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Original Research Article

Tax Revenue Consumption Expenditure and Public Debt in Nigeria

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Abstract
This paper examines the continuously rising Public debts as well as increased consumption expenditure despite the quantum of money generated from total tax revenue in the country. The study used public debt as the dependent variable and total tax revenue and consumption expenditure as the independent variable. Time series secondary data sourced from the statistical bulletins of the Debt Management Office (DMO), Federal Inland Revenue Service (FIRS), and Central Bank of Nigeria (CBN) covering 1992 – 2022 were obtained for analytical purposes. The data was tested for stability diagnostics using the Ramsey Reset Test, subjected to descriptive analysis and hypotheses testing through Ordinary Least Squares (OLS). The result of the study revealed a positive relationship between total tax revenue, consumption expenditure, and public debt. The relationship between consumption expenditure and public debt is statistically significant while the relationship between tax revenue and public debt is statistically non-significant. The study however recommends a decrease in consumption expenditure and an increase in savings to reduce the level of public debt.

Keywords: Public Debt, Total Tax Revenue, Consumption Expenditure, Economic Growth.

JEL Classification Code: F34, H50

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1. INTRODUCTION

Public debt is a widely used mechanism to offset the difference between the tax-gross domestic product (GDP) ratio and government expenditure as a proportion of GDP (Pratibha & Krishna 2022). Public debt also known as government debt or national debt is money owed by the government or total debt of all governmental units, including state and local governments. Public debt is defined as the total financial responsibilities acquired by governmental bodies of a nation, which includes money that is owed to individuals, mutual funds, hedge funds, pension funds, foreign governments and others. It considers government liabilities, future pension payments and payments for goods and services that the government contracted but not yet paid for. Public debt is one of the methods of financing government operations; governments can also create money to settle their debts to avoid interest payment, though the creation of money will only reduce interest costs and will not cancel the debt itself which may cause hyperinflation. And in some other times, the government might increase taxes to finance debt repayment in the economy. Since the early 1980s, the ratio of domestic government debt to gross domestic product (GDP) in Nigeria has risen sharply. By 1964, the level of domestic debt was 5.5 per cent of GDP. A decade later (by 1974), this ratio went up slightly to 6.9 per cent of GDP. But by 1984, the domestic debt /GDP ratio was over 40 per cent. Although it declined slightly in the 1990s, it has since 2000 moved upwards. In Nigeria, several factors have been advanced to explain the changing debt profile between the 1960s and now. The major factors include high budget deficits, low output growth, large expenditure growth, high inflation rate and narrow revenue base witnessed since the 1980s (Rapu, 2003). It is important to note that the components of public debt can vary across countries, and each government may have its specific terminology and types of debt instruments. The composition and size of public debt can have significant implications on the country's development. Many developing countries adopt different external and internal debts to fill the fiscal deficit. For several reasons, developing countries often struggle to deal with public debt to stabilize the macroeconomic environment. For example, Asteriou et al. (2021) and Shittu et al. (2018) argued that several developing countries suffer from unstable government budget balance and current account balance by adopting short- and long-term debts from different sources, resulting in twin deficits in the long run. Any country experiencing an incessant increase in public debt that is not utilized for infrastructural development will witness retarded growth and unemployment among its citizens. As such, Oyewobi (2019) states some of the factors that account for youth unemployment include the low level of industrialization, slow economic growth, low employability and quality of the labour force and slow implementation of the national labour policy.

Nigeria like many less developed economies is faced with economic challenges that require financial resources to meet its ever-increasing expenditure needs. Tax is a prime

source of income for both developed and developing economies. Governments perform their fundamental roles of providing; non-exclusive goods, upholding of rule of law, protecting life and properties against external aggressors, and regulating economic and social activities through tax (Azubike, 2009). According to Abomaye (2017), taxation is a process established by the government to exert control over tax and tax collection. It is thus considered as the redistribution of wealth from the private to the public sectors of the economy to help the nation in achieving some of its economic and social objectives which include providing essential facilities and services like proficient health care services, and quality roads, among others. However, the total tax revenue collected is ploughed back into the system for infrastructural development and other social needs of the citizenry. Total tax revenue refers to the sum of all taxes collected by a government within a specific period, typically a fiscal year. It represents the total amount of money received by the government from various taxation sources, such as income tax, sales tax, corporate tax, property tax, and other forms of levies and can be measured by aggregating the actual tax collections reported by the government through its tax authorities, such as the national tax agency or treasury department. These tax authorities collect data on the amount of tax paid by individuals, businesses, and other entities, which are then compiled to calculate the total tax revenue for a given period. Governments often publish official reports or statistics that provide detailed information on tax revenue, including the breakdown of revenue by tax type, taxpayer category, and economic sectors. These reports are typically based on data collected from tax returns, tax assessments, and other tax-related records. Researchers, economists, and policymakers often analyze total tax revenue data to assess the fiscal health of a government, evaluate the effectiveness of tax policies, and make informed decisions regarding public spending, budget planning, and economic development. Okon and Aladejare (2016), state that tax revenue is expected to complement other government revenue-earning sources, as a means of generating the required income to offset the deficit in the budget vis-à-vis buffer economic consequences of shortfalls in oil prices.

Every sovereign nation's goal, including Nigeria's, is to raise citizens' living standards while promoting the country's economic growth and development. Economic development, on the other hand, is predicated on expansion. This explains why the main policy thrust of the government's development objectives in Nigeria is always growth. Essentially, policies aimed at transforming and restructuring real economic sectors are linked to economic growth. Nonetheless, because of the gap between savings and investment, the lack of sufficient domestic resources, savings, and investment to support and sustain the sectors is a major impediment to the country's economic development (Agbonkhese & Asekome, 2014). Government consumption expenditure specifically refers to the portion of government expenditure that is allocated towards the consumption of goods and services. It represents the government's spending on items that are consumed within the current period and do not create a lasting asset or contribute to long-term economic growth. Examples of government consumption expenditure include salaries of public employees, maintenance of public

infrastructure, and the provision of public services such as healthcare and education.

Despite the government's increased spending, key macroeconomic indicators such as the balance of payments, import obligations, inflation rate, and exchange rate have not improved the country's economic growth. The country's infrastructure (roads and power) had continued to deteriorate, while unemployment had risen. In response to these, Okoro (2013) expresses concern that government spending in Nigeria does not appear to have replicated the same level of economic growth, pointing out that government spending has grown at a faster rate than GDP over the same period. Researchers and economic policymakers are also concerned about whether increased government spending is desirable to promote economic growth. The broad objective of this study is to examine the total tax revenue and consumption expenditure in Nigeria focusing on the public debt while the specific objectives are: to examine the relationship between total tax revenue and public debt and to evaluate the relationship between consumption expenditure and public debt. For this study, the following hypotheses are stipulated in their null form: Hypothesis 1: H_0: There is no significant relationship between total tax revenue and public debt.Hypothesis 2: H_0: There is no significant relationship between consumption expenditure and public debt.

2. LITERATURE REVIEW

2.1 Conceptual Framework

2.1.1 Public Debt

Public debt refers to the total amount of money that a government owes to various creditors, which may include individuals, institutions, and foreign governments. It is the accumulation of borrowing by the government over time to finance its expenses when its revenue falls short. The components of public debt can vary depending on the specific context but generally include Bonds, Bills, Notes, Loans and Others. In recent times there seems to be a consensus among public opinion leaders that huge external debt was adversely affecting economic growth and development in developing countries (Mojekwu & Ogege, 2012). This was affirmed by Reinhart and Rogoff (2010) who observe that 'the relationship between government debt and real GDP growth is weak for debt/GDP ratios below a threshold of 90 per cent of GDP'. Nigeria incurred both domestic and external debts. The external debt is typically owed to foreign creditors. These are multilateral agencies such as the Africa Development Bank, the World Bank, or the Islamic Development Bank, and bilateral agencies such as the China Exim Bank, the French Development Bank, or the Japanese Aid Agency. There are also foreign private creditors such as investors in Nigeria's Eurobonds. The domestic debt, however, is contracted within Nigerian borders, usually through bond and Treasury bills which are purchased by Nigerian banks, local pension funds, and other domestic and foreign investors. The government also has some contractor arrears and other local liabilities which form part of total public debt. The concern is that excessive domestic borrowing could crowd out private-sector investment as the government competes with the private sector for available funds.

2.1.2 Total Tax Revenue

Total tax revenue refers to the aggregate amount of revenue collected by the government through various types of taxes imposed on individuals, businesses, and other entities within a specific period. It

represents the sum of all tax receipts received by the government from different sources which include: Income Taxes, Sales Taxes, Value Added Taxes, Corporate Taxes, Property Taxes, Excise Taxes, Custom Duties, Payroll Taxes and Other Taxes. Total tax revenue is a critical component of government revenue. It provides the financial resources necessary to fund public services, infrastructure development, social welfare programs, defense, and other government expenditures. Total tax revenue has significant implications for the economy. Taxes can affect individuals' and businesses' behavior, investment decisions, consumption patterns, and overall economic activity. Tax policies can influence incentives, income distribution, economic growth, and the overall functioning of the economy. Tax-to-GDP Ratio is a commonly used indicator that compares total tax revenue to the country's gross domestic product (GDP). It reflects the size of the tax burden on the economy and provides insights into the level of government involvement in economic activities. The tax-to-GDP ratio can vary significantly among countries, influenced by factors such as tax policies, economic structure, and government priorities. Total tax revenue plays a crucial role in fiscal policy and budgeting. Governments analyze tax revenue patterns to assess their fiscal position, plan expenditure priorities, and evaluate the adequacy of revenue sources. Changes in tax revenue can impact government budget deficits or surpluses, debt levels, and overall fiscal sustainability. It serves as a vital source of funding for governments, enabling them to fulfil their responsibilities and provide public goods and services. It reflects the amount collected from taxpayers through various types of taxes and is an essential indicator for assessing government finances and the overall economic landscape.

2.1.3 Consumption Expenditure

Consumption expenditure refers to the portion of government expenditure that is allocated to the purchase of goods and services for current use by government agencies and entities. It represents the government's consumption of resources to provide public services and meet administrative needs. Government expenditures are the costs incurred by the government for its upkeep, as well as for society and the economy as a whole. All government consumption, investment, and transfer payments are included (Abdullah, 2010). Administration, economic services, infrastructure and social amenities, national security and defence, grants and aids, and interest on loans are the key components of government expenditure in Nigeria. Government spending, on the other hand, aids in the acceleration of economic growth and has an impact on the production pattern and component of output. It can be divided into two types: recurring and capital expenditures, which are combined to form an overall expenditure that includes all fees and net lending provided by governments (Mitchel, 2011). Government recurrent expenditures, in particular, relate to government spending that occurs regularly throughout the year. Administrative expenses, expenditures on the provision of economic, social, and community services, and expenditures on transfer payments are all included (CBN, 2012; Aladejare, 2013). Year after year, recurring expenses are incurred regularly. In other words, they are operating expenses that are required for government departments to function on a day-to-day basis. These expenses include civil administration, defence forces, public health and education, and government

machinery maintenance. These expenditures must be made regularly if government operations are to be maintained, and they must not result in the acquisition of permanent assets. They are divided into administration (general administration, defence, and internal security); social and community services (Education, Health, and Others); economic services, and transfers (public debt charges or interests for both internal and external debts, pensions and gratuities, and others such as transfer to contingency fund, net depreciation on investment revaluation, and extra-budget transfers) (Kanu, Ozurumba & Ihemeje, 2014).

2.1.4 Economic Growth:

When comparing one period of time to the next, economic growth refers to an increase in an economy's capacity to generate products and services. It is a prerequisite for economic development and affects the extent to which basic infrastructure is developed and amenities that make living easier are provided. Economic growth, according to Al-Shatti (2014), is defined as a rise in income or real gross national product (GNP) over time. It is an increase in a country's total production or the total quantity of products and services produced. Economic growth is defined as the increase in a country's overall output (Krugman, 2019). It is a steady increase in a country's per capita output or income, accompanied by increases in the labour force, consumption, capital, and trade volume. Technological innovation and positive external forces are usually the driving causes behind economic progress. It is the most widely used metric for assessing an economy's performance, as well as the most essential aspect in determining a country's success. Typically, changes in the Gross Domestic Product (GDP) are used to gauge economic growth (GDP). GDP is the most comprehensive measurable measure of a country's overall economic activity, encompassing all private and public consumption, government spending, investments, and exports. It is often calculated yearly.

2.2 Empirical Review

Agunbiade and Idebi (2020) examine the relationship between tax revenue and economic growth in Nigeria over the 1981–2019 period, with a special focus on Companies Income Tax, Value Added Tax and Petroleum Profits Tax. The data were sourced from the National Bureau of Statistics (NBS) and the Federal Inland Revenue Service (FIRS). The study employed the Vector Error Correction Model (VECM) to establish the nature and strength of the relationship between taxation and economic growth. The Johansen test of cointegration reveals that there is at least one cointegrating equation in the long run between the variables. Granger causality test found a causal relationship between Real GDP and the different tax components. The impulse response functions and the variance decomposition analysis uphold the findings that the impact of the shock in the indirect tax (VAT) and direct tax (CIT and PPT) on GDP growth does not die out over the specified period under consideration. Variance decomposition analysis found that the effect of the shock to the direct tax (CIT and PPT) on GDP growth tends to be low, whereas the effect of the shock to the indirect tax (VAT) on GDP growth tends to be significant to increase over the period. Therefore, this study recommended that to expand tax revenue, there should be a broad base tax strategy, focusing on all key areas of the tax system with measurable outcomes. Emphasis should be on simplification of the tax system and ease of implementation with priority given to quick

wins and low-hanging fruits, while more challenging aspects should be deferred until positive results are recorded. The regulatory authorities charged with the responsibility of collecting tax should further be strengthened to enforce compliance by taxpayers, among other recommendations.

Ntekpere and Olayinka (2020) examine the effect of Tax Revenue on Public Debt and Capital Expenditure in Nigeria for the period 1999-2018. It adopted the ordinary least square regression method to study the effect of the independent variables (represented by value-added tax, company income tax, petroleum profit tax and customs and excise duty) on the dependent variable (external debt, internal debt and capital expenditure). The data treatments used for the times series secondary data are Descriptive Statistics, Unit Roots using AugmentedDickey–Fuller, Co- co-integration tests using the Bounds Test and the Vector Error Correction Model. The findings revealed that tax revenue had a statistically significant, positive and negative effect on public debt and capital expenditure. Tax revenue had both positive and negative effects on external debt in Nigeria ($R2 = 0.789$, $f = 0.00010$, $p<0.05$); Tax revenue had both positive and negative effects on internal debt in Nigeria ($R2= 0.959$, $f = 0.00000$, $p<0.05$) and Tax revenue had both positive and negative effects on capital expenditure in Nigeria ($R2= 0.692$, $f = 0.00164$, $p<0.05$). The study concluded that tax revenue affects public debt and capital expenditure in Nigeria. It was recommended that the government should ensure that revenue from taxes is spent on profitable investments like capital expenditure. Also, to reduce public debt, fiscal authorities should enhance the effectiveness of the tax system by sealing loopholes and enforcing compliance. The government should also look to other sources of income to further reduce the burden of public debt.

David (2016) in his study Tax Incentives and Revenue Productivity of the Nigerian Tax System, analysed the buoyancy and elasticity of the Nigerian tax. Dynamic OLS (DOLS) and Vector Error Correction Model (VECM) were used as the methodology. The results of their study reveal that total revenue is statistically significant, elastic and buoyant having accounted for tax reforms of 2004. The study further shows that only PPT was relatively elastic but VAT, CED and CID were inelastic. Their findings also reveal that VAT and CIT are not significantly buoyant while PPT and CED are significantly buoyant after they accounted for tax reforms of 2004. Conclusively, their study advised the regulatory body to consider other factors that can influence structural change using 2005 as the cut-off date and recommended that concentration should be on generating more especially in the area of VAT and CIT.

Lambe (2015) examines the contribution of Tax revenue to the economic growth and development of Nigeria. Tax revenue is proxied on the income generation from tax sources by the national government. The study exploits a pre-dominantly review approach and data were sourced from the tax revenue collection profile of the Kaduna State Board of Internal Revenue, while personal interviews and participant observations were added as supplements. The trend analysis technique aimed at registering the increase or otherwise of tax-related revenue figures was employed as a tool of analysis. The findings reveal that taxes contribute significantly to the government revenue profile, thus capable of

creating the bedrock for sustainable economic growth and development in Nigeria. It is recommended that the Nigerian tax laws should be codified in simple, nontechnical languages, and there should be a harmonization of all the different taxes according to the approved list of taxes collectable by each tier of government to minimize multiple tax practices, while the government should be more responsive to the welfare needs of the citizens in other to induce voluntary compliance. The Nigerian tax system can effectively generate more revenue if only the citizens have trust and confidence in the authority.

Chigbu et al. (2014) in their journal titled An Empirical Study on the Causality between Economic Growth and Taxation in Nigeria examined the impact of value-added tax on the economic growth of Nigeria using relevant secondary data collected from the Central Bank of Nigeria (CBN) and the Federal Inland Revenue Service (FIRS) from 1994-2012. They analyzed the data with relevant econometric tests of Breusch-Godfrey Serial Correlation LM, White Heteroskedasticity, Ramsey RESET, Jarque Bera, Johansen Co-integration, and Granger Causality. The results showed that there exists a long-run equilibrium relationship between economic growth and VAT. It was also discovered that VAT granger caused to gross domestic product in Nigeria. Based on the empirical analysis, the paper concludes that VAT is one of the most important components of indirect taxes in Nigeria that affect economic growth and therefore should be properly managed to reduce the level of evasion by the input and output relationship in Nigeria. The paper recommended among others that vatable persons should be properly supervised by the relevant tax authority to reduce the level of tax evasion. Also, the government should show more accountability in the management of tax revenue and finally, the level of corruption in Nigeria and that of government officials should be drastically reduced to win the confidence of taxpayers for voluntary tax compliance.

Fasoranti (2013) in his journal titled Tax Productivity and Economic Growth in Nigeria assessed the productivity of tax revenue and the link between the productivity of tax revenue and the growth in Nigeria using time series data between 1970 and 2009. The study employs multiple regression analysis. The findings of the study show that tax productivity was significantly low using the elasticity index of the tax revenue. The study argues that the low elasticity implies that the aggregate tax revenue was not responsive to the growth of the Nigerian economy. The research concludes that the total tax revenue concerning the Real Gross Domestic Product is ineffective and further asserts that the increase in economic growth was faster than the increase in tax revenue and therefore recommends that efforts should be geared towards increasing tax generation to meet economic growth.

Urama et al. (2012) in their study titled The Lost Revenue Due to Trade Liberalization: Can Nigeria Recover Her Own? The objective was to look at tax buoyancy and elasticity of the Nigerian tax system to know if it is possible to use tax to restore revenue lost to the government's economic restructuring programme (economic liberalization, financial liberalization and the general financial reform). The research adopts Singer's approach and found that the Nigerian tax system is buoyant but inelastic. The study reported that the buoyancy of the Nigerian tax experienced a fall of about

16% after the 1991 trade reform. The research further showed that Import duty as a component of the total tax fell from 47.3% before the reform to 28% over the reform period but has a positive effect on tax buoyancy. Finally, the study suggests that much needs to be done in the domestic tax system (structure and administration) before consummating any bilateral or multilateral trade agreement.

2.3 Review of Theories

The theories reviewed for this study are the Keynesian Theory and the Public Finance Theory.

2.3.1 Keynesian Theory: The Keynesian theory was propounded by John Maynard Keynes, an influential British economist. Keynesian theory was developed in the 1930s, particularly during the Great Depression, and Keynes's seminal work on the subject, "The General Theory of Employment, Interest, and Money," was published in 1936. The motive behind Keynesian theory was to address the prevailing economic conditions of the time, specifically the high unemployment and prolonged economic downturn experienced during the Great Depression. Keynes challenged the classical economic view that markets would naturally self-adjust and argued that active government intervention was necessary to manage aggregate demand and stabilize the economy. Keynesian theory emphasized the role of aggregate demand in determining economic output and employment. Keynes argued that during periods of economic downturns, such as recessions or depressions, there could be insufficient aggregate demand in the economy, leading to high unemployment and a decline in production. The motive behind Keynesian theory was to provide a framework for understanding how governments could effectively use fiscal policy, including increased government spending and tax reductions, to stimulate aggregate demand and promote economic recovery.

2.3.2 Public Finance Theory

The public finance theory is widely attributed to the economist Richard Musgrave. Musgrave, along with his work on public finance, contributed significantly to the field of economics. He is known for his book "The Theory of Public Finance: A Study in Public Economy," first published in 1959. The motive behind the theory of public finance, as expounded by Musgrave, was to analyze the role of government in the economy and provide a framework for understanding how governments raise revenue and allocate resources to achieve economic and social objectives. Musgrave's theory aimed to address questions related to the appropriate level and structure of taxation, the provision of public goods, income redistribution, and the impact of fiscal policies on economic efficiency and equity. Musgrave's theory recognized the importance of public finance in shaping the overall economic system and sought to provide a theoretical foundation for policymakers to design effective and efficient tax and expenditure policies. The theory considered various aspects of public finance, including the incidence of taxation, public expenditure decisions, intergovernmental fiscal relations, and the role of government in addressing market failures. The study is anchored on the Public Finance Theory to substantiate total tax revenue, consumption expenditure and public debt.

2.4 Gap of the Study

Most of the reviewed articles for this study centred on Tax revenue and economic

growth; in this category are the works of Agunbiade and Idebi (2020), Lambe (2015), Chigbu et al. (2014), Fasoranti (2013), none of them considered taxation and public debt. Also, David (2016) focuses on Tax Incentives and Revenue Productivity of the Nigerian Tax System and Urama et al. (2012) study Lost Revenue due to Trade Liberalization. However, Ntekpere and Olayinka examined the effect of Tax Revenue on Public debt in Nigeria covering 1999 – 2018 (20 years). The gap of this study is to cover more years from 1992 – 2022 (31 years) and rather than having two dependent variables that proxy internal debt and external debt, an aggregate public debt figure for the dependent variable is used. Moreover, the methodology for this study also differs.

3. METHODOLOGY

The correlational research design was employed for this study. The adopted research design was used because it explores the relationship between variables using statistical analyses and mostly observational in terms of data collection. Secondary source of data was employed for this study and the data were collected from the Debt Management Office (DMO), Federal Inland Revenue Service (FIRS) and the Central Bank of Nigeria (CBN) statistical bulletin from various issues (1992-2022). The DMO, FIRS and the CBN statistical data capture the needed variables which are in line with the research objectives of the study. The population are the aggregate debt, aggregate tax revenue and aggregate consumption expenditure for a period of 31 years (1992-2022). Based on the availability of data, all the population will be considered.

3.1 Measurement of Variables

The variables used for this study, are the dependent and independent variables. The dependent variable is the total debt which was measured by the federally acquired public debt, the independent variables are the total tax revenue measured by the federally collected tax revenue while the consumption expenditure was measured by the recurrent expenditure as Olonite, Gurowa, Ibrahim, and Ajewole (2021) submit that recurrent expenditure is a consumption expenditure while the capital expenditure is an investment spending. All these data were retrieved from 1992-2022 being a period of 31years.

The data were also tested for stationarity (Unit root test) using the Augmented Dickey Fuller (ADF) to see if the data are fit to be used for regression estimation, inference and analysis. Therefore, before applying the test, the study determines the order of integration of all variables using unit root tests by testing for null hypothesis Ho: $\beta = 0$ (i.e. β has a unit root), and the alternative hypothesis is H_1: $\beta < 0$. All the variables should be integrated at first-order difference I(1). These tests were conducted to avoid the generation of spurious regression results.

After reaching the correlation results between the variables, the study then employs the Generalized Least Square (GLS) method to obtain the prediction coefficients. The following statistics will also be used to test for the statistical validation of the relationship between the variables of the study.

Descriptive Statistics was used to obtain the Skewness, Kurtosis, and Jarque-Bera to show the negative or the positive values, normality and the skewness of the values. In an attempt to establish empirical; evidence

and focus on the public debt using tax revenue and consumption expenditure in Nigeria, a model was formulated. In line with Ntekpere and Olayinka (2020), a disaggregated approach to examine the relationship between public debt, total tax revenue and consumption expenditure was developed. Ntekpere and Olayinka's (2020) model is shown below:

Y1= f(X) and Y2= f(X)
Where:
Y1 = Public Debt (PD)
y1a = External Debt (ED)
y1b = Internal Debt (ID)
Y2 = Capital Expenditure (CE)
X will represent Tax Revenue (TR)
x1 = Value Added Tax (VAT)
x2 = Company Income Tax (CIT)
x3 = Petroleum Profit Tax (PPT)
x4 = Customs and Excise Duties (CED)
ED= f(x1 , x2 , x3 , x4)
…….. ……1
ID= f(x1 , x2 , x3 , x4)
……..…….. ……...2
CE= f(x1 , x2 , x3 , x4
)……..….. ……3

Model 1
ED= f(VAT, CIT, PPT, CED)
EDt= â0 +â1VATt +â2CITt +â3PPTt + â4CEDt +µt

Model 2
ID= f(VAT, CIT, PPT, CED)
IDt= â0+ â1VATt +â2CITt +â3PITt + â4CEDt +µt

Model 3
CE=f(VAT, CIT, PPT, CED)
CEt= â0+ â1VATt +â2CITt +â3PPTt + â4CEDt +µt

Main Model
PDt+CEt= â0+ â1TRt +µt

Where:
â0 is the intercept.
â1– â4 are the coefficients of the explanatory variables.
µtis the error terms that absorb the influence of omitted variables in proxies used.

Adapting Ntekpere and Olayinka's (2020) model to suit the study`s claims, the study modified the main model by making public debt the dependent variable and aggregating total tax revenue and recurrent expenditure which proxy consumption thus: TD = f(TTR, CE) ……(4)
TD = α 0 +β1 TTR t + β2 CE t + µ t
…….. (5)
Where: TD = Total Debt
α 0 = Coefficient of the constant variable
β1, β2, = Regression of the coefficient of the independent variable

TTR = Total Tax Revenue
CE = Consumption Expenditure
µ = the error term which accounts for other likely factors which could influence the outcome that are not captured in the model. It is also known as Epsilon.
t = at time t (annual time series)
The apriori expectations of the variables are given as (β1, β2, > 0) i.e. TTR > 0, CE > 0.

3.2 Data Analysis Techniques

The ordinary least square regression will be employed to obtain numerical values of the model's coefficients. The probability values of the estimated coefficients will be evaluated at a statistical significance of 5%. The Apriori expectation from the data analysis is a positive and inverse relationship between tax revenues and public debt and capital expenditure and that tax revenue has a positive and direct relationship between public debt and capital expenditure.

4. RESULTS AND DISCUSSIONS

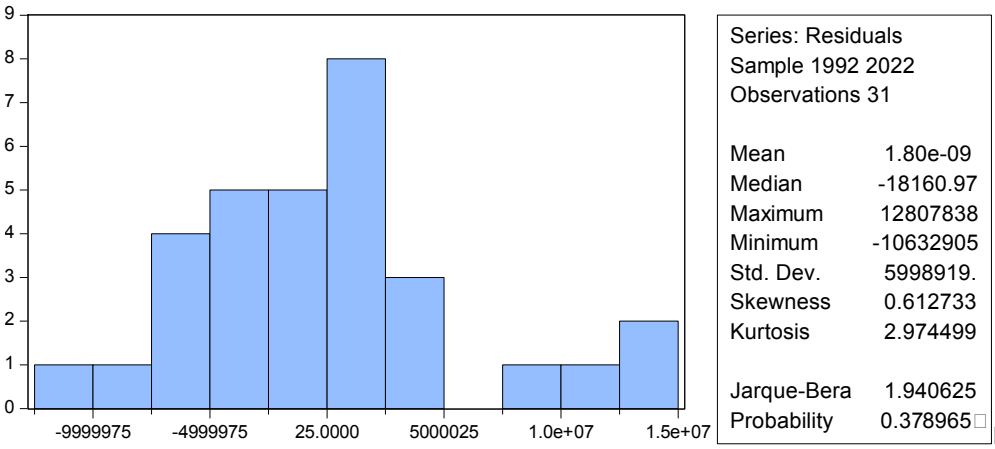
4.1. Descriptive Statistics

Table 1: Result of the Descriptive Analysis

	TD	TTR	CE
Mean	9531443.	4.09E+09	2.29E+09
Median	3757908.	4.03E+09	1.94E+09
Maximum	46253764	1.00E+10	6.91E+09
Minimum	1126453.	1.10E+09	53034.10
Std. Dev.	11098583	1.77E+09	2.03E+09
Skewness	1.674784	0.969351	0.906573
Kurtosis	5.351749	5.306259	3.118739
Jarque-Bera	21.63584	11.72497	4.264559
Probability	0.000020	0.002844	0.118567
Sum	2.95E+08	1.27E+11	7.11E+10
Sum Sq. Dev.	3.70E+15	9.35E+19	1.24E+20
Observations	31	31	31

The results of the descriptive statistics show that the mean value of total debt is □9.5billion. The mean value of total tax revenue is □4.09billion, and the mean value of consumption expenditure is □2.29billion. The Jarque-Bera statistic of the variables is TD (21.63584) TTR (11.42497) and CE (4.264559) respectively. The results show that the variables are all positively skewed with total debt (1.674784), total tax revenue (0.969351), and consumption expenditure (0.906573) respectively. The variable of total debt has a kurtosis value of 5.351749, total tax revenue of 5.306259, and consumption expenditure of 3.118739.

Residual Diagnostic (Histogram Normality Test)



RESIDUAL DIAGNOSTIC (HISTOGRAM NORMALITY TEST)

The average Jarque-Bera statistic is 1.940625 with a probability value of 0.378965 which signifies that the variables follow the normal Gaussian distribution. The mean skewness is 0.612733 and the mean kurtosis is 2.974499 which is approximately 3.00 and indicative of a mesokurtic distribution.

4.2. Correlation Analysis

Table 2: Result of the Correlation Analysis

Covariance Analysis: Ordinary
Date: 07/06/23 Time: 04:56
Sample: 1992 2022
Included observations: 31

Correlation t-Statistic Probability	TD	TTR	CE
TD	1.000000 ----- -----		
TTR	0.657562 4.700132 0.0001	1.000000 ----- -----	
CE	0.834741 8.163573 0.0000	0.697484 5.241506 0.0000	1.000000 ----- -----

The results of the bivariate analysis (correlation analysis) are indicative of positive correlations between the variables. The correlation coefficients are not substantially high, Apart from the coefficient between consumption expenditure and total debt with a value of 0.834741, the correlation coefficient between the other variables is below the benchmark of 0.80, which is indicative of the absence of the problem of multicorrelation. The correlation coefficient between total debt and total tax revenue is 0.657562 and between total tax revenue and consumption expenditure is 0.697484, which indicates that there is no problem of multicorrelation.

4.3. Coefficient Diagnostic (Variance Inflation Factor).

Table 3: Result of the Variance Inflation Factor (VIF)

Variance Inflation Factors
Date: 07/06/23 Time: 04:57
Sample: 1992 2022
Included observations: 31

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	8.75E+12	7.035256	NA
TTR	8.03E-07	12.76693	1.947358
CE	6.06E-07	4.513689	1.947358

4.4. Regression Diagnostics:

The results of the regression diagnostics is presented in Tables 5,6, and 7 in the appendix. The result shows the absence of serial correlation between the regression variables. The probability value of the Breusch-Godfrey test reported a value of 0.3887 which rejects the null hypothesis of the presence of serial correlation (see table 5 in the appendix). The results of the Breusch-Pagan-Godfrey test of heteroskedasticity reported a probability value of 0.0001 which implies the presence of heteroskedastic residuals and the absence of homoskedastic residuals (see Table 6). However, that the variables are heteroskedastic does not vitiate the results of the regression analysis. The Ramsey RESET test of model specification shows that the regression models are correctly specified, with a probability value of 0.222284 (see Table 7 in the Appendix).

The result of the absence of the problem of multicorrelation is reinforced with the result of the variance inflation factor (VIF) which is relatively low and below the benchmark of 10 and indicative of the absence of the problem of multicorrelation. The VIF values of the total tax revenue is 1.947358 and the VIF of consumption expenditure is 1.947358 and both are below the value of 10.

Table 4: Results of the Regression Analysis

REGRESSION ANALYSIS
Dependent Variable: TD
Method: Least Squares
Date: 07/06/23 Time: 04:57
Sample: 1992 2022
Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3424259.	2958106.	-1.157585	0.2568
TTR	0.000923	0.000896	1.029308	0.3121
CE	0.004001	0.000779	5.138091	0.0000

R-squared	0.707847	Mean dependent var	9531443.
Adjusted R-squared	0.686979	S.D. dependent var	11098583
S.E. of regression	6209471.	Akaike info criterion	34.21282
Sum squared resid	1.08E+15	Schwarz criterion	34.35159
Log likelihood	-527.2986	Hannan-Quinn criter.	34.25805
F-statistic	33.92004	Durbin-Watson stat	1.795886
Prob(F-statistic)	0.000000		

The result of the regression analysis is presented in Table 3. The result of the multiple coefficients of determination (R-squared) is 0.707847 and the adjusted value is 0.686979 which shows that sixty-nine per cent of the systematic variation in the dependent variable of total debt is accounted for by the explanatory variables of consumption expenditure and total tax revenue. The F-statistic is 33.92004, with a probability value of 0.000000 is significant and indicative of a high predictive value of the regression model. The Durbin-Watson statistic of 1.795886 is not substantially different from the benchmark of 2.0, indicating that the variables do not suffer the problem of autocorrelation.

The relationship between the dependent variable of total debt and the independent variable of total tax revenue is positive and statistically nonsignificant at the 5% significance level. The coefficient of the variable is 0.000923 with a t-value of 1.029308 and a probability value of 0.3121. The result implies that a unit increase in total tax revenue will increase the total debt by a minimal value of 0.09. The result is in tandem with the positive relationship established by Utekpere and Olayinka (2020).

The result of the relationship between consumption expenditure and public debt is positive and statistically significant at the 5% level. The coefficient of the variable is 0.004001, with a robust t-value of 5.138091, and a probability value of 0.0000. The result is beyond the likelihood of chance as it is intuitively expected that an increase in consumption expenditure will increase public debt. The result of the regression indicates that one unit increase in consumption expenditure will increase

public debt by 4%. The result is at variance with the negative relationship between public debt and consumption expenditure established by Avdimetaj et al. (2022).

5. CONCLUSION AND RECOMMENDATIONS

The broad objective of the study is to investigate the relationship between tax revenue, consumption expenditure, and public debt. The result of the study revealed a positive relationship between total tax revenue, consumption expenditure, and public debt. The relationship between consumption expenditure and public debt is statistically significant while the relationship between tax revenue and public debt is statistically non-significant. The result implies that while consumption expenditure exerts increases in public debt in a significant manner, the incremental effect of total tax revenue on public debt is not significant.

Against the backdrop of the significant relationship between consumption expenditure and public debt, a decrease in consumption expenditure and an increase in savings to reduce the level of public debt in Nigeria is recommended. This is because an increase in the level of public debt tends to stifle the growth of the economy of any nation, Nigeria inclusive. The insignificant relationship between total tax revenue and public debt in Nigeria is a well-come development. Therefore, the level of tax revenue that is not significantly related to public debt should be maintained to encourage economic growth and development.

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APPENDIX

TABLE 5: RESIDUAL DIAGNOSTIC (SERIAL CORRELATION TEST)

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.980099	Prob. F(2,26)	0.3887
Obs*R-squared	2.173308	Prob. Chi-Square(2)	0.3373

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 07/06/23 Time: 04:59
Sample: 1992 2022
Included observations: 31
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1890739.	3362573.	0.562289	0.5787
TTR	-0.000516	0.001055	-0.488523	0.6293
CE	9.35E-05	0.000850	0.109993	0.9133
RESID(-1)	-0.071586	0.237351	-0.301602	0.7654
RESID(-2)	0.348519	0.249792	1.395234	0.1747

R-squared	0.070107	Mean dependent var	1.80E-09
Adjusted R-squared	-0.072954	S.D. dependent var	5998919.
S.E. of regression	6213889.	Akaike info criterion	34.26916
Sum squared resid	1.00E+15	Schwarz criterion	34.50045
Log likelihood	-526.1720	Hannan-Quinn criter.	34.34456
F-statistic	0.490049	Durbin-Watson stat	2.179103
Prob(F-statistic)	0.742984		

TABLE 6: RESIDUAL DIAGNOSTIC (HETEROSKEDASTICITY TEST)

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	12.52700	Prob. F(2,28)	0.0001
Obs*R-squared	14.63931	Prob. Chi-Square (2)	0.0007
Scaled explained SS	11.79072	Prob. Chi-Square (2)	0.0028

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 07/06/23 Time: 04:59
Sample: 1992 2022
Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.50E+13	1.78E+13	-1.401403	0.1721
TTR	8581.657	5399.555	1.589327	0.1232
CE	10754.06	4690.520	2.292722	0.0296

R-squared	0.472236	Mean dependent var	3.48E+13
Adjusted R-squared	0.434538	S.D. dependent var	4.97E+13
S.E. of regression	3.74E+13	Akaike info criterion	65.43541
Sum squared resid	3.92E+28	Schwarz criterion	65.57419
Log likelihood	-1011.249	Hannan-Quinn criter.	65.48065
F-statistic	12.52700	Durbin-Watson stat	1.746111
Prob(F-statistic)	0.000130		

TABLE 7: STABILITY DIAGNOSTIC (RAMSEY RESET TEST)

Ramsey RESET Test
Equation: UNTITLED
Specification: TD C TTR CE
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	1.232444	27	0.2284
F-statistic	1.518919	(1, 27)	0.2284
Likelihood ratio	1.696656	1	0.1927

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	5.75E+13	1	5.75E+13
Restricted SSR	1.08E+15	28	3.86E+13
Unrestricted SSR	1.02E+15	27	3.79E+13

LR test summary:

	Value
Restricted LogL	-527.2986
Unrestricted LogL	-526.4503

Unrestricted Test Equation:
Dependent Variable: TD
Method: Least Squares
Date: 07/06/23 Time: 05:00
Sample: 1992 2022
Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1005385.	3527495.	-0.285014	0.7778
TTR	0.000569	0.000933	0.609196	0.5475
CE	0.002587	0.001382	1.871332	0.0722
FITTED^2	1.30E-08	1.05E-08	1.232444	0.2284

R-squared	0.723407	Mean dependent var	9531443.
Adjusted R-squared	0.692674	S.D. dependent var	11098583
S.E. of regression	6152719.	Akaike info criterion	34.22260
Sum squared resid	1.02E+15	Schwarz criterion	34.40763
Log likelihood	-526.4503	Hannan-Quinn criter.	34.28292
F-statistic	23.53875	Durbin-Watson stat	2.121574
Prob(F-statistic)	0.000000		

Table 8. Annual Data for total debt, total tax revenue and consumption expenditure in Nigeria

Year	Total Debt ₦' 000	Total Tax Revenue ₦' 000	Consumption Expenditure ₦' 000
2022	46,253,764	10,000,000,000	6,910,128,718
2021	19,245,546	6,467,855,554	6,832,938,498
2020	32,926,500	4,958,457,190	4,847,011,301
2019	27,401,454	5,261,916,400	3,332,497,282
2018	24,387,655	5,320,891,400	6,831,568,333
2017	21,726,345	4,027,945,200	2,912,841,220
2016	17,360,234	3,307,461,400	3,881,811,241
2015	12,604,659	3,741,757,400	2,955,348,000
2014	11,544,544	4,714,560,300	3.711,815,000
2013	12,323,433	4,805,642,000	2,384,381,000
2012	8,543,656	5,007,652,800	3,419,283,000
2011	7,897,210	4,628,475,700	3,336,096,000
2010	7,675,654	3,549,467,430	2,011,000,000
2009	7,446,343	2,763,755,100	1,627,000,000
2008	4,464,229	3,545,289,777	3,240,820,004
2007	3,675,876	4,867,333,632	2,450,896,706
2006	3,757,908	5,565,199,664	1,938,002,504
2005	3,577,457	2,386,233,363	1,822,100,002
2004	3,586,344	3,341,344,455	1,462,200,007
2003	1,126,453	3,455,129,099	1,225,965,907
2002	1,690,690	4,546,445,122	1,018,155,805
2001	1,690,799	6,402,714,433	1,018,025,604
2000	1,766,700	4,952,224,560	701, 069,407
1999	2,425,688	4,410,699,548	449,662,404
1998	1,435,685	3,500,546,112	178,097,805
1997	1,332,996	2,411,907,402	158,563,503
1996	1,577,323	2,234,562,987	124,491,306
1995	1,324,577	2,540,455,954	127,629,801
1994	1,267,675	1,634,870,222	86,974,906
1993	1,456,685	1,100,688,700	136,727,105
1992	1,980,654	1,425,764,101	53,034.103

Source: Debt Management Office, Federal Inland Revenue Service and Central Bank of Nigeria from various issues (1992-2022)