

## **EFFECT OF PUBLIC DEBT ON POVERTY REDUCTION IN NIGERIA: EVIDENCE FROM HIGHLY INDEBTED COUNTRY**

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### **ABSTRACT**

The concern of public borrowing rising all over the world has suffered by numerous developing countries. This has attracted global attention recently amid a shortfall in revenue generation to meet up the desired government expenditure. Based on this, the paper examines the effect of public debt on poverty reduction in Nigeria; assessed the effect of external, domestic, and debt servicing in Nigeria. Secondary time series data spanning the period of Twenty-one years (2000–2021) was gathered in the study. The data used in the study was estimated using descriptive statistics, correlational matrix, and Error Correction Mechanism (ECM). Discoveries from the result revealed that external debt exerts a positive and significant effect on poverty alleviation in Nigeria, while domestic debt and debt servicing had an inverse and significant relationship with poverty reduction in Nigeria as well. The empirical evidence reveals that there is a co-integration between public debt and poverty alleviation in Nigeria. Based on these findings, the paper recommends that; to achieve a significant reduction in poverty in Nigeria, the government should examine and review current policies and incentives of external borrowing in Nigeria and the current administration needs to mobilize domestic savings efforts to tackle the nuisance of poverty in Nigeria.

**Keywords:** Public Debt, Poverty Reduction in Nigeria, Error Correction Mechanism, Co-integration

## **INTRODUCTION**

When government income falls diminutive of its expenses, governments borrow to meet up their statutory obligation. Public debt is thus a critical instrument for governments to fund public spending and thereby accelerate economic growth, particularly when it is difficult to raise taxes and reduce public expenditure. Over the years, this process has left most governments with massive outstanding debts, which sound effects are distressing on the economy as a result of debt overhang. Reasonable borrowings to finance public and infrastructure development are the key to reducing hunger. However, excess borrowings without appropriate planning for investment may lead to a heavy debt burden and interest repayment, which in turn may create several undesirable effects on the economy (Joy & Panda, 2020). These resultant effects have constituted a serious barrier to achieving zero hunger in developing countries and the Sustainable Development Goals (SDGs) of 2030.

Public debt is a medium used by countries to bridge their deficits and carry out economic projects that can increase the standard of living of the citizenry and promote sustainable growth and development with future repayment (Eke & Akujuobi, 2021). Most economies especially, the developed world have at one time or the other experienced shortfall between domestic savings and the desired level of investment in the time past and they had to borrow including the United Kingdom (UK), Germany, Canada Australia, Russia, and United State of America (USA), had also borrowed to grow their economy (Stevens, 1994).

According to Tamunonimim (2014), applying the principles of scarcity, countries borrowed to grow their economies, sustain economic growth, and ultimately improve the standard of living of their citizenry. The level of public debt in developing Countries such as South Africa, Kenya, Tongo, and Madagascar had also used these debts to grow their economy and to improve the living standard of their citizens, but the high rate of borrowing has not been reflected in the poverty level in those countries. Particularly in South Africa, the level of public debt portfolio still predominantly contains multilateral loans (47%) and Bilateral Loans (35%) as the current debts stand at \$130 billion, and still about 18.2 million people in South Africa Lived in extreme poverty (WDI, 2022). The implication of this is that public borrowing has not contributed to poverty reduction in the country. The scenario is not different in Madagascar which is considered the poorest country in the whole of Africa as their poverty level reached 81% in 2022. It is the highest level of Poverty in the country since 2012 amid increasing public borrowing.

Nigeria is not an exception to this modality. Particularly, Nigeria's public borrowing is aimed at shaping macroeconomic variables which are occasioned by rising government expenditures *vis-à-vis* falling government revenues in recent times; supplementing the internal savings for productive activities through infrastructural development as well as management of other

macroeconomic conditions of the country (Ajayi; 1989, Adofu&Abula,2010). Government borrowing can be traced back to the financial reform introduced by the Colonial administration in 1958, which gave rise to the creation of public financial assets to finance fiscal deficit (Efanga&Etim2020), to enhance economic growth and reduce poverty.

Furthermore, in 2013, the Federal Government proposed to spend N543 billion on public debt servicing out of N592 billion total debt service cost, yet debt stock is to increase to approximately N7 trillion (\$45 billion) at the end of 2013 (Ozigbu, 2018). The public debt profile grew slowly until 2015 (Businessday, 2019). According to the DMO (2021), the Government spent a huge amount of N898.6 billion on debt servicing in Nigeria, and the current debt profile of Nigeria as it stands is N41.6 trillion. The debt profile level rose from N12 trillion to N25 trillion and, Nigeria has borrowed about N36 trillion as of December 2021 according to Debt Management Office (DMO, 2021).

Oyedele *et al* (2013) posited that a high level of indebtedness or increasing debt liabilities in Nigeria is the common state of affairs in recent times. This is because of the low level of domestic savings, high deficits in the current account, increasing levels of imports, especially capital goods, and commitments to poverty mitigation. The postulation of the neo-classical theory, especially the Harod-Domar growth model, is believed that the *raison d'être* for borrowing in poor economies, including Nigeria, is the savings-investment gap in that economy. It is important to note that once public borrowing is incurred, servicing of the debt is obligatory.

The huge amount of tax revenue spent on interest repayment has presented strong evidence of the trend of poverty in Nigeria since independence. Affirming this position, in 1980 only 27.2% of Nigerians were said to be poor, the proportion increased to 46.3%, 42.7%, 65.6%, 70%, 73%, and 79% in 1985, 1992, 1996, 2000, 2005, and 2010 respectively (NBS, 2012). Though, the National Bureau of Statistics (2019) put the Nigerian poverty number as 112million representing about 67.1% of the country's total population of 167million with reference to the new poverty benchmark of the \$3.2 a day threshold put forward by the World Bank. The situation has continued in its aggravating and unacceptable trend as Public borrowings keep increasing. This pathetic poverty situation in the country has rather painted a sober picture of a rich and blessed country in the world with alarming poverty rates.

The Poverty rate in Nigeria has also been unpredictable not following a steady trend with public debt borrowing. According to NBS, Nigeria's has risen from 11.6 percent in 2021 to 40.1 percent. Theoretically, a rise in public debt increases capital investment which by implication should reduce Poverty in Nigeria (DMO, 2016). Public debt in Nigeria has been on the increase despite the debt forgiveness in 2005 to the tune of about \$18 billion received by Nigeria from the Paris Club since the year 2005, there is no evidence of an accelerating pace of growth and

development and subsequent reduction of poverty in the country. Poverty reduction is a means by which people's purchasing power is improved. Poverty reduction presupposes that there is an increase in the income rate and consumption rate of the people over time. According to Oba & Onuoha (2013), poverty alleviation, which is also called poverty reduction, refers to the improvement in the living condition in which an entity is enabled to overcome economic, social, political, cultural, and environmental deprivation with an increase in his/her level of income.

Despite the enormous public borrowing to support the productive sectors of the economy to take Nigerians out of Poverty in the country, there has been a continual increase in the level of poverty in the country. It is on this background that this study applied the ECM to investigate the relationship between public debt and poverty reduction in Nigeria. This paper is divided into five parts, introduction is taken part one. The rest of the paper is structured as follows; part two is the review of selected literature relevant to the subject matter. Part three focuses on methodology, part four focuses on the result of data analysis and discussion of major findings, and part five deals with the conclusion and recommendations of the study.

## **REVIEW OF RELEVANT LITERATURE TO THE STUDY**

### **The Keynesian Theory of Public Debt**

This theory is fundamentally linked to the doctrine of Keynes (1936) and it is based on the assumption that state intervention in the economy is necessary due to the realities of market failure. The Keynesian doctrine alters the very liberal assumptions and principles of the Classical theory. In response to the challenges of those times, especially the great depression that hit the world between 1929 – 1930, the Keynesian doctrine attaches great importance to the state, whose interventions in the economy are considered helpful in complementing the activities of the free market and correcting its imperfections (Bilan, 2016). The Keynesian's view of public debt deviated from the classical assumptions as they perceive public borrowing as growth-enhancing due to the expected turnaround associated with its investment in productive activities.

More broadly, Keynesians are of the view that public borrowing tends to offer opportunities for growth as the government is more committed to more value-adding activities including public works, and assumes the task of countering disturbing economic and social phenomena. This is believed to add value to borrowed funds as a way of intervention to correct imbalances and keep the economy on the path of growth. Keynes' theory offered the basis for state intervention in accelerating the pace of economic growth, in a time of sluggish growth. Bernheim (1989) observed that many traditional Keynesians are of the view that public borrowings need not crowd out private investment as the increased aggregate demand enhances the profitability of private investments.

The theory stands on the assumption that public borrowing has an increasing function on economic growth through the availability of funds to finance decayed infrastructure which can create more job opportunities, improve income, and living standards and hence reduce poverty in the economy.

### **Empirical Review**

Adeyemi *et al*(2009)explored the determinants of poverty in Sub-Saharan Africa using a set of cross-country data drawn from 48 countries. The study adopted a multiple regression analysis. The regression estimates show that growth in population, rising price level and external debt servicing amongst others are the factors influencing the rate of poverty in the sub-region.

Udoka and Anyingang (2010), examined the connection between external debt management policies and economic growth of Nigeria over the period 1970 – 2006. The Ordinary least squares multiple regression techniques were used to analyze the data. The result showed that GDP, exchange rate, fiscal deficit, interbank rate, and terms of trade are the major determinants of external debt in Nigeria.

Oyedele *et al* (2013), applied co-integration and regression analysis in investigating the impact of external debt and debt servicing on poverty reduction in Nigeria using time series data that spanned from 1980 to 2010. Debt income ratio, debt service, degree of openness, growth of agricultural value added, per capita income, inflation rate, and investment-income ratio. Multiple regression results found that both external debt and debt servicing cause poverty in Nigeria. Similarly in Nigeria, Ekpo and Udo (2013) analyzed the link between debt burden, growth, and incidence of poverty reduction between 1970 and 2011. In the econometric model, elements of a failing state comprising corruption, insecurity, and ethnic violence were also included as explanatory variables. Again, the incidence of poverty was measured by the proportion of government spending on social services and income per capita. It was found that public debt is negatively related to growth and poverty reduction.

Tamunonimim (2014) investigated the relationship between domestic debt and poverty in Nigeria from 1986 – 2012. The variables used are RGDP, PCI, GDPPC, and BSSR were used. The Ordinary Least Squares method, Co-integration, and Granger Causality Approaches were employed. The OLS, equally revealed that the domestic debt coefficient has a positive impact.

Akram (2016) assessed the implications of public debt on economic growth and poverty reduction in some selected South Asian countries comprising Bangladesh, India, Pakistan, and Sri Lanka between 1975 and 2010. The study developed an empirical model that incorporates the role of public debt into growth equations and the model is extended to incorporate the effects of debt on poverty. The estimation process relied on the standard panel data-based estimation

methodologies. The results indicate that the public debt profile has a negative impact on economic growth. It was equally uncovered that neither public external debt nor external debt servicing has a significant relationship with income inequality. On the other hand, domestic debt has a positive link with economic growth and a negative impact on the GINI coefficient, indicating that domestic debt is pro-poor.

Abula and Ben (2016) examined the effect of public debt on economic development in Nigeria from 1986 to 2014. The Johansen co-integration test, Error Correction Mechanism (ECM), and the Granger Causality test were utilized. The results showed evidence of a long-run relationship among the variables. The results of the ECM indicated that external debt servicing and external debt stock have a negative and insignificant impact on economic development in Nigeria while domestic debt stock has a significant influence on economic development. The results also showed that domestic debt service payment has a negative and significant effect on economic development in Nigeria, while the Granger causality test revealed that there is causality between dependent and independent variables.

Ozigbu (2018), examined the impacts of public debt sustainability on poverty incidence in Nigeria, the variables used are external debt stock, interest payment on external debt, and poverty head account. The result of the Johansen-Juselius co-integration test revealed that the series has a long-run relationship. The estimated co-integrating regression model shows that external debt stock as a share of GNI has a significant positive relationship with poverty headcount; a 10 percent increase in external debt stock induces a 7.59 percent increase in poverty headcount.

Abimiku, *et al* (2018), investigated the role of education on poverty in Nigeria. The study focused on adult literacy rate and per capita expenditure densities, annual time series data used from 1986 to 2016. The OLS and ECM estimation techniques were employed for the analysis; findings revealed that education in Nigeria had not led to the desire for poverty reduction as the country is yet to fully harness the immense benefits of education.

## **RESEARCH METHODOLOGY**

Research design is a master plan specifying the method and procedures for collecting and analyzing the needed information for research. Phillips (1971) noted that research designs constitute the blueprint for the collection, measurement, and analysis of data. It is also a framework that specifies the type of information to be collected, the sources of data, and the data collection procedures. The article utilized secondary data gotten from the Central Bank of Nigeria (CBN) statistical bulletin, World Development Index, National Bureau of Statistics (NBS), and Debt Management Office from 2000 – 2021. The choice of this scope is anchored on

the actuality that public borrowing takes a different dimension in the earliest 2000 when the democratic rule was re-adopted.

**Model Specification**

To analyze the impact of each component of public debts on poverty reduction in Nigeria, variables that are the components of public debts are considered as the explanatory or independent variables while the poverty rate in Nigeria is the explained or dependent variable. This work is anchored on the work of Eke & Akujuobi 2021 and modified thus; the functional form of the model is expressed as:

$$RGDP = f(EXDT, DMDT, DBSV) \quad (1)$$

The stochastic form of the model is as follows

$$RGDP = \lambda_0 + \lambda_1 EXDT + \lambda_2 DMDT + \lambda_3 DBSV + \mu \quad (2)$$

Since the variables have different units of measurement with the poverty rate measured in percentage while other components of public debts are measured in billions, equation 2 is transformed into a log-linear form as follows:

$$RGDP = \lambda_0 + \lambda_1 \text{Log}EXDT + \lambda_2 \text{Log}DMDT + \lambda_3 \text{Log}DBSV + \mu \quad (3)$$

Where: POVR = Poverty Rate, EXDT = External Debts, DMDT = Domestic Debts, DBSV= Debts Servicing,  $\mu$ = stochastic or Error Term,  $\lambda_0$ = Constant or Intercept of the regression line

$\lambda_1, \lambda_2,$  and  $\lambda_3$ = Coefficient of the parameter estimates of External Debt, Domestic Debt, and Debt Servicing.

**Error Correction Mechanism**

To examine the long-run relationships of the model, the error correction model has been used. Error correction term included in the model, explains the speed of adjustment towards the long run equilibrium. Initially, if the variables confirm the existence of co-integration, then the Error Correction Model (ECM) will be estimated. Engle and Granger (1987), pointed out that if two variables are co-integrated in the first difference, their relationship can be expressed as the ECM by taking past disequilibrium as explanatory variables for the dynamic behavior of current variables. The ECM method corrects the equilibrium error in one period by the next period. Therefore, the deviation from the long-run relationship should be included as an explanatory variable in an Error Correction Model which can be presented as follows:

$$\Delta Y_t = \lambda_0 + \lambda_1 \Delta X_t + \lambda_2 \mu_{t-1} + \varepsilon_t \quad (4)$$

Where  $\Delta Y_t = Y_t - Y_{t-1}$ ,  $\Delta X = X_t - X_{t-1}$ ,  $\lambda_1$ , and  $\lambda_2$  are the dynamic adjustment coefficients,  $\mu_{t-1}$  is the lag of residual representing short run disequilibrium adjustments of the estimates of the long run equilibrium error, while  $\varepsilon_t$  is the random error term (Gujarati, 2004). The error correction coefficient must be negative which indicates the existence of a short-run relationship. The size of the error correction coefficient determines the speed of adjustment toward equilibrium. In this study, the Error correction model (ECM) is specified as:

$$\Delta \text{POVR}_t = \lambda_0 + \lambda_1 \Delta \text{EXDT}_{1t} + \lambda_2 \Delta \text{DMDT}_{2t} + \lambda_3 \Delta \text{DESV}_{3t} (t-1) + \varepsilon_t \quad - \quad - \quad (5)$$

Where;  $\Delta \text{POVR}_t$  is the change in the poverty rate in Nigeria at time  $t$ ,  $\Delta \text{EXDT}_{1t}$  is the change in external debt at time  $t$ ,  $\Delta \text{DMDT}_{2t}$  is the change in domestic debt at time  $t$ ,  $\Delta \text{DESV}_{3t}$  is the change in debt servicing at time  $t$ .  $\lambda_0$  is the constant term,  $\lambda_1$ ,  $\lambda_2$ , and  $\lambda_3$ , are parameters of the independent variables and  $\varepsilon_t$  is the stochastic error term which we will assume is well-behaved in the usual sense.  $ECM_{t-1}$  represents short-run disequilibrium adjustments of the estimates of the long-run equilibrium error and  $\alpha$  is the coefficient of the error correction term.

### **The *Apriori* Expectations of the Model**

According to Koutsoyiannis(1977), states that *apriori* definition is the theoretical criterion on the basis of which the results of the estimation of the model are evaluated. They are expectations about the sign and size of the parameters of the function in the model specified and they are estimated to determine if the magnitude and size of the parameters estimate conforms to and or negate the economic theory.

The *apriori* expectation of the coefficient of equations 2 and 3 is as follows;  $\lambda_0$ ,  $\lambda_1$ ,  $\lambda_2$ ,  $<0$  while  $\lambda_3$  is  $>0$ . This portrays an inverse relationship between poverty reduction and public debt components (External, Domestic, and Debt servicing). The negative relationship implies that an increase or decrease in public borrowing such as External, Domestic, and Debt servicing will bring about an increase or decrease in the poverty rate as the case may be.

### **DATA PRESENTATION**

This study used annual data on Poverty Rate, External Debt, Domestic Debt, and Debt Servicing for the period 2000-2021 to achieve its objectives. The summaries of descriptive statistics of the variables are presented in Table 1 below:



**Table 1: Descriptive Statistics**

	<i>InDESV<sub>t</sub></i>	<i>InDMDT<sub>t</sub></i>	<i>InEXDT<sub>t</sub></i>	<i>InPOVR<sub>t</sub></i>
Mean	3.820935	5573.987	18.12073	61.56818
Median	1.699832	2698.835	10.79446	62.60000
Maximum	15.41074	23220.31	52.94455	90.80000
Minimum	0.253797	898.2500	4.950816	33.10000
Std. Dev.	4.481525	5754.901	16.33279	15.69429
Skewness	1.266483	1.553891	0.977927	-0.173726
Kurtosis	3.481751	5.027528	2.372898	2.562833
Jarque-Bera	6.094004	12.62175	3.867071	0.285852
Probability	0.047501	0.001816	0.144636	0.866818
Sum	84.06057	122627.7	398.6560	1354.500
Sum Sq. Dev.	421.7653	6.95E+08	5601.962	5172.528
Observations	22	22	22	22

**Source:** Computation using study data (2021)

Table 1 reveals that the median value of each variable does not differ significantly from their respective mean values, suggesting that the variables are consistent in the Model. The standard deviation values of the variables showed that Domestic debt with a standard deviation value of 5754.901 has the highest variability while Debt servicing with a standard deviation value of 4.481525 has the least variability. The maximum values of DESV, DMDT, and EXDT their respective minimum values as indicated in the table means that during the study time, the values of these variables were not the same and were also not constant as well. EXDT, DMDT, and DESV are positively skewed whereas the poverty rate of the variable is negatively skewed. The

kurtosis values indicate that all the variables are platykurtic, that is, have a flatter allocation than the normal. The study fails to reject the null hypothesis that the variables are not normally distributed since the Jarque-Bera statistic of each variable is not statistically significant.

**Result of the Multicollinearity Test**

According to Puepetet *al* (2023), the correlations between the variables utilized for the study were examined to find out whether or not a strong correlation exists between the variables. However, focus is placed on the relationship between dependent and independent variables. The correlation analysis of the variables used is shown in Table 2.

**Table 2: Correlation Result**

	<i>lnDESV<sub>t</sub></i>	<i>lnDMDT<sub>t</sub></i>	<i>lnEXDT<sub>t</sub></i>	<i>lnPOVR<sub>t</sub></i>
<i>lnDESV<sub>t</sub></i>	1.0000			
<i>lnDMDT<sub>t</sub></i>	0.5210	1.0000		
<i>lnEXDT<sub>t</sub></i>	0.5877	0.4881	1.0000	
<i>lnPOVR<sub>t</sub></i>	0.0615	0.1343	0.1486	1.0000

**Source:** Computation using study data (2021)

Asteriou and Hall (2006) posited that a strong correlation only exists between variables if the correlation coefficient between the variables is greater than 0.9. Thus, there is no strong correlation between the explanatory variables of the model employed for this study since none of the correlation coefficients between the explanatory variables is as high as 0.9 and therefore suggests that the estimates produced in the study do not suffer from multicollinearity. The estimate indicates that a positive association exists between all the variables.

**Unit Root Test for Stationarity**

This study used the Augmented Dickey-Fuller unit root to test for data persistence. The variables used in the analysis need to be stationary and, or should be co-integrated to infer meaningful relationships from the regression result. The tests were performed on all series using the Augmented Dickey-Fuller Unit root test. The results of the famous ADF unit root test are presented in Table 3.

**Table 3: Augmented Dickey-Fuller (ADF) Unit Root Test Results**

Variables	ADF Statistic	Critical values	Order of Integration	Remark
<i>InPOVR</i>	-1.9601**	-10.6345***	I(1)	Stationary
<i>InEXDT</i>	- 2.581037	-1.982344	I[0]	Stationary
<i>InDMDT</i>	-3.024488	-1.988198	I[1]	Stationary
<i>InDESV</i>	-5.420002	-1.600140	I[0]	Stationary

**Source:** Computation using study data (2021)

The unit root test result shows that the study rejected the null hypothesis that the series has a unit root at level for EXDT and DESV at 10% and 5%, respectively in favor of the alternative hypothesis that the series does not have a unit root. This means that these variables are not stationary at level. In contrast, the study failed to reject the null hypothesis at level for POVR and DMDT, indicating that the variables are not stationary at level. This is because, in all the variables, the absolute value of ADF statistics is greater than the absolute value of the Critical value at a 5% level of significance. The result of the unit root test indicates the variables are a mixture of I(0) and I(1). This necessitated ECM to find out if the variables have a long-run asymmetry relationship.

**Error Correction Mechanism**

The Error Correction Coefficient reveals the speed at which the model returns to equilibrium after an exogenous shock. As a result, the Error Correction Term should be negatively signed to indicate a move toward equilibrium.

**Table 4:Error Correction Regression Result**

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-Statistic</i>	<i>Prob. Val.</i>
$\Delta \ln EXDT_t$	5.5911**	3.7310	0.000000	0.0000
$\Delta \ln DMDT_t$	-3122880**	538082	0.000000	0.0000
$\Delta \ln DESV_t$	-1.6313***	1.371200	0.000000	0.0000
CointEq(-1)*	-0.70741*	0.054868	12.89308	0.0060
R <sup>2</sup>	0.978334			
Adjusted R <sup>2</sup>	0.967501			
F-statistic	11.08209			0.0000

**Source:** Computation using study data (2021)

The validity of the ECM estimates was investigated in this study using three variables independent and one dependent variable to evaluate model 2 and 3 and check if the result conforms to or negate the *apriori* expectation of the study. External debt had a coefficient of 5.5911 and is statistically significant at 5%, indicating that there is a positive and statistically significant association between external debt and poverty reduction. *Ceteris paribus*, a 1% increase in external debts will increase or worsen the short-term poverty rate by more than 500%. This negates the theoretical expectations that increase in Public borrowing, the high benefactor will be the masses in Nigeria. This exponential rise in the poverty rate in Nigeria amid enormous government borrowing can be attributed to so many factors such as poor planning of the government to channel this public money, corruption, misplacement of priority, and a high belief of the government that long-term debts can be forgiven.

The ECM result uncovers that there is a negative and statistically significant relationship between domestic debt and poverty reduction in Nigeria. The impact on poverty reduction is -312288% if Domestic debts rise by 1%. The short-term debt servicing is negative and statistically significantly impacted poverty reduction in Nigeria, the inverse relationship implies that higher servicing of debt will increase the poverty rate within the study period. In other words, a 1% increase in debt servicing corresponds to a -1.6% poverty level will also increase. This conforms to *apriori* expectation in the sense that revenue from taxes that would have been used for poverty alleviation will be diverted to interest repayments.

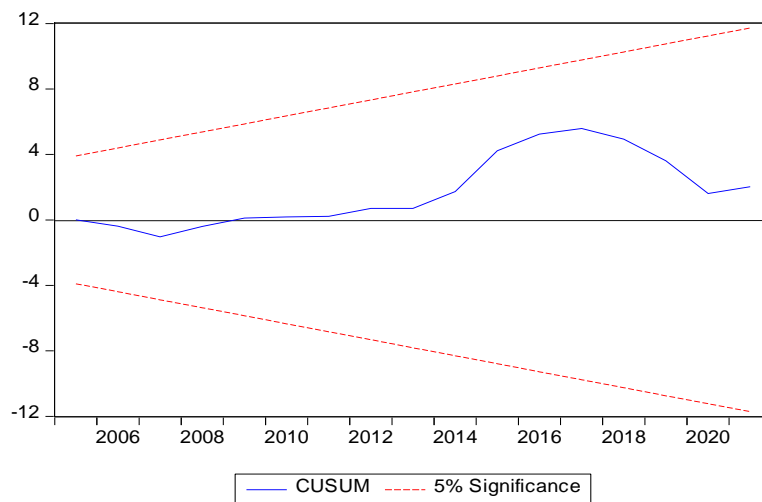
The cointeq(-1) term is negative (-0.707414) and significant at 1 % and 5 % level. This fulfills the conditionality for ECM which must lie between zero and one and must be significant as well. The ECM result implies that it will rightly act to correct any shocks from the long-run equilibrium up to the tune of 70% which represents the speed of adjustment. This significant value of the ECM explains the existence of a long-run equilibrium relationship between poverty and Public debt in Nigeria. The Durbin Waston (DW) value of 2.607762 revealed that there is no presence of serial correlation in the model. The Akaike (AIC), Schwarz (SC) and Hannan-Quinn (HQ) criteria with the values of 57.68, 57.80, and 57.54 respectively suggest that the model was better fitted into the model. The explanatory power of the regression model with an  $R^2$  of 0.97 is impressive. This indicates that 97% of poverty reduction is explained by the explanatory variables. The remaining 3% is explained by variables outside this model.

### **Stability Test**

The study conducted a stability test of the model using the cumulative sum of recursive residuals (CUSUM) and Cumulative Sum Squares of recursive Residuals (CUSUMSQ). Both tests are derived from the residuals of the recursive estimation known as recursive residuals.

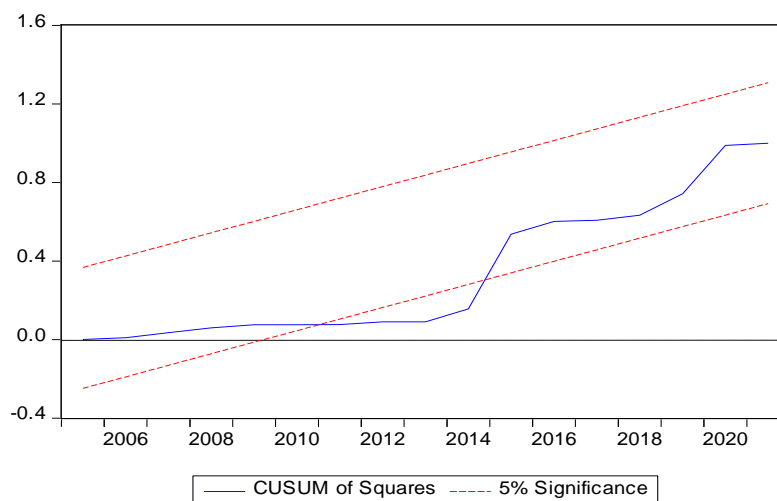
Given that, the expected value of the disturbance is always zero, a set of  $\pm 2$  standard error bands is usually plotted around zero, and any statistic lying outside the band or critical point, is taken as evidence of parameter instability. The plots of the CUSUM and CUSUMSQ are shown in Figures 1 and 2 respectively.

**Fig. 1:** Plot of Cumulative Sum Recursive Residuals (CUSUM)



**Source:** Computation using study data (2021)

**Fig. 2:** Plot of Cumulative Sum Recursive Residuals (CUSUMSQ)



**Source:** Computation using study data (2021)

The plots of the CUSUM and CUSUM SQ in Figures 1 and 2 illustrate that the residuals are within the critical bounds at a 5% level of significance for CUSUM. Likewise, the CUSUMSQ was stable from 2006 to 2010 and became unstable between 2011 and 2014, and the blue line returned to stability between the two critical red bands. This signifies that the estimates of the model for this study are stable, consistent, and reliable and therefore can be used for policy issues.

### **DISCUSSION OF MAJOR FINDINGS, CONCLUSION, AND RECOMMENDATIONS**

The result revealed that ADF statistics was used to check the stationarity of the variables and the result uncovered that external debt and debt servicing were stationary at level, while the poverty rate and domestic debt became stationary after the first differencing. The ECM result indicated that External debt had a positive relationship with poverty alleviation in Nigeria as against the expected sign of Negative signs and the result is statistically significant as uncovered by the Probability value. The coefficient of domestic debt and debt servicing both revealed an inverse relationship with poverty alleviation within the study period in Nigeria.

However, external debt is handled effectively; it will perform better and contribute significantly to the country's poverty reduction in Nigeria, which will lower the level of hunger either temporarily or permanently. Debt servicing had taken chunks of our total revenue in Nigeria which is why the poverty rate is increasing instead of reducing. The study's main finding is the demonstration of a positive time-series relationship between public debt and poverty reduction in Nigeria. Finally, to achieve a significant reduction in poverty in Nigeria, the government should examine and review current policies and incentives of external borrowing in Nigeria and the current administration needs to mobilize its domestic savings efforts. This is because dependence on foreign resources for improving life quality does cause poverty and it is both risky and unreliable. It is only the domestic efforts of a country that are more reliable and less risky for a developmental purpose that is recommended.

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