? The experience of Malaysia, *African Journal of Business Management,* 4(8), 1564-1575.

Chowdhury, K. (1994). A structural analysis of external debt and economic growth: Some evidence from selected countries in Asia and the pacific. *Applied Economics*, 26(12), 1121-1131. doi. 10.1080/00036849400000110

Clements, B., Bhattacharya, R., & Nguyen, T.Q. (2003). External debt, public investment, and growth in low-income countries, *IMF Working Paper,* No.WP/03/249. [Retrieved from].

Cobbe, J. (1990). Africa's economic crisis: The roles of debt, the state, and international economic institutions. *The Journal of Modern African Studies*, 28(2), 351-358. doi. 10.1017/S0022278X00054574

Cohen, D., & Vellutini, C. (2004). *Beyond the HIPC Initiative. Toulouse, France:* European Commission. [Retrieved from].

Cohen, D. (1993). Low investment and large LDC debt in the 1980s. *American Economic Review*, 83(3), 437-449.

Cunningham, R.T. (1993). The effects of debt burden on economic growth in heavily indebted nation, *Journal of Economic Development*, 18(1), 115-126.

Deshpande, A. (1997). The debt overhang and the disincentive to invest. *Journal of Development Economics*, 52(1), 169-187. doi. 10.1016/S0304-3878(96)00435-X

Dessy, S.E., & Vencatachellum, D. (2007). Debt relief and social services expenditure: The African experience 1989-2003. *African Development Review*, 19(1), 200-216. doi. 10.1111/j.1467-8268.2007.00154.x

Dijkstra, G. (2006). Comment on Tony Addison: Debt relief: The development and poverty impact. *Swedish Economic Policy Review*, 13, 231-239.

Dinneya, G. (2006). Democracy, external debt and growth in Nigeria: An impact analysis under a narrow definition of debt-led growth, *Canadian Journal of Political Science*, 39(4), 827-53. doi. 10.1017/S0008423906060379

EI-Shibly, A., & Thirlwall, A.P. (1979). The balance of payments constraint as an explanation of international growth rate differences, *Banca Nazionale del Lavoro Quarterly Review*, 32(128), 45–53.

Elbadawi, I., Ndudu, B., & Ndung'u, B. (1997). Debt overhang and economic growth in Sub-Saharan Africa. *In* Z. Iqbal, & K. Ravi (Eds.), *External Finance for Low Income Countries*. IMF Institute, Washington DC.

Gunter, B.G. (2002). What's wrong with the HIPC initative and what's next? *Development Policy Review*, 20(1), 5-24.

Hameed, A., Ashraf, H., & Chaudhary, M.A. (2008). External debt and its impact on economic and business growth in Pakistan, *International Research Journal of Finance and Economics*, 44, 88-97

Hasan, A., & Butt, S. (2008). Role of trade, external debt, labour force and education in economic growth empirical evidence from Pakistan by using ARDL approach. *European Journal of Scientific Research*, 24(4), 150-165.

Hausmann, R., & Klinger, B. (2008). *Growth Diagnostic: Mexico*. Inter-American Development Bank, Mimeo.

Karagol, E. (2002). The causality analysis of external debt service and GNP: The case of Turkey, *Central Bank Review*, 2(1), 39-64.

Krugman, P. (1988). Financing vs. forgiving a debt overhang: Some analytical issues. *NBER Working Paper*, No.2486. doi. 10.3386/w2486

Lora, E., & Olivera, M. (2006). Public debt and social expenditure: Friends or foes?, Inter-American Development Bank, Research Department, *Technical Report*, No.563. [Retrieved from].

Malik, S., Hayat, M.K., & Hayat, M.U. (2010). External debt and economic growth: Empirical evidence from Pakistan, *International Research Journal of Finance and Economics*, 44(1), 150-165.

Moss, T., Scott, S., Birdsall, N. (2005). Double standards on IDA and debt: The case of reclassifying Nigeria. Washington DC: *Centre for Global Development*. [Retrieved from].

Moyo, D. (2009). *Dead Aid*. New York: Farrar, Straus, and Giroux.

Mutaka, A., & Asafo, S. (2018). External debt and economic growth in Ghana: A co-integration and a vector error correction analysis. *MPRA Papers*, No.90463. [Retrieved from].

Mwega, F.M., Mwangi, N., & We-Ochilo, F.O. (1994). Macroeconomic constraints and medium term growth in Kenya: A three-gap analysis, *AERC Research*, Nairobi. [Retrieved from].

Ogunmuyiwa, M.S. (2011). Does external debt promote economic growth in Nigeria?, *Current Research Journal of Economic Theory*, 3(1), 29-35.

Okonkwo, C.S., & Odularu, G.O. (2012). External debt, debt burden and economic growth nexus: Empirical evidence and policy lessons from selected West African States, *Conference of the Centre for the Study of African Economies* (CSAE). March 18-20. Oxford, UK: St. Catherine's College.

Oleksandr, D. (2003). Non-linear impact of external debt on economic growth: The case of Post-Soviet countries. *Unpublished M.A. Thesis*, National University of Kyiv-Mohyla.

Oloyede, B. (2002). *Principles of International Finance*, Forthright Educational Publishers, Lagos.

Omotoye, O.R., Sharma, H.P., Ngassam, C., & Eseonu, M.C. (2006). Sub-Saharan Africa's debt crisis: Analysis and forecast based on Nigeria, *Managerial Finance*, 32(7), 606-602.

Osei, B. (2000). Ghana: The burden of debt-service payment under structural adjustment, *in* S.I. Ajayi & M.S. Khan (Eds.), *External Debt and Capital Flight in Sub-Saharan Africa*. Washington: International Monetary Fund.

Osinubi, T.S., & Olaleru, O.E. (2006). Budget deficits, external debt and economic growth in Nigeria, *Applied Econometrics and International Development*, 6(3), 159-185.

Patenio, J.A.S., & Tan-Cruz, A. (2007). Economic growth and external debt servicing of the Philippines: 1981-2005. *10th National Convention on Statistics*.

Patillo, C., Poirson, H., & Ricci, L. (2004). What are the channels through which external debt affects growth? *IMF Working Paper*, No.WP/04/15. [Retrieved from].

Rais, S.I., & Anwar, T. (2012). Public debt and economic growth in Pakistan: A time series analysis from 1972 to 2010, *Academic Research International*, 2(1), 535-544.

Sachs, J.D. (1989) Introduction to "developing country debt and the world economy. *In Developing Country Debt and the World Economy*, (pp.1-34). National Bureau of Economic Research, Inc.

Savvides, A. (1992). Investment slowdonw in development countries during the 1980's: Debt overhang or foreing capital. Kyklos, 45(3), 363-378. doi. 10.1111/j.1467-6435.1992.tb02121.x

Shabbir, S. (2009). Does external debt affect economic growth: Evidence from developing countries. *SBP Working Paper Series*, No.63. [Retrieved from].

Smyth, D.J., & Hsing, Y. (1995). In search of an optimal debt ratio for economic growth, *Journal of Contemporary Economic Policy*, 13(4), 51-59.

Solimano, A. (1990). Macroeconomic constraints for medium-term growth and distribution: A model for Chile. *Country Economics Department Working Papers*, The World Bank.

Soludo, C.C. (2003). Debt poverty and inequality. *in* O. Iweala, & A. Muntar (Eds), *The Debt Trap in Nigeria*, (pp.23-74), Africa World Press NJ.

Shobande, A.O., & Etukomeni, C. (2018). Financing human development for sectorial growth: A time series analysis. *Timisoara Journal of Economics and Business*, 10(1), 51–67. doi. 10.1515/tjeb-2017-0004

Shobande, O. (2015). In search of inclusive growth : A concern for fiscal space. *The Empirical Econometrics and Quantitative Economics Letters*, 4(4), 175-185.

Shobande, O.A. (2018). Imperative of exchange rates policy and industrial growth in Nigeria: A time series analysis. *Timisoara Journal of Economics and Business*, 10(2), 187-198. doi. 10.1515/tjeb-2017-0012

Shobande, O.A. (2018). Modelling the dynamics of government finance on bond market return in Nigeria. *Theoretical Economics Letters*, 8(15), 3438–3443. doi. 10.4236/tel.2018.815210

Taylor, J.B. (2010). Reassessing discretionary fiscal policy. *Journal of Economic Perspectives*, 14(3), 21-36. doi. 10.1257/jep.14.3.21

Warner, A.M. (1992). Did the debt crisis cause the investment crisis, *The Quarterly Journal of Economics*, 107(4), 1161-1186. doi. 10.2307/2118384

Were, M. (2001). The impact of external debt on economic growth in Kenya: An empirical assessment, UNU-WIDER, *Research Paper*, No.DP2001/116. [Retrieved from].

Yang, J., & Nyberg, D. (2009). *External debt sustainability in HIPC completion point countries*: An update. IMF Working Papers, No.WP/09/128. [Retrieved from].