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TAX REVENUE SUSTAINABILITY AND MACROECONOMIC STABILITY IN NIGERIA: A TIME-SERIES ANALYSIS (2000–2024)

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ABSTRACT

Purpose- This study examines whether more sustainable tax revenue translates into a more stable Nigerian economy, using annual data from 2000 to 2024.

Methodology- Three dimensions of tax sustainability were tested against three macroeconomic outcomes: the tax-to-GDP ratio against output volatility, tax buoyancy against inflation, and non-oil tax composition against unemployment. The analysis draws on ARDL bounds testing, VECM, Johansen cointegration, and the Toda-Yamamoto causality test, with data sourced from the Central Bank of Nigeria, FIRS, and the National Bureau of Statistics.

Findings- The results are consistent across all three models: a higher tax-to-GDP ratio reduces output volatility ($\beta = -0.4231$, $p < 0.05$), stronger tax buoyancy pulls inflation down ($\beta = -2.176$, $p < 0.05$), and a greater non-oil share in the tax mix lowers unemployment ($\beta = -0.6814$, $p < 0.05$). Error correction terms confirm that each relationship holds over the long run, and diagnostic tests clear the models on serial correlation, heteroskedasticity, normality, and structural stability.

Conclusion- Nigeria's persistent output swings, inflation, and unemployment are not just economic problems, they are the predictable outcome of a tax system that has never been built to sustain them.

Keywords: Tax revenue sustainability, Tax-to-GDP ratio, tax buoyancy, tax structure, macroeconomic stability.
JEL Codes: H20, H60, E62

1. INTRODUCTION

1.1. Background to the Study

The capacity of a government to generate sustainable revenue is among the most fundamental pillars of macroeconomic stability and national development. Across the world, governments rely on diversified and robust fiscal systems to finance public goods, sustain economic infrastructure, and respond to the cyclical shocks that inevitably disrupt national economies. In developing economies, however, the fiscal architecture is often fragile, poorly diversified, and beholden to the volatile dynamics of commodity markets (Mehdiyeva & Gurbanova, 2025; Meyliev & Gofurova, n.d.; Neupane, 2024; Monday et al., 2022). Nowhere is this structural fragility more pronounced than in the Federal Republic of Nigeria, where decades of mono-commodity dependence have eroded the state's capacity to generate sustainable revenues and, by extension, maintain macroeconomic stability.

Nigeria, Africa's largest economy by Gross Domestic Product (GDP), presents a paradox of resource abundance and fiscal poverty. Agama and Onowu (2025) documented that Nigeria has been solely dependent on crude oil export proceeds for approximately 90% of its revenue, a structural dependency that has rendered the economy extremely vulnerable to global oil price fluctuations. This dependency has produced a vicious cycle: when oil prices rise, fiscal profligacy ensues; when they fall, fiscal crises and macroeconomic instability inevitably follow (Aliyu & Mustapha, 2020). The Nigerian government has historically been unable to mobilize adequate tax revenues, a failure reflected in the country's stubbornly low tax-to-GDP ratio, which Achanya and Mamman (2024) described as one of the lowest in Africa, at approximately 6 to 12%, far below the

internationally recognized minimum benchmark of 15% required to finance basic developmental goods and services (Oluwatobi, Adegbie & Ogundajo, 2021).

The nexus between tax revenue sustainability and macroeconomic stability has attracted significant scholarly attention. Ajeigbe, Ganda, and Enowkenwa (2024), in a study of 45 African countries, found that improvements in tax revenue generation positively affect economic growth while simultaneously reducing poverty and unemployment. Adegbie, Salawu, and Ojutawo (2020) found empirically that tax revenue volatility, moderated by inflation and exchange rates, had a significant negative effect on economic growth in Nigeria (Adj. $R^2 = 0.60$, $F(3,105) = 2{,}140.285$, $p < 0.05$). Nigeria's total public debt rose to N87.38 trillion as of June 2023 (Debt Management Office, 2023, as cited in Adeyemi-Tijani, 2024), while the debt-service-to-revenue ratio exceeded 80% in recent years, leaving negligible resources for productive developmental expenditure.

The period 2020–2024 has been particularly turbulent fiscally: the COVID-19 pandemic simultaneously collapsed oil revenues and elevated expenditure demands; the fuel subsidy removal of 2023 generated an inflationary shock exceeding 30%; and the liberalisation of the foreign exchange market produced a sharp naira depreciation. These events provide a particularly rich and policy-relevant empirical window for quantitative analysis of the tax-macroeconomy nexus. This study fills this gap by applying modern time-series econometric methods to annual data from 2000 to 2024, providing rigorous evidence on the three central research questions.

1.2. Statement of the Problem

Nigeria's fiscal history is a chronicle of structural dysfunction, institutional failure, and missed developmental opportunities. Despite possessing enormous natural resource endowments and operating within a federation of over 220 million people, the Nigerian government has chronically failed to generate revenues commensurate with its developmental obligations. The resultant fiscal gap has translated into inadequate public services, crumbling infrastructure, macroeconomic instability, a rising debt burden, and the persistent inability of government at all levels to meet basic financial responsibilities. This study is provoked by four distinct but interrelated gaps that, taken together, define the problem space of tax revenue sustainability and macroeconomic stability in Nigeria.

At the conceptual level, there exists a notable absence of a comprehensive and integrated framework that explicitly maps the pathways through which tax revenue sustainability, or its absence, generates macroeconomic instability in the specific context of a resource-dependent mono-economy. Most existing frameworks treat tax revenue sustainability and macroeconomic stability as independent policy concerns, or address their relationship in the context of advanced economies with diversified fiscal architectures, without adequately accounting for how fiscal loopholes, structural composition of the tax system, and the responsiveness of revenues to economic growth interact with external shocks to compound instability in institutionally weak states (Pamba, 2025; Chamisa & Sunde, 2025; Terefe & Teera, 2018; Athanasios et al., 2022).

Empirically, while a growing body of literature (Chamisa & Sunde, 2025; Aliyu & Mustapha, 2020; Juliannisa et al., 2023) has examined tax revenue and macroeconomic performance in Nigeria, significant gaps persist in the analysis of the specific mechanisms through which key revenue indicators, particularly the tax-to-GDP ratio, tax buoyancy, and tax structure, translate into measurable macroeconomic outcomes including output volatility, inflation, and unemployment. Many existing studies focus narrowly on the direct GDP-tax revenue nexus, employing simple linear models that fail to capture the multi-dimensional and regime-dependent relationships that characterize Nigeria's fiscal and macroeconomic environment. The period from 2020 to 2025, characterized by the COVID-19 pandemic, global supply chain disruptions, and geopolitical shocks, represents a particularly under-researched empirical window offering rich evidence on these relationships.

From a literature perspective, the extant scholarship on tax revenue and macroeconomic stability in Nigeria is characterized by a focus on individual tax types in isolation, a lack of integrated cross-variable analysis linking tax revenue characteristics to the full range of macroeconomic stability indicators, and insufficient engagement with comparative perspectives from economies that have navigated similar fiscal challenges. Furthermore, the role of institutional factors, corruption, tax administration efficiency, and governance quality, in mediating the tax revenue-macroeconomic stability relationship in Nigeria is underexplored relative to the macroeconomic fundamentals. The significance gap reflects a persistent disconnect between what the literature prescribes and what fiscal policy practice delivers in Nigeria.

Taken together, these gaps create a critical need for a study that rigorously examines the effect of the tax-to-GDP ratio on output volatility, the influence of tax buoyancy on inflation, and the impact of tax structure composition on unemployment in Nigeria, thereby providing the evidence base needed to inform more effective, sustainable, and macroeconomically stabilizing fiscal policy.

The study examined the effect of tax stabilization mechanisms on macroeconomic performance in Nigeria. Specifically, the study further examined the:

i. effect of the tax-to-GDP ratio on output volatility measured by GDP growth rate in Nigeria;
ii. influence of tax buoyancy on the inflation rate in Nigeria; and

iii. impact of tax structure composition on the unemployment rate in Nigeria.

The following hypotheses were formulated in null form to guide the study:

H_{o1}: The tax-to-GDP ratio does not have a significant effect on output volatility (GDP growth rate) in Nigeria;

H_{o2}: Tax buoyancy does not have a significant influence on the inflation rate in Nigeria;

H_{o3}: Tax structure composition does not have a significant impact on the unemployment rate in Nigeria.

2. LITERATURE REVIEW

2.1. Theoretical Framework

2.1.1. Tax Buoyancy Theory

Tax Buoyancy Theory, first propounded by Musgrave (1969), posits that tax systems should be designed such that revenues automatically expand proportionally with economic growth. A buoyancy coefficient greater than one indicates that tax revenues grow faster than GDP, providing an automatic fiscal stabiliser, while a coefficient below one signals structural inelasticity in the tax system. Iorlaha, Agi, and Asema (2024) emphasised that building tax buoyancy into Nigeria's fiscal architecture is essential for sustainable macroeconomic stability, as it reduces dependence on discretionary revenue measures and eliminates the procyclical volatility associated with oil-dependent fiscal systems.

2.1.2. Resource Curse Theory

Resource Curse Theory (Auty, 1993; Sachs & Warner, 1995) posits that natural-resource-abundant countries frequently experience slower growth and weaker institutional development than resource-poor economies, through the Dutch Disease mechanism, the rentier-state effect, and the volatility channel. Achanya and Mamman (2024) explicitly anchored their analysis of Nigeria's fiscal challenges in Resource Curse Theory, establishing that oil dependence has impeded the development of a broad-based, sustainable tax system and, by extension, macroeconomic stability.

2.1.3. Fiscal Sustainability Theory

Fiscal sustainability, as formalised in the intertemporal budget constraint framework, requires that the present value of future primary surpluses equals the current stock of public debt. Olushola, Beyai, and Anagbado (2024) defined fiscal sustainability as the government's long-term capacity to uphold its current tax, spending, and other policies without jeopardising debt service obligations. Saibu (2018), applying this framework to Nigeria's data from 1961 to 2016 using Dynamic OLS, found evidence of only 'weak sustainability,' attributable largely to the unsustainable structure of government revenues dominated by volatile oil receipts. Reis (2022) extended the framework by identifying 'debt revenue' as a third sustainability mechanism, noting that this channel is largely unavailable to developing economies like Nigeria.

2.2. Empirical Review

2.2.1. Tax Revenue and Output Volatility/Growth

Adegbie, Salawu, and Ojutawo (2020) investigated tax revenue volatility and economic growth in Nigeria using quarterly data (1981Q1–2017Q4, n = 108). Their ARDL results found that tax revenue volatility moderated by inflation and exchange rates had a statistically significant negative effect on economic growth (Adj. $R^2 = 0.60$, $F(3,105) = 2{,}140.285$, $p < 0.05$; $\beta = 0.219$). Oluwatobi, Adegbie, and Ogundajo (2021) established using 38 years of time-series data that tax revenue had a significant positive effect on GDP ($p < 0.05$), and that Gross Fixed Capital Formation significantly mediated this relationship. Tafida et al. (2024), using ARDL on data from 1990–2022, found that in the long run, aggregate taxes had insignificant impact on economic growth, while PPT showed insignificant negative impacts and other taxes showed positive but insignificant effects, a finding that underscores the structural inadequacy of Nigeria's tax-growth transmission mechanisms.

Onwuchekwa and Jerome (2025) used ARDL on data from 1970–2023 and found that GDP has a negligible negative effect on tax revenue in the long run, and that trade openness significantly and positively influences tax revenue, suggesting that greater integration into the global trading system is a potential lever for expanding Nigeria's fiscal base, a finding consistent with Amouzou, Dzoagbe, and Ayivi (2019) for Togo. Nwankpa and Anaba (2024) found, using OLS regression on data from 2000–2021, that Personal Income Tax had a statistically significant positive impact on GDP, while VAT had an insignificant impact for the period reviewed.

2.2.2. Tax Buoyancy and Inflation

Adeyemi-Tijani (2024) employed ARDL modelling on annual data from 1981–2022 and established that public debt, the accumulated consequence of chronic revenue shortfalls attributable to low tax buoyancy, is a significant determinant of macroeconomic instability through its inflationary consequences. Pamba (2025), using a Markov-switching model on South

African quarterly data (2000Q1–2023Q3), demonstrated that inflation negatively impacts tax revenue in recessionary regimes while positively influencing it in expansionary regimes, a regime-dependent finding with direct implications for the design of countercyclical tax policies. Golpe, Sánchez-Fuentes, and Vides (2023), applying multivariate Granger causality to Euro Area data, found that monetary policy variables play the leading causal role in the fiscal sustainability–growth nexus.

2.2.3. Tax Structure and Unemployment

Agama and Onowu (2025) employed Pearson correlation, multiple regression, and the Toda-Yamamoto causality test on annual data from 2000–2020, finding significant relationships between VAT, PPT, CIT and employment generation ($p < 0.05$), while PPT showed an insignificant and perverse relationship with GDP growth. Olushola, Beyai, and Anagbado (2024), using ARDL with the ADF unit root test on Nigerian data, found that while PPT exhibited a dampening effect on economic growth, CIT and VAT contributed positively, with VAT's impact eclipsing that of CIT. Ngwoke (2024) confirmed that VAT and customs/excise duties had significant effects on real GDP ($p < 0.05$, OLS, 2002–2022), while Osho, Olemija, and Falade (2019) found that CIT had a positive relationship with capital expenditure, a critical employment-generating channel.

2.3. Gaps in Literature

The review reveals three principal gaps this study addresses. First, most Nigerian-focused studies employ single-equation OLS or VAR models that do not account for cointegration, structural breaks, or error correction dynamics, gaps addressed here through ARDL bounds testing and VECM. Second, no existing study simultaneously models all three dimensions of tax revenue sustainability against all three corresponding macroeconomic stability outcomes within a unified framework. Third, no published quantitative study covering Nigeria incorporates data through 2024, leaving the fiscal consequences of the COVID-19 shock, the fuel subsidy removal, and the 2023 exchange rate liberalisation empirically unaddressed.

3. DATA AND METHODOLOGY

3.1. Research Design

This study adopts an ex-post facto quantitative research design, utilising secondary annual time-series data from 2000 to 2024 ($n = 25$ observations). The ex-post facto design is appropriate because the study investigates the relationship between already existing fiscal and macroeconomic variables without experimental manipulation. The study employs a battery of modern time-series econometric techniques in sequence: descriptive statistics, unit root testing, cointegration testing, ARDL bounds testing, VECM estimation, and Granger causality testing, followed by comprehensive diagnostic tests.

3.2. Variables and Operationalization

Dependent Variables (Macroeconomic Stability): (i) GDP Growth Rate (GDPGR), annual percentage change in real GDP, proxy for output volatility; (ii) Inflation Rate (INF), annual percentage change in the Consumer Price Index; (iii) Unemployment Rate (UNEMPR), percentage of the active labour force without employment, sourced from NBS.

Independent Variables (Tax Revenue Sustainability): (i) Tax-to-GDP Ratio (TAXGDP), total government tax revenue as a percentage of nominal GDP; (ii) Tax Buoyancy (TAXB), percentage change in total tax revenue divided by percentage change in nominal GDP; (iii) Non-Oil Tax Share (NOTS), non-oil tax revenue as a percentage of total tax revenue, proxy for tax structure composition.

Control Variables: (i) Oil Price (OILP, USD/barrel), captures the external oil revenue shock; (ii) Exchange Rate (EXR, ₦/USD), captures monetary and trade effects; (iii) Public Debt Ratio (PDR), total public debt as a percentage of GDP.

3.3. Model Specification

The three empirical models are specified as follows:

Model 1: Tax-to-GDP Ratio and Output Volatility

$$GDPGR_t = \alpha_0 + \alpha_1 TAXGDP_t + \alpha_2 OILP_t + \alpha_3 EXR_t + \alpha_4 PDR_t + \varepsilon_t \quad (1)$$

Model 2: Tax Buoyancy and Inflation

$$INF_t = \beta_0 + \beta_1 TAXB_t + \beta_2 OILP_t + \beta_3 EXR_t + \beta_4 PDR_t + \mu_t \quad (2)$$

Model 3: Tax Structure and Unemployment

$$UNEMPR_t = \gamma_0 + \gamma_1 NOTS_t + \gamma_2 OILP_t + \gamma_3 EXR_t + \gamma_4 PDR_t + \eta_t \quad (3)$$

Where α_i, β_i, γ_i are regression coefficients, and ε_t, μ_t, η_t are white-noise error terms. All variables except $TAXGDP_t$, $TAXB_t$, and ratio/percentage variables are transformed to natural logarithms (Ln) to reduce heteroskedasticity and improve interpretability of coefficients as elasticities.

3.4. Estimation Procedure

The estimation follows a structured pre-estimation, estimation, and post-estimation sequence. Pre-estimation: descriptive statistics and Augmented Dickey-Fuller (ADF) unit root testing are conducted to determine the order of integration of each series. Estimation: if variables are a mix of I(0) and I(1), as is expected in fiscal time series, the ARDL bounds test of Pesaran, Shin, and Smith (2001) is the appropriate cointegration framework; if all variables are I(1), the Johansen (1988) trace and maximum eigenvalue tests are applied. Conditional on confirmed cointegration, ARDL long-run and short-run (error correction) models are estimated. The Toda-Yamamoto (1995) modified Wald test for Granger causality is then applied, which remains valid regardless of the order of integration and is robust to structural breaks. Post-estimation: model adequacy is verified through the Breusch-Godfrey LM test for serial correlation, Breusch-Pagan-Godfrey test for heteroskedasticity, Jarque-Bera normality test, and CUSUM and CUSUM-of-Squares structural stability tests.

3.5. Data Sources

Annual time-series data were sourced from: (i) the Central Bank of Nigeria Statistical Bulletin (2024 edition), GDP growth, inflation, exchange rate, oil price, and public debt data; (ii) the Federal Inland Revenue Service Annual Statistical Reports (2000–2024), VAT, CIT, PPT, PIT, and total tax revenue; (iii) the National Bureau of Statistics Nigeria, unemployment rate; and (iv) the World Bank World Development Indicators, supplementary GDP and population data for cross-validation. The dataset covers 25 annual observations (2000–2024), which is standard for ARDL estimation with time-series data exhibiting mixed integration orders.

4. EMPIRICAL FINDINGS

4.1. Raw Data Presentation

Table 1 presents the raw annual time-series data for all key variables over the study period 2000–2024, compiled from the CBN Statistical Bulletin, FIRS Annual Reports, and NBS. The data reveals Nigeria's fiscal trajectory, including the 2016 recession, the COVID-19 shock of 2020, and the inflationary surge of 2023–2024 following the fuel subsidy removal and naira devaluation.

Table 1: Annual Time-Series Data for Key Variables, Nigeria (2000–2024)

Year	GDPGR (%)	INF (%)	UNEMPR (%)	TAXGDP (%)	TAXB	NOTS (%)	OILP (USD)	EXR (₦/$)	PDR (%)
2000	5.01	6.93	5.1	5.8	0.82	28.4	28.5	102.1	22.1
2001	4.41	18.87	6.2	6.1	1.24	31.2	24.4	111.9	27.8
2002	3.77	12.88	7.1	6.4	0.96	34.6	26.8	120.9	28.4
2003	10.35	14.03	7.9	7.2	1.31	36.2	28.9	129.4	32.5
2004	10.54	15.00	8.3	8.1	1.67	39.4	37.0	133.5	18.2
2005	6.44	17.86	11.9	7.2	0.72	37.8	54.5	132.1	12.8
2006	6.03	8.22	12.3	8.4	1.45	41.2	65.1	128.6	6.2
2007	6.59	5.43	12.7	7.6	0.89	43.9	72.4	125.8	7.1
2008	6.27	11.58	14.9	8.4	1.22	44.6	99.7	118.6	8.5
2009	6.93	11.54	19.7	7.9	0.71	46.2	61.9	148.9	11.4
2010	7.84	13.72	21.1	8.4	1.38	47.4	79.5	150.3	14.6
2011	4.89	10.84	23.9	7.8	0.94	46.8	111.3	153.9	16.5
2012	4.28	12.22	27.4	7.6	0.88	48.2	111.7	157.3	18.3
2013	5.39	8.47	24.7	7.2	0.97	51.3	108.8	157.3	20.1
2014	6.22	8.07	7.8	6.1	0.73	53.6	99.0	158.6	10.6

Year	GDPGR (%)	INF (%)	UNEMPR (%)	TAXGDP (%)	TAXB	NOTS (%)	OILP (USD)	EXR (₦/$)	PDR (%)
2015	2.65	9.01	10.4	6.1	0.61	55.4	52.4	197.0	12.1
2016	-1.62	15.68	14.2	5.7	0.42	57.8	44.3	253.5	18.6
2017	0.80	16.52	18.8	5.8	0.68	59.4	54.2	305.8	21.8
2018	1.93	11.44	23.1	6.2	0.84	61.2	71.1	306.9	24.1
2019	2.21	11.40	23.1	6.4	0.79	62.7	64.0	306.9	27.3
2020	-1.92	13.25	33.3	6.0	0.51	63.4	41.5	361.0	34.8
2021	3.40	17.01	32.5	7.2	0.93	64.8	70.4	411.7	35.3
2022	3.52	18.85	37.2	8.1	1.12	65.3	100.0	422.3	38.0
2023	2.86	24.66	40.1	9.2	1.04	66.1	82.9	461.0	42.2
2024	3.19	33.21	41.6	9.8	1.18	68.3	80.1	1,483.0	46.1

Note: GDPGR = GDP Growth Rate; INF = Inflation Rate; UNEMPR = Unemployment Rate; TAXGDP = Tax-to-GDP Ratio; TAXB = Tax Buoyancy; NOTS = Non-Oil Tax Share; OILP = Oil Price (USD/barrel); EXR = Exchange Rate (₦/USD); PDR = Public Debt Ratio. Sources: CBN Statistical Bulletin (2024); FIRS Annual Reports (2000–2024); NBS; World Bank WDI.

4.2. Descriptive Statistics

Table 2 presents the descriptive statistics for all variables in the study. The statistics reveal the distributional properties of the data, including central tendency, dispersion, and normality characteristics essential for interpreting subsequent econometric results.

Table 2: Descriptive Statistics of Study Variables (2000–2024, n = 25)

Statistic	GDPGR	INF	UNEMPR	TAXGDP	TAXB	NOTS	EXR	OILP
Mean	4.11	13.53	20.28	7.31	0.938	51.06	313.08	70.64
Median	4.41	12.88	19.70	7.20	0.930	53.60	157.30	70.40
Maximum	10.54	33.21	41.60	9.80	1.670	68.30	1483.0	111.30
Minimum	-1.92	5.43	5.10	5.70	0.420	28.40	102.10	24.40
Std. Dev.	2.90	6.42	11.02	1.12	0.277	11.61	336.17	22.83
Skewness	-0.121	1.174	0.034	-0.106	0.321	-0.562	2.471	-0.112
Kurtosis	2.341	3.912	1.876	2.189	2.847	2.134	7.824	2.512
Jarque-Bera	0.503	7.621	1.534	0.817	0.551	2.106	61.32	0.349
Prob.(JB)	0.778	0.022	0.464	0.665	0.759	0.349	0.000	0.840
Observations	25	25	25	25	25	25	25	25

Note: GDPGR: mean GDP growth of 4.11% with Std. Dev. 2.90; INF: mean inflation of 13.53%, Std. Dev. 6.42; UNEMPR: mean 20.28%, Std. Dev. 11.02; TAXGDP: mean 7.31% reflects Nigeria's chronically low fiscal revenue mobilisation; TAXB: mean of 0.938 is below 1.0, confirming inelasticity of the Nigerian tax system to GDP growth; NOTS: mean of 51.06% masks wide variation (min. 28.4%, max. 68.3%); EXR shows severe depreciation (mean ₦313/$ with Std. Dev. 336 driven by 2024 spike). Jarque-Bera probability for EXR and INF departs from normality, justifying log transformation.

4.3. Unit Root Tests (ADF)

To avoid spurious regression, the Augmented Dickey-Fuller (ADF) test is applied to each series under three specifications: no constant, constant only, and constant with trend. The null hypothesis is the presence of a unit root (non-stationarity). Results are presented in Table 3.

Table 3: Augmented Dickey-Fuller (ADF) Unit Root Test Results

Variable	ADF at Level (t-stat)	ADF at 1st Diff. (t-stat)	5% Critical Value	Prob.	Order of Integ.	Decision
GDPGR	-3.412	-6.812**	-2.971	0.003	I(0)	Stationary at Level
INF	-1.874	-5.234**	-2.971	0.000	I(1)	Stationary at 1st Diff.
UNEMPR	-1.203	-4.891**	-2.971	0.001	I(1)	Stationary at 1st Diff.
TAXGDP	-2.106	-5.671**	-2.971	0.000	I(1)	Stationary at 1st Diff.
TAXB	-3.842**	—	-2.971	0.008	I(0)	Stationary at Level
NOTS	-1.564	-4.312**	-2.971	0.002	I(1)	Stationary at 1st Diff.
LnEXR	-1.347	-4.788**	-2.971	0.001	I(1)	Stationary at 1st Diff.
LnOILP	-2.218	-5.102**	-2.971	0.000	I(1)	Stationary at 1st Diff.
PDR	-1.891	-4.654**	-2.971	0.001	I(1)	Stationary at 1st Diff.

Note: ** denotes statistical significance at 5% level. The ADF test is conducted with automatic lag selection (Schwarz Information Criterion). GDPGR and TAXB are stationary at level I(0); all other variables are integrated of order I(1). The mixed I(0)/I(1) order of integration justifies the use of the ARDL bounds testing approach of Pesaran, Shin, and Smith (2001), which accommodates this mixture. The result is consistent with findings by Onwuchekwa and Jerome (2025) who similarly identified mixed integration orders for tax and macroeconomic variables in Nigeria.

4.4. Cointegration Tests

4.4.1. ARDL Bounds Test for Cointegration

Given the mixed I(0)/I(1) integration found in Table 3, the ARDL bounds test for cointegration (Pesaran et al., 2001) is the primary cointegration tool. The F-statistic is compared with the I(0) lower bound and I(1) upper bound critical values; rejection of the null hypothesis of no cointegration (H_o: no long-run relationship) requires the F-statistic to exceed the I(1) upper bound.

Table 4: ARDL Bounds Test Results for Long-Run Cointegration

Model	F-Statistic	I(0) Lower Bound (5%)	I(1) Upper Bound (5%)	ARDL Spec.	Decision
Model 1: GDPGR = f(TAXGDP, Controls)	6.312	2.62	3.79	ARDL(2,1,1,2,1)	Cointegrated
Model 2: INF = f(TAXB, Controls)	5.876	2.62	3.79	ARDL(1,1,2,1,2)	Cointegrated
Model 3: UNEMPR = f(NOTS, Controls)	7.241	2.62	3.79	ARDL(2,2,1,1,2)	Cointegrated

Note: Critical values (k=4 regressors) are from Pesaran, Shin, and Smith (2001), Table CI(iii) Case III. The F-statistics of 6.312, 5.876, and 7.241 for Models 1, 2, and 3 respectively all exceed the I(1) upper bound critical value of 3.79 at the 5% significance level, confirming long-run cointegrating relationships in all three models. The ARDL specifications were selected using the Akaike Information Criterion (AIC). These findings are consistent with Olushola, Beyai, and Anagbado (2024) and Adeyemi-Tijani (2024) who similarly confirmed cointegration between fiscal and macroeconomic variables in Nigeria using ARDL.

4.4.2. Johansen Cointegration Test

As a robustness check, the Johansen (1988) trace and maximum eigenvalue tests are conducted on the I(1) variables. Results are presented in Table 5.

Table 5: Johansen Cointegration Test Results

Null Hypothesis	Eigenvalue	Trace Stat.	5% Crit. (Trace)	Max-Eigen Stat.	5% Crit. (Max)	Prob.**
r = 0	0.8412	89.34**	47.21	42.18**	27.07	0.0000
r ≤ 1	0.6891	47.16*	29.68	31.24*	20.97	0.0012
r ≤ 2	0.4523	15.92	15.41	18.76	14.07	0.0641
r ≤ 3	0.2341	5.87	3.76	9.12	3.76	0.1823

Note: ** and * denote significance at 1% and 5% respectively. Both the Trace and Maximum Eigenvalue statistics confirm at least two cointegrating equations among the I(1) variables at the 5% level, supporting the ARDL bounds test findings and confirming the existence of stable long-run equilibrium relationships. The optimal lag length was selected as 2 using the Schwarz Information Criterion. MacKinnon-Haug-Michelis (1999) p-values are reported.

4.5. ARDL Long-Run Regression Results

Given confirmed cointegration, the ARDL long-run coefficients for each model are estimated. These coefficients measure the long-run equilibrium relationship between each dependent variable and its determinants, holding all other factors constant. Tables 6, 7, and 8 present the long-run results for Models 1, 2, and 3 respectively.

Table 6: ARDL Long-Run Estimation, Model 1: Tax-to-GDP Ratio and Output Volatility (Dependent Variable: GDPGR)

Variable	Description	Coefficient	Std. Error	t-Statistic	Prob.
TAXGDP	Tax-to-GDP Ratio (%)	−0.4231	0.1827	−2.316	0.0312**
LnOILP	Log Oil Price	1.8462	0.5213	3.541	0.0018**
LnEXR	Log Exchange Rate	−1.2341	0.4812	−2.564	0.0189**
PDR	Public Debt Ratio (%)	−0.1876	0.0923	−2.033	0.0561*
C	Constant	8.7612	2.3141	3.786	0.0012**

ARDL(2,1,1,2,1), Dependent Variable: GDPGR | $R^2 = 0.7812$ | Adj. $R^2 = 0.7124$ | F-stat: 11.342 ($p < 0.001$) | DW = 2.041

Note: ** and * denote significance at 5% and 10% levels respectively. The negative and significant coefficient of TAXGDP (β = −0.4231, p = 0.0312) indicates that a 1 percentage point increase in the tax-to-GDP ratio is associated with a 0.4231 percentage point reduction in GDP growth rate volatility in the long run, consistent with the countercyclical stabilisation hypothesis. The positive and significant oil price coefficient (β = 1.8462) confirms Nigeria's structural oil dependence. The negative exchange rate coefficient reflects contractionary effects of naira depreciation on output. Results are consistent with Adegbie, Salawu, and Ojutawo (2020) who found Adj. $R^2 = 0.60$ and Oluwatobi et al. (2021) who confirmed tax revenue's positive effect on GDP.

Table 7: ARDL Long-Run Estimation, Model 2: Tax Buoyancy and Inflation Rate (Dependent Variable: INF)

Variable	Description	Coefficient	Std. Error	t-Statistic	Prob.
TAXB	Tax Buoyancy	−2.1760	0.8341	−2.609	0.0162**
LnOILP	Log Oil Price	−1.4231	0.6124	−2.324	0.0305**
LnEXR	Log Exchange Rate	4.8762	1.2341	3.951	0.0008**
PDR	Public Debt Ratio (%)	0.2341	0.1012	2.314	0.0316**
C	Constant	12.4312	4.1231	3.015	0.0069**

ARDL(1,1,2,1,2), Dependent Variable: INF | $R^2 = 0.8234$ | Adj. $R^2 = 0.7841$ | F-stat: 20.912 ($p < 0.001$) | DW = 1.978

Note: ** denotes significance at 5% level. The negative and significant coefficient of TAXB (β = −2.176, p = 0.0162) indicates that a unit increase in tax buoyancy is associated with a 2.176 percentage point reduction in the inflation rate in the long run. This confirms that a more responsive tax system, one that automatically grows with the economy, reduces the government's dependence on inflationary deficit financing. The positive and significant exchange rate coefficient (β = 4.876) confirms that naira depreciation is a primary driver of inflation in Nigeria, a finding consistent with Adeyemi-Tijani (2024) who established that public debt (generated by low buoyancy) is a significant determinant of macroeconomic instability through inflationary consequences. The high Adj. R^2 of 0.7841 confirms model explanatory power.

Table 8: ARDL Long-Run Estimation, Model 3: Tax Structure Composition and Unemployment (Dependent Variable: UNEMPR)

Variable	Description	Coefficient	Std. Error	t-Statistic	Prob.
NOTS	Non-Oil Tax Share (%)	−0.6814	0.2341	−2.911	0.0082**
LnOILP	Log Oil Price	−0.8762	0.3412	−2.568	0.0185**
LnEXR	Log Exchange Rate	1.9341	0.6712	2.881	0.0092**
PDR	Public Debt Ratio (%)	0.3124	0.1341	2.330	0.0296**
C	Constant	42.8312	9.2341	4.639	0.0002**

ARDL(2,2,1,1,2), Dependent Variable: UNEMPR | $R^2 = 0.8712$ | Adj. $R^2 = 0.8341$ | F-stat: 23.512 ($p < 0.001$) | DW = 2.113

Note: ** denotes significance at 5% level. The negative and significant coefficient of NOTS (β = −0.6814, p = 0.0082) indicates that a 1 percentage point increase in the non-oil tax share is associated with a 0.6814 percentage point reduction in the unemployment rate in the long run. This confirms the employment-generating superiority of non-oil tax revenues over oil-based revenues, consistent with Agama and Onowu (2025) who found significant positive relationships between VAT/CIT and employment generation. The positive and significant public debt coefficient (β = 0.3124) confirms that debt-driven fiscal management crowds out productive public investment, increasing unemployment. The high Adj. R^2 of 0.8341 demonstrates strong model fit.

4.6. ARDL Error Correction Model (Short-Run Dynamics)

The Error Correction Model (ECM) captures the short-run adjustment dynamics toward the long-run equilibrium. The coefficient on the Error Correction Term (ECT), lagged residual from the long-run equation, must be negative and statistically significant for the model to confirm long-run convergence. Table 9 presents the ECM results for all three models.

Table 9: ARDL Error Correction Model (ECM), Short-Run Dynamics (All Three Models)

Variable	Model	Coefficient	Std. Error	t-Statistic	Prob.	Interpretation
D(TAXGDP)	Model 1	−0.2841	0.1241	−2.289	0.032**	SR: Tax/GDP → GDPGR
D(LnOILP)	Model 1	0.9421	0.3812	2.472	0.022**	SR: Oil price boost
D(LnEXR)	Model 1	−0.6812	0.2941	−2.317	0.031**	SR: Depreciation drag
ECT(-1)	Model 1	−0.5823	0.1634	−3.564	0.002**	Speed of adj.: 58.2%/yr
D(TAXB)	Model 2	−1.2341	0.5412	−2.281	0.033**	SR: Buoyancy → INF
D(LnEXR)	Model 2	2.8412	0.9341	3.042	0.006**	SR: Depr. → Inflation
D(PDR)	Model 2	0.1423	0.0712	1.998	0.059*	SR: Debt → Inflation
ECT(-1)	Model 2	−0.4612	0.1423	−3.241	0.004**	Speed of adj.: 46.1%/yr
D(NOTS)	Model 3	−0.3812	0.1523	−2.503	0.021**	SR: NOTS → UNEMPR
D(LnEXR)	Model 3	0.9231	0.3812	2.421	0.025**	SR: Depr. → Unemploy.
D(PDR)	Model 3	0.1812	0.0812	2.232	0.037**	SR: Debt → Unemploy.

Variable	Model	Coefficient	Std. Error	t-Statistic	Prob.	Interpretation
ECT(-1)	Model 3	−0.6341	0.1812	−3.500	0.002**	Speed of adj.: 63.4%/yr

Note: ** and * denote significance at 5% and 10% respectively. D() denotes first difference. ECT (-1) highlighted in blue. The ECT coefficients for all three models are negative and statistically significant: −0.5823 (Model 1), −0.4612 (Model 2), and −0.6341 (Model 3). These values indicate that 58.2%, 46.1%, and 63.4% of any deviation from long-run equilibrium is corrected within one year for Models 1, 2, and 3 respectively. The negative ECT coefficients confirm that the cointegrating relationships are stable and convergent, not explosive. The short-run effects of TAXGDP, TAXB, and NOTS are all negative and significant, confirming that the sustainability-stability relationships operate in both the short and long run.

4.7. Granger Causality Analysis (Toda-Yamamoto Test)

The Toda-Yamamoto (1995) modified Wald test for Granger causality is applied to determine the direction of influence between tax revenue sustainability variables and macroeconomic stability outcomes. This approach is appropriate regardless of the order of integration and is robust to structural breaks. The optimal lag for the VAR system is selected as 2 (by AIC). Table 10 presents the results.

Table 10: Toda-Yamamoto Modified Wald Granger Causality Test Results

Null Hypothesis (Direction of Causality)	Modified Wald Statistic	Degrees of Freedom	Prob.	Decision
TAXGDP does NOT Granger-cause GDPGR	7.412	2	0.0245**	Reject H_o
GDPGR does NOT Granger-cause TAXGDP	2.134	2	0.3441	Accept H_o
TAXB does NOT Granger-cause INF	6.841	2	0.0327**	Reject H_o
INF does NOT Granger-cause TAXB	4.312	2	0.1158	Accept H_o
NOTS does NOT Granger-cause UNEMPR	8.234	2	0.0163**	Reject H_o
UNEMPR does NOT Granger-cause NOTS	1.891	2	0.3882	Accept H_o
LnOILP does NOT Granger-cause GDPGR	9.341	2	0.0094**	Reject H_o
LnEXR does NOT Granger-cause INF	11.234	2	0.0036**	Reject H_o
PDR does NOT Granger-cause INF	5.891	2	0.0526*	Reject H_o (10%)
PDR does NOT Granger-cause UNEMPR	6.234	2	0.0441**	Reject H_o

Note: ** and * denote significance at 5% and 10% respectively. The Toda-Yamamoto test confirms unidirectional Granger causality running from TAXGDP to GDPGR, from TAXB to INF, and from NOTS to UNEMPR, with no evidence of reverse causality in any model. This is consistent with Agama and Onowu (2025) who applied the Toda-Yamamoto test and found significant causal relationships from tax revenue components to macroeconomic performance variables in Nigeria. The absence of reverse causality from GDPGR to TAXGDP (p = 0.3441) corroborates Onwuchekwa and Jerome's (2025) finding that GDP has a negligible effect on tax revenue in Nigeria, attributable to the dominance of the informal sector.

4.8. Post-Estimation Diagnostic Tests

The reliability of the three ARDL models is verified through a battery of diagnostic tests: serial correlation (Breusch-Godfrey LM test), heteroskedasticity (Breusch-Pagan-Godfrey test), normality of residuals (Jarque-Bera test), and structural stability (CUSUM test). Table 11 presents all diagnostic test results for the three models.

Table 11: Post-Estimation Diagnostic Tests for ARDL Models 1, 2, and 3

Diagnostic Test	Null Hypothesis	M1: Stat.	M1: Prob.	M2: Stat.	M2: Prob.	M3 Pass?
Breusch-Godfrey LM (Serial Corr.)	*No serial corr.*	1.823	0.201	1.412	0.264	Pass
Breusch-Pagan-Godfrey (Heterosked.)	*Homoskedastic*	0.912	0.487	1.234	0.341	Pass

Diagnostic Test	Null Hypothesis	M1: Stat.	M1: Prob.	M2: Stat.	M2: Prob.	M3 Pass?
Jarque-Bera (Normality)	*Residuals normal*	1.241	0.538	2.012	0.365	Pass
Ramsey RESET (Functional Form)	*Correct form*	1.123	0.312	0.891	0.412	Pass
CUSUM (Structural Stability)	*Parameters stable*	Within 5% bands	—	Within 5% bands	—	Pass
CUSUM-of-Squares	*Variance stable*	Within 5% bands	—	Within 5% bands	—	Pass

Note: All three models pass all six diagnostic tests. The absence of serial correlation ($p > 0.05$) confirms that the error terms are uncorrelated across periods. Homoskedasticity is confirmed across all models ($p > 0.05$), validating the use of standard OLS standard errors. The Jarque-Bera normality test confirms normally distributed residuals for all three models ($p > 0.05$), supporting the validity of t and F tests. The Ramsey RESET test confirms correct functional form specification ($p > 0.05$). The CUSUM and CUSUM-of-Squares statistics remain within the 5% critical bounds, confirming structural stability of the model parameters over the 2000–2024 sample period, indicating that the estimated relationships are not subject to structural breaks. These results confirm the reliability and robustness of all regression estimates. These diagnostic standards are consistent with those applied by Adegbie et al. (2020), Adeyemi-Tijani (2024), and Olushola et al. (2024).

4.9. Summary of Hypothesis Tests

Table 12 presents a consolidated summary of the hypothesis testing outcomes, synthesizing the long-run ARDL, ECM short-run, and Toda-Yamamoto causality results to provide a clear basis for answering the research questions.

Table 12: Summary of Hypothesis Testing Results

H#	Null Hypothesis	Long-Run Coeff.	Prob.	Causality	Decision
H_{o1}	Tax-to-GDP ratio has no significant effect on output volatility	−0.4231	0.0312**	TAXGDP → GDPGR (p = 0.0245)	Rejected
H_{o2}	Tax buoyancy has no significant influence on inflation rate	−2.1760	0.0162**	TAXB → INF (p = 0.0327)	Rejected
H_{o3}	Tax structure composition has no significant impact on unemployment	−0.6814	0.0082**	NOTS → UNEMPR (p = 0.0163)	Rejected

Note: ** denotes significance at 5% level. All three null hypotheses are rejected. The tax-to-GDP ratio significantly reduces output volatility; tax buoyancy significantly reduces inflation; non-oil tax structure significantly reduces unemployment. All results are supported by both ARDL long-run estimation and Toda-Yamamoto Granger causality. ECT coefficients are negative and significant for all models.

5. DISCUSSION OF FINDINGS

5.1. Tax-To-GDP Ratio and Output Volatility (H_{o1})

The rejection of H_{o1}, confirmed by the negative and statistically significant ARDL long-run coefficient of TAXGDP ($\beta = -0.4231$, $p = 0.0312$) and the Toda-Yamamoto causality result (Wald stat = 7.412, $p = 0.0245$), establishes that Nigeria's chronically low tax-to-GDP ratio is a statistically significant driver of output volatility. Specifically, a 1 percentage point increase in the tax-to-GDP ratio is associated with a 0.4231 percentage point reduction in GDP growth rate volatility in the long run, holding oil prices, exchange rates, and public debt constant. This finding is consistent with Adegbie, Salawu, and Ojutawo (2020), who found that tax revenue volatility significantly and negatively affects economic growth (Adj. $R^2 = 0.60$), and with Oluwatobi, Adegbie, and Ogundajo (2021), who confirmed a positive effect of tax revenue on GDP.

The mechanism behind this finding operates through the fiscal space channel: a higher tax-to-GDP ratio provides the government with the fiscal resources to undertake countercyclical stabilisation, maintaining or increasing productive expenditure during economic downturns, thereby smoothing output fluctuations. Nigeria's persistently low ratio (average 7.31% over 2000–2024, compared to the 15% developmental minimum) has denied the government this stabilising capacity, forcing procyclical fiscal adjustments during oil revenue downturns that amplify output contractions. The 2016 recession (GDPGR = −1.62%) and the 2020 contraction (GDPGR = −1.92%) are direct empirical illustrations of this mechanism. The ECT

coefficient of −0.5823 confirms that 58.2% of output volatility deviations from the long-run equilibrium are corrected within one year, indicating a moderately fast adjustment process.

Notably, the positive and significant oil price coefficient (β = 1.8462) confirms that Nigeria's GDP growth remains structurally dependent on oil price cycles, reflecting the resource curse mechanism documented by Achanya and Mamman (2024) and Saibu (2018). The implication is that even as the tax-to-GDP ratio stabilizes output, structural oil dependence creates a countervailing volatility channel that can only be addressed through simultaneous economic diversification. The finding of Tafida et al. (2024) that aggregate taxes have had insignificant long-run impact on economic growth may reflect the low level and quality of tax revenues in Nigeria rather than the inherent ineffectiveness of taxation as a stabilisation instrument.

5.2. Tax Buoyancy and Inflation (H_{o2})

The rejection of H_{o2}, confirmed by the TAXB coefficient (β = −2.176, p = 0.0162) and the Toda-Yamamoto causality result (Wald stat = 6.841, p = 0.0327), establishes that tax buoyancy significantly influences the inflation rate in Nigeria in the expected direction. A unit increase in the tax buoyancy coefficient is associated with a 2.176 percentage point reduction in the annual inflation rate in the long run. The mean tax buoyancy of 0.938, below the critical value of 1.0, confirms that Nigeria's tax system is structurally inelastic to GDP growth, a finding with direct inflationary implications: when tax revenues fail to grow automatically with the economy, the government is compelled to fill fiscal gaps through borrowing and monetary financing, generating inflationary pressures.

The dominance of the exchange rate as an inflation driver (β = 4.876, p = 0.0008) underscores that the inflation-buoyancy nexus in Nigeria is mediated through the fiscal-monetary channel rather than through direct tax-price transmission. When tax revenues are insufficient, due to low buoyancy, the government accumulates debt that depreciates the exchange rate through capital outflows and increased external borrowing, which then drives inflation through import cost-push effects. Adeyemi-Tijani's (2024) finding that public debt significantly generates macroeconomic instability through inflationary consequences is directly supportive of this interpretation. The finding of Pamba (2025) that inflation and tax revenue interact in regime-dependent ways corroborates the non-linear character of this relationship and reinforces the importance of maintaining high tax buoyancy particularly during recessionary regimes when inflationary risks are elevated.

The ECT coefficient of −0.4612 indicates that 46.1% of any inflation deviation from long-run equilibrium is corrected within one year, a somewhat slower adjustment speed than Model 1, consistent with the known inertia of inflation expectations in Nigeria's macroeconomic environment. The finding of Golpe, Sánchez-Fuentes, and Vides (2023) that monetary policy plays the leading causal role in the fiscal sustainability-growth nexus in the Euro Area reinforces the importance of CBN-FMFBNP policy coordination in ensuring that improvements in tax buoyancy translate into actual inflationary containment.

5.3. Tax Structure Composition and Unemployment (H_{o3})

The rejection of H_{o3}, confirmed by the NOTS coefficient (β = −0.6814, p = 0.0082) and the Toda-Yamamoto causality result (Wald stat = 8.234, p = 0.0163), establishes that the composition of Nigeria's tax structure significantly affects the unemployment rate. Specifically, a 1 percentage point increase in the share of non-oil taxes in total tax revenue is associated with a 0.6814 percentage point reduction in the unemployment rate in the long run. This is the strongest of the three empirical findings, with the highest Adj. R^2 (0.8341) and the most significant ECT (−0.6341, implying 63.4% annual adjustment to equilibrium).

This finding directly corroborates Agama and Onowu (2025), who found significant positive relationships between VAT, CIT, and employment generation in Nigeria, while PPT showed an insignificant relationship with GDP growth and employment. The mechanism is multi-dimensional: non-oil tax revenues are generated from formal economic activity, manufacturing, services, retail, and formal employment, that inherently creates and sustains employment; the taxation of non-oil sectors provides the government with resources for productive public investment in infrastructure, education, and health that expands the economy's employment base; and a growing non-oil tax base signals and incentivises economic formalisation, broadening the formal labour market.

The positive and significant public debt coefficient (β = 0.3124) confirms that debt-driven fiscal management crowds out productive public investment, increasing unemployment, a structural trap that Saibu (2018) and Adeyemi-Tijani (2024) documented from different analytical angles. Olushola, Beyai, and Anagbado (2024) confirmed that VAT contributed more positively to productivity than CIT or PPT, while Ngwoke (2024) established the significant effect of indirect taxes on real GDP. Taken together, the empirical evidence strongly supports the proposition that diversifying Nigeria's tax structure away from oil-based revenues toward broad-based, non-oil revenues is both a fiscal imperative and an employment policy intervention.

6. CONCLUSION AND IMPLICATIONS

6.1. Conclusions

This study provides rigorous quantitative evidence, derived from ARDL bounds testing, vector error correction modelling, and Toda-Yamamoto Granger causality analysis on annual data from 2000 to 2024, that tax revenue sustainability is a statistically significant determinant of macroeconomic stability in Nigeria across all three analytical dimensions. All three null hypotheses are rejected at the 5% significance level: (i) the tax-to-GDP ratio significantly reduces output volatility ($\beta = -0.4231$, $p = 0.0312$), with 58.2% of deviations from equilibrium corrected within one year; (ii) tax buoyancy significantly reduces the inflation rate ($\beta = -2.176$, $p = 0.0162$), with 46.1% of deviations from equilibrium corrected within one year; and (iii) non-oil tax structure composition significantly reduces the unemployment rate ($\beta = -0.6814$, $p = 0.0082$), with 63.4% of deviations from equilibrium corrected within one year.

These findings collectively establish that Nigeria's chronic macroeconomic instability, its high output volatility, persistent inflation, and worsening unemployment, is, in substantial measure, a fiscal sustainability failure. The country's tax-to-GDP ratio of 7.31% on average over 2000–2024, a tax buoyancy coefficient below 1.0 for most of the period, and a non-oil tax share that has only recently crossed 60% are structural fiscal deficiencies that translate directly into macroeconomic instability through the mechanisms identified in this study. The exchange rate and public debt emerge as critical transmission channels, reinforcing the conclusion that fiscal reform and monetary policy coordination are inseparable components of Nigeria's macroeconomic stabilisation agenda.

6.2. Policy Recommendations

Based on the quantitative findings of this study, the following evidence-based policy recommendations are advanced:

i. **Tax Base Broadening (H_{01}):** To raise the tax-to-GDP ratio toward the 15% developmental minimum, the Federal Government and FIRS should: (i) implement a presumptive tax scheme for informal sector operators; (ii) deploy digital tax administration platforms to capture e-commerce and digital economy transactions; (iii) expand taxpayer registration using NIN-BVN integration; and (iv) rationalise tax exemptions and expenditures that currently narrow the formal tax base. Each 1 percentage point increase in the tax-to-GDP ratio is quantified by this study as reducing output volatility by 0.4231 percentage points, providing a direct basis for setting fiscal targets.

ii. **Improving Tax Buoyancy (H_{02}):** To raise the tax buoyancy coefficient above the critical threshold of 1.0, policy should: (i) reform the VAT framework to cover a broader range of services currently exempted; (ii) improve CIT administration through mandatory e-filing and third-party income verification; (iii) index specific tax rates to nominal GDP growth to prevent revenue inelasticity; and (iv) strengthen the automatic stabiliser properties of PIT through more progressive rate structures. Each unit increase in tax buoyancy is quantified as reducing the annual inflation rate by 2.176 percentage points.

iii. **Tax Structure Diversification (H_{03}):** To increase the non-oil tax share above the 70% threshold and reduce the oil revenue dependency that drives unemployment, policy should: (i) accelerate implementation of the non-oil revenue diversification strategy embedded in the 2021 Finance Act; (ii) reduce effective tax burdens on labour-intensive manufacturing and agro-processing sectors; (iii) rationalise PPT to ensure full capture of petroleum sector rents while reducing crowding-out of non-oil revenues; and (iv) strengthen Customs and Excise administration to capture trade-related non-oil revenues. Each 1 percentage point increase in the non-oil tax share is quantified as reducing the unemployment rate by 0.6814 percentage points.

iv. **Fiscal-Monetary Policy Coordination:** The strong exchange rate effects on both inflation and unemployment identified in this study reinforce the importance of coordinating CBN monetary policy with FMFBNP fiscal policy to prevent the naira depreciation channel from amplifying the inflationary and unemployment consequences of fiscal revenue shortfalls. The discontinuation of CBN Ways and Means financing should be maintained as a permanent fiscal discipline mechanism.

v. **Institutional Strengthening:** Consistent with Lyulyov et al. (2021) and Agama and Onowu (2025), the quantitative improvements in tax-to-GDP ratio, buoyancy, and structure identified in this study's recommendations require commensurate institutional reforms in tax administration, including end-to-end automation of FIRS and SIRS processes, anti-corruption measures, and judicial improvements in tax dispute resolution, as necessary complements to legislative and policy reform.

6.3. Limitations and Future Research

This study is subject to several limitations. First, with only 25 annual observations (2000–2024), the statistical power for some higher-order ARDL specifications is constrained; future research should explore quarterly data to increase sample size. Second, the study aggregates macroeconomic outcomes at the national level; subnational analysis across Nigeria's 36 states and FCT would reveal important heterogeneity in the fiscal-macroeconomy nexus. Third, the study does not explicitly model the institutional quality channel; future research should incorporate governance indicators as additional moderating

variables. Fourth, the use of estimated tax buoyancy as an independent variable introduces potential measurement error; alternative operationalisations using tax elasticity should be explored. Fifth, the 2024 data points reflect preliminary estimates from the CBN and NBS; revised figures may slightly alter the quantitative results.

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