Impact of Value-added Tax and Inflation Rate on Government Revenue in Nigeria

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Abstract

This study investigated the nexus between Value-Added Tax (VAT), Inflation Rate, and Government Revenue in Nigeria from 1994 to 2021 using Ordinary Least Squares (OLS) and Auto Regressive Distributed Lag (ARDL) models of multiple regression analysis. Using the OLS technique to estimate the nexus, Government Revenue (TRG) was regressed on VAT and Inflation Rate, and the results indicated that VAT had a significant positive influence on Government Revenue (TGR), while Inflation Rate (INFR) had insignificant negative influence on Government Revenue (TGR) in Nigeria from 1994 to 2021, ruling based on their respective associated P values at 5% level of significance. Using the ARDL model to estimate the nexus, it was found that no significant short run nexus exists between VAT, INFR and TGR, while a significant long run nexus exists between VAT and TGR in Nigeria from 1994 to 2021, ruling based on their respective associated P values at 5% level of significance. Hence, the study concludes that value-added tax (VAT) has the capacity of increasing the revenue-base of Government in Nigeria, thereby, reducing government's reliance on oil for revenue, while Inflation Rate dwindles Government Revenue. Based on these findings, the study recommends among others that strict enforcement, supervision, and administration of VAT payments in Nigeria should be employed and sustained by authorities of the FIRS, as well as identifying administrative and technical gaps and obstacles hampering the smooth implementation of the scheme and proffering robust solutions through consultations with crucial stakeholders on how to advance the scheme, in order to boost and sustain the generation of vigorous VAT revenue consistently for the government.

Keywords: Inflation Rate, Government Revenue, Value-Added Tax and Nigeria
JEL Classification: H2, E31

Contribution to Knowledge/Originality:
This study contributes to existing body of knowledge as most of the extant studies focused on only the influence of VAT on government revenue in Nigeria without also examining the effect of the prevailing inflation rate in the country on the government's revenue generation. Also, the few studies that investigated the nexus between VAT, inflation rate, and government revenue failed to investigate the short run and long run relationships between these variables. Consequently, this study investigates the individual influences of VAT and inflation rate on government revenue as well as the short run and long run relationships between the using OLS and ARDL regression models. The study is original as all literatures and works cited herein are acknowledged.

1.0   Introduction

The introduction of the value added tax (VAT) has accounted for close to 20 percent of the total tax income of countries that implanted it (Gerard & Naritomi, 2018). Globally, the ability to generate sustainable revenue internally has been a serious problem to many countries as they strive to reduce their increasing budget shortfalls (Ezomike & Ango, 2019). As expected, many

of these countries adopted the VAT system based on the fact that they think of it to be a genuine tool in enhancing the income generated internally by the government. However, despite the merits and benefits of VAT strategy, it is not free from criticism by experts. Some critics of the VAT are of the view that VAT is in effect, a relapsing tax scheme that, apart from increasing administrative afflictions on businesses, it tends to escalate economic pressure on taxpayers who are low-income earners (Agbo & Nwadialor, 2020).

The very important function of value-added tax (VAT) regarding the development of the fiscal system of Nigeria cannot be overly emphasized on, as revenues realized by the government through VAT are used in administering the social and economic affairs of the nation, and in implementing desirable development projects (Ugwu, Peter, & Udolu, 2019). According to Afolayan, Okonkwo, and Okaro (2021), the VAT system was introduced in Nigeria as a strategy to safeguard mobilization of income for the government with the intention to address the challenges experienced with earlier tax regimes that were held to be regressive. With the introduction of the VAT system, the government can adequately and effectively collect taxes from companies and other taxpayers without making resort to tax collection agents.

Some experts are of the view that, since VAT is charged on almost every item bought or service received in the Nigeria, it could stimulate arbitrary hike on prices of things as well as services, which triggers inflation (Afolayan et al et al. (2019). It is also believed that VAT collected from some customers/clients by some unregistered businesses and organizations may be difficult to remit to FIRS, since the VAT is embedded in the total cost of the item sold or service provided (Ugwu et al., 2019). The non-remittance of VAT collected by unregistered businesses or organizations to the FIRS does not favour the Nigerian economy as it dwindles the revenue of the government. Even landlords in Nigeria now charge VAT on houses rented to individuals or other properties rented out. Hotels and restaurants also include VAT in their charges and bills for food, drinks, accommodation, and other services provided to customers. As good as these seem to be, these persons most times do not remit the monies as VAT to the FIRS, which contravenes the regulations governing the VAT system in Nigeria which adversely affects government revenue (Afolayan et al., 2021).

It is believed that the proper and consistent collection and remittance of VAT in Nigeria has helped in increasing the total revenue generated by the government in the country, while the persistent increasing inflation rate in country has negative influence on the total revenue generated by the government in the country, as observed by Ugwu et al. (2019). The researcher also observed that there are only very few empirical studies on the nexus between VAT, inflation rate, and government revenue in Nigeria, which constitutes a research gap that needs to be filled. This motivated the researcher to investigate the nexus between Value-Added Tax, Inflation Rate, and Government Revenue in Nigeria from 1994 to 2021. Consequently, the study specifically seeks to evaluate the individual influences of VAT and inflation rate on government revenue in Nigeria, and to determine the short run and long run nexus between Value-Added Tax, Inflation Rate, and Government Revenue in Nigeria from 1994 to 2021.

This study is structured into five sections. The first section is the introductory part that provides a background to the study. The second section reviews conceptual, theoretical, and empirical

literatures regarding the subject matter of the study; the third section explains the methodology used in conducting the study; the fourth section presents and analyzes the data used in the study, while the fifth or last section makes conclusion and proffer recommendations in the study.

2.0   Literature Review

2.1   Conceptual Literature Review

2.1.1   Value-Added Tax (VAT)

According to FIRS (2020), value-added tax is a toll usually paid when goods and services are procured by citizens and organizations in a country (FIRS, 2020). VAT is typically charged on almost every item manufactured in Nigeria or those imported from other countries, excluding items clearly exempted by government as prescribed in the VAT Order (Obaretin & Uwaifo, 2020). VAT is an ancillary tariff that is placed on manufactured articles at different stages, which therefore, helps in avoiding incidences of double tax payments experienced in analogous tax systems like the sales tax. This unique feature of the VAT makes it more popular and acceptable than the sales tax (Obaretin & Uwaifo, 2020). Another reason for change from sales tax to VAT was due to the fact that considerable successes were recorded on VAT regimes in nations like France and Germany, and due to the overwhelming criticisms of the sales tax by many. Most importantly, among the criticisms of the sales tax is the fact that the tax places limit on only 9 items categories, with the addition of sales of foods, drink and other services rendered in hotels, motels, and related businesses. This places an undesirable effect on items and services produced or acquired domestically; in that way, items manufactured within the country and services provided by citizens locally are always at a disadvantage compared to items and services imported into the country (Obaretin & Uwaifo, 2020). One merit of the VAT strategy is that the prevalence like other consumption taxes, for instance, import duty, export tax, and sales tax, are usually shouldered by citizens who patronize the goods and services; hence, making evasion very hard. It also ensures that rich and wealthy persons in the country are effectively taxed (Afolayan et al., 2021). According to Agbo and Nwadialor (2020), the VAT approach which is an indirect tax collection system was affirmed in Nigeria via Decree 102 of 1993 repealing the Sales Tax Decree No.7 of 1986. This new VAT regime became effective on the 1st of January 1994. The VAT rate in Nigeria was increased from 5% to 7.5% effective February 1st 2020 (FIRS, 2020).

2.1.2   Inflation Rate

According to Sengul (2020), inflation is a quantified measure that shows a general upward movement in the prices of items and services within a country lasting for a significant period of time. He further stated that inflation refers to a persistent plunge in the purchasing power of a country's currency over a significant time period. This implies that inflation is the dynamics in the overall prices of items and services in a country lasting for a significant period of time, and does not imply changes in prices of only few items and services within the country during this period.

In the views of Echekoba, Okpala, and Anachedo (2021), inflation is said to be experienced in a country when there is a persistent or insistent upsurge concerning the prices of items and

services for a prolonged time period. The trio also stated that inflation is a situation in which large amounts of a country's currency are being used to make payments for just few items and insignificant services in the country. This implies that inflation is an indication of reduction in the buying power of a country's currency and a loss of the real value of the currency relative to the currencies of other countries (Okpala et al., 2021).

A general belief by many economic scholars is that a slightly little inflation is healthy for the economy of a country, as both periods of hyper-inflation and deflation have adverse effects on the economic happenings in the country, which stimulates economic insecurity, and undersized economic policies (Sengul, 2020). Nevertheless, there is no single global level for 'little inflation' which is assumed to be an equilibrium inflation necessary for countries. However, it is believed that adverse effects of inflation on the economy of a country is mostly dependent on the economic characteristics of the country (Ha, Iyanova, Ohnsorge, & Unsal, 2019). Furthermore, just like hyper-inflation, extremely low inflation or deflation makes it difficult for robust economic activities to thrive in a country, as it tends to limit the country's central bank from making robust monetary policies. Similarly, when inflation rate drops to a level lower than zero percent, it adversely affects real interest rates; thereby, triggering an increase (Sengul, 2020).

2.1.3 Government Revenue

Revenue generation is a very fundamental aspect of every government as it is through revenue that the government is able to perform its functions effectively and carry out developmental projects in the country. In order to effectively perform its function, the government must strategize properly on ways of generating significant revenue from not only the predominant oil sector, but also from other non-oil sectors of the economy so that they can amass enough funds to effectively run the government and perform other statutory activities and projects in the country (Olaoye & Ayeni, 2018). Oseni (2017) posited that taxation is one of the ways in which revenues are collected by the government in order to get funds that can be used to meet their needs and those of the citizenry. It is an indispensable liability that every resident in the country must accept in order to support the government's determinations in performing its constitutional tasks. In Nigeria, local, state, and federal governments carry out the generation of revenues for government via the Federal Inland Revenue Service (FIRS). State governments generate their own internal revenues via the individual states' Boards of Internal Revenue, while local governments generate theirs through the Local Revenue Collection Services of the individual local government areas (Ugwu et al., 2019).

2.2 Empirical Review

The study of Kwanti and Dauda (2022) examined the impact of value-added tax (VAT) on the economic growth of Nigeria from 1994 to 2020 using OLS - regression analysis. The study used secondary annual time series data on the variables – VAT, Gross Domestic Product, and Federally Collected Revenue collected from Central Bank of Nigeria Statistical Bulletin, Federal Inland Revenue Service, Nigerian Bureau of Statistics, and the Joint Tax Board Bulletin. Findings of the study revealed that VAT has significant positive impacts on economic growth and federally collected revenue in Nigeria from 1994 to 2020.

Similarly, a study by Odu (2022) was carried out to investigate the effect of Value-added Tax (VAT) on revenue generation and economic growth in Nigeria from 1994 to 2018 using Vector Error Correction Model (VECM) and Vector Auto Regression Model (VARM). The study utilized annual time series secondary data on the variables – VAT, total tax revenue, and GDP collected from the Federal Inland Revenue Service (FIRS) and Central Bank of Nigeria (CBN). Findings of the study revealed that VAT has a significant effect on total tax revenue in Nigeria.

Similarly, the study of Odu and Omesi (2022) investigated the relationship between Value-added tax revenue and Revenue allocation in Nigeria within the period of 2000-2020 using OLS regression analysis and Pearson correlation analysis. The study used secondary annual time series data on the variables – VAT revenue, Federal allocation, state and local government allocations shared from the federation account source from the CBN Annual Statistical Bulletin 2020. Findings of the study revealed that VAT has significant positive relationship with revenue allocations to the federal, state and local government in Nigeria from 2010 to 2019.

In the same vein, the study of Echekoba, Okpala, and Anachedo (2021) ascertained the effect of inflationary trend on Nigerian developing economy from 2010 to 2019 using OLS regression analysis and Granger Causality test. The study used annual time series secondary data on the variables – Gross Domestic Product (GDP), Gross National Expenditure (GNE), and Inflation Rate collected from the Central Bank of Nigeria (CBN), Securities and Exchange Commission (SEC), and National Bureau of Statistics (NBS). Findings of the study revealed that inflationary trend had significant positive effect on economic growth (GDP) in Nigeria from 2010 to 2019 at 5% level of significance.

Likewise, the study of Owino (2019) analyzed the effect of Value-added tax (VAT) on economic growth in Kenya from 1973 to 2010 using the ordinary least squares technique of regression analysis. The study used annual time series data on the variables – GDP, income tax, VAT, customs duty, and excise duty collected from the Kenya Revenue Authority, Kenya National Bureau of Statistics, Ministry of National Treasury, World Bank, and IMF. Findings of the study revealed that a significant positive relationship exists between VAT revenue and GDP in Kenya. The finding meant that VAT revenue was not adequate to influence economic growth in Kenya.

Also, Obaretin and Uwaifo (2018) conducted a related study to examine the impact of VAT on economic development in Nigeria from 1994 to 2018 using the Auto-Regressive Distributed Lag (ARDL) model. Data used in the study were secondary annual time series data on the variables – GDP, VAT, and Total Consolidated Revenue collected from the Federal Inland Revenue Service and United Nations. The results of the data analysis revealed that VAT had significant positive influence on economic development in Nigeria at 5%.

In a bid to examine the relationship between Value-Added Tax (VAT), customs duty, and revenue generation in Nigeria for the period 2000 to 2016, the study of Olaoye and Ayeni (2018) employed ARDL model and Granger causality test. Data used in the study were secondary annual time series data on the variables - Value-Added Tax (VAT), Customs Duty, and Revenue Generation in Nigeria. The data were collected from the Federal Inland Revenue

Service. It was found from results of the data analysis that there was no long-run significant relationship between Value-Added Tax (VAT), customs duty, and revenue generation in Nigeria for the period 2000 to 2016 at 5%. It was also found that there was no significant causality between variables at 5%. However, it was found that VAT had positive influence on revenue generation in Nigeria at 5%.

Also, the study of Okegbe, and Ezejiofor (2017) assessed the magnitude of effect VAT had on the Nigerian economy from 1999 to 2013 using OLS regression model and one sample t-test. Data used in the study were secondary annual time series data on Gross Domestic Product, Per Capital Income, and Total Revenue (TR) source from Central Bank of Nigeria, Federal Inland Revenue Service, and Federal Ministry of Finance. Findings of the study revealed that a significant positive relationship exists between VAT and total revenue generation in the Nigerian economy from 1999 to 2013.

In a like manner, the study of Sowole and Adekoyejo (2019) also assessed the influence of VAT on the revenue generation of the federal government in Nigeria from 2008 to 2017 using Pearson correlation analysis and simple regression model. Data used in the study were secondary annual time series data on VAT, Real GDP, Federally Collected Revenue (FCR), and Inflation Rate for 10 years (2008 to 2017). The data were collected from CBN, NBS, World Bank, International Financial Statistics, and Federal Ministry of finance. The results of the data analysis revealed that VAT had insignificant positive impact on revenue generation in Nigeria from 2008 to 2017 at 5%. Findings also revealed that Inflation Rate had insignificant negative influence on revenue generation in Nigeria from 2008 to 2017 at 5%.

Furthermore, the study of Ugwu et al. (2019) examined the effect of VAT on total revenue of government in Nigeria from 1994 to 2014 usi ng Error Correction Model. Data for the study were secondary annual time series data on VAT, Inflation Rate, Unemployment Rate, and Capital Utilization from 1994 to 2014 collected from CBN and FIRS. The study's findings revealed that VAT had statistical significant positive effect on total revenue of government, while inflation rate had statistical insignificant positive effect on total revenue of government in Nigeria from 1994 to 2014 at 5%.

2.3   Theoretical Review

This study reviews three relevant theories to help explain the need for government to impose and operate an optimum VAT rate that stimulates the generation of optimum government revenue in Nigeria. The theories are; 'Ibn Khaldun Theory of Taxation', Benefit Received Theory of Taxation', and the Laffer Curve Model'.

2.3.1   Theory of Taxation

Abu Zayd Abd al-Rahman Ibn Khaldun (1332-1406) pioneered the first 'Theory of Taxation' (Jafar & Ismail, 2017). This theory is thought to be an innovative and important contribution in economics (Islahi, 2015). Ibn Khaldun maintained that a high tax rate regime leads to reduction in the revenue accrued from taxes, as it slows down or reduces economic activities in the state. The reverse is also true. Ibn Khaldun also maintained that a low tax rate regime, if

activated in a state could be beneficial to manufacturers, entrepreneurs, individuals, government, and the state at large, as new businesses and enterprises would emanate, giving rise to increased revenues from taxes (Jafar & Ismail, 2017). This implies that, for a state to achieve higher tax revenues, tax rates on goods and services in the state has to be low.

The principal idea of Ibn Khaldun's theory of taxation was to reduce to a reasonable extent, the amount of money levied on individuals capable of undertaking artistic initiatives in the state. This makes the individuals psychologically predisposed to embark on these artistic initiatives, with the notion that they will make good profit from the ventures and only remit a small fraction to the state. Consequently, Ibn Khaldun supported a reduction in the taxes imposed on manufacturers and business owners so as to encourage them to effectively carryout their businesses that attract better profits, thereby, increasing the revenue base of the state. In his experimentation, Ibn Khaldun practically observed that government of the time initially operated relatively low tax rates in line with Islamic injunctions. This caused many enterprises in the economy to increase in numbers and sizes, and consequently, increase in tax revenue for the state.

2.3.2   Benefit Received Theory of Taxation

The 'benefit received theory of taxation' was initially developed by two economists of the Stockholm School – Knut Wicksell (1896) and Erik Lindahi (1919) (Hansjurgens, 2000). This approach was however, expanded by Paul Samuelson and Richard Musgrave. The theory is based on the assumption that a mutual nexus essentially exists between taxpayers and the state (Bhartia, 2009). The theory is of the opinion that the state provides some goods and services to its citizens, who in turn support the cost of these goods and services proportionately to the benefits they receive (Bhartia, 2009). Anyanfo (1996) maintains that taxes ought to be apportioned on the crux of the gains derived from government spending. The idea of benefits received theory of taxation, which is a principle of fairness of income tax states that citizens should pay taxes on the basis of the benefits they derive from government's spending. Proponents of this theory are of the belief that citizens who derive the utmost benefits from government spending directly or indirectly, ought to pay higher taxes on these goods or services consumed and accessed than citizens who consumed or accessed less, based on the ideology of equity. For instance, citizens who possess motor vehicles should pay more taxes for the maintenance and repairs of roads than citizens who do not possess motor vehicles. Nevertheless, it is hard to distinguish the goods and services that are meant for the betterment and preservation of the country at large, and not just a single person. The benefit received ideology of taxation states that families and enterprises ought to procure government's goods and services essentially in the same way they procure other commodities. Therefore, this follows an identical concept like that of the market which entails that persons who derive gains from consuming or accessing a specific good or service ought to pay a tax ordinarily known as the value-added tax (VAT) which is required for the supply of the good or service. The advocates of the benefit received theory maintain that persons ought to only pay for a thing that they will derive a benefit from. Hence, it I important to state that because of citizens' needs for goods and services and the gains they ultimately derive from these, they ought to be ready to pay a tax for the value added on the goods and services known as value-added tax (VAT).

2.3.3 The Laffer Curve

The Laffer curve was pioneered by Professor Arthur Laffer as a theoretical illustration of the nexus between government revenue and taxation. The curve indicates increases in government revenue stimulated by increases in tax rate. According to Afolayan, Okonkwo, and Okaro (2021), the Laffer curve shows that government revenue has a ceiling in which it can increase to as a result of increases in the tax rate. This implies that there is an optimum tax rate that stimulates an optimum increase in government revenue. Hence, government has to determine the optimum tax rate in order to attain maximum total revenue. This theory is explained using a curve as illustrated in Figure 1:
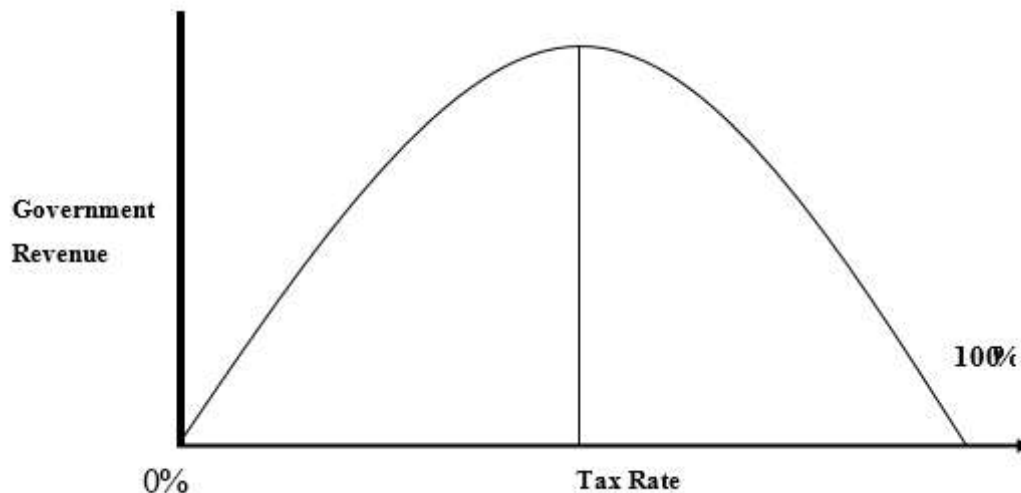

Figure 1: Nexus between Tax rate and Government Revenue

Source: Afolayan, Okonkwo, and Okaro (2021).

The curve shows the increase in government revenue as a result of increases in tax rate from 0% and100%. The theory deduces that a 100% tax rate generates zero government revenue in the same manner that a 0% tax rate generates zero revenue. This is because at 100% tax rate, no incentive exists for a rational tax payer to attract any income, hence, the total government revenue generated will be 100% of nothing. This then follows that there must be a rate in between the tax rate that government revenue would be at maximum. Laffer attributes this model to the works of Ibn Khaldun and Keynes J. M. arguments. One possible consequence of the Laffer model is that raising VAT rate further than some level will turn out to be counter-productive for increasing government revenue due to diminishing returns (Afolayan et al., 2021).

3.0   Research Methodology

3.1   Research Approach

An ex-post facto research approach was adopted in this study. This approach enabled the researcher to use already existing data on relevant variables pertaining to the study.

3.1.1 Variables in the Study

The following variables were used in this study: Value-Added Tax, Inflation Rate, and Government Revenue. (Proxied by Total Government Revenue). Government Revenue is the dependent (response) variable, while Value-Added Tax and Inflation Rate are the independent (explanatory) variables in the study.

3.1.2 Data Type and Source

The study used already existing or secondary data. The data were annual time series data on Value-Added Tax (VAT), Inflation Rate (INFR), and Total Government Revenue (TGR) in Nigeria from 1994 to 2021. The data were sourced from the CBN, FIRS, and IMF database.

3.1.3 Model Specification

A functional linear model that depicts the nexus between Government Revenue, Vat, and Inflation Rate in Nigeria from 1994 to 2021 is given as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$$

Where;

Y = Government Revenue (Proxied by Total Government Revenue (TGR))
X_1 = Value-Added Tax (VAT)
X_2 = Inflation Rate (INFR)
B_0 = Intercept (Constant) of the model
β_1 = Slope of X_1 (Coefficient of VAT)
β_2 = Slope of X_2 (Coefficient of INFR)
ε = Residual or Error Term

3.2 Method of Data Analysis

This study utilizes descriptive statistics (mean and standard deviation), unit root test, OLS technique of the multiple regression analysis, and Auto Regressive Distributed Lag (ARDL) Model of the multiple regression for data analysis. Descriptive statistics (mean and standard deviation) was used to conduct a preliminary analysis to estimate the mean and standard deviation of the variables in the study. Since the data pertaining to the variables in the study are time series data, the unit root test is used to determine the stationarity status of the variables in order to ascertain their stability and capability for prediction so as not to produce spurious regression results. The OLS regression analysis is used to estimate the influence of the independent variables on the dependent variables when the variables are all stationary at levels, while the ARDL model is used to determine the short run and long run relationships between the variables.

4.0   Results/Findings and Discussion

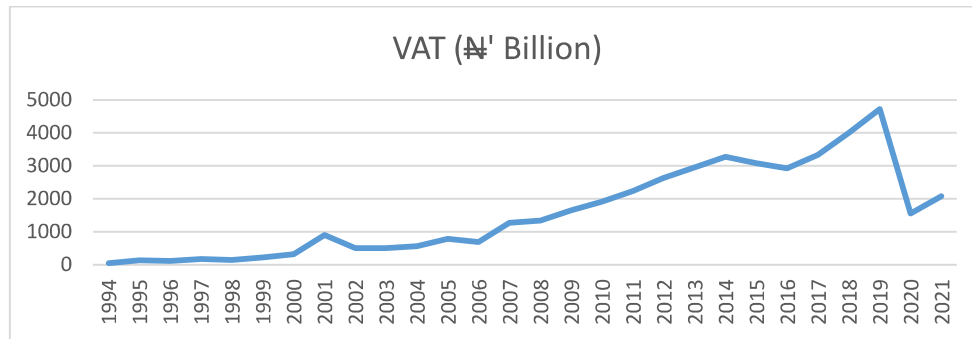## 4.1   Data Presentation

Figure 1: Value-Added Tax (VAT) for Nigeria from 1994-2021.

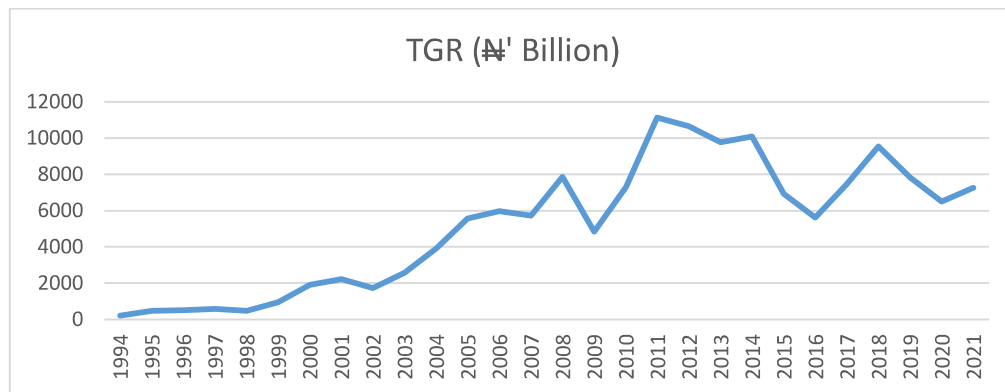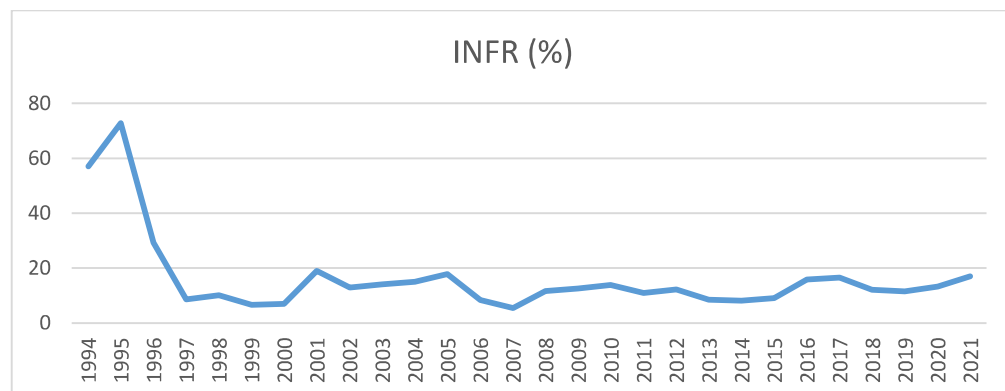Figure 2: Total Government Revenue (TGR in Nigeria from 1994-2021.

Figure 3: Inflation Rate (INFR) in Nigeria from 1994-2021.

4.2   Data Analysis

4.2.1   Descriptive Statistics

Table 2: Descriptive Statistics

	VAT	TGR	INFR
Maximum	4725.6000	11116.8500	72.8400
Minimum	41.7200	201.9100	5.3900
Mean	1571.9610	5197.0250	16.2800
Std. Dev.	1348.3930	3512.8800	14.7079
Observations	28	28	28

Source: Author's Descriptive Statistics with the aid of Eviews 10, 2022.

The result of the descriptive statistics (Table 2) reveals that VAT has a mean of 1,571.9610 (₦' Billion) and standard deviation of 1,348.3930; TGR has a mean of 5,197.0250 (₦' Billion) and standard deviation of 3,512.8800, while the mean and standard deviation of INFR are 16.2800% and 14.7079 respectively.

4.2.2   Stationarity Test (Unit Root Test)

Table 3: ADF Unit Root Test

Variable	ADF Test Statistic	P-value	Level of Sig.	Order of Integration
LnVAT	-2.6274	0.0884	10%	I(0)
LnTGR	-2.7963	0.0492	5%	I(0)
LnINFR	-3.7115	0.0001	1%	I(0)

Source: Author's ADF Unit Root Tests with the aid of Eviews 10, 2022.

The results of the ADF (Augmented Dickey-Fuller) stationarity test reveals that all the variables in this study (VAT, Inflation Rate, and Total Government Revenue) are stationary at levels. This implies that all the variables are of integration order zero I(0). Hence, the multiple regression (OLS technique) is appropriate for estimating the influence of VAT and Inflation Rate on Government Revenue in Nigeria for the period of 1994 to 2021. The study also uses the Auto Regressive Distributed Lag (ARDL) model to estimate the short run and long run nexus between variables VAT, Inflation Rate, and Government Revenue.

4.3   OLS – Multiple Regression Analysis

Table 4: Multiple Regression Analysis (OLS Technique)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.0108	0.6443	4.6730	0.0001
LNVAT	0.8252	0.0605	13.6471	0.0000
LNINFR	-0.1915	0.1349	-1.4195	0.1681
R-squared	0.9086			
Adjusted R-squared	0.9013			
S.E. of regression	0.3659			
F-statistic	124.2340			

Prob(F-statistic)	0.0000

Source: Author's OLS-Multiple Regression Analysis with the aid of Eviews 10, 2022.

Table 4 is the output of the OLS - multiple regression analysis used in estimating the nexus between the response variable (TGR) and the explanatory variables (VAT and INFR). The Table shows that the values of R-Squared and Adjusted R-Squared used as measures of goodness of fit of the multiple regression model in this study are; 0.9086 and 0.9013 respectively.

The Table shows that the intercept of the model is significant at 1% ($\beta_0 = 3.0108$, $P < 0.0010$). The Table also reveals that VAT has a positive coefficient in the model which is significant at 1% ($\beta_1 = 0.8252$, $P < 0.001$). The Table also reveals that INFR has a negative coefficient in the model which is insignificant at 5% ($\beta_2 = -0.1915$, $P = 0.1681$).

The Table also reveals that the F-statistic of the model indicates that the OLS multiple regression model has an overall statistical significance in explains the nexus between VAT, Inflation Rate, and Government Revenue in Nigeria for the period 1994 to 2021 at 1% ($F = 124.2340$, $P < 0.0010$).

4.4   OLS Regression Diagnostic Tests

The regression diagnostic tests carried out in this study to ensure that the OLS – multiple regression model complies with assumptions of OLS regression technique; thus, making it robust. The important regression diagnostic test carried out herein are; autocorrelation test, heteroskedasticity test, multicollinearity test, and normality test.

4.4.1   Autocorrelation Test

Table 5: Breusch-Godfrey Serial Correlation LM Test

F-statistic:	2.2410	Prob. F(4, 21):	0.0991
Obs*R-Squared:	8.3763	Prob. Chi-Square(4):	0.0787

Source: Author's B-G Serial Correlation LM Test with the aid of Eviews 10, 2022.

The output of the Breusch-Godfrey serial correlation LM test at lag 4 (Table 5) suggests that no autocorrelation of any order exist in the multiple regression model ($F_{0.05, (4, 21)} = 2.2410$, $P = 0.0991$; Chi-Square $_{(0.05)(4)} = 8.3763$, $P = 0.0787$). This confirms that the model is non-spurious and reliable.

4.4.2   Heteroskedasticity Test

Table 6: Breusch-Pagan-Godfrey Heteroscedasticity Test

F-statistic:	0.3882	Prob. F(2, 25):	0.6823
Obs*R-Squared:	0.8433	Prob. Chi-Square(2):	0.6560
Scaled Explained SS:	0.4332	Prob. Chi-Square(2)	0.8052

Source: Author's B-P-G Heteroscedasticity Test with the aid of Eviews 10, 2022.

The output of the Breusch-Pagan-Godfrey heteroskedasticity test (Table 6) suggests that the model does not have the problem of heteroskedasticity ($F_{0.05, (2, 25)}$ = 0.3882, P = 0.6823; Obs*R-Squared = 0.8433, P(Chi-Sqr(2)) = 0.6560; Scaled Explained SS = 0.4332, P(Chi-Sqr(2)) = 0.8052). This also implies that the multiple regression model in this study is non-spurious and reliable.

4.4.3 Multicollinearity Test

Table 7: Variance Inflation Factors (VIF) Test

Variable	Coefficient Variance	Centered VIF
C	0.4151	Not Applicable
LnVAT	0.0037	1.2147
LnINFR	0.0182	1.2147

Source: Author's VIF Test with the aid of Eviews 10, 2022.

The output of the VIF test (Table 7) suggests that the independent variables in the multiple regression model are not highly correlated since none of the centered VIF value is higher than 5.0 (Centered VIF (LnVAT) = 1.2147; Centered VIF (LnINFR) = 1.2147). Hence, the multiple regression model does not have the problem of multicollinearity, which makes it non-spurious and reliable.

4.4.4 Normality Test

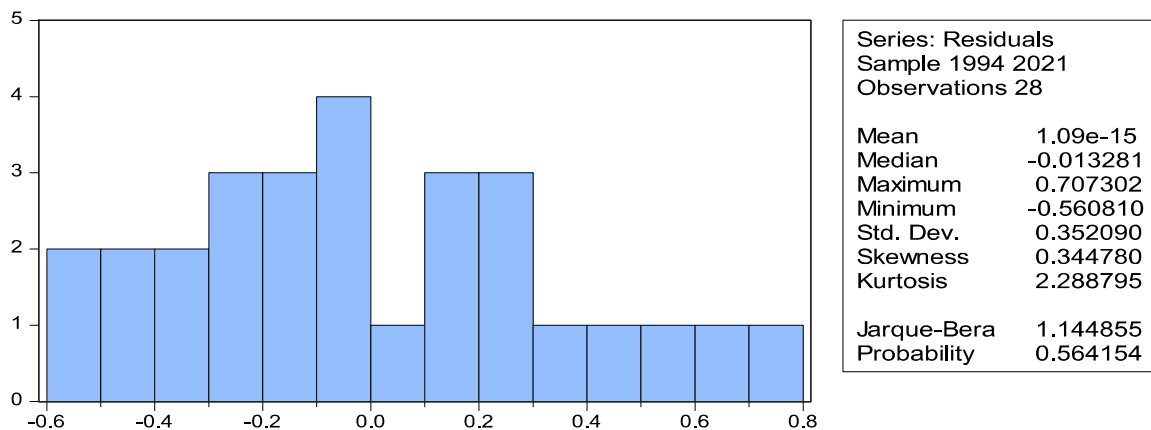| Series: Residuals	
Sample 1994 2021	
Observations 28	
Mean	1.09e-15
Median	-0.013281
Maximum	0.707302
Minimum	-0.560810
Std. Dev.	0.352090
Skewness	0.344780
Kurtosis	2.288795
Jarque-Bera	1.144855
Probability	0.564154

Figure 4: Normality Test with the aid of Eviews 10, 2022.

The output of the normality test (Figure 4) returned a Jarque-Bera (J-B) statistic of 1.1449 and an associated P value of 0.5642 (P > 0.05). This is an indication that the observations in the error term of the multiple regression model are independently and identically normally distributed. Hence, making the model to be non-spurious and reliable.

Based on the result of the multiple regression analysis in Table 4, it implies that multiple regression model that explains the nexus between Value-Added Tax, Inflation Rate, and Government Revenue in Nigeria for the period of 1994 to 2021 is:

$$Y = 3.0108 + 0.8252X_1 - 0.1915X_2 + \varepsilon$$

Where;

      Y = Government Revenue

      X_1 = Value-Added Tax

      X_2 = Inflation Rate

      ε = Residual or Error Term

4.5   Auto Regressive Distributed Lag Model

Table 8: ARDL Regression Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Short Run ARDL Coefficients				
LNTGR(-1)	0.6350	0.1555	4.0833	0.0005
LNVAT	0.2371	0.1526	1.5538	0.1339
LNINFR	0.0050	0.1250	0.0398	0.9686
C	1.4363	0.6407	2.2416	0.0349
Long Run ARDL Coefficients				
LNVAT	0.6497	0.1821	3.5673	0.0016
LNINFR	0.0136	0.3448	0.0396	0.9688
C	3.9354	1.5330	2.5672	00172
R-squared	0.9317			
Adjusted R-squared	0.9228			
S.E. of regression	0.2905			
F-statistic	104.5479			
Prob(F-statistic)	0.0000			
Durbin-Watson Stat	1.6985			

Source: Author's ARDL Analysis with the aid of Eviews 10, 2022.

Table 8 is the output of the ARDL analysis used in estimating the short run and long run nexus between response variable (TGR) and the explanatory variables (VAT and INFR). The result indicates that VAT and INFR had no significant short run nexus with TGR at 5% (LNVAT = 0.2371, P = 0.1339; LNINFR = 0.0050, P = 0.9686). The result also shows that VAT had a positive significant long run nexus with TGR at 5% (LNVAT = 0.6497, P < 0.05), while INFR has no significant long run nexus with TGR at 5% level of significance (LNINFR = 0.0136, P = 0.9686) in the Nigerian economy for the period under review.

4.6   ARDL Regression Diagnostic Tests

The diagnostic tests carried out in this study to ensure that the ARDL regression model in this study is robust and non-spurious. The tests carried out are linearity test, homoskedasticity test, serial correlation test, and normality test.

4.6.1   Linearity Test

Table 10: Ramsey Reset Test

	Value	df	Probability
t-statistic	1.4978	22	0.1484
F-statistic	2.2433	(1, 22)	0.1484

Source: Author's ARDL Linearity Test with the aid of Eviews 10, 2022.

The output of the Ramsey reset test indicates that the ARDL model is properly linearly specified (t = 1.4978, df = 22, P = 0.1484; F = 2.2433, df = 1, 22, P = 0.1484). In other words, it implies that the short run and long run AEDL model do not have specification error.

4.6.2   Autocorrelation Test

Table 11: Breusch-Godfrey Serial Correlation LM Test

F-statistic:	1.0872	Prob. F(2, 21):	0.3554
Obs*R-Squared:	2.5334	Prob. Chi-Square(2):	0.2818

Source: Author's B-G Serial Correlation LM Test with the aid of Eviews 10, 2022.

The output of the Breusch-Godfrey serial correlation LM test for the ARDL model indicates that no serial correlation exists in the ARDL model ($F_{0.05, (2, 21)}$ = 1.0872, P = 0.3554; Chi-Square $_{(0.05)(2)}$ = 2.5334, P = 0.2818). This confirms that the ARDL model is non-spurious and robust.

4.6.3   Heteroskedasticity Test

Table 12: Breusch-Pagan-Godfrey Heteroscedasticity Test for ARDL Model

F-statistic:	1.2923	Prob. F(3, 23):	0.3008
Obs*R-Squared:	3.8947	Prob. Chi-Square(3):	0.2731
Scaled Explained SS:	1.2387	Prob. Chi-Square(2)	0.7437

Source: Author's B-P-G Heteroscedasticity Test with the aid of Eviews 10, 2022.

The output of the Breusch-Pagan-Godfrey heteroskedasticity test indicates that the ARDL model does not have problem of heteroskedasticity ($F_{0.05, (3, 23)}$ = 1.2923, P = 0.3008; Obs*R-Squared = 3.8947, P(Chi-Sqr(3)) = 0.2731; Scaled Explained SS = 1.2387, P(Chi-Sqr(2)) = 0.7437). This implies that the ARDL model is non-spurious and robust.
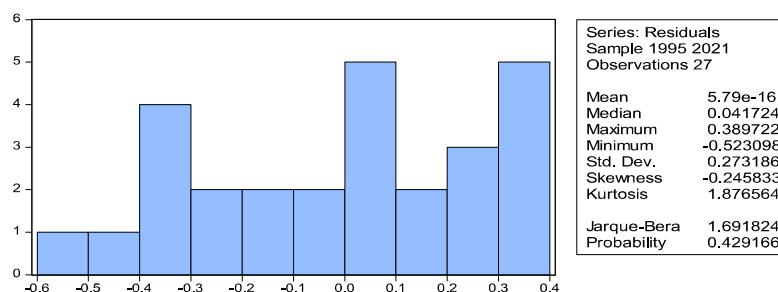
Normality Test for ARDL Model

Figure 5: Normality Test for ARDL Model with the aid of Eviews 10, 2022.

The output of the normality test (Figure 4) indicates that the observations in the error term of the ARDL model are independent and identically normally distributed (J-B = 1.6918, P = 0.4292). Hence, the ARDL model is non-spurious and robust.

4.7   Discussion of Results/Findings

The results of the OLS – multiple regression analysis (Table 4) shows that the intercept of the model is significant at 1% ($\beta0$ = 3.0108, P < 0.0010). The implication of this result is that in the absence of the two explanatory variables (VAT and INFR) in the model, the dependent variable (TGR) still attained a positive value of about 3.0108 (N' Billion).

The Table also reveals that VAT has a positive coefficient that is significant at 1% ($\beta1$ = 0.8252, P < 0.001). This implies that VAT has a significant positive influence on Government Revenue in Nigeria from 1994 to 2021 at 1% level of the significance. The implication of this result is that a unit rise in VAT triggered an increase of 0.8252 (N' Billion) in Total Government Revenue (TGR) in Nigeria during the period under review. This finding is consistent with the findings of Kwanti and Dauda (2022), Odu (2022), Ugwu et al. (2019), Oraka et al. (2017), Olaoye and Ayeni (2018), and Obaretin and Uwaifo (2018) whose individual studies found that VAT had significant positive influence on government revenue. The finding is however, inconsistent with the finding of Sowolo and Adekoyejo (2019) whose study found VAT to have an insignificant positive influence on federally collected revenue in Nigeria.

The ARDL result (Table 8) shows that VAT has no short run nexus with Government Revenue in Nigeria during the period 1994 – 2021 at 5% level of significance (LNVAT = 0.2371, P = 0.1339). However, the Table shows that VAT has a long run nexus with Government Revenue in Nigeria for the same period at 5% (LNVAT = 0.6497, P = 0.0016). The implication of the long run ARDL model result is that in the long run 1% increase in VAT triggered an increase of 64.97% in Government Revenue in Nigeria during the period of 1994 to 2021.

The Table also shows that INFR has an insignificant negative influence on Government Revenue in Nigeria from 1994 to 2021 at 5%. The implication of this result is that a unit increase in INFR triggered a decrease of 0.1915 (N' Billion) in Government Revenue (TGR) in Nigeria during the period under review. The finding supports the finding of Sowole and Adekoyejo (2019) whose study found that inflation rate has insignificant negative influence on federally collected revenue. However, the finding disagrees with the finding of Ugwu et al. (2019) whose study found inflation rate too have insignificant positive influence on government revenue.

The ARDL result (Table 8) also shows that Inflation Rate no short run and long run nexus with Government Revenue in Nigeria during the period 1994 – 2021 at 5% level of significance (Short Run: LNINFR = 0.0050, P = 0.9686; Long Run: LNINFR = 0.0136, P = 0.9688).

The F-statistic of the OLS multiple regression model also indicates that the regression model used in explaining the nexus between VAT, Inflation Rate, and Government Revenue in Nigeria for the period 1994 to 2021 is statistically significant at 1%.

5.0   Conclusion and Recommendations

51   Conclusion

Based on the findings above, the study concludes that value-added tax (VAT) has the capacity of increasing the revenue base of Government in Nigeria, thereby, reducing government's reliance on oil for revenue, while Inflation Rate dwindles Government Revenue.

5.2   Recommendations

The study recommends that:

1. Strict enforcement, supervision, and administration of VAT should be embarked on and sustained by authorities of the FIRS, identifying administrative and technical gaps and obstacles hampering on the smooth implementation of the scheme and proffering robust solutions through consultations with crucial stakeholders on how to advance the scheme, in order to boost and sustain the generation of vigorous VAT revenue consistently for the government.

2. In order to enhance the total Value-Added Tax collection system in the country, there is need for the adoption of Information Communication Technology as well as the regular trainings and re-trainings of personnel of the FIRS in order to enhance their capacities and effectiveness; thereby, making the payment and remittance of VAT easy for tax payers and personnel vested with powers of enforcement and administration of the scheme.

3. Government should pave way for the establishment and development of more private production/manufacturing industries in Nigeria so as to enhance domestic production of goods and services in the country, which would help in the generation of considerable VAT and the reduction of inflation, thereby, enhancing government revenue in the country.

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