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# Tax Structure and Economic Growth in Nigeria: Evidence from Vector Autoregressive Model

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**Abstract:** This paper used quarterly time series data to examine the tax structure and economic growth in Nigeria over a period of 2006 to 2021. Data were secondarily sourced from Federal Inland Revenue Service (FIRS) and Central Bank of Nigeria (CBN) bulletins. The tax structure variables on which data were collected are the company income tax, value added tax and petroleum profit tax. Data were also collected on gross domestic product which is a proxy for economic growth. The data generated were analyzed using vector autoregressive model. The study found a bidirectional causality between the GDP and value added Tax. The lags of the company Income Tax cannot significantly cause the GDP. Lags of value added Tax can cause company Income Tax, but lags of company Income Tax cannot cause Value added and petroleum Income Tax. The study therefore recommends that the tax administrative loopholes, including tax evasion and avoidance should be prevented to improve tax revenue and GDP of the Federal Republic of Nigeria.

**Keywords:** Tax, Tax Structure, Economic Growth.

## 1. Introduction

This study examines the relationship between tax structure and economic growth in Nigeria over a period of 2006 to 2020. Taxation is one of the fiscal policy instruments used by the government to stabilize the economy (Alexander, Keyi & Alfa 2019). Tax is a major source of revenue for the Nigerian government at all levels. According to Samuel and Simon (2011) in Adeyemi and Mieseigha (2019), taxation is a system of imposing an obligatory levy on all incomes, goods, services and properties of individuals, partnership, trustees, executorships and companies by the government. The tax structure in Nigeria is divided into direct and indirect taxes. Examples of indirect taxes include value added tax, excise duties and service tax while direct tax examples include company income tax, personal income tax and petroleum profit tax.

Emphasis will be on value added tax (VAT), petroleum profit tax (PPT) and company income tax (CIT). Tax is therefore a major source of government revenue all over the world. It is a revenue source for government to collect needed resources for discharging its pressing obligations (Yahaya & Bakare, 2018). It has a bearing on the Gross Domestic Product (GDP) which is the standard indicator for measuring the economic wellbeing of a nation (Okafor, 2012). A tax system offers itself as one of the most effective means of mobilizing a nation's internal resources and tends itself toward creating an environment conducive to the promotion of economic growth (Azubike, 2009).



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Government uses tax structure and policy to balance many economic goals including revenue generation, economic efficiency, redistribution, equity between similarly situated taxpayers, and stabilization of economic cycles. For instance, if output suddenly contracts, government can allow tax revenues fall along with income or deliberately cut tax rates and let unemployment benefits increase with the number of unemployed. What this does is to maintain income and purchasing power for individuals and support demand. Government can also raise demand directly by deliberately spending more. Government use tax proceeds to render their traditional functions, such as the provision of public goods, maintenance of law and order, defense against external aggression, regulation of trade and business to ensure social and economic maintenance (Otu & Adejumo, 2013).

In addition, the principal objective of taxation is to raise revenue for the government, which is required for the provision of security, capital and revenue expenditures and execution of other activities of the government. Other objectives of taxation are to ensure economic development, price stability, to manage economic recession and inflation, exercising right and control over the public asset, employment opportunity and control of cyclical fluctuations. Musgrave and Musgrave (2004) maintained that the "economic effects of taxation include micro effects on the distribution of income and efficiency of resource use as well as macro effects on the level of capacity output, employment, prices and growth".

Most literature on the relationship between tax structure and economic growth have focused on types of taxation such as Value Added Tax (VAT), Company Income Tax (CIT), Personal Income Tax (PIT) and Petroleum Profit Tax (PPT) among others. Other studies have also taken a step further by classifying taxes into direct and indirect taxes. Major reason for this has been to assess their separate role in economic growth process.

The CBN (2016) argues that revenue derived from taxation has been very low when compared to expected revenue from taxation. However, statistics recently have shown that the situation is improving. For instance, tax revenue between 2016 to 2020 are **N3.307billion, N4.027billion, N5.320billion, N5.261billion** and **N4.952billion** respectively (FIRS 2020). It has also been argued that the role of taxation in promoting economic growth in Nigeria is not felt, primarily because of its poor administration (CBN, 2016).

The major challenges facing tax administration in Nigeria include corruption of tax officials, tax multiplicity, poor accountability, structural problems in economy, tax avoidance and evasion, complexity of the tax laws, inadequate tax statistics, lack of awareness of the general public on the imperatives and benefits of taxation, malfunctioning of the e-filing and e-payment systems due to poor infrastructure and inadequate relevant trainings for tax officials.

Economic growth is the increase in the market value of the goods and services produced by an economy over time and it is measured as the percentage rate of increase in the real gross domestic product (GDP). The nexus between tax structure and economic growth is usually demonstrated using the tax-to-GDP ratio. This ratio provides a useful look at a country's tax revenue because it reveals potential taxation relative to the economy. It also enables a view of the overall direction of a nation's tax policy, as well as international comparisons between the tax revenues of different countries. The trend of taxation in Nigeria suggests that tax revenue to gross domestic product (GDP) has been very low over the years compared to what is obtainable in other African economies. Alexander, Keyi and Alfa (2019) opined that in 2010, tax revenue to GDP ratio stood at about 7.3 per cent, rose to 9.4 per cent in 2011 and 5.3 per cent in 2016, but falls to 6.0 per cent in 2019. In 2020 the tax to GDP ratio stood at 6.3 per cent and fall to 6.1 per cent in 2021. Given the foregoing, the major question is what effect does the tax structure (petroleum profit tax, personal income tax and value added tax) have on economic growth in Nigeria?



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This study examines the relationship between the tax structure andeconomic growth in Nigeria between 2001 -2021**. xxxxxxxxxxxxxxxxxxxxx**

The main objective of this study is to examine if tax structure has effect on the economic growth in Nigeria. The specific objectives of this study are to:

1. Determine how petroleum profit tax significantly affects the GDP of Nigeria.
2. Determine how value added tax significantly affect the GDP of Nigeria.
3. Determine how company income tax significantly affects the GDP of Nigeria.

For the objective of the study to be achieved, the following research hypothesis were formulated and tested:

1. **H1**: petroleum profit tax has no significant effect on the GDP of Nigeria.
2. **H2**: value added tax do not significantly affect the gross domestic product (GDP) ofNigeria.
3. **H3**: company income tax has no significant effect on the GDP of Nigeria.

The rest of the study is structured as follows: Section two reviews the literature while Section three present the methodology. Section four focuses on presentation of results and analysis while five is the conclusion and the recommendations section.

## 2. Literature Review

The related literature review is done under three sub-headings: conceptual review, theoreticalreview and empirical studies review.

### 2.1 Conceptual Review of Tax Structure

The government of Nigeria inaugurated the national tax policy review committee on 10 August2016 by the finance minister with a mandate to review and update the National Tax Policy which was first published in 2012. The committee completed its assignment and submitted the revised national tax policy to the finance minister on 29 September 2016. The conceptual review explained the main concepts associated with the study. These aresummarily reviewed in this section of the paper as follows:

### Concept of Tax

Tax is a compulsory levy by the government of a nation, through an appropriate agency, on all incomes, goods, services and properties of an individual, partnership, executor, trustee and a corporate body (Oyebanji, 2018). Government received tax to pay for services such as security, infrastructure, health and education. Tax is a fiscal policy tool used to control balance of payment, restrict dumping of sub-standard products into the country, protect local industries like manufacturing and create employment. The Chartered Institute of Taxation of Nigeria (2012) described tax as an imposed contribution of money to government pursuant to a defined authorized legislation. Shahzad and Maqbool (2016) define tax as a compulsory payment to government by the public, in exchange for the services indirectly provided to publicby the government. Olatunji and Adegbite (2014) opined that taxes are instruments of fiscal control and serve the purpose of raising revenue/funds for the public sector. However, the authors did not identify other instruments of fiscal policy such as government expenditure (capital and recurrent) and transfer payment to influence aggregate demand.



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**Tax Structures in Nigeria**

The Nigerian Tax System is structured into direct and indirect to contribute to economic growth through income generation. The direct tax system is assessable directly on the taxpayer who is required to pay tax on his property, income or profit, etc. The types of taxes that fall under this heading are: Personal income tax (PIT); Companies income tax (CIT); Capital gains tax (CGT); Tertiary education tax (TET); and Petroleum profits tax (PPT). The indirect taxes are those, which are imposed on commodities before they reach the consumer and are paid by those upon whom they ultimately fall, not as taxes, but as part of the selling price of the commodity. The types of taxes under indirect tax system include: Value added tax (VAT); Stamp duties (SD); Excise duties (ED); and Customs duties (CD). Indirect taxes may affect the cost of living, as they constitute taxation on expenditure.

**National Tax Policy**

The National Tax Policy provides the fundamental guidelines for the orderly development of the Nigeria tax system. The Policy is designed to achieve the following specific objectives, among others: guide the operation and review of the tax system; provide the basis for future tax legislation and administration; serve as a point of reference for all stakeholders on taxation; provide benchmark on which stakeholders shall be held accountable; and provide clarity on the roles and responsibilities of stakeholders in the tax System.

The policy is designed to encourage diversification, expand the country's tax base and improve Tax to GDP ratio.

**2.1.1 Petroleum Profit Tax and Economic Growth**

The principal legislation governing petroleum taxation in Nigeria is the Petroleum Profit Tax Act (PPTA) of 2007. According to PWC Tax Data Card Nigeria (2022), PPT is levied on the income of companies engaged in the upstream petroleum operations, that have not executed a conversion contract in line with the Petroleum Industry Act.

The PPT Act provides for the imposition of Petroleum Profits Tax on the chargeable profits of companies involved in the upstream activities of exploration, drilling, extraction and transportation of crude oil. From inception in 1959, the Act has undergone series of amendments culminating in the Petroleum Profits Tax (Amendment) Act of 2007. According to Ogbonna and Ebimobowei (2012), from 1970 – 2009, the petroleum industry generated 82 per cent income for Federal Government of Nigeria, while only 18% came from non-oil revenue.

**Economic Growth**

Economic growth is the in the production of economic goods and services, compared from one period to another. Jhigan (2004) defined economic growth as the process whereby the real per capita income of a country increases over a long period of time. Ayres and Warr (2016) define economic growth as a rise in the total output (goods or services) produced by a country. It represents an increase in the capacity of an economy to produce goods and services, compared from one period to another. According to Olopade and Olapade (2010), growth means an increase in economic activities. The short run variation of economic growth is termed the business cycle (Devaranjan, Swaroop & Zou, 1996).

Tax system plays a vital role in ensuring equity, social and economic improvement in any economy. Angahar and Sani (2012), Omojemite and Godwin (2012), Ogbonna and Appah (2012) and Chigbu et al. (2012) note that a well-organized, efficient and effective tax system is a necessary requirement for


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economic growth. Economic growth measures growth in monetaryterms and looks at no other aspects of development (Illyas and Siddiqi, 2010).

### 2.1.2 Company Income Tax Act

According to PWC Tax Data Card Nigeria (2022), the principal law is the Companies Income Tax Act (CITA) as amended by the Finance Acts (FAs) 2019, 2020 and 2021. CITA imposes income tax on profits accruing in, derived from, brought into or received in Nigeria. It is payable by companies that are registered in Nigeria and non- resident entities carrying on business or that have a Significant Economic Presence (SEP) in Nigeria.

The Company Income Tax (CIT) has become a major source of revenue in many developed countries (Ajakaiye, 2000). The company income tax rate has been 30% and it is applied on the total profit or chargeable profit of the company (Adegbie & Fakile, 2011). The tax law exempted profits of small companies from company income tax i.e. companies with annual gross turnovers of N25m or less), recommend 20% for medium-sized companies i.e. companies with gross annual turnovers greater than N25m but less than N100 million and 30% for large companies i.e. companies with annual gross turnovers higher than N100m (PWC Tax Data Card Nigeria, 2022).

### 2.1.3 Value Added Tax Act

VAT is chargeable on the supply of all goods and services in Nigeria other than those listed in the First Schedule of the Act. The relevant law is the VAT Act LFN 2004 as amended. The rate iscurrently 7.5% on the value of goods and services.

The administration of taxation in Nigeria is vested in various tax authorities depending on the type of tax under consideration. Some are administered by the Federal Inland Revenue Service, while some are administered by State Board of Internal Revenue and Local Government Revenue Committee. The enabling law in respect of each type of tax will normally contain a provision as to the body charged with the administration of the tax. For instance, the administration of the CIT, TET, PPT and VAT are vested on the Federal Inland Revenue Services.

## 2.2 Theoretical Review

The theoretical framework is a research framework that uses a pre-established theory. It is usually the paradigm within which the research fits by highlighting the researcher's understanding of knowledge and reality. This study applied a theory that provides a link between tax revenue generation and economic growth.

This study was anchored on Expediency Theory. According to expediency theory, every tax revenue collection proposal must pass the test of practicability, which must be the only consideration when the county government is choosing a revenue collection proposal.

Proposition is that the economic and social objectives of the government should be treated asirrelevant, since it is useless to have a tax which cannot be levied and collected efficiently.

However, there are pressures from economic, social and political groups. Every group tries to protect and promote its own interests and county government is often forced to reshape tax structure to accommodate these pressures (Bhartia, 2009). Anyafo (1996) explained that the expediency theory is based on a link between tax liability and state activities. The administrative set up may not be efficient to collect the tax at a reasonable cost of collection (Flora, 2020). Taxation provides a powerful set of policy tools to the authorities and should be effectively used for remedying economic and social ills of



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the society such as income inequalities, regional disparities, unemployment, cyclical fluctuations and so on (Bhatia, 2009).

Tax revenue provides a powerful set of policy tools to the authorities and should be effectively used for remedying economic and social ills of the society such as income inequalities, regional disparities, and unemployment and so on (Yahaya & Bakare, 2018). This theory relates to a normal development process and represents a bench mark against which country specific empirical evidence may be compared.

This study is therefore anchored on the expediency theory in that, it enables the researcher to assess the extent to which the tax structure and economic activities are linked. The theory will assist in estimating a sustainable revenue profile for the government, thereby facilitating effective management of the country's fiscal policy. This is because the expediency theory focuses on the fact that taxes are collected to achieve economic objective which enhances the growth and development of a country in all its spheres (Yahaya & Bakare, 2018).

The theory was used in the work of Yahaya & Bakare (2018) on the "Effect of Petroleum Profit Tax and Companies Income Tax on Economic Growth in Nigeria". Governments pursue reforms in tax and expenditure policies act as incentives to firms to venture into research and development and to invest in capital formation which yield external effects that benefits the rest of the economy. Therefore, in the long-run, taxes have unrelenting effects on the economy. Higher direct taxes reduce personal income and discourage private investment and consumption, thereby impeding economic growth.

### 2.3 Empirical Review

Several empirical studies on the relationship between tax structure and economic growth exist in the literature. Alexander, Keyi & Alfa (2019) examined the effect of taxation on economic growth in Nigeria over a period of 1980 to 2018. Data were collected from the Central Bank of Nigeria (CBN) statistical bulletin, and the annual data publication of Federal Inland Revenue Services (FIRS). The variables on which data were collected are the Gross Domestic Product (GDP), Petroleum Profit Tax (PPT), Value Added Tax (VAT) and Personal Income Tax (PIT). Data on GDP was collected from CBN while data on the other variables were collected from FIRS. The data were analyzed using autoregressive distributed lag (ARDL) model. Findings reveal that in Nigeria, the various categories of taxation such as Petroleum Profit Tax, Personal Income Tax and Value Added Tax selected for this study have significant effects on economic growth process. The effect of these taxes on economic growth in Nigeria is even more pronounced in the long-run than in the short-run. Based on the findings, the study recommends that the level of tax evasion and avoidance in the petroleum profit tax should be reduced to achieve sustainable growth in Nigeria.

Makunaji (2018) studied the effect of tax structure on economic growth in Nigeria. The study made use of time series data from 1994 to 2016. Tax was disaggregated into value added tax, petroleum profit tax, personal income tax and company income tax. These tax components were regressed against gross domestic product which is a proxy for economic growth. The data generated were analyzed using descriptive statistics, stationarity test, cointegration test and ordinary least square. The study found that all the tax components studied (Value added tax revenue, personal income tax revenue, petroleum profit tax revenue and company income tax revenue) has significant effect on economic growth in Nigeria. The study contends that tax administrative loopholes should be plugged for tax revenue to contribute immensely to the development of the economy.

Ojong, Ogar and Oka (2016) examined the impact of tax revenue on economic growth: Evidence from Nigeria. The objectives of the study were; to examine the relationship between petroleum profit tax and


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the Nigeria economy, the impact of company income tax on the Nigerian economy and the effectiveness of non-oil revenue on the Nigerian economy. The study uses theOrdinary Least Square (OLS) method to analyze the relationship among the variables of the study. The finding revealed that there is a significant relationship between petroleum profit tax and the growth of the Nigeria economy. It showed that there is a significant relationship between non-oil revenue and the growth of the Nigeria economy. The finding also revealed that there is no significant relationship between company income tax and the growth of the Nigeria economy. However, like Okoh, Onyekwelu, Aca and, Iyidiobi (2016), this study also adopted the OLS approach which is based on unrealistic assumptions.

Salami, Apelogun, Omidiya and Ojoye (2015) empirically investigated the impacts of taxation on the growth of the economy between 1981 to 2012. Gross Domestic Product (RGDP), is specified to depend on the taxation indicators which are the petroleum profit tax (PPT), company income tax (CIT), customs and excise duties (CED), value added tax (VAT). The study employed the use of both simple and multiple linear regression analysis of the ordinary least square method.

These were used to determine the impact and relationship between the endogenous variable, RGDP, and the exogenous variables, PPT, CIT, CED and VAT. It was discovered that if all the exogenous variables were tested individually on the economic growth, they show a significant impact individual on economic. The F-statistic shows that the overall model is statistically significant.

Usman and Adegbite (2015) examine the impact of Petroleum Profit Tax on economic growth in Nigeria for the period 1978-2013. The study employs the Johansen Co-Integration and the Granger Causality tests to examine the direction of causality among Petroleum Profit Tax, money supply, interest rate, inflation rate and economic growth. Results from the study show that Petroleum Profit Tax has positive significant impact on GDP both in the short run and long run. Also, PPT does not granger cause GDP. Money supply impacted GDP positively in the short run but negative significant impact in the long run.

Emmanuel and Charles (2015) investigate the impact of taxation on the Nigerian economy for the period 1994 -2012. The study employs the co-integration technique and findings reveal that the variables are cointegrated and long run relationships exist between the variables. The results of the statistical analysis reveal that positive relationships exist between the explanatory variables (Custom and Excise Duties, Company Income Tax, Personal Income Tax, Petroleum Profit Tax and Value Added Tax) and the dependent Variables (Gross Domestic Product, Unemployment). But the individual explanatory variables have not significantly contributed to the growth of the economy; also, the explanatory variables have not significantly contributed to the reduction of the high rate unemployment and inflation in Nigeria for the period under review.

Okoli, Njoku and Kaka (2014) studied taxation and economic growth in Nigeria using Granger causality approach. The study covered the period 1994-2012. Taxation was disaggregated into: Value Added Tax, Personal Income Tax, Company Income Tax and Petroleum Profit Tax, while the Gross Domestic Product was used as a parameter for measuring economic growth in Nigeria. The data collected were analyzed using the Granger Causality Approach and regression analysis. The results of the analysis reveal that a significant positive relationship exists between Taxation and economic growth in Nigeria. The study also found significant relationship between the disaggregated tax revenue (Value Added Tax, Personal Income Tax, Company Income Tax and Petroleum Profit Tax) and gross domestic product.

Olatunji and Adegbite, (2014) study the Effect of Petroleum Profit Tax, Interest Rate and Money Supply on Nigeria economy from 1970 to 2010. Multiple regression model was employed to analyze the relationship among variables of the study. The analysis reveals that short run effect of Petroleum Profit Tax was positive while that of interest rate was positive on economic growth. The study indicate that



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petroleum contributes positively to national income in Nigeria.

Similarly, Ilaboya, and Ofiafor, (2014) also conducted a study on the impact of Petroleum Profit Tax on Nigeria's economic growth from 1980-2011. The study adopted the Ordinary Least Square (OLS) and the findings of the study reveals that Petroleum Profits Tax and total direct tax was found to have a statistically significant positive relationship with real GDP growth while trade Openness was found to have a negative and insignificant impact on the growth of Nigerian economy.

Abdullahi, Madu and Abdullahi (2015) examined the evidence of petroleum resources on Nigeria economic using simple linear regression model from 2000 to 2009 and found that petroleum has a direct and positive significant relationship with the Nigeria economy and therefore concluded that petroleum has been the mainstay of Nigeria economy since it discovery and it constitutes the major source of our foreign reserves and main source of development capital. They showed no evidence of whether a unit root was conducted, and as such one would not be inclined to affirm a generalized statement as claimed by them.

Adeyemi and Mieseigha (2019) examines Personal Income Tax (PIT) and Economic Growth in Nigeria: A Vector Autoregression (VAR) Analysis. The ex-post facto research design was adopted, and the theoretical framework was anchored on Laffer Curve Theory (LCT). Yearly time series data of personal income tax and the gross domestic product (GDP) were obtained from the Federal Inland Revenue Service (FIRS) and the Central Bank of Nigeria (CBN) statistical bulletins during the period 1987–2017. The data obtained was analysed using the Vector Autoregression (VAR) model via STATA 13.0. The findings of the study revealed that personal income tax has significantly contributed to the level of economic growth in Nigeria, though negatively. The study recommended that the regulatory framework of taxation in the country should put in place a more effective tax revenue generation system that can enhance better administration of personal income tax.

## 3. Methodology

This research employed Vector Autoregressive Model to investigate the relationship between Tax structure and Economic Growth in Nigeria.

Vector Autoregressive is a statistical method used to analyze the relationship between several influencing variables that appear to be endogenous by theory. This model is a combination of several models of autoregressive (AR), where these models form a vector between the variables affect each other. VARs are powerful tools for describing data and for generating reliable multivariate benchmark forecasts (James and Mark, 2001). The model is a workhouse multivariate time series model that relates current observations of a variable with past observations of itself and past observations of other variables in the system. It is a statistical model used to capture the relationship between multiple quantities as they change over time(Dickey and Fuller, 1979).

The VAR model was adopted in the work of Dickney and Fuller (1979) and Stock and Watson(2001).

### Augmented Dickey- Fuller (ADF) test

Said and Dickey (1984) augment the basic autoregressive unit root test to accommodate general ARMA (p, q) models with unknown orders and their test is referred to as the Augmented Dickey- Fuller (ADF) test.



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The augmented Dickey- Fuller (ADF) test is based on estimating the regression equation:

$$y_t = \beta^I D_t + \varphi_{t-1} + \sum_{j=1}^{p} \pi_j \Delta y_{t-j} + \varepsilon_t$$

Where $D_t$ = deterministic terms

$\Delta y_{t-j}$ Captures the serial Correlation

$$ADF_{Test\ statistic} = t\varphi = 1 = \frac{\hat{\varphi}-1}{SE(\varphi)}$$

The ADF test tests the Null hypothesis that a time series $y_t$ is I(1) that is non stationary against the alternative hypothesis that it is I(0), that is stationary.

VAR model describes the relationship between observations on a variable at a time with his own observations on the variables at earlier times and its association with observations on other variables at previous times. Researcher's model is specified as:

$$LGDP_t = \alpha + \sum_{i=1}^{k} Q_i \boldsymbol{GDP_{t-i}} + \sum_{j=1}^{k} \varphi_j LPIT_{t-j} + \sum_{m=1}^{k} \omega_i LCIT_{t-m} + \sum_{r=1}^{k} \Omega_r LVAT_{t-r} + u_{1t}$$

$$LPIT_t = \sigma + \sum_{i=1}^{k} \beta_i GDP_{t-i} + \sum_{j=1}^{k} \boldsymbol{\varphi_j LPIT_{t-j}} + \sum_{m=1}^{k} \omega_i LCIT_{t-m} + \sum_{r=1}^{k} \Omega_r LVAT_{t-r} + u_{2t}$$

$$LCIT_t = \gamma + \sum_{i=1}^{k} \beta_i GDP_{t-i} + \sum_{j=1}^{k} \varphi_j LPIT_{t-j} + \sum_{m=1}^{k} m_i \boldsymbol{LCIT_{t-m}} + \sum_{r=1}^{k} \Omega_r LVAT_{t-r} + u_{3t}$$

$$LVAT_t = \rho + \sum_{i=1}^{k} \beta_i GDP_{t-i} + \sum_{j=1}^{k} \varphi_j LPIT_{t-j} + \sum_{m=1}^{k} \omega_i LCIT_{t-m} + \sum_{r=1}^{k} \Omega_r \boldsymbol{LVAT_{t-r}} + u_{4t}$$

Where k is the optimal lag length, , σ, γ, ρ are the intercepts and β,φ,ω,Ω are the short run coefficients of the model's adjustment long run equilibrium. u_it are the residuals in the in theequations.

There are two important assumptions that must be considered from the time series data inorder to set up a VAR model, (a) stationary, (b) the error normality and independence. UnitRoot Test is one way to test for stationarity.



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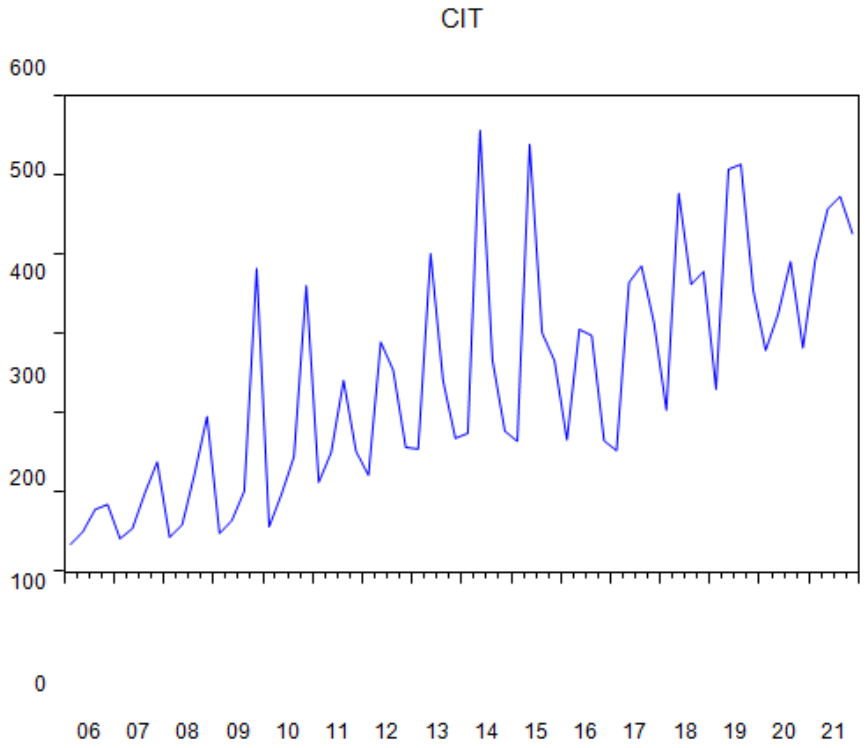
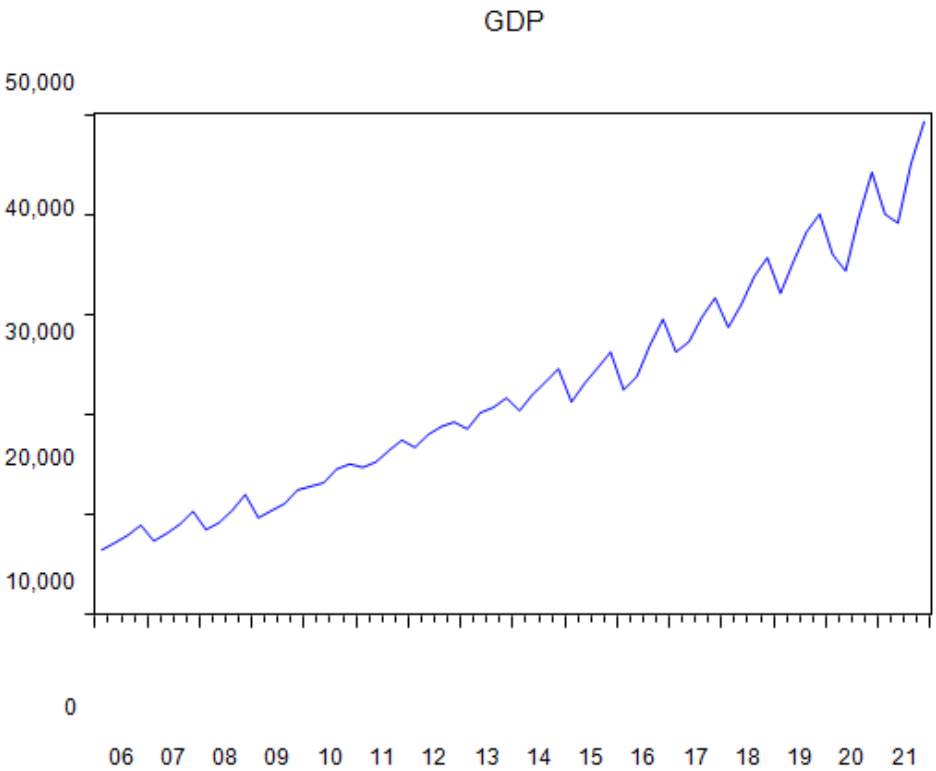
This research investigates the relationship between Tax structure and Economic Growth inNigeria using Vector Error Correction Model.

There is evidence that most economic variables exhibit trend in their behaviours. Any inference that is based on non-stationary series will definitely give a spurious results.



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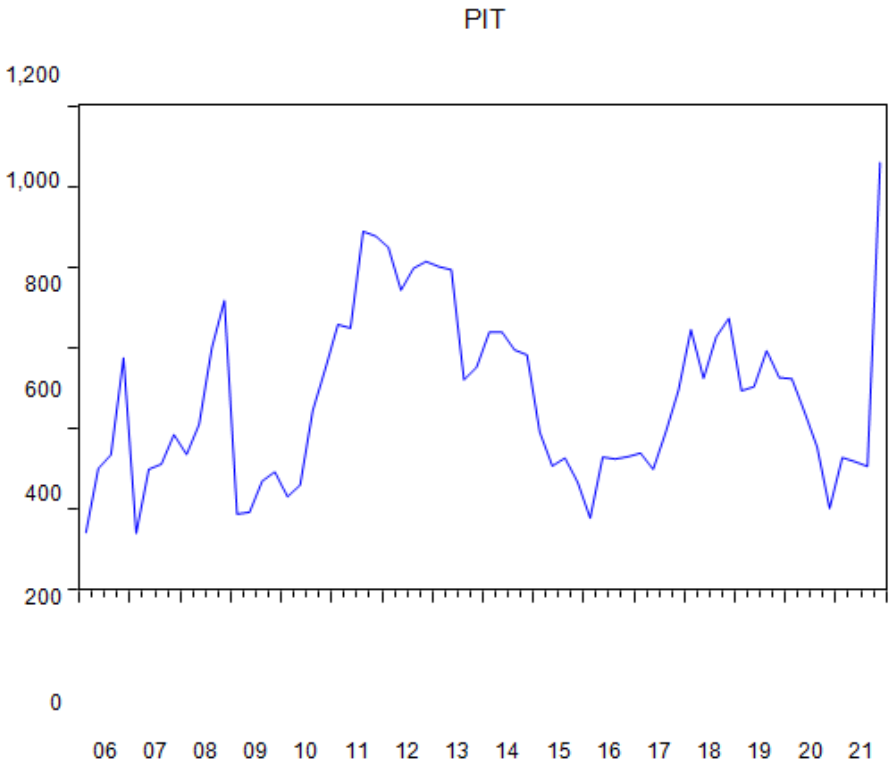


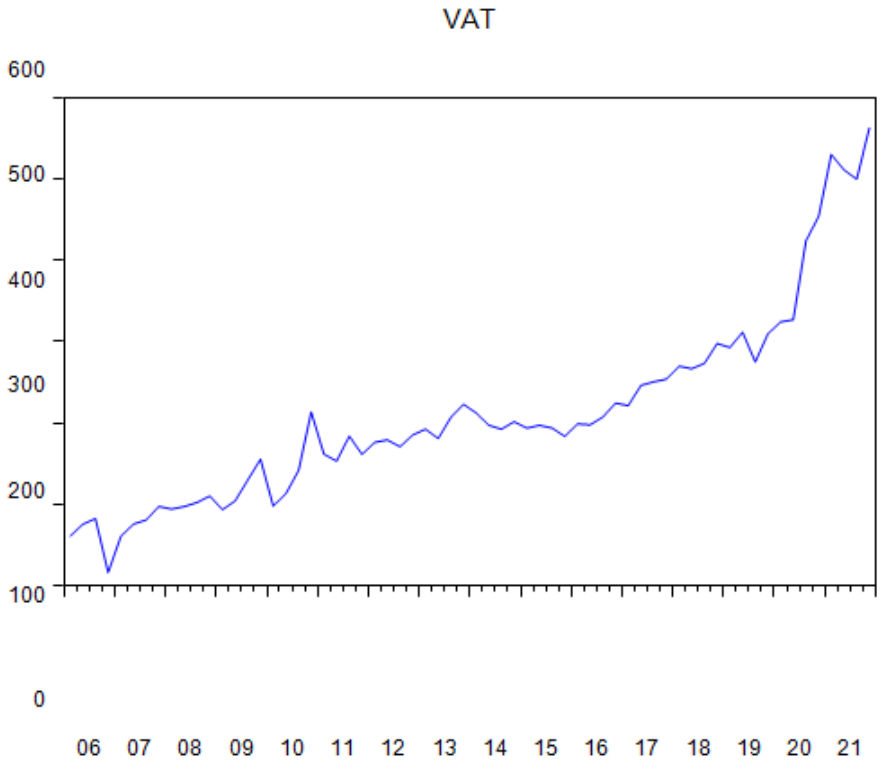


## 4. Data Presentation and Discussion of Findings

This research investigates the relationship between Tax structure and Economic Growth inNigeria using Vector Error Correction Model.



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There is evidence that most economic variables exhibit trend in their behaviours. Any inference that is based on non-stationary series will definitely give a spurious results.

### 4.1 Unit Root Test

A unit root is a unit of measurement to determine how much stationarity a time series model has. A stationary time series is one whose statistical properties such as mean, variance, autocorrelation, etc. are all constant over time'. The consistency of these variables makes predictions easier to do. Analyzing economic data in the presence of unit roots can cause issues like spurious regression. Many Studies including Skrabic and Tomic-Plazibat (2009) have shown that economic variables behave like random walks or at least have random walk component. This implies that they are unstable. There are several ways to check for presence of a unit root process, we used an Augmented Dickey Fuller test in this study.

**Augmented Dickey- Fuller (ADF) test**

Said and Dickey (1984) augment the basic autoregressive unit root test to accommodate general ARMA (p, q) models with unknown orders and their test is referred to as the Augmented Dickey- Fuller (ADF) test.

The augmented Dickey- Fuller (ADF) test is based on estimating the regression equation:

$$y_t = \beta^I D_t + \varphi_{t-1} + \sum_{j=1}^{p} \pi_j \Delta y_{t-j} + \varepsilon_t$$

Where $D_t$ = deterministic terms

$\Delta y_{t-j}$ Captures the serial Correlation

$$ADF_{\substack{Test \\ statistic}} = t\varphi = 1 = \frac{\hat{\varphi}-1}{SE(\varphi)}$$

The ADF test tests the Null hypothesis that a time series $y_t$ is I(1) that is non stationary against the alternative hypothesis that it is I(0), that is stationary.

**Table 1:** Unit Roots Test Results

| **Variable: Company Income Tax (CIT)** | | |
|---|---|---|
| | **t statistic** | **Prob.** |
| ADF (Level) | -0.5662 | 0.8698 |
| Critical Values | | |
| 1% | -3.5441 | |
| 5% | -2.9109 | |
| 10% | -2.5931 | |
| | | |
| **Variable: Gross Domestic Product (GDP)** | | |



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| | t statistic | Prob. |
|---|---|---|
| ADF (Level) | 2.6391 | 1.0000 |
| Critical Values | | |
| 1% | -3.5461 | |
| 5% | -2.9117 | |
| 10% | -2.5934 | |
| | | |
| **Variable: Petroleum Income Tax (PIT)** | | |
| | **t statistic** | **Prob.** |
| ADF (Level) | -2.9323 | 0.0473 |
| Critical Values | | |
| 1% | -3.5384 | |
| 5% | -2.9084 | |
| 10% | -2.5934 | |
| | | |
| **Variable ; Value Added Tax (VAT)** | | |
| | **t statistic** | **Prob.** |
| ADF (Level) | 1.1829 | 0.9978 |
| Critical Values | | |
| 1% | -3.5384 | |
| 5% | -2.9084 | |
| 10% | -2.5918 | |
| | | |
| **Variable: Company Income Tax (ΔCIT)** | | |
| | **t statistic** | **Prob.** |
| ADF (first Difference) | -17.1123 | 0.0000 |
| Critical Values | | |
| 1% | -3.5441 | |
| 5% | -2.9109 | |
| 10% | -2.5931 | |
| | | |
| **Variable: Gross Domestic Product (ΔGDP)** | | |
| | **t statistic** | **Prob.** |
| ADF (first Difference) | -3.1220 | 0.0303 |
| Critical Values | | |
| 1% | -3.5461 | |
| 5% | -2.9117 | |
| 10% | -2.5936 | |
| | | |
| **Variable: Petroleum Income Tax (ΔPIT)** | | |
| | **t statistic** | **Prob.** |
| ADF (first Difference) | -7.5480 | 0.0000 |
| Critical Values | | |
| 1% | -3.5402 | |
| 5% | -2.9092 | |



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| | | |
|---|---|---|
| 10% | -2.5922 | |
| | | |
| **Variable: Value Added Tax (Δ VAT)** | | |
| | **t statistic** | **Prob.** |
| ADF (first Difference) | -8.9539 | 0.0000 |
| Critical Values | | |
| 1% | -3.5402 | |
| 5% | -2.9092 | |
| 10% | -2.5922 | |

The result in the table 1 above revealed that the Null hypothesis of non-stationary series was accepted for all the variable considered in level, P> 0.05 but all the variables were stationary at the first difference.

### 4.2 Cointegration

**Table2:** Unrestricted Johansen Cointegration Test Result

| **Trace** | | | |
|---|---|---|---|
| Hypothesis | Trace Statistic | 5% Critical Value | Prob. |
| $r$=0* | 53.8007 | 47.85613 | 0.0125 |
| r ≤1* | 33.2599 | 29.7971 | 0.0192 |
| r ≤ 2 | 14.1636 | 15.4947 | 0.0786 |
| r ≤ 3 | 0.1580 | 3.8415 | 0.6910 |
| **Maximum Eigen Value** | | | |
| Hypothesis | Maximum EigenStatistic | 5% Critical Value | Prob. |
| $r$=0 | 20.5407 | 27.5843 | 0.3049 |
| r ≤1 | 19.0963 | 21.1316 | 0.0941 |
| r ≤2 | 14.0056 | 14.2646 | 0.0549 |
| r ≤3 | 0.1579 | 3.8414 | 0.6910 |

Engle and Granger (1987) has pointed out that the linear combination of two or more non stationary series may be stationary. The Stationarity combination of may be interpreted as Cointegration or equilibrium relationship between variables. Trace and Maximum Eigen Statistics in Johansen Cointegration test as shown in table 2 revealed the existence of Cointegration among Personal Income Tax, Petroleum Income Tax, Value added Tax and theGross Domestic Product.

**Table3:** Normalized Cointegrating Coefficients

| Cointegration Eqn | GDP | PIT | LVAT | LCIT |
|---|---|---|---|---|
| Cointegrating Eqn1 | 1.0000 | 1.8471 | 13.0947 | -98.4905 |
| Standard Error | | 2.7836 | 10.4006 | 9.4841 |
| t - Statistic | | 0.6636 | 1.2590 | -10.3848 |

**Table4:** Error Correction Coefficients

| | Coefficients | Std. Error | t-statistic | Prob |
|---|---|---|---|---|
| $\alpha$ | -0.0022 | 0.0005 | 4.5830 | 0.0000 |
| $D(GDP_{t-1})$ | -0.6396 | 0.1115 | -5.7386 | 0.0000 |
| R Squared | 0.8754 | | | |



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| | | | | |
|---|---|---|---|---|
| Adj. R squared | 0.8403 | | | |
| F Statistic | 24.8744 | | | |
| Prob.(F-Statistic) | 0.0000 | | | |
| Daubin-Watson Stat | 1.5063 | | | |

The long run analysis shows that the Cointegrating relation or error correction or speed of adjustment to equilibrium as measured by the multiplier $\alpha = -0.0022$ is significant at 1% level. Although there is an evidence that the GDP can converge to its long run equilibrium to allow short run dynamics, yet, this is not expected any time soon.

In order to evaluate the long run relation, the Cointegrating vector was normalized on GDP. The result shown in (table 3). The global test value of 24.87 is significant at 1 % which implies that Tax structure in Nigeria has a significant effect on the Economic Growth proxy by Gross domestic product. The model is adequate as the adjusted R squared that measures model adequacy is 84%. This is an indication that our data is well fitted.

**Table5:** Short Run CausalityWald Test

| Variables | Test Statistic | Value | d.f | probability |
|---|---|---|---|---|
| CIT | F- Statistic | 4.4247 | 3,46 | 0.0082 |
| | Chi-square | 13.2741 | 3 | 0.004 |
| PIT | F- Statistic | 1.2023 | 3,46 | 0.3195 |
| | Chi-square | | 3 | 0.3072 |
| VAT | F- Statistic | 2.5254 | 3,46 | 0.0691 |
| | Chi-square | 7.5763 | 3 | 0.0556 |

Existence of long run causality necessitates the investigation of the variable in the short run. As shown in the (table 5 ) above, Company Income Tax is significant at 1% and can cause can cause Economic Growth in Nigeria. Unfortunately, Petroleum Income Tax and Value added Tax are not significant at both 1% and 5%, indicating that they cannot cause Economic Growth in their present state.

### 4.3 Diagnostic Tests

The null hypothesis of serial correlation was accepted (F = 0.06880 using Breusch Godfery Serial correlation test. Therefore, errors were not correlated at any period.

The null hypothesis of homoscedasticity was not rejected (×^2=0.06) usin Breusch-Pagan-Godfrey test. Therefore, residuals have constant variance.

Residuals are normally distributed as Jargue Berra statistic fall to reject the null hypothesis of normal distribution



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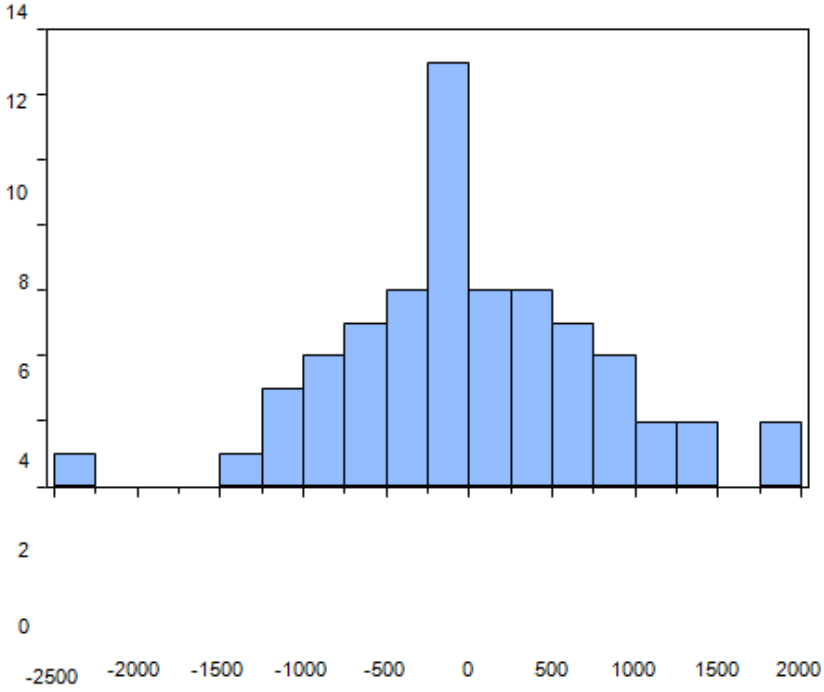


| | |
|---|---|
| Series: Residuals Sample 2007Q1 2021Q4 | |
| Observations 60 | |
| Mean | 1.82e-13 |
| Median | -36.83874 |
| Maximum | 1878.191 |
| Minimum | -2459.374 |
| Std. Dev. | 781.5431 |
| Skewness | -0.089268 |
| Kurtosis | 3.886489 |
| Jarque-Bera | 2.044345 |
| Probability | 0.359812 |



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### 4.4 Discussion of Findings.

The study revealed that lags of the Value added Tax can significantly cause the Economic growth proxy by GDP in the short run. Similarly, the lags of the GDP can significantly cause value added Tax. This implies that there is a bidirectional causality between the GDP and value added Tax. Furthermore, the lags of GDP can significantly cause company Income Tax in the short run, but the lags of the company Income Tax cannot significantly cause the GDP. Lags of value added Tax can cause company Income Tax, but lags of company Income Tax cannot causeValue added and petroleum Income Tax.

The findings show that Nigeria government should pay more attention on company income taxand at the same time on valued added tax.

## 5. CONCLUSION AND RECOMMENDATION

The main purpose of this study was to assess nexus between the tax structure and economic growth in Nigeria. The study concludes that the CIT and VAT shows positive significant relationship with economic growth in Nigeria within the review period. The major contributionmade by this study is that, it reaffirms the positions of previous studies that tax structure has a significant positive effect on economic growth.

All categories of taxes have different impact on GDP, but Company Income Tax and Value Added Tax are major factor accounting for economic growth in Nigeria for the years under review. However, there is poor tax administration in the entire system which has given encouragement to tax evasion and avoidance. The study therefore recommends that for tax revenue to improve, significant percentage of the tax administrative loopholes, including tax evasion and avoidance should be prevented. Government should embark on policies and programmes that will enhance the level of income of the citizens to raise the consumption level of the people with a view to accelerating investment, employment, output, and ultimately value added tax revenue. The finding from the study is in consistence with Alexander et al (2019) and Manukaji (2018).

The vector autoregressive model has limitations when it comes to structural inference and policy analysis, so do the alternatives. Calibrated dynamic stochastic general equilibrium macroeconomic models are explicit about causal links and expectations and provide an intellectually coherent framework for policy analysis. Future research would benefit from the use of other time series models for more robust analysis. The variables examined in this study are GDP, VAT, PIT and CIT. More variables, especially on economic growth apart from GDP aresuggested for future research.

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