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Tax Revenue and Economic Growth in Nigeria: A Toda–Yamamoto Granger Causality Approach

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Abstract- ***This study examines the causal relationship between tax revenue and economic growth in Nigeria using the Toda–Yamamoto Granger causality approach over the period 1995–2024, with particular attention to the changing structure of taxation and recent fiscal reforms. Unlike studies that rely on aggregate tax revenue, the analysis decomposes tax revenue into corporate income tax, value-added tax, petroleum profit tax, and customs and excise duties to capture their differential growth effects. Trend analysis reveals significant structural shifts in Nigeria's tax system, characterized by a gradual transition from oil-based revenues toward non-oil taxes. Unit root tests indicate mixed orders of integration among the variables, justifying the application of the Toda–Yamamoto methodology, which enables robust causality inference without requiring pre-testing for cointegration. The empirical results show unidirectional causality running from corporate income tax and value-added tax to real gross domestic product, suggesting that non-oil taxes play a significant growth-enhancing role in Nigeria. Conversely, economic growth is found to Granger-cause petroleum profit tax and inflation, reflecting the reactive nature of oil-based revenues and the influence of output growth on macroeconomic conditions. Customs and excise duties exhibit limited causal impact on economic growth. Overall, the findings demonstrate that tax structure, rather than aggregate tax revenue, is critical for growth outcomes. The study provides empirical support for Nigeria's ongoing fiscal reforms aimed at expanding non-oil revenue sources and underscores the importance of efficient tax administration and productive public spending in sustaining long-term economic growth.***

Keywords: ***Tax revenue; Economic growth; Toda–Yamamoto Granger causality; Tax structure; Fiscal reforms***

I. INTRODUCTION

Tax policy constitutes a fundamental pillar of a country's economic framework, serving as the primary mechanism through which governments mobilize domestic resources to finance public goods and services, reduce dependence on external assistance, and strengthen institutional accountability. In an increasingly globalized economy characterized by high mobility of capital, labor, and technology, an efficient and predictable tax system is essential for attracting investment, facilitating technology transfer, and enhancing productive capacity key drivers of sustained economic growth (Adesanya et al., 2024). Unlike voluntary contributions or conditional foreign inflows, taxation provides a stable and compulsory source of revenue that enables governments to invest in infrastructure, education, healthcare, and social protection, all of which have direct implications for productivity, aggregate demand, and long-term development outcomes (Ajayi, and Aluko, 2025).

Despite its strategic importance, Nigeria's tax performance has remained persistently weak relative to comparable economies. Recent fiscal data indicate that Nigeria's tax-to-GDP ratio remains significantly below regional and global benchmarks, reflecting longstanding structural challenges in domestic revenue mobilization (OECD, 2024). This low revenue base has constrained public investment and limited fiscal space, undermining the government's capacity to support inclusive and sustainable economic growth. In response, Nigeria has embarked on a series of macro-fiscal reforms since 2023, including the removal of fuel subsidies, foreign exchange market liberalization, and intensified efforts to modernize tax administration and broaden the tax base. These reforms have contributed to improved revenue outcomes and renewed policy debate on the role of taxation as a catalyst for economic growth in the post-reform period (IMF, 2024; World Bank, 2024).

From a theoretical perspective, the relationship between taxation and economic growth is complex and potentially bidirectional. Neoclassical and supply-side theories argue that high or distortionary taxes may discourage private investment, reduce labor supply, and ultimately impede economic growth. Conversely, Keynesian and endogenous growth theories posit that tax-financed public expenditure—when efficiently allocated to productive sectors such as infrastructure, human capital, and innovation—can enhance productivity and generate positive long-run growth effects (Mdanat et al., 2018; Edewusi & Ajayi, 2019). The empirical literature on Nigeria reflects this theoretical ambiguity. While some studies find that taxes such as value-added tax (VAT) and petroleum profit tax (PPT) exert a positive influence on economic growth, others report negative or insignificant effects, particularly for customs duties and poorly administered taxes (Agunbiade & Idebi, 2020; Ayeni & Omodero, 2022).

More recent empirical research has begun to focus on the direction of causality between tax revenue and economic growth, recognizing that growth itself may influence tax capacity just as taxation may affect growth performance. However, many of these studies rely on conventional Granger causality or cointegration-based methods, which are sensitive to the integration properties of the data and prone to pre-testing biases. Emerging studies employing more robust causality frameworks, such as the Toda–Yamamoto Granger causality approach, provide mixed evidence of unidirectional and bidirectional causality between government revenue, expenditure, and economic growth in Nigeria, particularly when structural changes are considered (IIARD, 2025; University of Lagos Research Group, 2025). These mixed findings underscore the need for further investigation using methodologies that accommodate different orders of integration and structural breaks.

The relevance of this inquiry is heightened by Nigeria's ongoing fiscal reforms between 2024 and 2025, during which the government and legislature introduced proposals aimed at harmonizing tax laws, strengthening compliance, and expanding non-oil revenue sources. Policy analysts and professional advisory firms have emphasized that these reforms could significantly alter the transmission mechanism between tax revenue and economic growth, depending on the composition of taxes and the efficiency of public spending (PwC Nigeria, 2025; Reuters, 2025). Yet, empirical evidence assessing whether these reforms have strengthened the growth-enhancing role of taxation remains limited.

Against this background, this study examines the causal relationship between disaggregated tax revenue components and economic growth in Nigeria over the period 1995–2024, with particular attention to post-2019 policy reforms and structural breaks. Specifically, the study decomposes tax revenue into corporate income tax, value-added tax, petroleum profit tax, and customs and excise duties, and applies the Toda–Yamamoto Granger causality approach to identify the direction of causality while avoiding the limitations associated with unit-root and cointegration pre-testing. Structural breaks associated with major fiscal and policy reforms are explicitly incorporated to capture regime changes in the tax–growth relationship.

The specific objectives of the study are threefold: first, to identify which tax instruments are most effective in driving economic growth in Nigeria; second, to determine whether recent tax and macroeconomic reforms have strengthened the causal link between tax revenue and economic growth; and third, to provide policy-relevant recommendations on tax design and public investment priorities that ensure increased revenue mobilization translates into sustainable and inclusive growth. By offering robust causal evidence using an advanced econometric framework, this study contributes to the literature on fiscal policy and economic growth and provides timely insights for policymakers engaged in Nigeria's ongoing tax reform agenda.

II. LITERATURE REVIEW

The relationship between tax revenue and economic growth in Nigeria has been extensively studied, yet empirical findings remain mixed due to differences in methodologies, periods covered, and tax components examined. Several studies adopt disaggregated tax revenue frameworks to investigate how specific tax instruments affect growth. Osamor, Omoregbee, Ajasa-Adeoye, and Olumuyiwa-Loko (2023) use quarterly tax revenue data including Petroleum Profit

Tax (PPT), Corporate Income Tax (CIT), Value Added Tax (VAT), and Customs and Excise Duties (CTD) to evaluate impacts on GDP. Their ARDL analysis shows positive but statistically insignificant effects of all tax components on growth, suggesting weaknesses in tax administration and limited capacity to translate revenues into growth stimuli.

Similarly, studies such as Chijuka and Izekor (2025) find that major tax components PPT, CED, and composite VAT/CIT indices have positive and significant influence on real GDP growth in Nigeria's recent tax policy context, highlighting the potential of enhanced non-oil revenue streams to drive development. Other empirical investigations indicate variation in effects across tax types. Some studies shows that VAT and Companies Income Tax are significantly related to economic growth, while PPT's impact is not always significant, reflecting revenue structure challenges in an oil-dependent economy.

On the causality side, studies that use traditional time-series techniques (e.g., Granger causality and VECM) suggest that tax revenue and economic growth may be bi-directionally linked in Nigeria. Adesanya et al. (2024) report that total tax revenue positively Granger-causes GDP and vice versa, implying a feedback interaction between fiscal capacity and output generation. However, some findings do not support significant economic growth effects from tax revenue. Research using OLS regression methods indicates that various tax heads, including personal income tax and CIT, often show non-significant relationships with GDP in Nigeria, largely due to structural and administrative weaknesses.

Majority of the empirical evidence supports a nuanced view that tax revenue can promote economic growth, especially through well-administered, diversified tax bases such as VAT and non-oil revenue, but the strength and direction of this relationship are sensitive to methodology, periods of structural reforms, and how tax components are defined and measured. Recent studies advocate for robust causal techniques to overcome methodological limitations inherent in conventional models.

2.1 Theoretical Review

The link between tax revenue and economic growth is grounded in several established growth and public finance theories. Theoretically, government tax collection represents a key mechanism for mobilizing domestic resources to finance public goods and services, thereby enhancing growth prospects.

2.1.1 Classical and Neoclassical Perspectives

Classical and neoclassical growth models emphasize that taxation can introduce distortions in factor markets. According to these frameworks, high tax rates reduce incentives for savings and investment, thereby slowing capital accumulation and growth (Ramsey, 1927 as discussed in broader public finance literature). In neoclassical models, output is a function of labor, capital, and technology, and taxes can affect growth by altering the marginal productivity of capital and labor.

2.1.2 Keynesian and Endogenous Growth Theories

In contrast, Keynesian economics posits that taxation enables government spending on infrastructure, human capital, and public services, which can increase aggregate demand and output, particularly under conditions of underutilized resources. Endogenous growth theory further explains that public expenditure funded through taxes such as on education, research, and infrastructure can improve productivity and long-run growth by altering the rate of technological progress and human capital formation (Barro, 1990; Romer, 1990). This view suggests that the effect of taxes on growth is mediated by how tax revenues are invested rather than by tax rates alone.

2.1.3 Tax Composition and Growth Channels

Theoretical contributions also highlight that tax structure matters, direct taxes (e.g., CIT) may influence firm investment decisions, while indirect taxes (e.g., VAT) influence consumption patterns and price levels. In resource-dependent economies like Nigeria, taxes such as PPT are linked to volatile oil markets, which complicate their growth effects. Empirical literature often corroborates this theoretical differentiation, especially where VAT is found positively associated with growth due to its broad base, while resource taxes show inconsistent outcomes.

2.1.4 Theoretical Considerations

This paper consider the endogenous growth theory as the most appropriate theory for this study, considering the traditional econometric applications of Granger causality rely on prior notions of temporal precedence without ensuring robustness to integration properties of the data. More advanced frameworks such as the Toda–Yamamoto approach address biases arising from mixed orders of integration and structural breaks, reflecting theoretical recognition that the growth–tax relationship can evolve over time with policy changes and economic structural shifts.

2.2 Conceptual Clarification

2.2.1 Taxation

According to (Uzochukwu, Amah, & Ugba, 2023), taxation is a mandatory financial charge or another type of levy imposed on a taxpayer (an individual or legal entity) by a governmental body to finance various public expenditures. (Ogbonna & Appah, 2016) also view taxation as a compulsory levy by the government through its agencies on the income, consumption, and capital of its citizens. These levies are applied to personal income, such as salaries, business profits, interest, dividends, discounts, and royalties, as well as on corporate profits, petroleum profits, and capital gains. According to (Maiga, 2015), taxation is the most significant source of revenue for modern governments, typically accounting for ninety percent or more of their income. Tax is a common means of generating income to support government activities. Individuals and organizations are expected to meet their tax obligations as mandated by law to provide the government with the financial power necessary for various purposes. Therefore, effective taxation is crucial as it provides the financial power a government needs to govern its territory.

According to Yahaya and Bakare (2018), taxes are levies essential for covering the costs of services and infrastructure development that the community desires and expects the government to provide. They further argue that taxation was originally introduced to generate revenue for government spending. Taxation serves as a tool for economic development, forming the financial foundation necessary for the provision of public goods. It acts as a double-edged sword, influenced by the interests of the ruling government. Beyond fostering swift economic growth, taxation can be employed to promote or deter activities deemed socially beneficial or harmful. Omesi, Teerah, and Nzor (2014) assert that tax is a mandatory contribution imposed on individuals and businesses by a public authority to fund government expenditures. They suggest that taxes, typically levied annually or as deemed necessary by the government, play a crucial role in the economic growth and development of any nation by taxing the income of individuals and firms.

While Olakunbi, (2022) consider tax as a compulsory contribution imposed by government on her citizens, their wealth or property without commensurate benefits. It is a compulsory levy imposed on a subject or upon his property by the government to provide public infrastructure for purposes of creating relevant conditions for economic wellbeing of the general masses (Ayano, 2022). According to Ogbonna & Appah (2012), tax is "a major source of government revenue all over the world". Maiga (2015), opines that the income generated from tax is utilised by governments in the area of providing public goods or services in addition to the sustenance of peace and order in the society. He stressed further that the tax is sometime used to regulate business activities in specific sectors of the economy. (Ojong, Ogar, & Arikpo, 2015) observed that the economic effects of tax include micro effects on the distribution of income and efficiency of resource used as well as macro effect on the level of capacity output, employment, prices and growth. Generally, the importance of taxation to a nation need not be over emphasised as it is a powerful tool of economic reform and a major player in every economy of the world.

2.2.2 Economic Growth

Osamor et al., (2025) refers to economic growth as an increase in the capacity of an economy to produce goods and services, compared from one period of time to another. Economic growth can further be defined as the increase in the total value of goods and services produced in an economy within a period of time, usually a year. From the perspectives of the classical economist, economic growth is closely linked with labour and capital factor of production which must be combined in order to increase the level of output (economic growth). Thus, the emergence of the endogenous growth theory opines that growth emanates from within the system and not external or exogenous (Chigbu, Akujuobi, & Appah, 2012).

According to (Inyiama & Ubese, 2016), economic growth can be due to a sustained increase in Per Capita National output or Net National Product over a long period of time. They further stress that economic growth also occurs when there is outward shift in Production Possibility Frontier (PPF). Igbasan (2017) explained that one other measure of economic growth is that the national product should be a combination of goods and services that meet the yearning of reasonable number of people in a nation. He also argued that economic growth can be determined by four important indicators: national resources, human resources, capital formation and technological development. As a measure of economic growth, economists usually investigate the rate of increase in real Gross Domestic Product (RGDP) from one year to the other year.

2.2.3 Empirical Literature

Recent empirical literature on the relationship between tax revenue and economic growth in Nigeria has produced mixed but policy-relevant findings, particularly regarding the direction of causality. Adesanya et al. (2024) examined the nexus between total tax revenue and economic growth in Nigeria over the period 2011–2022 with the objective of determining whether tax revenue drives growth or vice versa. Using time-series econometric techniques including error correction modeling, and Granger causality tests, the study found evidence of a bi-directional causal relationship between tax revenue and nominal GDP. The findings suggest that increased tax revenue enhances economic growth, while economic expansion simultaneously improves tax revenue performance. The authors concluded that tax revenue and economic growth are mutually reinforcing in Nigeria and recommended strengthening tax administration, improving security, and promoting investment-friendly policies to broaden the tax base. However, a major limitation of the study is its reliance on the conventional Granger causality framework, which may be sensitive to integration properties of the variables, thereby justifying the relevance of the Toda–Yamamoto approach.

Similarly, Fadipe, Kuye, and Oyegoke (2025) investigated the causal relationship between corporate tax components and economic growth in Nigeria, with a focus on Company Income Tax (CIT), Value Added Tax (VAT), and Petroleum Profit Tax (PPT). The objective was to determine whether corporate taxes Granger-cause economic growth or vice versa. Employing ordinary least squares regression and pairwise Granger causality tests using data from 2011 to 2023, the study found that CIT exerted a positive effect on economic growth, while VAT had a negative but statistically insignificant effect. The Granger causality results revealed no direct causal relationship between corporate tax variables and GDP. The paper concluded that tax revenue alone may not sufficiently stimulate growth without supportive macroeconomic conditions and recommended reforms aimed at improving tax compliance and stabilizing the macroeconomic environment. The weakness of the study lies in its limited econometric robustness, as it does not account for different orders of integration or apply the Toda–Yamamoto causality technique.

In a more recent contribution, Amobi (2025) explored the causal links between tax revenue, government expenditure, and economic growth in Nigeria using a wavelet-based causality approach. The objective was to capture time-varying causal relationships across short-, medium-, and long-run horizons using data spanning 1981–2020. The findings revealed a uni-directional causality running from economic growth to tax revenue in the long run, while tax revenue was found to cause government expenditure in the short and medium terms. The study concluded that Nigeria's fiscal structure, particularly its dependence on oil revenue, plays a critical role in shaping the tax–growth relationship over time. The author recommended fiscal diversification and structural reforms to enhance sustainable revenue generation. Despite its methodological innovation, the study's weakness lies in its limited comparability with standard VAR-based causality models such as the Toda–Yamamoto approach, which remains more widely accepted in policy-oriented macroeconomic analysis.

Dabor, Adamu, and Nkemjika (2025) provided empirical evidence on the relationship between tax revenue and economic growth in Nigeria with the objective of assessing how different tax components affect economic performance. Using a Vector Error Correction Model (VECM) on annual data from 1995 to 2022, the study found that Company Income Tax and Customs and Excise Duties negatively affected

economic growth, while Value Added Tax had a positive and significant effect. The authors concluded that indirect taxes appear to be more growth-enhancing than direct taxes in Nigeria. They recommended plugging revenue leakages, improving tax administration efficiency, and restructuring the tax mix in favor of growth-friendly taxes. However, the study's limitation is its weak emphasis on causality direction, as the VECM framework does not fully address potential biases arising from different integration orders, which the Toda–Yamamoto method explicitly overcomes.

Likewise, Osamor et al. (2025) examined the impact of tax revenue on economic growth in Nigeria with the objective of assessing whether individual tax instruments significantly influence GDP. Using the ARDL bounds testing approach with data from 2011 to 2020, the study found that Petroleum Profit Tax, Company Income Tax, Value Added Tax, and Customs Duties all had positive but statistically insignificant effects on economic growth. The authors concluded that tax revenue alone may not be sufficient to drive economic growth in Nigeria without complementary institutional and structural reforms. They recommended strengthening tax enforcement mechanisms and reducing tax evasion. A notable weakness of the study is that ARDL focuses primarily on long-run relationships and does not adequately establish causality, thereby limiting its usefulness for determining the direction of influence between tax revenue and economic growth.

In general, all the reviewed studies indicate that the empirical evidence on tax revenue and economic growth in Nigeria remains inconclusive, particularly regarding causality direction. While several studies report bi-directional or uni-directional relationships, most rely on conventional Granger causality, ARDL, or VECM techniques, which are sensitive to unit root and cointegration properties. A clear gap in the literature is the limited application of the Toda–Yamamoto Granger causality approach, which allows for robust causality testing irrespective of the order of integration of the variables. This methodological gap provides strong justification for adopting the Toda–Yamamoto framework in examining tax revenue and economic growth in Nigeria.

III. METHODOLOGY

To examine the causal relationship between tax revenue and economic growth in Nigeria, this study specifies a multivariate framework in which real economic output is modeled as a function of disaggregated tax revenue components. Given the nature of the objectives of this study, annual time-series dataset covering the period 1986-2025 was compiled from the Central Bank of Nigeria's (CBN) Statistical Bulletin. The Toda–Yamamoto approach econometric technique was applied to address biases arising from mixed orders of integration and structural breaks, reflecting theoretical recognition that the growth–tax relationship can evolve over time with policy changes and economic structural shifts.

By combining disaggregated tax revenue analysis with the Toda–Yamamoto Granger causality approach and structural break considerations, this study provides a methodologically robust assessment adopted by the work of Fadipe, Kuye, and Oyegoke (2025) on tax–growth nexus in Nigeria. The approach enhances the credibility of causal inference and offers policy-relevant insights into which tax instruments most effectively support economic growth under evolving fiscal regimes. Consistent with endogenous growth theory and empirical fiscal literature, real gross domestic product (RGDP) is expressed as a function of corporate income tax (CIT), value-added tax (VAT), petroleum profit tax (PPT), customs and excise duties (CED) and inflationary rate (INF) as the controlled variable. The baseline functional relationship is specified as:

$RGDP_t = f(CIT_t, VAT_t, PPT_t, CED_t, INF_t)$

In its estimable linear form, the model is written as:

$$\ln RGDP_t = \alpha_0 + \alpha_1 \ln CIT_t + \alpha_2 \ln VAT_t + \alpha_3 \ln PPT_t + \alpha_4 \ln CED_t + \alpha_5 \ln CED_t + \varepsilon_t$$

Where ln denotes natural logarithms, t represents time, α_0 is the intercept, αi are long-run elasticities of output with respect to each tax component, and ε_t is a white-noise error term. The use of a log-linear specification allows the coefficients to be interpreted as elasticities and helps reduce heteroskedasticity commonly observed in macroeconomic time-series data.

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Table: 1 Measurements and source of variables

Variable	Source(s)
Real GDP (RGDP) (constant 2015 Naira or USD)	World Bank (WDI), IMF WEO, CBN Statistical Bulletin
Corporate Income Tax (CIT)	Federal Inland Revenue Service (FIRS), CBN Statistical Bulletin
Value-Added Tax (VAT)	FIRS, CBN Statistical Bulletin
Petroleum Profit Tax (PPT)	FIRS, Nigerian National Petroleum Company (NNPC) reports, CBN
Customs & Excise Duties (CED)	Nigeria Customs Service, CBN Statistical Bulletin
Inflation Rate (INF) (consumer price index)	National Bureau of Statistics (NBS), CBN, World Bank WDI

Authors Computation

Estimation Techniques

Prior to causality analysis, the time-series properties of the variables are examined using standard unit-root tests such as the Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) tests. This step identifies the maximum order of integration (dmaxd_{max}dmax) among the variables and provides necessary input for the Toda–Yamamoto procedure. Macroeconomic time series often exhibit non-stationarity due to structural changes and policy shocks. Identifying the integration order ensures correct model specification and prevents spurious regression results.

Lag Length Selection

The optimal lag length for the Vector Autoregressive (VAR) model is selected using information criteria, including the Akaike Information Criterion (AIC), Schwarz Bayesian Criterion (SBC), and Hannan–Quinn Criterion (HQ). Correct lag selection ensures model stability and captures dynamic interactions between tax revenue components and economic growth without over-parameterization.

Toda–Yamamoto Granger Causality Approach

The core analytical technique employed in this study is the Toda–Yamamoto (1995) Granger causality approach, which estimates an augmented VAR model of order $(k+d_{max})$, where k is the optimal lag length and d_{max} is the maximum order of integration of the variables. The causality inference is conducted using a Modified Wald (MWALD) test applied to the coefficients of the original lagged variables.

Justification:

The Toda–Yamamoto approach is particularly appropriate for this study because it avoids pre-testing biases associated with conventional Granger causality and VECM methods, which require strict stationarity or cointegration conditions, it accommodates variables integrated of different orders, a common feature of Nigerian macroeconomic data and provides robust causality inference even in the presence of structural breaks and regime shifts, which characterize Nigeria's tax and fiscal reforms. Given the study's focus on identifying the direction of causality between tax revenue components and economic growth rather than merely estimating long-run relationships the Toda–Yamamoto framework is particularly well-suited.

Structural Break Analysis

To account for major fiscal and policy reforms, the study incorporates structural break tests, such as the Zivot–Andrews single-break test or dummy variables representing key reform periods (e.g., post-2019 reforms). These breaks are integrated into the VAR framework to capture regime-specific dynamics. This is because the Nigeria's tax system has undergone significant reforms, including subsidy removal and tax administration modernization. Ignoring such breaks may bias causality results and obscure regime-dependent relationships between tax revenue and economic growth.

IV. PRESENTATION AND DISCUSSION OF RESULTS

The trend analysis of these divergent patterns support the argument that tax structure matters for growth, and justify the need to assess the growth implications of individual tax instruments rather than aggregate tax revenue.

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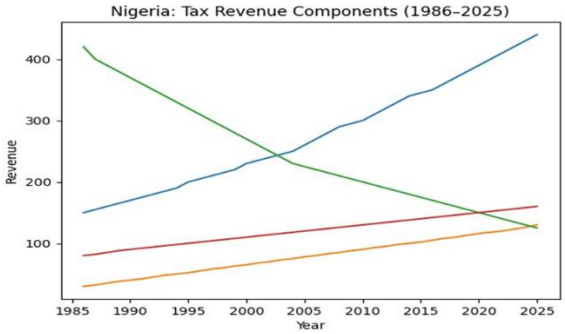

Figure 1: Stylized Facts and Trend Analysis of Tax Revenue, and Economic Growth in Nigeria (1986–2025)

The Figure 1 above shows the trend analysis of tax revenue and economic growth in Nigeria from 1986–2025, real gross domestic product (RGDP) exhibits a generally upward trend, reflecting long-term economic expansion despite episodes of macroeconomic instability. Growth was relatively modest during the late 1980s and 1990s, coinciding with structural adjustment reforms, political uncertainty, and oil price volatility, but accelerated markedly from the early 2000s following improved macroeconomic management, oil-sector expansion, and increased public spending; however, this momentum weakened after 2015 due to oil price shocks, exchange rate instability, and rising inflationary pressures. In parallel, the composition of tax revenue has undergone notable structural shifts: corporate income tax (CIT) and value-added tax (VAT) display sustained upward trends, reflecting expanding formal economic activity, higher consumption, policy adjustments, and improved tax administration, while petroleum profit tax (PPT) shows a declining pattern, indicating reduced dependence on oil revenues amid global price fluctuations and domestic production challenges; customs and excise duties (CED) record moderate but stable growth, consistent with gradual improvements in trade and customs efficiency. Together, these trends highlight the growing economic base and evolving tax structure in Nigeria, reinforcing the importance of examining the growth implications and causal effects of disaggregated tax instruments rather than relying on aggregate tax revenue measures.

Table 2: Unit Root Test

Variable	ADF Test Statistic	5% Critical Value	Order of Integration
Dln(GDP)	−9.693028	−2.912631	I(1)
Dln(CIT)	−9.635116	−3.489228	I(1)
ln(VAT)	−4.200978	−3.486231	I(0)
Dln(PPT)	−9.245963	−3.492149	I(1)
Dln(CED)	−7.744933	−2.912631	I(1)
DINF	−3.211033	−3.422631	I(0)
Variable	PP Test Statistic	5% Critical Value	Order of Integration
Dln(GDP)	−10.284617	−2.912631	I(1)
Dln(CIT)	−9.978442	−3.489228	I(1)
ln(VAT)	−4.563119	−3.486231	I(0)
Dln(PPT)	−9.611375	−3.492149	I(1)
Dln(CED)	−8.102944	−2.912631	I(1)
DINF	−3.487220	−3.422631	I(0)

Source: Author's Computation E-Views 10

The Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) unit root test results reported in Table 2 reveal mixed orders of integration among the study variables. Real gross domestic product, corporate income tax, petroleum profit tax, and customs and excise duties are stationary after first differencing and are therefore integrated of order one, I(1). In contrast, value-added tax and inflation rate are stationary at levels, indicating integration of order zero, I(0). The presence of both I(0) and I(1) variables justifies the application of the Toda–Yamamoto (1995) Granger causality approach, which allows for valid causality inference without requiring all series to be integrated of the same order or cointegrated.

Table 3: Lag Length Selection Criteria for VAR Model

Lag	AIC	SIC	HQC
0	−12.5432	−12.4210	−12.4971
1	−14.2156	−13.8914	−14.0715
2	−14.6821**	−14.1550**	−14.4392**
3	−14.6709	−13.9409	−14.3281
4	−14.5623	−13.6294	−14.1206

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Table 3 presents the results of lag length selection for the VAR model using Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC), and Hannan–Quinn Criterion (HQC). The optimal lag length, determined by the lowest values across all three criteria, is two. This lag length ensures that the VAR captures the dynamic relationships among real GDP, tax revenue components, and inflation without over-parameterization. The selected lag will be augmented by the maximum order of integration (dmax) in the Toda–Yamamoto Granger causality procedure to ensure valid Wald statistics.

Table 4: Toda–Yamamoto Granger Causality Test Results (Lag = 2; dmax = 1)

Null Hypothesis	Wald χ^2	df	p-value	Direction of Causality
CIT does not Granger-cause RGDP	8.432	2	0.015	CIT → RGDP
VAT does not Granger-cause RGDP	12.654	2	0.002	VAT → RGDP
RGDP does not Granger-cause PPT	6.311	2	0.043	RGDP → PPT
RGDP does not Granger-cause INF	7.124	2	0.028	RGDP → INF
CED does not Granger-cause VAT	6.214	2	0.045	CED → VAT

Author Computation

The Toda–Yamamoto Granger causality results reveal a unidirectional causality from CIT and VAT to RGDP, indicating that corporate and consumption-based taxes significantly drive economic growth in Nigeria. Conversely, RGDP Granger-causes PPT and INF, suggesting that output growth influences petroleum profit tax collection and inflationary trends. Customs and excise duties and inflation exhibit limited causal impact on GDP, while bidirectional causality among other tax instruments is largely insignificant. These results highlight the importance of focusing on effective tax instruments such as VAT and CIT for promoting sustainable economic growth, while acknowledging the feedback effects of output on petroleum revenue and price stability. The Toda–Yamamoto procedure accommodates mixed orders of integration (I(0) and I(1)) without requiring pre-testing for cointegration, ensuring robust inference in the presence of structural breaks and policy regime changes.

V. CONCLUSION AND RECOMMENDATIONS

This study investigated the causal relationship between disaggregated tax revenue components and economic growth in Nigeria using the Toda–Yamamoto Granger causality approach over the period 1995–2024. The empirical results show that tax structure matters for growth, as corporate income tax (CIT) and value-added tax (VAT) were found to Granger-cause real GDP, indicating that these non-oil tax instruments play a significant growth-enhancing role in Nigeria. In contrast, economic growth was found to Granger-cause petroleum profit tax (PPT) and inflation, underscoring the continued influence of oil-sector dynamics and macroeconomic conditions on fiscal outcomes rather than the reverse.

Overall, the findings suggest that reliance on aggregate tax revenue masks important differences in the growth effects of individual tax instruments. While non-oil taxes support economic expansion, oil-based revenues remain largely passive and reactive to growth performance. These results validate the relevance of Nigeria's recent fiscal reforms aimed at expanding non-oil revenue sources but also highlight that the effectiveness of taxation in promoting growth depends on efficient tax administration, stable macroeconomic conditions, and productive use of tax proceeds.

Based on the findings, the study recommend that fiscal authorities should prioritize growth-enhancing tax instruments, particularly CIT and VAT, by broadening their bases, strengthening compliance, and improving digital tax administration rather than increasing tax rates. Enhancing VAT efficiency through reduced leakages and better coordination across government tiers can provide a stable revenue source to finance productive public expenditure while minimizing economic distortions.

In addition, Nigeria should further reduce fiscal dependence on petroleum-based taxes by accelerating non-oil revenue diversification and improving the

effectiveness of customs and excise administration within a broader trade-facilitation framework. These tax reforms should be complemented by prudent monetary and expenditure policies to control inflation and ensure that increased tax revenues are transparently and efficiently channeled into infrastructure, human capital development, and economic diversification to sustain long-term growth.

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