

Implication of the Rising Debt Profile and Dwindling Revenue for Nigeria's Public Health Expenditure

Vonke J. Dickson

Department of Economics, University of Jos, Jos, Nigeria

Abstract

This study investigated the implication of rising government debt and dwindling government revenue for public health expenditure in Nigeria, which is the study's main objective. The study employed quantitative method of analysis, using the autoregressive distributed lagged (ARDL) model, as analytical technique. Aggregate government expenditure on health (proxy for public health expenditure) is the dependent variable, while debt, revenue and population (control variable) are the independent variables. Secondary data was used, sourced from Central Bank of Nigeria (CBN) and World Health Organisation (WHO). The main findings of the study are: the rising debt stock has negative, but insignificant impact on government health spending and aggregate government revenue's impact on government health spending is positive, but insignificant also, while, population growth rate, has a negative and significant impact on government health expenditure. One of the key recommendations is that in order to protect health expenditure, Nigeria's government at all levels should set borrowing rules (e.g. no borrowing unless in extreme circumstances such as recession, expected natural disaster etc.) if it must borrow and it should seriously avoid its debt turning into a burden.

Keywords: Debt, Revenue, Health Expenditure

JEL Classifications: H63, E62, I19

Introduction

Health expenditure refers to all health spending that covers area as preventive and curative services, nutrition, etc. aimed at promoting health status. There are various sources of health expenditure in Nigeria, such as budgetary allocation from government (local, state and federal), loans and grants, out-of-pocket expenses, etc. (WHO, 2011). The source-based categorization of health expenditure divides it into public and private health expenditure. The public health expenditure largely comprises of government budgets and external grants.

Adequate health expenditure implies sound health system, sound health system implies good health status and good health status further implies increased economic growth. There are so many pointers to the fact that Nigeria's public health expenditure is inadequate. First, the recommended per capita public health expenditure for low income countries is \$34, but Nigeria's is less than \$5 (WHO, 2011). Nigeria's per capita public health spending is far below the international benchmark.

Second, over the years, public health expenditure has risen in some countries but not in Nigeria. Public health spending as a percentage of Gross Domestic Product (GDP) in 1990, 2000 and 2009 in Germany for example was 8.3, 10.3 and 11.6 percent of GDP, in Switzerland 8.2, 10.3, and 11.4 respectively, in the U. S. 11.9, 13.2 and 17.4 respectively (Clements, Coady, Shang & Tyson 2011). However, in Nigeria, the value was 2.7 in 1995, 3.6 in 2000, 3.8 in 2005, in 2010 it was 3.3, in 2015 and 2019 the values were 3.6 and 3.03 respectively (Index-Mundi, 2019; Global-Economy, 2017). While the average public health spending, as a percent of GDP in OECD countries was 8.8, in 2019, the U.S. had the highest value (17), followed by Germany, then Switzerland (Statista, 2022). Nigeria's public health spending in 2019 however, experienced a decline compared to the preceding year.

Third, the country along with other WHO member countries being aware of their spending inadequacy, signed WHO's recommendation, that they should allocate at least 13% of their annual budget to the health sector for effective funding. Also the Abuja declaration in 2001 recommended to members of African Union (AU), the minimum of 15% of annual budget to be allocated to the health sector. In response to the recommendations, 18% of Rwanda's budget in 2016 was allocated to the health sector, Botswana 17.8%, Malawi 17.1%, Zambia 16.4% and Burkina Faso allocated 15.8% (Ifejeh, 2017). However, Nigeria from 2010 to 2016 allocated 3.2%, 5.7%, 5.8%, 5.7%, 5.6%, 5.8% and 4.1% respectively (Babaranti, 2017). Government revenue and Debt issues have implications for public health expenditure.

Debt does not become a burden when the collected loan is invested well and the investment yield is enough to meet maturing obligations and at the same time, running the domestic economy is not threatened (Ojo, 1994). In other words, when the investment returns is equal to or less than the cost of borrowing, debt service becomes a burden, which largely reduces revenue and makes running of the domestic economy difficult, thus, funding critical sectors such as health

becomes difficult. Thus, debt could either increase a nation's revenue when managed well or reduce it when poorly managed.

Nigeria is one of the countries that largely depends on its external sector's foreign exchange resources. Dwindling foreign exchange resources, make such a country, unable to raise enough resources to enhance investment. This drastically reduces or destroys domestic savings. Savings rate however, is identified as one of the three key factors that affect debt servicing: investment returns, cost of the loan and the savings rate (Ojo, 1994). Where debt service burden arises, even the entire revenue of the country is at risk, just as a chunk of Nigeria's revenue is expended on debt servicing and only a little is left for servicing the entire economy. On the list of highly indebted countries, Nigeria ranks the fourth globally, while first in Africa (Amah, 2022). With debt servicing 'swallowing up' revenue, servicing the domestic economy such as the health sector, is at risk.

How Nigeria's public health expenditure is thriving amidst the country's indebtedness, revenue challenges, and even amidst the increase in population, calls for an in-depth inquiry. It is on this background that this study investigated the implication of government's rising debt profile, as well as the dwindling revenue for public health expenditure in Nigeria. The study sought to answer the implication of Nigeria's debt stock for public health expenditure, does aggregate government revenue impact public health expenditure in Nigeria, and what is the implication of Nigeria's population growth rate for government health expenditure?

The study is divided into five sections. After the introduction in the first section, review of literature was done in the second. The study's method of analysis, captured by section three, was clearly stated. In section four, all the study's results were carefully reported and discussed. Finally, the last section has conclusion of the study, as well as recommendations.

Literature Review

Theoretical Review – Keynes Theory of Aggregate Demand

The Keynesian theory reveals the existence of insufficient aggregate demand, which affects the economy negatively and requires fiscal policy to fine-tune the economy. Government spending is needed, so as to raise aggregate demand of the economy to an expected level.

Keynes argued that economic stimulus to raise aggregate demand can be achieved through fiscal policy. Expansionary fiscal policy is a better way to achieve upward shift in aggregate demand, full employment and output. Harrod () extended Keynes' analysis with his work on growth theory and dynamics. He pointed out that the economy does not necessarily tend towards full employment and that what may influence the growth rate of the economy is aggregate demand, which has different components. He focused on the government component of the four components of aggregate demand, pointing out how this source of demand can affect the growth path of the economy. Government policies, especially fiscal policy is to be used, both to stabilise the economy and to achieve higher growth.

Harrod stated that government policy could be applied by using equilibrium condition of the commodities' market which is 'saving + taxation is equal to investment plus government expenditure

$$s(1-t + r_b b) + t = kg + h + r_b b \quad (1)$$

Where:

s = the propensity to save of the private sector

t = the average tax rate, defined in terms of the net output of the economy.

r_b = the interest rate on government bonds

b = the amount of government bonds in circulation, measured in terms of the net output of the economy

k = the capital-output ratio

g = the rate of growth of the economy

h = the amount of government expenditure on goods and services measured in terms of the net output of the economy

He suggested that the equation can be used to study the factors that affect that affect growth rate, as well as to study how fiscal policy can be applied to achieve reasonable full employment or growth according to the economy's potential.

In order words, fiscal policy, influences aggregate demand. Government debt, as well as revenue are streams of income to the government, which are expected to influence the government component of aggregate demand and further influence income, output or economic growth. By implication government debt and revenue influence its expenditure on health goods and services, which further influence both the consumption and production of health goods and services and lead to economic growth. The Keynesian aggregate demand theory, forms the theoretical underpinning of this study.

Empirical Review

Most of the reviewed studies were carried out outside Nigeria. Baicker and Staiger (2005) studied health expenditure's effectiveness on health outcome, when there is the presence of fiscal shenanigans (when lower government levels have the tendency to expropriate the funds for other uses) in the USA. Using regression technique, they isolated states that could expropriate funds from those that could not and found that the impact on patient mortality for the first group of states, was not significant, while payments to the latter group were not expropriated, thus had significant declines in patient mortality. This finding shows that fiscal activities influence health expenditure, thus the health status of the people, especially that of the poor.

Assessing the effects of total public debt on social expenditure in emerging markets, Lora and Olivera (2007) used unbalanced panel data of 50 countries between 1985 -2003 and came up with three main findings: higher debt ratios reduced social services such as health, defaults may have direct positive effect on social expenditures.

Berger, Reichmann and Czypionka (2020) analysed the association between Soft Budget Constraints and hospital efficiency change in Austria using the ordinary least squares regression method of estimation and reported that the debt crisis which occurred in Europe affected the pattern of hospital efficiency after the economic crisis. They revealed that the annual efficiency change of hospitals in states with low debt was 1.1 percent lower compared to the hospitals found in highly indebted states.

Assessing revenue's and expenditure's relationship, Maggazzino (2014) reported that government revenue drives government expenditure, in ASEAN countries, using Granger Causality Test. Ma, Hu and Zafar (2022) used panel ARDL method to estimate data collected from emerging ASIAN countries (Bangladesh, Malaysia, Philippines, Thailand, Sri Lanka, China and India). They aimed at finding the impact of FDI and external debt on health outcomes in emerging Asian economies from 1991 to 2020. They reported that: debt increased infant mortality and decreased life expectancy in emerging Asian economies in the long run; FDI reduced infant mortality and raised life expectancy; health expenditure reduced infant mortality, though insignificantly and improved life expectancy; finally they found a two-way causality between infant mortality and health expenditure as well as between health expenditure and debt.

Bordignon and Turati (2009) found stronger link between regional health expenditure and the central government's ex ante financing when future bailing outs expectations were lower in India. Behera, Mohanty and Dash (2019) used Generalized Method of Moment Regression approach and found that economic growth, tax revenue and central transfers have a positive and significant effect on public health expenditure among the Indian states. Behera and Dash (2018) examined the dynamic relationships between public health expenditure and some macroeconomic factors of 15 major states in India, using panel dynamic bias corrected least squared dummy variable. Their result showed that states' revenue and central transfer, majorly finance health care of Indian states. They consequently found that economic growth and fiscal balance lead to favourable impact on public health expenditure in the long run.

Using ARDL bounds test approach, Lone and Lone (2022) found long run causal relationship existing among fiscal deficit, public debt, economic growth, energy consumption and health expenditure in India. Hassan (2021) investigated the asymmetric effect of oil revenue on government expenditure in developing oil-exporting countries using non-linear panel ARDL. The estimates revealed that both total and health government expenditures respond asymmetrically to positive and negative changes in oil revenue in the long run, but symmetric responses were reported in the short run.

Applying seemingly unrelated regression (SUR) on a 5-year panel data of 35 African countries, Fosu (2007) explored the impact of a binding external debt-servicing constraint on the sectoral composition of government expenditures in the economies of Africa and found that debt service burden negatively impacts social sector's share of public spending, with similar impacts on education and health. Using Generalized Method of Moments (GMM) approach on 43 sub-Saharan African countries, Said and Morai (2020) examined the relationship between public debt burden and health expenditure, highlighting the role of institutional quality. They found that public debt burden and health expenditure have negative relationship in sub-Saharan Africa, the relationship however, becomes positive when quality of institutions is at maximum.

Fosu (2008) found that although actual debt servicing has little impact, a binding debt-servicing constraint that reflects the debt burden, would shift expenditure away from health. The relationship among oil revenue, health expenditure and economic growth in Nigeria was investigated by Awoyemi and Divine (2022) using Pairwise Granger Causality. They found a bidirectional relationship

between total health expenditure and real GDP in Nigeria; a unidirectional relationship between oil revenue and GDP and also a unidirectional relationship between oil revenue and health expenditure in Nigeria. They concluded that oil revenue and health expenditure granger cause economic growth. From the foregoing, it is obvious that studies in this research area are inadequate in Nigeria, furthermore, most of the studies either focused on debt and health expenditure, or on revenue and health expenditure. This study employs both debt and revenue at the same time using data from Nigeria.

Research Methodology

Model Specification

The Keynesian Aggregate Demand Model has it that fiscal policy influences aggregate demand. In other words, government revenue and debt, influence health spending or health expenditure which further influences economic growth. In line with the theoretical postulations, the following economic model was specified, aggregate government expenditure on health is a function of total debt stock, aggregate government revenue and population growth rate (the control variable).

$$AGEH = f(TDS + AGR + PGR) \quad (2)$$

The specified model was transformed into a linear multiple regression model:

$$AGEH_t = \alpha_0 + \alpha_1 TDS_t + \alpha_2 AGR_t + \alpha_3 PGR_t + \mu_t \quad (3)$$

Where:

AGEH = Aggregate Government Expenditure on Health

TDS = Total Debt Stock

AGR = Aggregate Government Revenue

PGR = Population Growth Rate

α_0 = intercept of the function

α_1 = slope of the function

u = error term

t = time period

In order to obtain the numerical values of the different variables, to smoothen the data set so as to prevent spurious regression, to raise precision level, as well as to reduce the effect of unit measurement in the data, the model is re-specified in the following log linear form:

$$\log AGEH_t = \alpha_0 + \alpha_1 \log TDS_t + \alpha_2 \log AGR_t + \alpha_3 \log PGR_t + \mu_t \quad (4)$$

Unit Root Test

Pre-estimation diagnostic test of unit root was conducted to find out whether the variables are stationarity or not, so as to avoid spurious regression analysis.

Specifically, the study employed Augmented Dickey Fuller (ADF) method as one of the so many methods of testing for unit root. This is because it is an improvement over, for example, the Dickey Fuller (DF) method which does not add the lagged value of disturbance term in the equation to take care of serial correlation but the ADF does. The null hypothesis:

$H_0: \delta = 0$ (time series data is non-stationary)

Where $\delta = \rho - 1$. The decision rule is that: When ADF value > critical value, reject H_0 .

Co-integration Test

If two or more series move closely together in the long run, the variables are said to be stationary and co-integrated at the same time. However, if the series are not co-integrated, it indicates the presence of unit root - non-stationary, the estimated parameter will not be efficient for prediction (Dickey, Jansen & Thornton 1991). The ARDL bounds test developed by Pesaran and Shin (1999) and later Pesaran, Shin and Smith (2001) was employed to test the existence of co-integration, or the presence of long run relationship in the models. The null hypothesis is that there I no long-run relationships exist (all the coefficients equal zero). While the alternate is a long-run relationships exist (at least one of the coefficients is not equal to zero).

The computed F-statistic is compared with the Pesaran F- statistic values (I0 bound and I1 bound). The Decision rule is:

If computed F- statistic > upper critical bounds, I1, H_0 is rejected.

If F-statistic < both the upper and lower bounds, H_0 cannot be rejected.

When F-statistic lies between the critical lower and upper bounds values, the test is inconclusive.

Method of Estimation

The main technique of estimation used is the simple Autoregressive Distributed Lag (ARDL) regression model. The ARDL approach was based on unrestricted error correction to allow for testing dynamics as well as testing for both short-run and long-run relationships between or among variables. As pointed out by Narayan (2004); Harris and Sollis (2003), the ARDL approach is preferred to other traditional approaches to cointegration tests because it has some important advantages:

- i. All the variables do not have to be integrated of the same order.
- ii. It is efficient in the case of small and finite sample data sizes.
- iii. It provides both the short-run and long-run estimates simultaneously.

Since this study's variables are not integrated of same order and the sample size is small, ARDL approach to cointegration was adopted. In line with ARDL specifications, model 2 is further re-specified as:

$$\Delta \log \text{AGEH}_t = \alpha_0 + \sum_{i=1}^p \alpha_1 \Delta \log \text{AGEH}_{t-1} + \sum_{i=0}^p \alpha_2 \Delta \text{TDS}_{t-1} + \sum_{i=0}^p \alpha_3 \Delta \text{AGR}_{t-1} + \sum_{i=0}^p \alpha_4 \Delta \text{PGR}_{t-1} + \eta_1 \log \text{AGEH}_{t-1} + \eta_2 \text{TDS}_{t-1} + \eta_3 \text{AGR}_{t-1} + \eta_4 \text{PGR}_{t-1} + \mu_t \quad (5)$$

Where:

Δ = The first difference operator

log = Natural logarithm

p = Lag order selected

α_i = Short-run dynamic coefficients

η_j = Long-run coefficients

U = the error term

t = current time period

t-1 = previous time period. Other variables are defined earlier

The Error Correction Model (ECM) representation of the specified ARDL model is:

$$\Delta \log \text{AGEH}_t = b_0 + \sum_{i=0}^p b_2 \Delta \text{TDS}_{t-1} + \sum_{i=0}^p b_3 \Delta \text{AGR}_{t-1} + \sum_{i=0}^p b_4 \Delta \text{PGR}_{t-1} + \lambda \text{ECM}_{t-1} + \varepsilon_t \quad (6)$$

Where:

λ = Coefficient of ECM, representing the speed of adjustment to long run equilibrium.

From the model, it is expected that all the coefficients α , β , η and Θ , would be positive. Debt is expected to positively influence government expenditure, because debt enables the debtor to make purchases that could not be afforded under normal circumstances. Moreover, where the loan is self-liquidating, a debt service burden will not arise. Rise in the flow of government loan or debt is expected to lead to the rise in public health expenditure. Aggregate government revenue is the primary source of funding government expenditure. A government is expected to thrive well even where there is no aid or loan. Government revenue, generated through different sources is expected to positively influence government expenditure. That is, when the public revenue rises, public expenditure on health is expected to rise also. Theoretically, population is a determinant of health expenditure. Population growth is expected to positively influence health expenditure. Increase in population and/or changing population age structure should increase the public health expenditure. The a priori expectation is stated symbolically as $\alpha_1, \alpha_2, \alpha_3, > 0$

Results and Discussion

Unit Root Test Result

The Augmented Dickey Fuller (ADF) approach to unit root test, was used to determine the stationarity of the various data series used. The result is presented in table 1.

Table 1: Augmented Dickey Fuller (ADF) Unit Root Test Results

Variable ADF	Critical Value			Order of Integration
	1%	5%	10%	
AGEH	-5.781026*	-4.571559	-3.690814	I(1)
TDS	2.764684*	-2.699769	-1.961409	I(0)
AGR	-3.967019**	-4.498307	-3.658446	I(0)
PGR	-2.158655**	-2.692358	-1.960171	I(1)

* Indicates significance at 1%, and ** at 5% levels respectively.

Mackinnon (1996) Critical value for rejection

Source: Author's Computation Using EVIEWS 9

The ADF unit root test results in Table 1 shows that Aggregate Government Expenditure on Health (AGEH) and Population Growth Rate (PGR) were stationary at first differencing, I(1), while, Total Debt Stock (TDS) and Aggregate Government Revenue (AGR) were stationary at level I(0). The ADF results necessitated the choice of Autoregressive Distributed Lag (ARDL) method of estimation in this study.

Co-integration Test Result

Bounds test was conducted to test the existence of cointegration in the model. Table 2 presents the result of the cointegration test using the ARDL bounds test approach to cointegration.

Table 2: Co-integration Test Result

Test Statistic	Value	K
F-statistic	6.667534	3
Critical Value Bounds by Pesaran (2001)		
Significance	I(0)	I(1)
1%	5.17	6.36

Source: Author's Computation, 2022 Using EVIEWS 9

The result as presented in table 2 indicated that the F-statistic value is 6.667534, which is greater than the upper (6.36) bounds at 1% level of significance. It means that there is a long run relationship between aggregate government expenditure on health and the explanatory variables within the study period. Based on the bounds test result, the co-integrating and long run form of the model was also estimated.

Table 3: ARDL (1,0,0,0) and ECM Results

ARDL – ECM				
Variable	Coefficient	Standard Error	t-Statistics	Probability
DLOG(TDS)	-0.050758	0.088224	-0.575334	0.5742
DLOG(AGR)	0.049480	0.032363	1.528911	0.1486
DLOG(PGR)	-3.675160	1.068241	-3.440385	0.0040
D@TREND	-0.049970	0.006668	-7.494544	0.0000
CointEq(-1)	-1.012617	0.225194	-4.496647	0.0005
R-squared		0.782361		
Adjusted R-squared		0.704633		
F-statistic		10.06537		
Prob (F-statistic)		0.000300		
Durbin Watson statistic		1.923677		
Long Run ARDL (1,0,0,0) Result				
Variable	Coefficient	Standard Error	t-Statistics	Probability
LOG(TDS)	-0.050126	0.078037	-0.642334	0.5310
LOG(AGR)	0.048864	0.032828	1.488456	0.1588
LOG(PGR)	-3.629369	0.823262	-4.408521	0.0006
C	6.961565	1.234123	5.640900	0.0001
TREND	-0.049348	0.012576	-3.924027	0.0015

Source: Author's Computation, 2022, using EVIEWS 9

The lagged error correction term is negative and statistically significant at 5% level of significance, which further confirms the presence of long run relationship as indicated by the co-integration test result. The ECT coefficient of -1.0126 revealed that when there is disequilibrium, it takes the average speed of 100% for the system to adjust back to equilibrium. The adjusted R-squared which measured the goodness of fit of the estimated model revealed that the model has a good fit, showed that 70% changes in AGEH were collectively due to TDS and AGR, while the remaining percentage was captured by the error term. The probability value of the F-statistic showed that the model is statistically significant at 5%. This revealed that the regression model is generally significant. At 5% level of significance, trend was found to be significant in the model, the probability value (0.0000) is above 0.005. There is no first order serial correlation as indicated by the value of the Durbin Watson statistic (1.924) which is approximately 2.

Discussion of Findings

The study's long run estimates revealed that Nigeria's total debt stock (TDS) has an inverse relationship with aggregate government expenditure on health, (which is a proxy for public health expenditure), but the impact is insignificant at 5% level of significance (probability value, 0.5310 > 0.05). The direction of the impact of the coefficient of TDS is not in line with a priori expectation of the

study. It is expected a priori that the effect would be positive because debt is not ordinarily expected to constitute a burden on the economy, however, it turned negative. The negative sign of TDS imply that that the contracted loan is not appropriately invested and fails to meet maturing obligations, thus, debt constitutes a burden on the Nigerian economy and in the long run, servicing of the economy becomes a challenge. This finding is similar to Lora and Olivera (2007) who found a negative relationship between debt ratios and social expenditures including health.

The coefficient of aggregate government revenue (AGR) met the apriori expectation, it is positive (0.048864), but insignificant at 5% ($0.1588 > 0.05$). The total revenue of the government did not significantly raise government spending on health. Nigeria largely depends on the external sector for its revenue. Faced with external shocks, Nigeria suffers from dwindling foreign exchange resources, thus dwindling revenue. Aside the dwindling revenue, a chunk of the revenue is used for servicing debt, because Nigeria’s debt is already a burden. This factor among others, renders the revenue insignificant. Behera, Mohanty and Dash (2019) found that revenue positively affects public health expenditure, which is in harmony with this finding.

The long run estimates of the control variable indicated that the coefficient of population growth rate PGR is negative (-3.629369) and significant (probability value, $0.0006 < 0.05$). The implication of this result is that as the population growth rate rises, government health expenditure decreases.

Robustness Tests

Table 4: Post Estimation Diagnostic Test Results

	Tests	Coefficient	
Probability			
Normality Jarque Bera	0.215799	0.897718	
Breusch-Godfrey Serial Correlation	F-stat.	1.141989	0.3516
Heteroscedasticity-ARCH	F-stat.	1.772370	0.1832

Source: Author’s Computation, 2022 Using EVIEWS 9

Table 4 revealed that the ARDL estimated model successfully passed the tests of normality, serial correlation and heteroscedasticity. As observed from table 4, all the probability values are above 0.05, which is the 5% significance level. Thus, the model is free from serial correlation, heteroscedasticity and it is normal.

Stability Tests

Two stability tests were conducted. The cumulative sum and cumulative sum of squares tests.

Figure 1: CUSUM Test Result

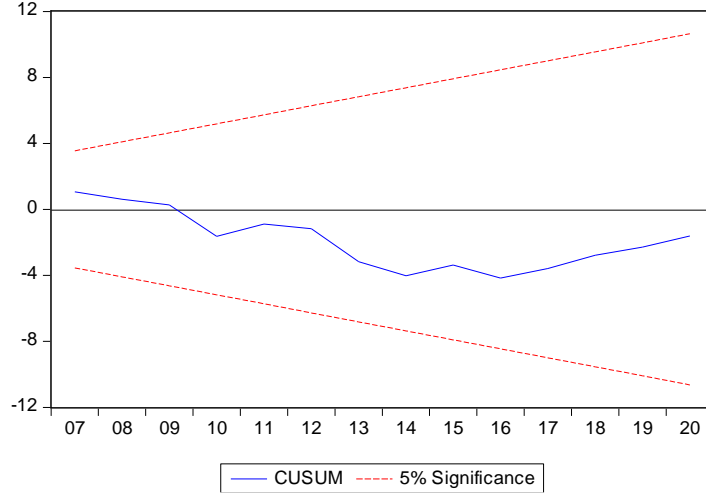
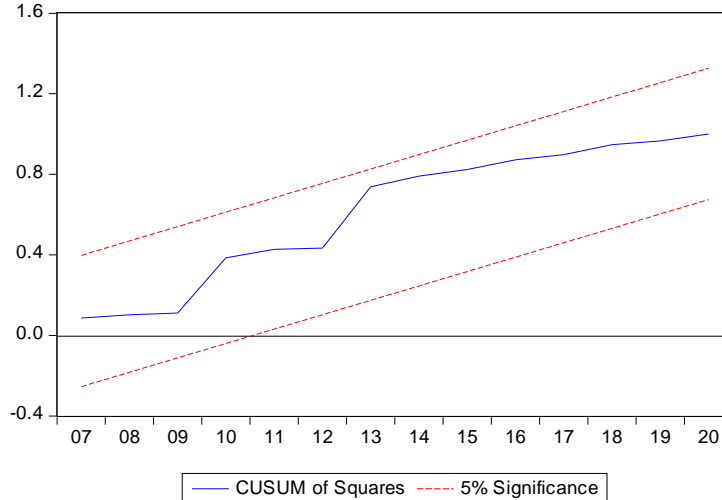


Figure 2: CUSUM Square Test Result



Figures 1 and 2 showed the stability test results. The stability test of Cumulative Sum (CUSUM) presented in figure 1 as well as CUSUM of squares in figure 2, revealed that the model is stable as the plot of the charts (the middle lines) lie within the critical bounds at 5% level of significance.

Conclusion and Recommendations

The findings of the study indicated that Nigeria's total debt stock has a negative, insignificant impact on government health expenditure. Which implies that debt if not checked could erode health spending. While aggregate government revenue has a positive, but insignificant impact on health expenditure, which implies that it has the tendency to raise health expenditure if it is well mobilised and managed. Nigeria's population growth rate has a negative, significant impact on health spending of the government. Which implies that the population growth rate exerts serious pressure on health spending of the government. The following recommendations were made, based on the empirical findings.

1. Nigeria's government at all levels should set borrowing rules (e.g. no borrowing unless in extreme circumstances such as recession, expected natural disaster etc), and if it must borrow, it should seriously avoid its debt turning into a burden.
2. Nigeria's revenue base, needs to be diversified and also protected from unnecessary leakages, such as debt servicing, so as to make significant impact in the health sector.
3. The government needs to put Nigeria's population growth rate into serious consideration as it budgets for the health sector.

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