DIRECT TAX ASSESSMENT AND ECONOMIC GROWTH IN RIVERS STATE

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Abstract
This study examined the impact of direct tax assessment on economic growth in Rivers State. Ex-post facto research design was adopted because of the nature of the independent variable which has already occurred, and the researchers are examining its impact on the dependent variable – economic growth. The data used for this study was generated from historical economic operations, The study employed Vector Error Correction Model (VECM) because it is a statistical model used to analyse relationships between two variables. With the help of the E-view version, the data was analysed and the following findings emerged: the study's findings showed that PAYE and RGDP in Rivers State do not have a statistically significant association. This suggests that, based on our data, PAYE is not having a major impact on the region's infrastructure's economic production. Therefore, we recommend that improving tax laws is essential to promoting economic expansion. Additionally, increasing the effectiveness of PAYE collection would increase tax revenues, which could then be used to fund vital initiatives like infrastructure and healthcare. The study's examination of how taxes affect the development of healthcare and road infrastructure is one of its main contributions. The study demonstrates that although there is a connection between taxes and the advancement of healthcare, the impact on the development of road infrastructure is very noteworthy and requires additional governmental consideration. The study emphasizes the multifaceted function of taxes in promoting social and economic development by connecting tax revenues to these vital public services.

Keywords: *Direct Tax Assessment, Real Gross Domestic Product*

Introduction

The economic performance of Rivers State from 1999 to 2024 has been shaped by various macroeconomic factors, with oil and gas remaining the dominant sector. The period saw economic booms driven by high oil prices, followed by recessions induced by global market downturns. Between 2016 and 2020, Rivers State generated an aggregate revenue of approximately NGN 1.335 trillion, with Internally Generated Revenue (IGR) constituting an average of 41% of total revenue (Rivers State Government, 2022). The IGR grew by 17.7% during this period, although its share of total revenue declined from 46% in 2016 to 43% in 2020 due to fluctuations in revenue collection efficiency. Despite positive efforts to improve fiscal performance, challenges persist in optimizing revenue collection, exacerbated by weak tax administration systems, inefficient collection processes, and the absence of comprehensive taxation databases (Nigeria Governors' Forum, 2016). By 2023, Rivers State had made considerable progress in enhancing its revenue streams, achieving a 6.09% increase in IGR from N191.87 billion in 2022 to N203.56 billion in 2023 (Budget, 2024). Additionally, federal allocations increased by 15.57%, reaching N339.53 billion in 2023. However, government expenditure rose significantly by 46%, from N499.71 billion in 2022 to N730.86 billion in 2023, reflecting the growing fiscal pressure on state finances. Notably, Rivers State maintained its top ranking in fiscal performance among Nigeria's

36 states in Budget's annual State of States Report, with its 2024 budget amounting to N800.4 billion.

This milestone marked the first time IGR surpassed federal allocations, indicating progress towards financial self-sufficiency (Business Day, 2024). In spite of these fiscal improvements, Rivers State continues to face critical developmental challenges, including inadequate road infrastructure, suboptimal healthcare services, and economic growth inconsistencies relative to its revenue potential. The state's real GDP growth has not been commensurate with its revenue generation capacity, necessitating a shift towards sustainable economic policies. Research indicates that subnational governments can enhance economic resilience by adopting robust internal revenue generation strategies, particularly through effective tax reforms and broadening the tax base (Falayi, 2023).

Furthermore, despite being a resource-rich state, Rivers State continues to grapple with poor economic performance, as reflected in key indicators such as real Gross Domestic Product (GDP) growth, road infrastructural development, and healthcare services. The state's economic performance has been constrained by inadequate revenue generation, which has hindered public investment in critical sectors (World Bank, 2023; National Bureau of Statistics, 2024). The foregoing could be attributable to the weak institutional frameworks, corruption, and inefficient tax administration have impeded revenue generation efforts in Rivers State (Ekpo & Udo, 2021). Addressing these economic challenges necessitates an effective internal revenue generation device that ensures financial sustainability for government expenditures.

Previous studies have examined the relationship between internal revenue generation and economic growth, highlighting mixed findings. While some studies indicate a positive correlation between tax revenues and economic growth (Ebeke & Ehrhart, 2018; Asaolu et al., 2019), others argue that excessive taxation without proper accountability could stifle private sector investment and economic activities (Uchenna & Onyekachi, 2020). Furthermore, studies focusing on Nigeria often adopt a national or regional perspective, neglecting state-specific analyses that consider the unique economic dynamics of Rivers State. Moreover, limited research has explored the impact of non-tax revenue as a critical determinant of economic growth in the state, creating a gap in the literature that necessitates further investigation.

Given these gaps, this study seeks to examine the extent to which internally generated revenue proxies by PAYE, non-tax revenue, and withholding tax affects economic growth in Rivers State. By providing empirical insights into the effectiveness of these revenue components in financing infrastructural and healthcare development, the study will contribute to policy discussions aimed at enhancing sustainable economic growth. Additionally, it will offer recommendations on improving tax administration and revenue mobilization strategies to address the state's economic challenges effectively. The findings are expected to bridge the gap in the literature by offering a localized perspective on the interplay between internally generated revenue and economic growth in Rivers State, thereby informing evidence-based policymaking (NBS, 2024; IMF, 2023). Moreso, existing literature lacks a comprehensive analysis of the dynamic relationship between internally generated revenue and economic sustainability within the context of fiscal federalism in Nigeria. The foregoing have provided the firmed justification to addressing these gaps by examine the internally generated revenue and economic growth in Rivers State that would showcase empirical evidence and policy recommendations to enhance revenue mobilization and foster long-term economic growth in Rivers State.

Governance inefficiencies, lack of transparency, and weak institutional frameworks further impede the state's ability to optimize revenue collection and management. Tax evasion, revenue leakages,]and the predominance of informal sector activities outside the tax net significantly constrain the revenue base, reducing the funds available for critical investments in infrastructure, healthcare, and economic expansion. The economic performance of Rivers State has not been fully optimized due to an overreliance on federal allocations, which account for a substantial share of total revenue. Despite efforts to increase internally generated revenue (IGR), inefficiencies in revenue collection, weak enforcement mechanisms, and a limited tax base have constrained the state's ability to harness available fiscal resources effectively. Key indicators of economic growth including real GDP growth, road infrastructure, and healthcare services, remain underfunded, leading to suboptimal socioeconomic outcomes.

To address these challenges, it is imperative to explore sustainable revenue generation strategies that can drive economic growth. This study focuses on three critical revenue proxies: Pay-As-You-Earn (PAYE), direct tax assessment, and withholding tax, as potential levers for improving the fiscal health of Rivers State. By examining the relationship between these revenue sources and economic growth indicators, this research seeks to identify policy interventions that can enhance revenue mobilization and ensure long-term economic sustainability. The existing literature has ***largely overlooked the nuanced interplay between internally generated revenue and key*** macroeconomic variables at the subnational level, highlighting a gap that this study aims to bridge through empirical analysis and practical recommendations.

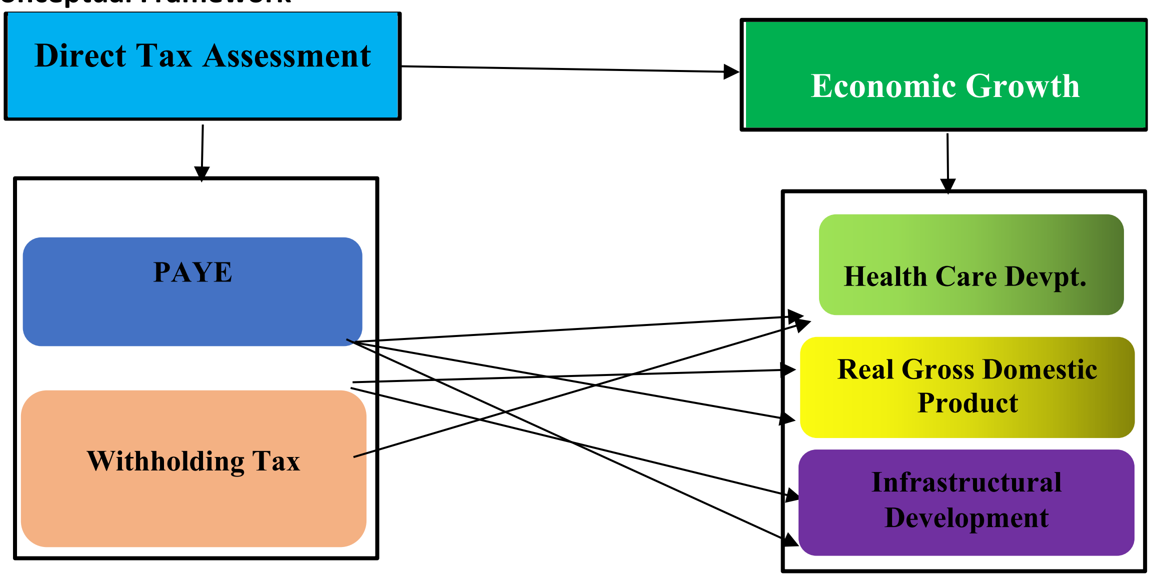
Aim and Objectives

The aim of this study is to investigate the relationship between direct tax assessment and economic growth in Rivers State while the specific objectives are stated as follows:

1. Analyse the relationship between Pay as You Earn (PAYE) tax and health Care development, real gross domestic product and road infrastructural development in Rivers State.
2. Ascertain the relationship between withholding tax and health Care development, real gross domestic product and road infrastructural development in real gross domestic product in Rivers State.

Literature Review

Conceptual Framework



Direct Assessment Tax

Direct Assessment Tax is the income tax which the government imposed on individuals that on self-employed jobs/operations. These individuals that run their small businesses with the state are those chargeable and are assessed for based on the direct assessment baseline, policy or laws. The direct assessment tax regime is a system of tax administration whereby the tax payer is granted the right, by law, to compute his own tax liability, pays the tax due and produces evidence of tax paid at the time of filing his tax return at the tax office, on due date. On the other hand, the tax authority has the responsibilities of enablement to and checks on the taxpayers to ensure compliance with tax administration process (Appah & Ogbonna, 2014).

Self-employment are mainly seen within the professionals such as farmers, lawyers, musicians, architects, athletes, accountants, surveyors, traders, consultants and others like contractors, politicians, mechanics, welders, vulcanizers, carpenters, tailors, butchers, hair dressers, bricklayers, dyers, artisans, comedians and others. Direct assessment tax is payable annually on chargeable income (total income less allowable deductions) at the rates listed in the Sixth Schedule, Personal Income Tax Act 1993 as amended. The practice of raising frivolous and unreliable best of judgment (BOJ) assessments is circumvented (Oyebanji, & Oyebanji 2017). This type of tax assessment also encourages early and timely collection of taxes and discourages corruption by reducing physical contact with tax payers.

Economic Growth

Economic growth simply refers to the increase in the production of economic goods and services in comparison with a given period of time (Senzak & Gbegi, 2021). In Jhingan (2016), economic growth is defined as a process which increases the real per capita income of a country. Economic growth can be described as a rise in the volume of the goods produced and services rendered over a particular period of time (Ordu & Nkwoji, 2019). The Organization for Economic Cooperation and Development (OECD) sees economic growth as a phenomenon of an active market productivity resulting in increase in Gross Domestic Product (GDP).

Economic growth, according to Odu (2022), is the increase in the value of goods and services produced by an economy. Economic growth is measured either in nominal or real terms. Though other alternative metrics exist for measuring aggregate economic growth, it is conventionally measured in terms of gross domestic product (GDP) or gross national product (GNP) (Senzak & Gbegi, 2021). The economists use an increase in country’s Gross Domestic Product (GDP) to measure economic growth. It is the belief of the economists that adequate use of capital expenditure by government will result to rise in the productive sector of the economy, generate employment opportunities and finally result to a remarkable increase in the GDP. In a similar way, wobbling country’s GDP may be a sign of wrongly channeled expenditure particularly when the government recurrent expenditure is substantially higher than the capital expenditure (World Bank, 2013). Meanwhile, economic growth can also be seen as the rise in a country’s productive capacity measured by the comparison of the increase in gross national product over the year. The rise in capital stock, advancement in technology and enhancement in the literacy rate are some of key drivers of economic growth in a country.

The cardinal objectives of economic growth and development policies in a given

State are to seek economic growth through improved productivity, introducing political systems that are in tandem with the preferences of its citizens as accurately as possible, extension of rights to all social groups, creating enabling environment for institutions and entities to function strive optimally, in such a way that they will be able to handle technical and complex tasks. One of those tasks involves sourcing for finance through taxes and deploying the revenue generated for the provision of public goods and services (Bayly, 2008; Brautigam, 2002; Kenneth & Mark, 2010; Daron & James, 2012). Economic growth is basically determined by how much revenue a state is generated and channeled towards its development. The state government's inability to meet financial challenges caused by population growth and infrastructural decay as a result of dwindling oil prices and prevailing inflationary conditions in the country have forced some states in Nigeria to look inward through the formulation of different tax policy reforms, using social engineering as a mechanism to stimulate economic growth (Sunday, Uniamikogbo, Erah, & Aggreh, 2020; Oshemi & Otusanya, 2022).

Real Gross Domestic Product

The organisation for economic co-operation and development (OECD) defines GDP as an aggregate measure of production equal to the sum of the gross value added of all resident and institutional units engaged in production (plus any taxes, and minus any subsidies, on products not included in the value of their outputs). From the extant literatures, a country’s economic growth is measured by the Gross Domestic Product (GDP) while the level of welfare of people is measured by per capita income. That is, GDP as a ratio of the country’s total population. It is conventionally measured as the percent rate of increase in real gross domestic product, or real GDP (Onuoha et al, 2015). In a more concise explanation, economic growth is an increase in the production of goods and services over a specific period, especially a year.

In real money terms, the measurement must remove the effects of inflation from its computation. With good levels of economic growth, businesses will be more profitable as such, stock prices will be on the increase. Thus, economic growth is the increase in the inflation-adjusted market value of the goods and services produced by an economy over time. The access of a nation to international finance as well as foreign financial institution taking risk for Letters of Credits, transactions is informed by the level of the nation’s Gross Domestic Product. Nations in the world look at the indices that contribute to the growth of GDP for proper planning and harnessing of resources. This gave rise to various economic reforms all over the world that were aimed at trying to boast their economies.

Elebiju (2007) mentioned that employment, taxes and investments are paramount in growing the gross domestic product of any nation. This position makes tax as a tool for raising fund for government functions to be more important. Some questions to answer include whether we are currently raising enough fund through taxes to grow our economy.

An international monetary fund (IMF, 2017) publication states that "GDP measures the monetary value of final goods and services - that is, those that are bought by the final user - produced in a country in a given period of time (say a quarter or a year)". Total GDP can also be broken down into the contribution of each industry or sector of the economy. The ratio of GDP to the total population of the region is the per capita GDP and the same is called Mean

Standard of Living. GDP is considered the "world's most powerful statistical indicator of national development and progress. The gross domestic product (GDP) is one of the primary indicators used to gauge the health of a country's economy. It represents the total dollar value of all goods and services produced over a specific time period; you can think of it as the size of the economy. Usually, GDP is expressed as a comparison to the previous quarter or year.

For example, the Q3 2017 GDP is up 3%, this is thought to mean that the economy has grown by 3% over the third quarter. While quarterly growth rates are a periodic measure of how the economy is faring, annual GDP figures are often considered the benchmark for the size of the economy. Nigeria Economic Outlook (2018), expressed that much is needed to be explored in the area of taxation as our tax to gross domestic product is 6% as mentioned by Organization for Economic Cooperation and Development (OECD, 2017). The report of World Bank Group (WBG) in 2018 stated that growth in advanced economies is predicted to decelerate their economies especially USA by adjusting towards monetary policy and fiscal stimulus. The report mentions that emerging market and developing economies (EMDEs) will rebound in commodity exporters while progress in per capita income growth will be subdued in Sub-Sahara Africa.

This shows a lot of concerns for the economic growth in developing countries as business outlooks are subjected to various risks. Trade protectionism has increased substantially and risks of disorderly financial market movements heightened the geopolitical tensions. Trade protections constrained individual countries to look inwards in achieving economic growth. This has potentials for decline in economic growth of the nations. The study of Siyanbola et al, (2017) on sub-Saharan Africa shows that there is positive effect of tax incentives on industrial and economic growth of the region.

Korolo and Korolo (2024)examined the federally collected taxes on economic growth in Nigeria. The study proxies federally collected taxes with companies' income tax, petroleum profits tax, Custom and Excise Duties, and value-added tax while economic growth is proxy with real gross domestic product. It adopts an ex post facto research design. The study employs secondary data from the various annual official publications of the Federal Inland Revenue Service and the Central Bank of Nigeria Statistical Bulletin. These data were collected over thirty years, covering the period from 1994 to 2023. The study employs the Vector Error Correction Model to estimate both short- and long-term effects of federally collected taxes on economic growth in Nigeria. The study found that companies' income tax, petroleum profits tax, and value-added tax have a positive significant effect on economic growth in Nigeria in the long run. In the short run, companies' income tax and Value Added Taxes have no significant effect on economic growth, while Petroleum profits tax has a significant positive effect on economic growth in Nigeria in the short run. The study concludes that federally collected taxes, such as companies' income tax, petroleum profits tax, and value-added tax enhance the economic growth of Nigeria in the long run. The study also concludes that in the short run petroleum profits tax improves the Nigerian economy while companies' income tax and value-added do not improve the economic growth of Nigeria in the short run. It recommends that government should continue to ensure that tax revenues are properly managed in a manner that will accelerate economic growth.

Falayi (2023) investigated the link between internally generated income (IGR) and economic growth in Lagos State using an ex-post facto research design, utilising data from reliable sources like the National Bureau of Statistics and the Lagos State Bureau of Statistics. The findings suggest a significant and long-lasting connection between specific revenue elements and GDP in Lagos State.

Sokoh (2023) examined internally generated revenue (IGR) in Delta State as a tool for infrastructural development. To analyze the impact of internally generated revenue on infrastructural development in Delta State, the Ordinary Least Squares was applied on the secondary data obtained from publishing materials from Delta State Ministry of Finance covering the period from 2008 to 2018. The results indicated that the internally generated revenue has an insignificant impact on government expenditure on health while internally generally revenue by the Delta State Government has a significant impact on government expenditure on education infrastructure. Based on the findings, the study recommended that the government should increase the budgetary provision on health to at least 40 percent of the internally generated revenue.

Abdulwahab and David (2023) examine the effects of tax revenue on the economic growth of Nigeria for the period of 1998 to 2021. Specifically, the study evaluated the influence of petroleum profit tax, company income tax, custom and excise duty, value added tax and educational tax on economic growth in Nigeria. Secondary data sourced from Central Bank of Nigerian statistical bulletin was employed. Ex-post facto and correlational research design was adopted and fixed effects regression model was used to analyze petroleum profit tax, company income tax, custom and excise duty, value added tax and education tax on gross domestic product (economic growth). The results indicated that petroleum profit tax, custom and excise duty, value added tax and education tax has a statistically positive and significant effect on gross domestic product (economic growth) in Nigeria while company income tax has a negative and significant effect on gross domestic product (economic growth) in Nigeria. The study recommended that tax authorities should venture to support companies to pay tax in other to enhance the growth of Nigerian economy.

Oshemi and Otusanya (2022) investigated the impact of tax revenue volatility on Nigeria's economic growth. With the employment of an ex-post facto research design, secondary data obtained National Bureau of Statistics, Central Bank of Nigeria Statistical Bulletin, and World Development Indicators for the period from 1981 to 2020, which gives forty (40) observations, were analyzed using Pearson correlation and OLS for long run estimates between all variables. Results showed that tax revenue volatility comprising of oil and non-oil tax revenue sources moderated by inflation rate, interest rate, exchange rate and crude oil price had a positive and significant relationship in the short run but a positive and insignificant relationship in the long economic growth. Exploratory design and ex-post fact design were adopted and data was secondary data sourced from the CBN statistical bulletin. Ordinary least squared technique and the Granger Causality Test were applied in estimation of the variables in the model. The results revealed that positive but insignificant relationship exist between the variables under study. The study then recommended that Nigerian government should properly and prudently utilize tax revenue for the provision of needed social amenities and infrastructure to enhance economic growth.

Ihenyen and Ogbise (2022) studied the relationship between Nigerian tax revenues and economic growth in Nigeria. The economic growth as a dependent variable was regressed against the independent variable, which is tax revenue, using petroleum profit tax, company income tax custom & excise duties and value added tax as proxy. The study applied multiple linear regression analysis to analyze the data using the Microsoft Excel package. The result showed that petroleum profit tax, company income tax and value added tax have a positive impact on Nigeria's economic growth, while custom and excise duties on the other hand have a negative impact on the economy. Meanwhile, the overall result between tax revenue and Nigeria's economic growth revealed that there is a significant correlation. The study suggested that government should thoroughly sensitize her citizens on the basic reasons for taxes imposition.

Appah (2022) examined the correlation between oil revenue and economic growth in Nigeria, finding a significant negative correlation between crude oil and gas exports and the real gross domestic product.

Ahannaya et al. (2021) conducted a comprehensive analysis of internally generated revenue (IGR) and its effects on funding infrastructure development in Nigeria. The study found a favourable correlation between IGR and total revenue, highlighting the substantial contribution of IGR to the overall revenue of Lagos state. The study also found a substantial positive correlation between IGR and capital expenditure in various sectors, suggesting that state governments should implement policies aimed at achieving sustained increases in IGR and allocate the generated IGR towards funding capital expenditure for infrastructure development.

Mamuda and Alhassan (2021) investigated the effect of tax proceeds on the economic growth of Nigeria. The study adopted an exploratory design and secondary data was sourced from Central Bank Statistical Bulletin. The multiple regression models were used to analyze the data so collected. The results revealed a positive relationship between revenue from tax and economic growth. Hence the study recommended that tax revenue generated from the taxpayers should be properly utilized in order to boost the economic growth of Nigeria.

Ajike, Ariguzo, Akinyosoye, Nwankwere and Oyedeji (2020) investigated the impact of internally generated revenue on infrastructural development in Lagos State, Nigeria (1998-2018). The study employed Ex-post facto research design and annual time series data for a twenty-one year period. The findings showed that internally generated revenue components had significant effect on transport infrastructure in Lagos State, Nigeria. It then concluded that internally generated revenue enhances the transport infrastructural development in Nigeria. It therefore recommended that the State government should utilized internally generated revenue for the development of transport infrastructure, in order to bring an improved standard of living, increased gross domestic product and boost economic growth.

El Sulastri, Nazamuddin and Hamzah (2020) analyzed the effect of locally-generated revenue on the economic growth of 23 districts in Aceh Province, Indonesia over a period of 5 years (2013-2017). The weighted fixed effect model (FEM) of panel regression was employed and the results revealed that the locally generated revenue has a positive and significant effect on the economic growth of 23 districts in Aceh Province, Indonesia. The study suggested that the local government should gear efforts toward the efficient management of their locally-generated revenues in order to improve economic growth in the Province.

Joseph and Omodero (2020) examined the relationship between government revenues and the economic growth of Nigeria. The exploratory and ex-post facto research designs were employed while secondary data for the period of 1981 to 2018 were collected from the Federal Inland Revenue Services (FIRS), National Bureau of Statistics and CBN statistical bulletin. The Ordinary Least Squares (OLS) regression technique was used to test the relationship between government revenue and economic growth. The findings showed that revenue received from federal government and Value Added Tax (VAT) are positively related with the economic growth. The study recommended that the government should formulate relevant revenue policies that will stimulate government revenue so that more favourable implication on the economy will be experienced.

Hammayo, Shittu & Abdullahi (2020) examined the impact made by the Bauchi State Government revenues on infrastructural development of the state. The study used secondary data obtained from the State government’s Annual Financial Statements spanning the period of 2006 to 2018 and the Ordinary Least Square (OLS) regression technique was employed in the analysis. The results indicated that the federal transfers received from the federation account (FAAC) and debts have a positive and significant impact on the provision of infrastructure whereas internally generated revenue (IGR) revealed a negative and significant influence on the development of infrastructure in the state. Also, contributions from Local Governments for the execution of joint projects and local/foreign grants receipts showed a positive but insignificant relationship. It then recommended that more efforts should be intensified towards internally generated revenue and grants and the policy makers should make sure that reasonable allocation of federation account revenues to the implementation of capital projects to cater for the infrastructural needs of the state.

Imoh (2020) examined the effects of internally generated revenue on revenue growth of Lagos state. The study used the Benefit Theory, which assumes that people should be demanded to pay taxes in proportion to the benefits they earn from the government's service. Also, the Endogenous Growth Theory and Public Expenditure Theory were used to anchor the study. Secondary data obtained from the National Bureau of Statistics, Lagos State data budget book, and other related research works were used. The study used an ex-post facto research design and linear regression analysis was employed to test the formulated research hypotheses. The findings revealed that internally generated revenue does not have a significant relationship with revenue growth in Lagos State. Again, human development index does not have a significant relationship with revenue growth in Lagos State. And consumer price index does not have a significant relationship with revenue growth in Lagos State. The study concluded that there is no significant relationship between internally generated revenue and revenue growth in Lagos State. It therefore recommended that further research is needed to investigate the application of IGR on government expenditure in comparison with the IGR inflows in all the states and local governments in Nigeria

Uket et al, (2020). The impact of taxation proceeds on the development of

Nigerian economy. The study explored the impact of three tax income streams – Income tax from companies' profits, income tax from petroleum companies profits and Value Added Tax on economic development represented by Gross Domestic Product (at current basic prices) growth for the period 1994 to 2018. The study applied Ordinary Least Square statistical tool with the help of SPSS 20.0. The study revealed a positive relationship with a coefficient of determination of 99.2% of the variation in economic development attributable to the tax income streams studied. Also although the study revealed the existence of significant effect of taxes from companies' profits and Value Added Tax on Gross Domestic Product Growth, there is little or no significant impact of taxes on profits of Petroleum companies on Gross Domestic Product growth in Nigeria due to restriction by Organization of Petroleum Exporting Countries production ceiling on Nigeria's production/sales and the global price shocks of crude oil over the decade. Also the study revealed tax payers apathy to tax payment and presence of tax leakages due to corruption and administrative inefficiencies by the tax authorities.

Oluwasegun and Joseph (2020). This study examined the dynamic relationship between tax revenue, infrastructural development and economic growth in Nigeria, using an annual secondary time series data from 1981 – 2018. The unit root properties of the series were examined using both Augmented Dickey Fuller (ADF) test and Phillip Perron (PP) test, while the Johansen Cointegration test was employed to examine if the series are cointegrated. The results reveal that the series are all integrated of order 1 and non cointegrated. To examine the direction of causality and the interrelationship among the variables, a vector autoregression (VAR) causality test was carried out, and a VAR at-first difference model was estimated.

The results reveal a unidirectional causality running from tax revenue to economic growth and from economic growth to infrastructure, while a bi-directional causality is found between tax revenue and infrastructural development. Findings from the impulse response results show that while tax revenue influences economic growth and infrastructure, infrastructure does not influence economic growth, but significantly influence tax revenue collected. The study recommends that government should better embrace fiscal responsibility by being more accountable to tax payers in terms of providing infrastructures of higher quality that can truly promote economic growth.

John and Dickson (2020). This study investigated the impact of tax revenue on economic growth using adjusted and unadjusted GDP. Data for the study were collected from the annual abstract of National Bureau of Statistics (NBS) and Central Bank of Nigeria Statistical Bulletin (CBN) from 1984 to 2018.

Economic growth was proxy using unadjusted GDP (Nominal GDP), adjusted GDP (RGDP), and analysed using Error Correction Models (ECMs). The results from the study revealed that Petroleum Profits Tax (PPT) had a positive influence on economic growth when GDP was adjusted and a negative influence when GDP was unadjusted for inflation. Value Added Tax (VAT) had a negative influence on economic growth when GDP was unadjusted for inflation and a positive influence on economic growth when GDP was adjusted for inflation. Companies Income Tax (CIT) had a negative influence on economic growth when GDP was adjusted and a positive influence when unadjusted for inflation. Custom and Excise Duties (CED) had a positive influence on economic growth when GDP was unadjusted and unadjusted. The study concludes that for CED researchers are free to use either GDP or RGDP as a proxy for economic growth but PPT, CIT and VAT researchers will find mixed result in using GDP or RGDPas a proxy for economic growth.

Ironkwe and Agu (2019). Tax revenue and economic development in Nigeria. The main aim of this research is to analyse the relationship between total tax revenue and economic growth in Nigeria. Time series data on different types of total tax revenue and economic development from 1986-2016 were collected from Central Bank of Nigeria statistical bulletin, Federal Inland Revenue Service and National Bureau of Statistics. Multiple regression analysis was used in analysing the data with the aid of stata version 13. The results indicate that the exits a significant positive relationship between total tax revenue and unemployment in Nigeria. The study concludes that total tax revenue relates positively to unemployment and recommends that government should distribute its social welfare programmes in such a way to provide direct benefit to tax payers.

This makes them believe that the portion of their hard earned money paid for purposes, is being effectively utilised by the government. The tax official needs improvement through adequate training and provision of suitable working materials and facilities.

Presence of Co-integration

A fundamental assumption of VECM is that the variables share a long-run equilibrium relationship, meaning they are cointegrated. Cointegration is typically tested using Johansen's Cointegration Test, which determines whether a meaningful long-term relationship exists among the variables. If no cointegration is found, the VECM is not valid, and a Vector Autoregressive (VAR) model in first differences may be more appropriate.

Existence of at Least One Cointegrating Equation

For the VECM to be applied, there must be at least one cointegrating equation in the system, as identified through Johansen's Trace or Maximum Eigenvalue test. The number of cointegrating relationships determines how many long-run equilibrium conditions exist in the model.

Error Correction Term (ECT) Should Be Negative and Significant

The error correction term (ECT) represents the speed of adjustment toward equilibrium after a short-term shock. The coefficient of the ECT must be negative and statistically significant to ensure that deviations from the long-run equilibrium are corrected over time. A positive or insignificant ECT implies that the variables do not revert to equilibrium, making the VECM unreliable.

Optimal Lag Selection

The appropriate lag length must be determined using criteria such as the Akaike Information Criterion (AIC), Schwarz Bayesian Criterion (SBC), or Hannan-Quinn Criterion (HQC). Incorrect lag selection can lead to autocorrelation, overfitting, or loss of important information, affecting the model's accuracy.

No Perfect Multi-collinearity

The explanatory variables should not be perfectly correlated with each other. Multicollinearity can distort coefficient estimates and make interpretation unreliable. A Variance Inflation Factor (VIF) test is typically used to check for multicollinearity.

Residuals Must Be Normally Distributed and Free from Serial Correlation

The error terms (residuals) in the VECM must be normally distributed, homoscedastic, and uncorrelated. Tests such as the Jarque-Bera test (for normality), Breusch-Godfrey LM test (for autocorrelation), and White's test (for heteroscedasticity) are conducted to verify these assumptions.

General VECM Model Specification

For a given dependent variable Y_t, the VECM model can be expressed as:

$Y_t = \alpha_o + \sum_{i=1}^{p} \lambda iYt - i + \sum_{i=1}^{q} \beta_{iX}t\text{-}i + \varepsilon_t$

Where:

Y_t = is the dependent variable (e.g., RGDP, RID, HCD).

$Xt{-}j$ = are the independent variables (PAYE, DTA, WHT).

α = is the intercept term.

λi = are the coefficients of the lagged dependent variable.

βj = are the coefficients of the lagged independent variables.

εt = is the error term.

Model Specification for Each Dependent Variables

1. VECM Model for Economic Growth (RGDP)

$RGDP_t = \alpha_1 + \sum_{i=1}^{p} \lambda i\, RGDP + \sum_{i=1}^{q} \beta_{1j}t\text{-}iPAYE_{t\text{-}j} + \sum_{i=1}^{q} \beta_{2j}t\text{-}iDTA_{t\text{-}j} + \sum_{i=1}^{q} \beta_{3j}t\text{-}iWHT_{t\text{-}j} + \varepsilon_{1t}$

2. VECM Model for Road Infrastructural Development (RID)

$RID_t = \alpha_1 + \sum_{i=1}^{p} \lambda i\, RGDP + \sum_{i=1}^{q} \beta_{1j}t\text{-}iPAYE_{t\text{-}j} + \sum_{i=1}^{q} \beta_{2j}t\text{-}iDTA_{t\text{-}j} + \sum_{i=1}^{q} \beta_{3j}t\text{-}iWHT_{t\text{-}j} + \varepsilon_{2t}$

3. VECM Model for Health Care Development(HCD)

$HCDt = \alpha_1 + \sum_{i=1}^{p} \lambda i\, RGDP + \sum_{i=1}^{q} \beta_{1j}t\text{-}iPAYE_{t\text{-}j} + \sum_{i=1}^{q} \beta_{2j}t\text{-}iDTA_{t\text{-}j} + \sum_{i=1}^{q} \beta_{3j}t\text{-}iWHT_{t\text{-}j} + \varepsilon_{3t}$

Where:

RGDP = Real Gross Domestic Product

RID = Road Infrastructural Development

HCD = Health Care Development

PAYE = Pay as you earn

DTA = Direct Tax Assessment

WHT = Withholding

α, β = Constants

$\alpha_1\text{-}\alpha_3, \beta_1\text{-}\beta_3$ = Coefficient of predictor variables

ε = Error terms

Test for 4.2.3 Engle-Granger Cointegration Test Result

	Value	Prob.*
Engle-Granger tau-statistic	-2.562063	0.8961
Engle-Granger z-statistic	-11.76103	0.8601

*MacKinnon (1996) p-values.
Warning: p-values may not be accurate for fewer than 30 observations.

Intermediate Results:	
Rho – 1	-0.490043

Rho S.E.	0.191269
Residual variance	160940.6
Long-run residual variance	160940.6
Number of lags	0
Number of observations	24
Number of stochastic trends**	6

**Number of stochastic trends in asymptotic distribution.

Engle-Granger Test Equation:
Dependent Variable: D(RESID)
Method: Least Squares
Date: 08/03/25 Time: 02:01
Sample (adjusted): 2000 2023
Included observations: 24 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID(-1)	-0.490043	0.191269	-2.562063	0.0174

R-squared	0.219584	Mean dependent var	-24.93479
Adjusted R-squared	0.219584	S.D. dependent var	454.1189
S.E. of regression	401.1740	Akaike info criterion	14.86744
Sum squared resid	3701633.	Schwarz criterion	14.91653
Log likelihood	-177.4093	Hannan-Quinn criter.	14.88046
Durbin-Watson stat	2.152190		

Source: *Researchers' compilation from e-view result*

The Engle-Granger cointegration test results indicate that the tau-statistic is -2.562063 with a p-value of 0.8961, and the z-statistic is -11.76103 with a p-value of 0.8601. These high p-values suggest that the null hypothesis of no cointegration cannot be rejected at conventional significance levels. This means there is insufficient evidence to conclude that a long-run equilibrium relationship exists among the variables RGDP, EXRC, EXPH, PAYE, DTA, and WHT over the study period.

Despite the lack of cointegration indicated by the main test statistics, the coefficient on the lagged residual term (RESID(-1)) is -0.490043, which is statistically significant with a p-value of 0.0174. This negative coefficient suggests some degree of error correction, implying that deviations from equilibrium, if they occur, tend to adjust back over time. However, this adjustment mechanism alone is not enough to confirm cointegration given the overall test results.

The model explains about 21.96% of the variation in the differenced residuals, as reflected in the R-squared value. The Durbin-Watson statistic of 2.15 indicates no serious autocorrelation problems in the residuals. The relatively large residual variance and sum of squared residuals point to substantial unexplained variation in the model.

Findings

Overall, the findings suggest that the variables do not maintain a stable long-term relationship, and future analysis may need to focus on short-run dynamics or consider alternative cointegration techniques, such as Johansen's test, which can handle multiple cointegrating relationships more effectively. Since cointegration is not established here, proceeding with a VAR (Vector Autoregression) model is appropriate, as it allows analysis of short-term interactions and dynamic relationships among the variables without assuming a long-run equilibrium.

Bayesian VAR estimation, which revealed strong autoregressive behavior in PAYE and DTA variables, with highly significant lagged coefficients indicating persistent internal dynamics. This finding supports the fiscal decentralization theory, which argues that internally generated revenue streams such as PAYE and DTA exhibit momentum due to institutional tax structures and enforcement mechanisms (Bird and Smart, 2002). Real GDP showed moderate persistence, highlighted by a positive and significant coefficient on its first lag, corroborating the endogenous growth theory's premise that past output influences current economic performance (Romer, 1986). Meanwhile, variables like EXRC, EXPH, and WHT showed less significant lagged effects, possibly due to external shocks or volatility not captured fully by the model, echoing the concerns raised by Uket et al. (2020) about the vulnerability of Nigerian economic indicators to global price fluctuations and exchange rate instability.

Model fit statistics indicated high explanatory power for PAYE and DTA, with R-squared values approaching unity, suggesting these tax revenue variables are strongly influenced by their past values. This aligns with studies such as Ahannaya et al. (2021), which emphasize the predictable nature of internally generated revenues in Nigeria's fiscal framework. Conversely, the moderate explanatory power for RGDP and other variables reflects the complex interplay of numerous factors influencing economic growth, as noted by Ajike et al. (2020).

Diagnostic tests further reinforced the model's validity. The Jarque-Bera test confirmed residuals' normality, which is crucial for reliable inference, while the Breusch-Pagan-Godfrey test showed no heteroscedasticity, ensuring consistent variance over time. These results provide confidence in the robustness of the Bayesian VAR approach for modeling short-term dynamics without requiring co-integration, in line with the findings of Koop, Poirier, and Tobias (2007).

In practical economic terms, the absence of co-integration suggests that Nigerian fiscal and economic variables may not move together in the long run, possibly due to structural inefficiencies or policy inconsistencies highlighted by Imoh (2020). However, the significant short-term interactions, especially within tax-related variables, imply that fiscal authorities can still influence economic outcomes through timely adjustments in tax policies and administration. The findings underscore the relevance of short-run policy measures for managing revenue flows and stabilizing the economy, supporting the adaptive expectations theory where agents continuously update their behavior in response to recent fiscal conditions (Muth, 1961).

Conclusion

Overall, this study's evidence advocates for a focus on enhancing the predictability and efficiency of internal revenue collection mechanisms while acknowledging the limitations of long-term equilibrium relationships in Nigeria's macroeconomic context. Policymakers should leverage the dynamic short-run linkages illuminated by the Bayesian VAR model to design responsive fiscal strategies that address immediate economic fluctuations, supporting sustainable development within an often volatile real economy.

The Bayesian VAR model effectively captures these short-run interactions, emphasizing the importance of examining immediate economic adjustments rather than long-term equilibrium. Additionally, the diagnostic tests confirm that the model is statistically sound, with normally distributed and homoscedastic residuals, thereby validating the inference drawn from the results. These findings imply that policy measures targeting fiscal variables should consider their short-run effects and dynamic interplay with macroeconomic indicators, as long-term predictability may be limited. Future research could benefit from exploring alternative modeling approaches and including additional explanatory factors to better understand the complexities of these economic relationships.

Recommendations

Given the study's findings, it is recommended that policy makers focus on strengthening short-run fiscal strategies, particularly in the management of Internally Generated Revenue (IGR) components—Pay-As-You-Earn (PAYE), Direct Tax (DTA), and Withholding Tax (WHT). These variables exhibited strong short-term dynamics and autoregressive behavior, especially PAYE and DTA, which showed high persistence over time.

Therefore, we recommend that:

1. The state or local governments should implement responsive and flexible tax administration practices to improve revenue performance in the short term.

2. To increase IGR, the state should enhance its tax payment techniques and implement additional incentives to promote voluntary tax payments by taxpayers.

3. Since the analysis found no evidence of a long-run cointegrating relationship among the macroeconomic and IGR variables, relying on long-term forecasting models for revenue planning may not yield accurate or actionable insights. Instead, data-driven short-run interventions—such as regular compliance audits, real-time monitoring of tax collections, and periodic adjustments to tax policies based on observed revenue trends are likely to be more effective in optimizing revenue generation.

4. Ultimately, the state should judiciously spend the tax revenue on the tax payers welfare in order to encourage them to pay their tax as at and when due.

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