Taxation Dynamics and Economic Performance in Nigeria: Evidence from The Revised Tax-To-GDP Series, 2010–2021

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Abstract
This study examines how taxation dynamics relate to economic performance in Nigeria between 2010 and 2021, using the revised official tax-to-GDP series of the National Bureau of Statistics alongside real GDP and inflation data. Descriptive, correlation, regression and lead–lag analyses are applied to the annual series and interpreted against recent peer-reviewed evidence. Three findings stand out. First, the tax-to-GDP ratio fell from 15.3% in 2010 to 8.3% in 2016 and recovered only to 10.9% by 2021; in 2010 prices, total tax revenue was about 6% lower in 2021 than in 2010 while real GDP rose by about 32%. Second, the rising non-oil share of tax revenue (82.3% to 88.6%) reflects the collapse of oil taxes rather than a deepening of the non-oil base, whose ratio to GDP fell from 12.6% to 9.6%. Third, the tax ratio is positively associated with growth (0.56 percentage points of growth per percentage point of tax-to-GDP), but the association weakens once inflation and the oil component are considered, and lead–lag tests suggest, weakly, that growth leads tax revenue rather than the reverse. Taxation in Nigeria is therefore largely procyclical and commodity-driven. The paper argues for real base-broadening, counter-cyclical fiscal buffers, macroeconomic stability and stronger institutions as the conditions for the 2025 tax reforms to raise economic performance.

Keywords: *taxation; tax-to-GDP ratio; non-oil revenue; economic growth; fiscal policy; Nigeria*

1. Introduction

Taxation sits at the centre of the development finance debate in Nigeria. Africa's most populous country is also one of its least fiscally mobilised: in a study of tax revenue determinants, Atolagbe and Abiodun (2021) described Nigeria, with a population of roughly 200 million, as having the lowest tax-to-GDP ratio among Sub-Saharan African countries. The official picture has been clarified only recently. When the National Bureau of Statistics (NBS, 2023) revised the computation of the ratio using the Organisation for Economic Co-operation and Development (OECD) classification and a wider coverage of federal, state and local revenues, the 2021 ratio

rose to 10.86% from an earlier estimate of about 6%. Even after that upward revision, Nigeria remains well below the unweighted Africa (33) average of 15.6% reported for 2021 in the OECD, African Tax Administration Forum and African Union Commission (2023) revenue statistics.

The weakness of tax mobilisation matters because Nigeria's fiscal position has long depended on a single commodity. Siyanbola et al. (2025) noted that in the first quarter of 2022 about 90% of export income and 85% of government revenue accrued from oil and gas, and that falling oil receipts pushed the government towards heavier borrowing for capital projects. Oil-linked revenue is volatile by nature, so the stability of public expenditure, and with it the predictability of growth, depends on how far non-oil taxes can substitute for it. Oghuma et al. (2022) framed the problem in precisely these terms, observing that oil price volatility has threatened the balance of public expenditure and that the non-oil sector offers room to expand fiscal space.

Economic performance during the same period has been disappointing. The World Bank, as summarised by KPMG Nigeria (2023), observed that growth averaging about 1.5% over the preceding decade was too slow to address extreme poverty and that per capita income had contracted by more than 40% since 2015. A reform agenda has followed. The Nigeria Tax Act 2025 and three related statutes were signed in June 2025 and, for the main tax and administration laws, took effect on 1 January 2026 (EY, 2025). These Acts are intended to streamline compliance, broaden the base and raise revenue, which makes it timely to ask what the historical relationship between taxation and economic performance actually looks like.

The empirical literature on Nigeria is large but unsettled. Some studies report that non-oil revenue promotes growth (Rotimi et al., 2022), others find long-run relationships between specific taxes and output (Adefolake & Omodero, 2022), and still others report that individual instruments such as value-added tax (VAT) can be negatively related to growth (Oghuma et al., 2022). Most studies treat taxation as an exogenous driver of output. Few examine the structure of tax revenue (oil versus non-oil), few consider the possibility that growth drives tax collection as much as the reverse, and many rely on long time series whose revenue definitions changed over time. The present study contributes in three ways. It uses the revised NBS tax series, which applies a consistent OECD-based definition from 2010 to 2021. It separates oil and non-oil taxes and expresses revenue in real terms, which allows a check on whether rising non-oil shares signal real base-broadening. It also tests the direction of association, rather than assuming it.

The paper addresses three questions. First, how have the level and composition of tax revenue evolved since 2010? Second, how is the tax-to-GDP ratio, and its oil and non-oil components, associated with real GDP growth once inflation is taken into account? Third, does tax performance lead growth, or does growth lead tax performance? The remainder of the paper is organised as follows. Section 2 describes the tax and fiscal setting. Section 3 reviews the theoretical and empirical literature. Section 4 presents the data and methods. Section 5 reports and discusses the results. Section 6 concludes with policy implications.

2. Nigeria's Tax System and Fiscal Setting

Nigeria operates a three-tier fiscal system in which the federal government, 36 states and the Federal Capital Territory, and local governments each have defined revenue powers. Federal taxes have historically included the petroleum profit tax (PPT), company income tax (CIT), VAT, customs and excise duties and the education tax, while personal income tax is assessed mainly at state level. Dada et al. (2022) examined five of these instruments in their disaggregated analysis, namely personal income tax, corporate income tax, petroleum profit tax, education tax, and customs and excise duties, which reflects the usual grouping of the Nigerian tax base in empirical

work. The NBS (2023) revised computation distinguishes oil taxes from non-oil taxes and sums them to total tax revenue, drawing on data from the Office of the Accountant General of the Federation, the Federal Inland Revenue Service (FIRS), the Nigeria Customs Service, the Joint Tax Board and other collecting agencies. The expanded coverage matters for interpretation. Because the older estimate of about 6% captured less of the revenue collected by state and local governments and by other agencies, earlier studies that used it may have understated the revenue effort actually made. At the same time, the revised ratio is still low in comparison with the African average, and it fell steadily after 2014 as oil-related revenue weakened.

Recent macro-fiscal developments have intensified the policy interest in tax mobilisation. The World Bank (2024) described reforms to fuel subsidies, exchange-rate policy and the tax system as beginning to restore macroeconomic stability, while pointing to the fragility of the gains. Its subsequent Nigeria Development Update (World Bank, 2025) reported a marked improvement in federally collected revenue in 2024, associated with exchange-rate unification, better tax administration and treasury remittance reforms. These improvements fall outside the 2010–2021 window of the present analysis and therefore serve here as context rather than as evidence.

Institutional reform is also under way. The four 2025 statutes comprise the Nigeria Tax Act, the Nigeria Tax Administration Act, the Nigeria Revenue Service (Establishment) Act and the Joint Revenue Board (Establishment) Act. According to EY (2025), the Nigeria Tax Act is meant to modernise the framework, simplify compliance and widen the base. The Nigeria Revenue Service replaces FIRS. Because these laws were implemented only in 2026, no consistent official series yet exists with which to test their effect, and the empirical analysis below should be read as describing the system that the reforms inherit.

3. Literature Review

3.1 Conceptual and Theoretical Considerations

Taxation affects output through several channels that can pull in opposite directions. On the positive side, tax revenue finances infrastructure, education, health and public administration, which raise the productivity of private capital. Oghuma et al. (2022) drew on the endogenous growth tradition to argue that public spending financed by taxation can raise the long-run growth rate when it augments human and physical capital. On the negative side, taxes reduce after-tax returns to saving and investment, raise the cost of production and can encourage evasion and informality. The net effect therefore depends on the composition of taxes, how revenue is spent, and the quality of administration. A distributive perspective is also relevant. Dada et al. (2022) framed their analysis partly in terms of the equal-sacrifice principle, in which taxpayers bear burdens that equalise the marginal utility of income given up, so that richer taxpayers contribute proportionally more. Tax systems that depart from this principle through heavy reliance on consumption taxes or on a narrow set of formal firms may depress demand without delivering the public goods that would offset it. Abd Hakim et al. (2022) offered cross-country support for the importance of structure: in their comparison of developed and developing countries, the tax structure of developing countries did not enhance economic development, whereas direct taxes were positively related to development in developed countries.

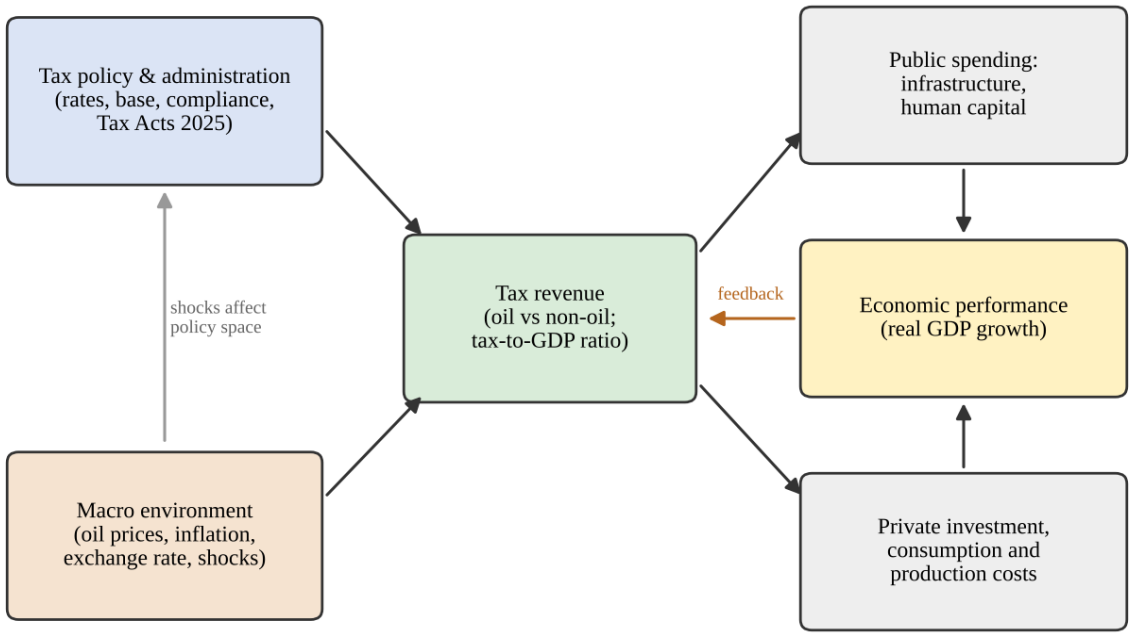
For resource-rich economies, two further strands are essential. The first concerns tax effort. Adeniyi et al. (2022), studying 28 Sub-Saharan African countries, found that economies with oil rents invest less effort in non-oil revenues and that trade openness weakened tax effort in such countries. This is consistent with the idea that resource rents crowd out the political and administrative investment needed to tax citizens and firms. The second strand concerns

institutions. Naape (2021) analysed 14 members of the Southern African Development Community and examined the interplay between economic freedom and tax revenue performance, while Siyanbola et al. (2025) investigated the six governance dimensions of institutional quality in relation to Nigerian tax revenue. Both studies treat institutional quality as a condition for revenue mobilisation rather than a by-product of it.

A final conceptual point is the direction of causation. Because tax bases expand when output and incomes rise, tax revenue is procyclical. Atolagbe and Abiodun (2021), for example, modelled tax revenue as the dependent variable and found that macroeconomic conditions and trade liberalisation help explain total and domestic tax revenue in Nigeria. Yinusa et al. (2024) likewise found that GDP per capita had a significant positive effect on tax revenue, while inflation had a significant negative effect. If growth drives revenue, then a positive correlation between the tax ratio and growth does not by itself show that taxes cause growth. Figure 1 summarises the channels and feedbacks that guide the empirical design.

Figure 1

Conceptual Framework Linking Taxation Dynamics and Economic Performance



Note. Adapted by the author from the channels discussed in Section 3.1.

3.2 Empirical Review

Evidence from Nigeria

Studies that use Nigerian data typically employ autoregressive distributed lag (ARDL), vector error-correction or multiple regression methods. Oghuma et al. (2022) applied ARDL to non-oil taxes and growth. They reported that CIT revenue had a positive and significant effect on growth at the 5% level, that customs and excise duties also showed positive growth effects, but that the long-run effect of VAT on growth was negative. Their policy conclusion emphasised the need for an effective and accountable expenditure framework to translate revenue into growth.

Adefolake and Omodero (2022) used data for 2000 to 2021 on PPT, CIT, VAT and GDP. After finding the variables stationary at first difference, they identified a long-run relationship through Johansen cointegration and estimated a vector error-correction model. Their recommendations focused on training and enlightenment programmes by tax agencies, which implies that compliance, not only rates, was seen as the binding constraint. In a broader fiscal framing, Rotimi et al. (2022) examined government revenue mobilisation from 1981 to 2018 and found that domestic debt and non-oil revenue positively and significantly affected growth, while external debt and oil revenue showed the opposite sign.

Omojolaibi and Obieke (2021) studied the dynamics of the tax system and macroeconomic performance between 1980 and 2019 with an ARDL model. They reported that changes in the tax system were associated with improvements in macroeconomic performance, with estimated effects ranging between 0.10% and 3.05% for a percentage change in the tax system. They also advocated using taxation to address inflation, growth, unemployment and public debt. Dada et al. (2022) used a dynamic OLS and ARDL framework and called for a comprehensive overhaul of tax policy alongside measures against inflation, unemployment and population growth, and stronger trade and domestic investment. This emphasis on complementary conditions echoes the macro-environment box in Figure 1.

A further group of studies treats tax revenue as the outcome. Atolagbe and Abiodun (2021) used ARDL and error-correction modelling for 1981 to 2019 and found that trade liberalisation and most of the macroeconomic variables they considered helped to predict total and domestic tax revenue. Yinusa et al. (2024) examined economic, international and financial determinants of Nigerian tax performance, and Siyanbola et al. (2025) analysed institutional quality and tax revenue from 1996 to 2021 using ARDL. The latter concluded that attention to human capital, infrastructure and diversification would help to expand the tax base.

Evidence from Africa and cross-country studies

Evidence from other African settings suggests that the sign of the tax–growth relationship is context dependent. Adegbite and Azeez (2022) used panel ARDL for ten Sub-Saharan countries and found that CIT revenue had a negative and statistically insignificant relationship with growth in both the short and long run. Abd Hakim et al. (2022) reported that tax structures in developing countries did not promote economic development. Naape (2021) found that conventional and unconventional determinants of tax revenue were statistically significant in SADC countries, which points to the role of institutions. Adeniyi et al. (2022) documented the weakening effect of oil rents on non-oil tax effort across Sub-Saharan Africa.

Table 1 summarises the peer-reviewed empirical studies used in this paper. Two patterns emerge. First, results for Nigeria lean towards positive tax–growth relationships when non-oil revenue or specific taxes such as CIT are examined, but the evidence is mixed for VAT and for oil revenue. Second, studies of Sub-Saharan Africa and developing countries more broadly are more cautious, with negative or insignificant results common. The difference may reflect sample composition, tax definitions, estimation methods or the fact that causation runs in both directions.

Table 1

Study	Scope / period	Method	Variables	Main finding
Omojolaibi & Obieke (2021)	Nigeria, 1980–2019	ARDL	Tax system, macro indicators	Tax-system changes associated with better macro performance
Atolagbe & Abiodun (2021)	Nigeria, 1981–2019	ARDL / ECM	Tax revenue, trade liberalisation, macro variables	Trade liberalisation and macro variables predict tax revenue
Naape (2021)	14 SADC countries, 2000–2017	Dynamic panel GMM	Economic freedom, tax revenue	Conventional and unconventional determinants are significant
Adefolake & Omodero (2022)	Nigeria, 2000–2021	Johansen, VECM	PPT, CIT, VAT, GDP	Long-run relationship; emphasis on compliance
Oghuma et al. (2022)	Nigeria	ARDL	Non-oil taxes, growth	CIT and customs duties positive; VAT negative in long run
Rotimi et al. (2022)	Nigeria, 1981–2018	Multiple regression	Revenue sources, debt, GDP	Non-oil revenue positive; oil revenue negative
Dada et al. (2022)	Nigeria	DOLS / ARDL	PIT, CIT, PPT, education tax, customs	Call for overhaul; macro conditions matter
Adegbite & Azeez (2022)	10 Sub-Saharan countries	Panel ARDL	CIT, growth	CIT negative and insignificant
Abd Hakim et al. (2022)	Developed vs developing countries	Panel analysis	Direct and indirect taxes	Developing-country tax structure does not enhance development
Adeniyi et al. (2022)	28 Sub-Saharan countries, 1996–2016	Panel analysis	Oil rents, tax effort	Oil rents reduce non-oil tax effort
Yinusa et al. (2024)	Nigeria	ARDL	Economic, international, financial factors	GDP per capita raises, inflation lowers tax revenue
Siyanbola et al. (2025)	Nigeria, 1996–2021	ARDL	Institutional quality, tax revenue	Institutions matter for mobilisation

Summary of Selected Peer-Reviewed Empirical Studies (2021–2025)

Note. ARDL = autoregressive distributed lag; ECM = error-correction model; VECM = vector error-correction model; GMM = generalised method of moments; DOLS = dynamic ordinary least squares; PIT = personal income tax; PPT = petroleum profit tax; CIT = company income tax; VAT = value-added tax. Summaries are drawn from the cited studies' abstracts and reported results.

3.3 Research Gap

Three gaps remain. First, most Nigerian studies model aggregate or individual tax revenues in nominal naira terms, which can blur real changes when inflation is high, as it was in 2016–2017 and 2021. Second, relatively few studies separate the oil and non-oil components in the same framework while controlling for inflation. Third, causality is seldom tested explicitly, even though evidence on determinants of tax revenue suggests that growth feeds back into collections. This paper addresses these gaps by using real revenue measures, separating oil from non-oil taxes and applying a simple lead–lag test.

4. Data and Methodology

4.1 Data and Variables

The analysis uses annual data for 2010–2021, a window that is determined by the availability of the NBS (2023) revised tax series. Oil taxes, non-oil taxes, total tax revenue and nominal GDP are in billions of naira and are taken directly from the NBS report. The NBS tax-to-GDP ratio is reproduced as total tax revenue divided by nominal GDP. Real GDP at 2010 constant prices, in trillions of naira, is taken from the series reported by KPMG Nigeria (2023); real GDP in 2010 is set equal to nominal GDP because 2010 is the base year. Real GDP growth is the annual percentage change in that series, so that the first growth observation is for 2011. Annual average consumer-price inflation is the World Bank indicator reproduced by the Federal Reserve Bank of St. Louis (World Bank, n.d.). Table 2 defines all variables. The complete dataset is reproduced in Appendix A.

Table 2

Variable Definitions and Sources

Variable	Definition	Source
TTG	Total tax revenue as % of nominal GDP	Computed from NBS (2023)
NOTG	Non-oil tax revenue as % of nominal GDP	Computed from NBS (2023)
OTG	Oil tax revenue as % of nominal GDP	Computed from NBS (2023)
NOSH	Non-oil taxes as % of total tax revenue	Computed from NBS (2023)
GROWTH	Annual % change in real GDP (2010 prices)	Computed from KPMG Nigeria (2023)
INF	Annual average consumer-price inflation (%)	World Bank (n.d.) via FRED
RNOT, ROT	Non-oil and oil taxes deflated by the implicit GDP deflator (nominal GDP ÷ real GDP), ₦ trillion, 2010 prices	Computed by the author
RGDP	Real GDP, ₦ trillion, 2010 prices	KPMG Nigeria (2023)

Note. NBS = National Bureau of Statistics; FRED = Federal Reserve Economic Data. Real GDP values are published to one decimal place, so derived growth rates and deflators carry small rounding error.

4.2 Empirical Strategy

Given a sample of only twelve annual observations, a full ARDL bounds-testing framework is not credible because the number of parameters would quickly exhaust the degrees of freedom. The analysis therefore uses transparent, parsimonious specifications estimated by ordinary least squares (OLS), with heteroskedasticity-consistent (HC1) standard errors, and treats the results as exploratory. Five models are estimated. Model 1 relates growth to the aggregate tax ratio:

$$GROWTH_t = \alpha 0 + \alpha 1\ TTG_t + \varepsilon_t \quad (1)$$

Model 2 separates the oil and non-oil components of the ratio, and Model 3 adds inflation as a control for macroeconomic instability:

$$GROWTH_t = \beta 0 + \beta 1\ NOTG_t + \beta 2\ OTG_t + u_t \quad (2)$$

$$GROWTH_t = \gamma 0 + \gamma 1\ NOTG_t + \gamma 2\ OTG_t + \gamma 3\ INF_t + v_t \quad (3)$$

Model 4 is a log-level specification that uses real revenues, which removes the effect of price changes from the tax measures:

$$ln\ RGDP_t = \delta 0 + \delta 1\ ln\ RNOT_t + \delta 2\ ln\ ROT_t + w_t \quad (4)$$

Model 5 replaces the contemporaneous tax ratio with its first lag to reduce simultaneity:

$$GROWTH_t = \theta 0 + \theta 1\ TTG_{t-1} + \eta_t \quad (5)$$

To examine the direction of association, a bivariate Granger-type lead–lag test is applied with one lag. In the first regression, growth is regressed on its own lag and the lagged tax ratio; in the second, the tax ratio is regressed on its own lag and lagged growth. The joint restriction on the added lag is tested with an F-test. Because one lag uses up observations, the test uses ten observations (2012–2021), and its power is low.

4.3 Diagnostics and Limitations

Residual diagnostics reported for each model include the Durbin–Watson (DW) statistic, the Jarque–Bera (JB) test for normality and the Breusch–Pagan (BP) test for heteroskedasticity. Dickey–Fuller (DF) statistics without augmentation are reported for the key series. These tests have little power in samples of this size, so conclusions about stationarity are tentative. The principal limitations are as follows. The series ends in 2021 and excludes the 2023–2025 fuel-subsidy removal, exchange-rate unification and tax reforms. Oil prices affect both tax revenue and growth, so the tax–growth association may reflect a common driver. Finally, with so few observations, statistical significance should be read as indicative rather than conclusive.

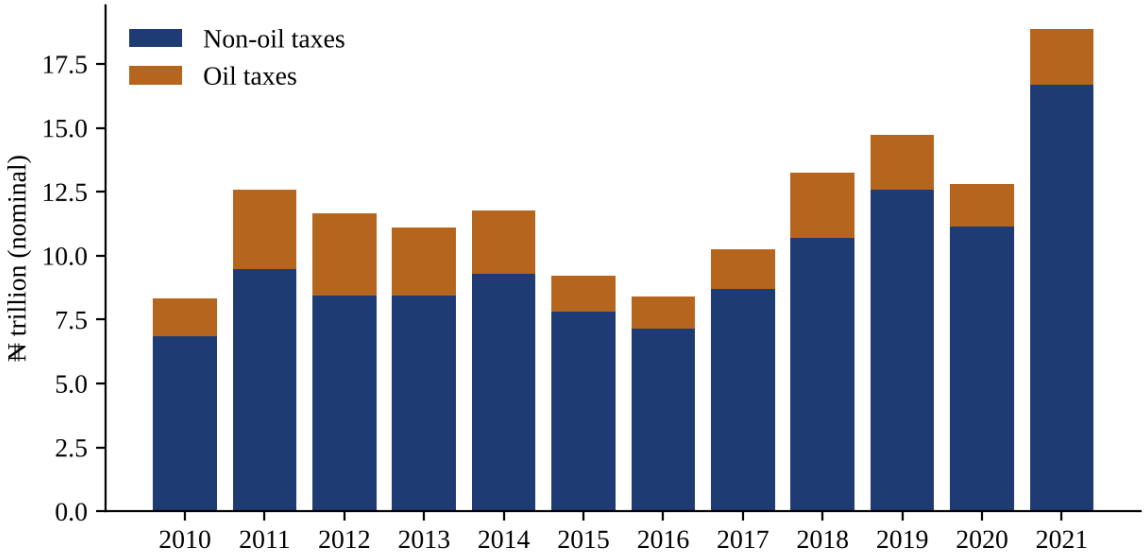
5. Results and Discussion

5.1 Trends in Tax Revenue

Figure 2 shows nominal oil and non-oil tax revenue. Total nominal revenue rose from ₦8.34 trillion in 2010 to ₦18.85 trillion in 2021, an increase of about 126%. Nominal GDP, however, rose by about 218% over the same period, from ₦54.61 trillion to ₦173.53 trillion. A large part of the nominal increase therefore reflects inflation and a growing economy rather than deeper tax effort. Non-oil taxes grew from ₦6.86 trillion to ₦16.70 trillion, with a particularly large jump in 2021, whereas oil taxes remained between ₦1.24 trillion and ₦3.21 trillion throughout and ended the period at ₦2.15 trillion.

Figure 2

Nominal Oil and Non-Oil Tax Revenue in Nigeria, 2010–2021

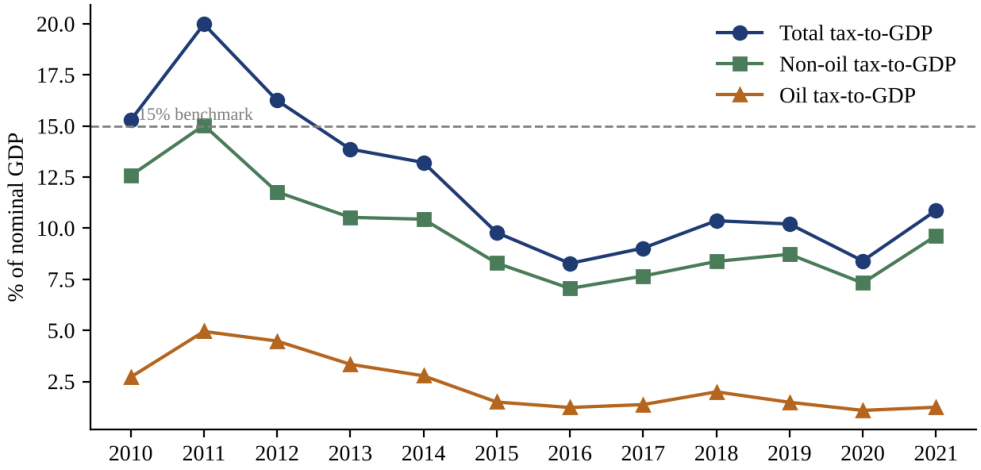


Note. Source: author's computation from National Bureau of Statistics (2023).

The ratio of tax revenue to GDP tells a more sobering story (Figure 3). Total tax-to-GDP peaked at 19.98% in 2011, fell steadily to 8.28% in 2016 and recovered only to 10.86% in 2021. The average ratio was 15.7% in 2010–2014 and 9.6% in 2015–2021. The non-oil ratio followed a similar but less extreme path, declining from 12.57% in 2010 to 7.05% in 2016 and recovering to 9.63% in 2021, while the oil ratio fell from a peak of 4.95% in 2011 to between 1.1% and 2.0% after 2015. The dashed line in Figure 3 marks a 15% reference level, which approximates the Africa (33) average of 15.6% reported by the OECD et al. (2023). Nigeria was above this level only in 2010–2012.

Figure 3

Tax-to-GDP Ratios in Nigeria, 2010–2021 (% of Nominal GDP)



Note. Source: author's computation from National Bureau of Statistics (2023). The dashed line is an illustrative 15% reference level.

Real values change the picture further (Table 3 and Figure 4). When tax revenue is deflated by the implicit GDP deflator, total real tax revenue was ₦8.34 trillion in 2010 and ₦7.85 trillion in 2021 at 2010 prices, a decline of about 6%, while real GDP rose by about 32%. Real non-oil taxes were almost flat, increasing by about 1.4% over eleven years, and real oil taxes fell by about 40%. In compound annual terms, real GDP grew by 2.6% a year, while real total tax revenue fell by 0.5% a year, real non-oil taxes grew by 0.1% a year and real oil taxes fell by 4.5% a year. Nigeria's tax system therefore failed to keep pace with the economy it was meant to finance. The sharp rise in federal revenue that the World Bank (2025) reported for 2024, from a very low base, is consistent with this reading, although that report concentrates on later years.

Table 3

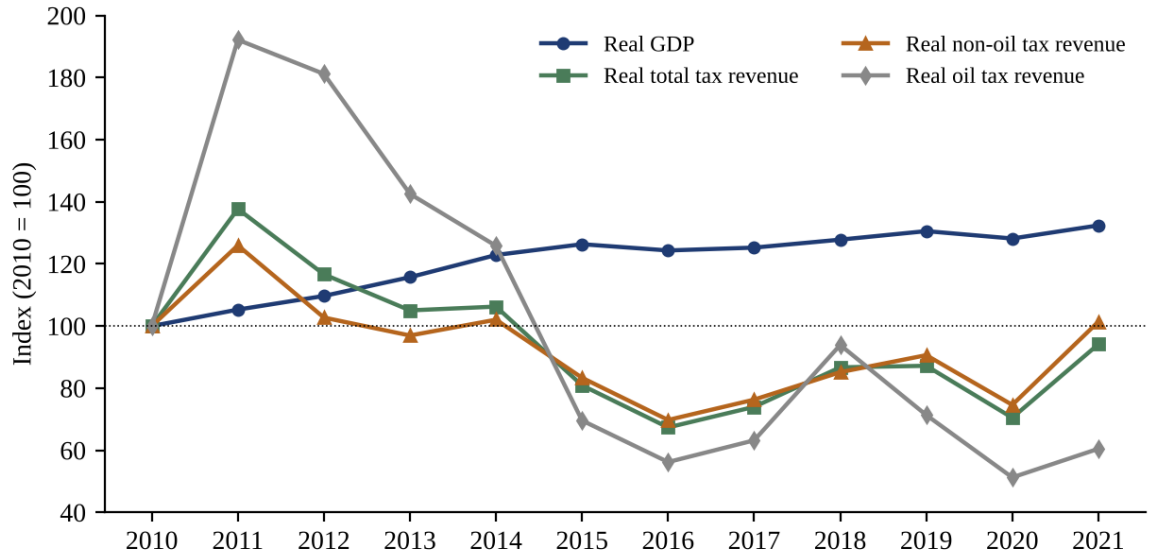
Real GDP and Real Tax Revenue (₦ Trillion, 2010 Prices)

Variable	2010	2014	2016	2021	Change 2010–21 (%)	CAGR (%)
Real GDP	54.61	67.10	67.90	72.30	+32.4	2.6
Real total tax revenue	8.34	8.87	5.62	7.85	−5.9	−0.5
Real non-oil tax revenue	6.86	7.00	4.79	6.96	+1.4	0.1
Real oil tax revenue	1.48	1.86	0.83	0.90	−39.5	−4.5

Note. Source: author's computation from National Bureau of Statistics (2023) and KPMG Nigeria (2023). Tax revenues are deflated by the implicit GDP deflator (nominal GDP ÷ real GDP). CAGR = compound annual growth rate, 2010–2021.

Figure 4

Real GDP and Real Tax Revenue Indices, 2010–2021 (2010 = 100)



Note. Source: author's computation. Tax revenues are deflated by the implicit GDP deflator.

The rising non-oil share of tax revenue also needs careful interpretation. The share increased from 82.3% in 2010 to 88.6% in 2021, which might suggest successful diversification. However, the

non-oil tax ratio fell from 12.6% to 9.6% over the same period. The higher share is therefore mostly a denominator effect: oil taxes shrank faster than non-oil taxes did. Real broadening of the non-oil base would show up as a rising non-oil ratio, which occurred only after 2016 and has not yet restored the 2010–2014 levels. This finding qualifies policy narratives that treat the rising non-oil share as evidence of fiscal diversification, and it is in line with the concern of Adeniyi et al. (2022) that oil dependence discourages non-oil revenue effort.

A sub-period comparison sharpens the contrast (Table 4). Between 2010–2014 and 2015–2021 the average total tax ratio fell from 15.7% to 9.6%, the non-oil ratio from 12.1% to 8.2% and the oil ratio from 3.7% to 1.4%. Average growth fell from 5.3% (2011–2014) to 1.1% (2015–2021), while average inflation rose from 10.7% to 13.6%. The break coincides with the weakening of oil-linked revenue after 2014 and the 2016 recession, although the data cannot attribute it to any single cause.

Table 4

Sub-Period Averages

Variable	2010–2014	2015–2021	Change
TTG (% of GDP)	15.72	9.56	−6.16
NOTG (% of GDP)	12.07	8.15	−3.92
OTG (% of GDP)	3.65	1.41	−2.24
NOSH (% of tax revenue)	76.97	85.25	+8.28
GROWTH (%) (2011–2014 vs 2015–2021)	5.29	1.09	−4.20
INF (%)	10.67	13.56	+2.89

Note. Source: author's computation. Entries are simple averages of annual values; changes are in percentage points.

5.2 Descriptive Statistics and Correlations

Table 5 presents descriptive statistics. The mean tax-to-GDP ratio for 2010–2021 is 12.13%, with a standard deviation of 3.63 points and a range from 8.28% to 19.98%. The non-oil share averages 81.8%. Real GDP growth averages 2.62% for 2011–2021 and ranges from −1.82% in 2020 to 6.17% in 2014, while inflation averages 12.36%. All three tax ratios are positively skewed, which reflects the high values at the start of the sample.

Table 5

Descriptive Statistics

Variable	N	Mean	SD	Min	Max	Skewness
TTG (%)	12	12.13	3.63	8.28	19.98	0.97
NOTG (%)	12	9.78	2.41	7.05	15.04	0.96
OTG (%)	12	2.34	1.32	1.08	4.95	1.01
NOSH (%)	12	81.80	5.15	72.44	88.60	−0.58
GROWTH (%)	11	2.62	2.69	−1.82	6.17	−0.48
INF (%)	12	12.36	3.02	8.05	16.95	0.12

Note. Source: author's computation. SD = standard deviation. TTG, NOTG and OTG are the total, non-oil and oil tax-to-GDP ratios; NOSH is the non-oil share of tax revenue; INF is inflation.

Table 6 shows the correlation matrix. Growth is strongly and positively correlated with the total tax ratio (r = .77, p = .006), the non-oil tax ratio (r = .77, p = .005) and the oil tax ratio (r = .71, p = .014). It is negatively correlated with the non-oil share (r = −.68, p = .022) and with inflation (r = −.64, p = .036). The negative association with the non-oil share is a useful reminder that a high share is not itself a sign of good performance: the share was highest in 2020 and 2021, years of contraction and weak recovery, and lowest in 2011–2012, when growth was strong. The oil and non-oil ratios are also highly correlated with each other (r = .89), which is consistent with common cyclical drivers such as oil prices and aggregate demand. Figure 5 displays the relationship between the non-oil tax ratio and growth, and Figure 6 shows how growth and the non-oil share moved in opposite directions over time.

Table 6

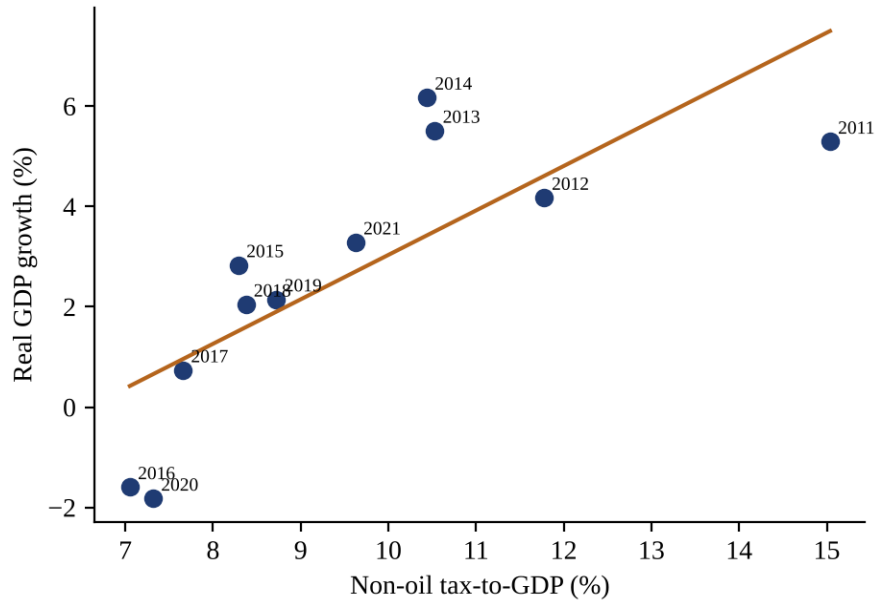
Pearson Correlation Matrix

	TTG	NOTG	OTG	NOSH	GROWTH	INF
TTG	1.00					
NOTG	.99	1.00				
OTG	.95	.89	1.00			
NOSH	−.80	−.70	−.94	1.00		
GROWTH	.77	.77	.71	−.68	1.00	
INF	−.37	−.31	−.45	.55	−.64	1.00

Note. Source: author's computation. Correlations involving GROWTH use 11 observations (2011–2021); others use 12. All correlations with GROWTH are significant at the 5% level.

Figure 5

Non-Oil Tax-to-GDP Ratio and Real GDP Growth, 2011–2021



Note. Source: author's computation. The line is the OLS fit.

5.3 Regression Results

Table 7 reports the growth regressions. In Model 1, the aggregate tax ratio has a positive and significant coefficient of 0.56 (robust standard error 0.17, p = .009): a one-percentage-point higher tax-to-GDP ratio is associated with 0.56 points of additional real growth, and the model explains 58% of the variation in growth. In Model 2, separating the oil and non-oil components removes the significance of both coefficients. The non-oil coefficient is 0.89 (p = .147) and the oil coefficient is essentially zero. This is largely a multicollinearity problem, since the correlation between the two ratios is .89, but it also indicates that the data cannot separate their effects.

Model 3 adds inflation. The inflation coefficient is −0.37 and significant at the 5% level on robust standard errors (p = .046): an additional percentage point of inflation is associated with about 0.37 points less growth, holding the tax ratios constant. The non-oil coefficient rises to 1.02, though it remains imprecise (p = .145), and the oil coefficient becomes negative and insignificant. The explanatory power increases to 74% (adjusted R^2 = .63). The negative role of inflation echoes Yinusa et al. (2024), who found that inflation reduced tax performance, and Dada et al. (2022), who emphasised the need to address inflation alongside tax reform. The suggestion is that tax mobilisation and price stability are complementary rather than separate objectives.

Table 7

OLS Regression Results for Real GDP Growth (Dependent Variable: GROWTH)

Variable	Model 1	Model 2	Model 3	Model 5
Constant	−4.040 (2.074)	−5.840 (4.063)	−1.149 (5.035)	−2.913 (2.274)
TTG	0.562** (0.171)			
NOTG		0.889 (0.553)	1.017 (0.621)	
OTG		−0.005 (0.643)	−0.600 (0.856)	
INF			−0.371* (0.153)	
TTG (t−1)				0.452* (0.170)
Observations	11	11	11	11
R^2	.585	.598	.741	.403
Adjusted R^2	.538	.497	.631	.337
F-statistic (p)	12.66 (.006)	5.94 (.026)	6.69 (.018)	6.07 (.036)
Durbin–Watson	1.68	1.48	1.99	2.32
Jarque–Bera (p)	.733	.789	.627	.685
Breusch–Pagan (p)	.859	.825	.691	.661

Note. Source: author's computation. HC1 robust standard errors in parentheses. * p < .05. ** p < .01. Model 4 (log levels) is discussed in the text. Model 5 uses 2011–2021 growth and 2010–2020 tax ratios.

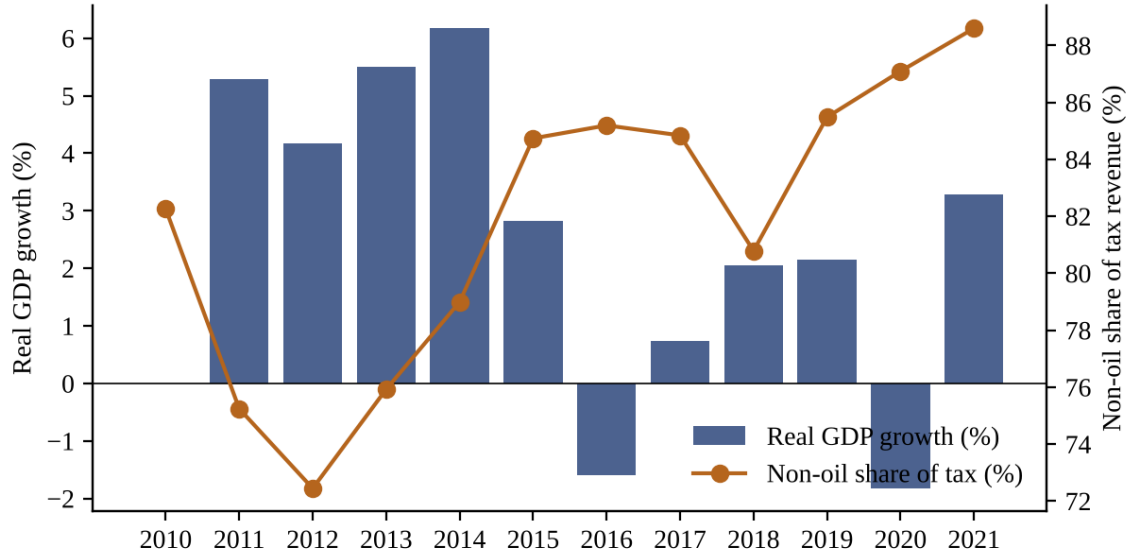
Model 5 shows that the lagged tax ratio is also positively related to growth. The coefficient is 0.45 (p = .026) and the residuals are well behaved (DW = 2.32). A year-earlier tax ratio is thus informative about current growth, but the specification explains only 40% of the variance and does not control for oil prices or inflation. It would be unwise to read it as evidence that tax revenue causes growth.

Model 4 relates the log of real GDP to the logs of real non-oil and oil tax revenues ($\delta 1 = -0.02$, p = .897; $\delta 2 = -0.13$, p = .035 on robust errors). These coefficients are not reliable. The residual

autocorrelation is severe (DW = 0.99) and the Jarque–Bera test rejects normality (p = .029), which is a typical symptom of a spurious regression between trending levels. The unaugmented Dickey–Fuller statistics support this caution. The tau statistics for the levels of TTG (−1.26), NOTG (−1.50), GROWTH (−2.03) and INF (−1.61) do not reject a unit root at conventional levels, whereas the first differences of TTG (−4.24) and NOTG (−3.99) do, and those of GROWTH (−2.87) and INF (−2.54) are borderline. Given the small sample and the low power of these tests, the log-level model is reported only for completeness, and the growth models are preferred.

Figure 6

Real GDP Growth and the Non-Oil Share of Tax Revenue, 2010–2021



Note. Source: author's computation from National Bureau of Statistics (2023) and KPMG Nigeria (2023). Growth for 2010 is not defined.

5.4 Lead–Lag Analysis

Table 8 reports the lead–lag tests. Adding the lagged tax ratio to a regression of growth on its own lag gives an F-statistic of 2.45 (p = .162), so past tax performance does not significantly improve the prediction of growth once growth persistence is accounted for. In the reverse direction, adding lagged growth to a regression of the tax ratio on its own lag gives F = 4.69 (p = .067), which is significant at the 10% level. With ten observations neither result is conclusive, but the pattern is more consistent with growth (or the shocks that drive it) leading tax revenue than with tax revenue leading growth. This accords with the conceptual argument in Section 3.1 and with Atolagbe and Abiodun (2021), who modelled revenue as responding to macroeconomic conditions.

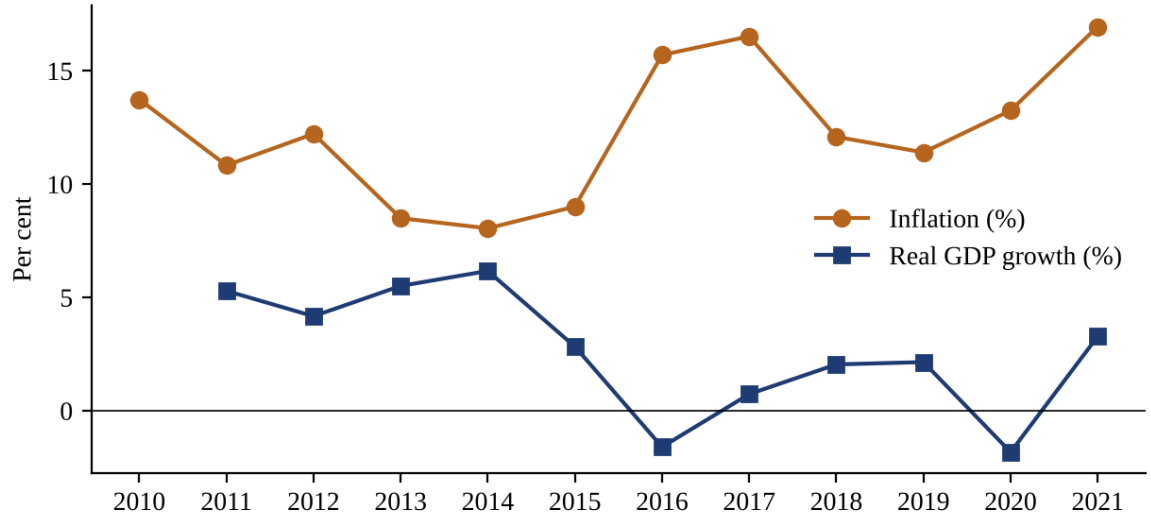
Table 8

Lead–Lag (Granger-Type) Tests, 2012–2021

Null hypothesis	F-statistic	p-value	Observations
TTG does not lead GROWTH	2.45	.162	10
GROWTH does not lead TTG	4.69	.067	10

Note. Source: author's computation. One lag; F-test on the added lag. Power is low because of the small sample.

Figure 7
Inflation and Real GDP Growth in Nigeria, 2010–2021



Note. Source: author's computation from KPMG Nigeria (2023) and World Bank (n.d.).

5.5 Robustness Checks

Several checks assess whether the Model 1 association is fragile. Dropping each year in turn changes the slope only within a range of 0.48 to 0.84, and the association remains significant at the 5% level in every case; the largest slope arises when 2011, the peak year, is excluded. Excluding both recession years (2016 and 2020) reduces the slope to 0.37 ($p = .026$), which indicates that part of the association reflects the contrast between years of contraction and years of expansion. A rank-based check gives a Spearman correlation of .87 ($p < .001$) between the tax ratio and growth, so the relationship is not an artefact of a few outliers. Finally, to reduce the influence of shared trends, year-on-year changes in the tax ratio are correlated with year-on-year changes in growth. The correlation is .72 ($p = .019$, $n = 10$), and the slope of the regression is 1.07. These checks suggest that the association is statistically robust, but they do not show that it is causal: years in which oil revenue and prices rise lift both tax collections and output.

5.6 Discussion

Three themes emerge from the results. The first is that taxation in Nigeria behaves procyclically and is strongly shaped by the commodity cycle. The sharp declines in the tax ratio in 2015–2016 and in 2020 coincide with the two years of negative growth in the sample (2016 and 2020), and the strong recovery in 2021 coincides with rebounding output and prices. Figure 7 shows that the 2016 recession combined negative growth with a jump in inflation to 15.7%. When both revenue and growth respond to the same external shocks, a positive association such as that in Model 1 is expected even if taxes have no causal effect on output. This supports the caution of Adegbite and Azeez (2022) and Abd Hakim et al. (2022) that the tax–growth link in developing countries is not automatically positive. The second theme is that the structure of revenue deserves more attention than its headline level. Non-oil taxes carry the fiscal system, accounting for 88.6% of the total in

2021, yet in real terms they have barely grown since 2010. This contrasts with studies reporting positive growth effects of non-oil revenue (Rotimi et al., 2022) and of CIT (Oghuma et al., 2022): if these effects exist, they operate on a base that has not expanded in real terms. It also helps to explain why Adefolake and Omodero (2022) and Dada et al. (2022) both stress compliance and wider reform. Our descriptive evidence suggests that base-broadening, rather than rate increases on a stagnant base, is the binding requirement. The third theme is that macroeconomic stability and institutions condition the effect of taxation. The robust negative coefficient on inflation, together with the pattern in Figure 7, indicates that periods of rapid price increases are associated with weaker growth and with erosion of the real value of revenue. Siyanbola et al. (2025) and Naape (2021) highlight institutional quality as a determinant of tax mobilisation, which implies that the quality of spending, transparency and trust in the tax system are likely to be as important as statutory design. The 2025 reforms, with their emphasis on administration and on a unified revenue service, address some of these conditions (EY, 2025), but whether they will produce a sustained rise in real non-oil revenue remains an empirical question for future data.

The study has several limitations. The sample is short, the data end in 2021, and the models do not isolate the effect of oil prices or of specific taxes. The results should therefore be read as stylised facts and conditional correlations rather than causal estimates. Future work, when the NBS series is extended to cover 2022–2025, could apply bounds testing or structural VAR methods, separate individual taxes, and use quarterly data to evaluate the 2025 reforms.

6. Conclusion and Policy Implications

This paper examined taxation dynamics and economic performance in Nigeria between 2010 and 2021 using the NBS revised tax series, real GDP and inflation. Four conclusions follow. First, Nigeria's tax-to-GDP ratio declined from 15.3% in 2010 to 8.3% in 2016 and recovered to 10.9% in 2021, and in real terms total tax revenue was about 6% lower in 2021 than in 2010 even though real GDP rose by about 32%. Second, the rise in the non-oil share of tax revenue from 82.3% to 88.6% reflects the collapse of oil taxes rather than a deeper non-oil base, since the non-oil ratio fell from 12.6% to 9.6%. Third, the tax ratio is positively associated with growth, but the association is weakened by controlling for inflation and the oil component, and is probably driven in part by common cyclical shocks. Fourth, lead–lag tests give weak evidence that growth leads tax revenue rather than the reverse. Several policy recommendations follow, conditional on the limits of the evidence. First, policy should prioritise real base-broadening over nominal revenue targets. Registering and bringing into the net more taxpayers, digitising administration and closing leakages would raise the non-oil ratio without raising statutory rates, and the implementation of the 2025 Acts should be monitored with real, GDP-scaled indicators. Second, the government should reduce the exposure of revenue to oil cycles by building counter-cyclical fiscal buffers, so that falls in oil-linked revenue do not force abrupt cuts in capital spending. Third, macroeconomic stability and taxation should be treated as complementary: the negative association between inflation and growth, and the erosion of real revenue in high-inflation years, imply that monetary and fiscal authorities should coordinate. Fourth, institutional credibility matters: publishing timely, consistent tax statistics in the NBS format, improving the quality of public spending and strengthening taxpayer trust would reinforce voluntary compliance, as the literature on institutions suggests. Finally, the research agenda is open. As post-2021 data are released, researchers should test whether the recent improvements in federal revenue reported by the World Bank (2025) represent a structural break or a temporary effect of exchange-rate adjustment, and whether the 2026 implementation of the new tax laws raises real non-oil revenue relative to GDP.

Declarations

Data availability. All data are drawn from the public sources listed in Table 2 and are reproduced in Appendix A. Computed series (ratios, growth rates, real revenues and regression outputs) can be reproduced from these data. Conflict of interest. The author declares no conflict of interest. Funding. No external funding was received for this study.

Appendix A

Table A1

Dataset Used in the Analysis, Nigeria, 2010–2021

Year	Oil tax (₦bn)	Non-oil tax (₦bn)	Total tax (₦bn)	Nominal GDP (₦bn)	Real GDP (₦tn)	Growth (%)	Infl. (%)	TTG (%)	NOSH (%)
2010	1,480.36	6,864.18	8,344.55	54,612.26	54.6	–	13.74	15.28	82.3
2011	3,115.82	9,470.32	12,586.14	62,980.40	57.5	5.29	10.83	19.98	75.2
2012	3,211.05	8,442.14	11,653.19	71,713.94	59.9	4.17	12.22	16.25	72.4
2013	2,674.09	8,433.17	11,107.27	80,092.56	63.2	5.51	8.50	13.87	75.9
2014	2,471.70	9,294.53	11,766.23	89,043.62	67.1	6.17	8.05	13.21	79.0
2015	1,405.53	7,804.70	9,210.23	94,144.96	69.0	2.83	9.01	9.78	84.7
2016	1,243.69	7,156.77	8,400.46	101,489.49	67.9	-1.59	15.70	8.28	85.2
2017	1,555.32	8,707.12	10,262.44	113,711.63	68.4	0.74	16.52	9.02	84.8
2018	2,543.57	10,695.90	13,239.47	127,736.83	69.8	2.05	12.09	10.36	80.8
2019	2,136.20	12,580.35	14,716.55	144,210.49	71.3	2.15	11.40	10.20	85.5
2020	1,651.04	11,144.51	12,795.55	152,324.07	70.0	-1.82	13.25	8.40	87.1
2021	2,148.55	16,702.51	18,851.06	173,527.66	72.3	3.29	16.95	10.86	88.6

Note. Oil, non-oil and total tax revenue, nominal GDP and TTG are from National Bureau of Statistics (2023). Real GDP (2010 constant prices) is from KPMG Nigeria (2023); growth is computed from it. Inflation is from World Bank (n.d.). NOSH = non-oil share of total tax revenue. A machine-readable copy of the dataset is supplied as a separate CSV file.

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