

Fiscal Policy and Macroeconomic Stability in Nigeria: Evidence from Dynamic Regression Models

A. T. Ridwanullahi¹; T. A. Bature²; S. A. Abba³; M. K. Apo⁴;
G. O. Suleiman⁵; J. F. Eniayebinu⁶

¹Dept. of Statistics, University of Ilorin. Ilorin, Nigeria

²Dept. of Mathematics, Nigerian Army University Bui, Borno State, Nigeria.

³Dept. of Statistics, Abubakar Tafawa Balewa University, Bauchi, Nigeria.

⁴Dept. of Statistics, Federal Polytechnic Ado-Ekiti, Nigeria.

⁵Dept. of Physical Science, Al-Hikmah University, Ilorin, Kwara State.

⁶Dept. of Statistics, University of Ilorin, Nigeria.

Publication Date: 2026/09/02

Abstract: Fiscal policy is widely regarded as a central instrument of macroeconomic management, yet its short-run relationship with stability outcomes in oil-dependent, low-income economies remains empirically unsettled. This study examines the effect of fiscal policy on macroeconomic stability in Nigeria using annual data covering 1990 to 2025. Macroeconomic stability is disaggregated into three indicators real GDP growth, the annual change in inflation, and exchange-rate volatility rather than treated as a single composite outcome. Fiscal policy is represented by the annual log growth of tax revenue and public debt, with changes in the interest rate, foreign direct investment, and the exchange rate included as controls. Three short-run dynamic regression models are estimated by ordinary least squares following unit-root testing, and reported with heteroscedasticity-consistent (HC3) standard errors after diagnostic testing. The results show that tax-revenue growth and public-debt growth are not jointly significant at the 5 percent level in any of the three models, while lagged GDP growth is a strong and statistically significant predictor of current growth, pointing to substantial persistence in Nigeria's growth process. Diagnostic tests reveal heteroscedasticity in the inflation model and non-normal residuals in the growth and exchange-rate-volatility models, both of which are accommodated through robust inference. The findings suggest that, within a short annual macroeconomic series, fiscal variables alone provide limited independent explanatory power for stability outcomes in Nigeria, and that broader structural and external factors are likely to dominate short-run dynamics. Implications for fiscal policy design and macroeconomic management are discussed.

Keywords: Fiscal Policy, Macroeconomic Stability, Public Debt, Tax Revenue, Dynamic Regression, Nigeria.

How to Cite: A. T. Ridwanullahi; T. A. Bature; S. A. Abba; M. K. Apo; G. O. Suleiman; J. F. Eniayebinu (2026) Fiscal Policy and Macroeconomic Stability in Nigeria: Evidence from Dynamic Regression Models. *International Journal of Innovative Science and Research Technology*, 11(8), 2524-2529. <https://doi.org/10.38124/ijisrt/26aug724>

I. INTRODUCTION

Macroeconomic stability broadly understood as sustained output growth alongside controlled inflation and a manageable external position is a recurring policy objective in developing economies, and Nigeria's experience over the past three and a half decades illustrates why this objective has proven difficult to secure. The economy has moved through episodes of recession, sharp currency depreciation, and double-digit inflation, punctuated by periods of fiscal expansion intended to cushion these shocks. Because fiscal policy operates through

government revenue and expenditure decisions that are, in principle, directly controllable by policymakers, it is routinely treated as the primary lever available for stabilizing an economy exposed to volatile commodity revenue and external shocks.

Whether fiscal policy delivers this stabilizing role in practice, however, is an empirical question rather than a foregone conclusion. Evidence from cross-country studies indicates that the effectiveness of fiscal policy in supporting stability depends on the state of public debt, the credibility of fiscal rules, and the composition of government spending, and

that fiscal expansions do not automatically translate into more stable growth, inflation, or exchange-rate outcomes (Fatás & Summers, 2018; Combes, Minea, & Sow, 2017). For an economy such as Nigeria's, where fiscal operations are heavily influenced by oil revenue and where a complete government-expenditure series is often unavailable for the full historical period, this question requires direct empirical testing using the fiscal instruments that can be reliably measured over time principally tax revenue and public debt.

This study examines the relationship between fiscal policy and macroeconomic stability in Nigeria using annual data from 1990 to 2025. Rather than treating macroeconomic stability as a single outcome, the study follows recent practice in disaggregating it into three separate indicators GDP growth, the change in inflation, and exchange-rate volatility on the grounds that fiscal policy may plausibly affect real activity, price stability, and the external sector through different channels and with different lags (Alagidede & Ibrahim, 2017). The specific objective is to determine whether growth in tax revenue and public debt is systematically associated with these three stability indicators once persistence and relevant macroeconomic controls are taken into account.

The remainder of the paper is organized as follows. Section 2 reviews the relevant literature on fiscal policy and macroeconomic stability. Section 3 sets out the data, model specification, and estimation strategy. Section 4 reports the empirical results. Section 5 discusses the findings, and Section 6 concludes with policy recommendations.

II. LITERATURE REVIEW

A substantial literature examines how fiscal policy interacts with macroeconomic outcomes, though the direction and stability of this relationship vary with the fiscal position and institutional context of the economy under study. Fatás and Summers (2018) show that fiscal consolidations have effects on output that persist well beyond the short run, implying that the timing and scale of fiscal adjustment carry lasting consequences for macroeconomic performance rather than being neutral over the business cycle. This finding is relevant for economies such as Nigeria's, where fiscal expansion and contraction have alternated in response to swings in oil revenue.

The cyclical behaviour of fiscal policy itself has also received close attention. Combes, Minea, and Sow (2017) find that the extent to which fiscal policy is counter-cyclical or pro-cyclical depends on the level of public debt and on whether credible fiscal rules are in place, with high-debt economies more prone to pro-cyclical fiscal behaviour that can amplify, rather than dampen, macroeconomic instability. This is consistent with concerns that Nigeria's rising public debt over the study period may have constrained the government's capacity to use fiscal policy counter-cyclically during downturns.

On the external side, Alagidede and Ibrahim (2017) examine the relationship between exchange-rate volatility and economic growth in a West African economy and find that volatility in the exchange rate is associated with adverse growth effects, operating partly through the uncertainty it introduces for trade and investment decisions. Their work supports the treatment of exchange-rate volatility as a distinct stability outcome, separate from output growth and inflation, since the channels through which fiscal and monetary conditions affect the currency need not mirror those that affect real output.

Evidence from international financial institutions reinforces the view that fiscal outcomes in commodity-dependent economies are difficult to insulate from external shocks. The World Bank's regional and global economic assessments document that oil-exporting developing economies, including Nigeria, have experienced heightened fiscal and macroeconomic volatility during periods of commodity-price decline and global disruption, with debt burdens rising as governments sought to offset falling revenue (World Bank, 2023). Complementary IMF surveillance work highlights those persistent structural constraints including narrow non-oil revenue bases and exchange-rate rigidities continue to limit the effectiveness of fiscal policy as a stabilization tool in sub-Saharan African economies (International Monetary Fund, 2025).

Taken together, this literature suggests three propositions that motivate the present study. First, the effect of fiscal policy on macroeconomic outcomes is not automatic and may be weak, absent, or even destabilizing depending on debt levels and policy credibility. Second, growth, inflation, and exchange-rate stability may respond differently to fiscal shocks and should therefore be modelled separately rather than pooled into a single indicator. Third, in oil-dependent economies such as Nigeria's, structural and external factors are likely to compete with, and potentially dominate, the explanatory power of domestic fiscal variables in the short run. The empirical strategy adopted below is designed to test these propositions directly using Nigerian data.

III. METHODOLOGY

➤ Research Design and Data

The study adopts an ex post facto research design appropriate for the analysis of historical macroeconomic time series that cannot be experimentally manipulated. Annual secondary data covering 1990 to 2025 (35 observations) were obtained from the Central Bank of Nigeria, the National Bureau of Statistics, the World Bank, and the International Monetary Fund. The variables comprise real GDP growth, the inflation rate, the naira-US dollar exchange rate, the real interest rate, foreign direct investment (FDI) inflow, total public debt, and tax revenue. Because a complete government-expenditure series was not available for the full period, fiscal policy is represented in the empirical models by tax revenue and public debt, transformed into annual log growth rates to remove long-

run trends and permit short-run interpretation. Macroeconomic stability is measured through three separate indicators: GDP growth (used in levels), the first difference of the inflation rate, and exchange-rate volatility, computed as the absolute annual log change in the exchange rate.

➤ Model Specification

The general functional relationship underlying the analysis is:

$$MS = f(TAX, DEBT, INT, FDI, EXR)$$

where MS denotes macroeconomic stability, TAX denotes tax revenue, DEBT denotes public debt, INT denotes the interest rate, FDI denotes foreign direct investment, and EXR denotes the exchange rate. Since macroeconomic stability is measured through three separate indicators, three dynamic regression models are specified, each including the relevant lagged dependent variable to capture persistence:

$$\text{Model One (GDP Growth): } GDPG_t = \beta_0 + \beta_1 LAGGDPG_t + \beta_2 DLNTAX_t + \beta_3 DLNDEBT_t + \beta_4 DINT_t + \beta_5 DFDI_t + \beta_6 EXRCH_t + \mu_t$$

$$\text{Model Two (Inflation Dynamics): } DINF_t = \alpha_0 + \alpha_1 LAGDINF_t + \alpha_2 DLNTAX_t + \alpha_3 DLNDEBT_t + \alpha_4 DINT_t + \alpha_5 DFDI_t + \alpha_6 EXRCH_t + \varepsilon_t$$

$$\text{Model Three (Exchange-Rate Volatility): } EXRV_t = \gamma_0 + \gamma_1 LAGEXRV_t + \gamma_2 DLNTAX_t + \gamma_3 DLNDEBT_t + \gamma_4 DINT_t + \gamma_5 DFDI_t + \epsilon_t$$

where DLNTAX and DLNDEBT denote the annual log growth of tax revenue and public debt (the fiscal-policy variables of interest), DINT and DFDI denote the annual change in the interest rate and FDI inflow, EXRCH denotes the annual log change in the exchange rate, and μ_t , ε_t and ϵ_t are error terms. The exchange-rate-change control is excluded from Model Three because it is mechanically related to exchange-rate volatility.

➤ Estimation Technique and Diagnostic Tests

The models are estimated by Ordinary Least Squares $\hat{\beta} = (X'X)^{-1}X'Y$. Prior to estimation, the Augmented Dickey-Fuller (ADF) test is applied to each series to establish its order of integration and guard against spurious regression. Post-estimation, the models are subjected to the Breusch-Pagan test for heteroscedasticity, the Breusch-Godfrey test for first-order serial correlation, the Jarque-Bera test for normality of residuals, the Ramsey RESET test for functional-form

adequacy, and the variance inflation factor (VIF) for multicollinearity. Where heteroscedasticity is detected, HC3 heteroscedasticity-consistent standard errors are used for inference in place of conventional standard errors. Hypotheses concerning the joint significance of the fiscal-policy block (tax-revenue growth and public-debt growth) are tested using robust F-statistics at the 5 percent level of significance.

IV. RESULTS

➤ Preliminary Analysis

Over 1990–2025, average annual GDP growth was 4.12 percent (SD = 3.79), with a minimum of –2.04 percent confirming that the sample includes recessionary years. Inflation averaged 18.75 percent (SD = 15.91) and ranged from 5.39 to 72.84 percent, indicating substantial price instability. Exchange-rate volatility averaged 16.05 percent and reached a maximum of 143.94 percent. Public debt and tax revenue both rose markedly across the period, from single-digit billions of US dollars in the early 1990s to USD 185.2 billion and USD 138.0 billion, respectively, by 2025, reflecting a growing scale of fiscal operations alongside increasing fiscal pressure.

The Augmented Dickey-Fuller test showed that GDP growth, exchange-rate volatility, and the exchange-rate change control were stationary at level (I(0)), while inflation, public debt, the interest rate, and FDI became stationary after first differencing (I(1)). The first difference of log tax revenue was only marginally stationary at the 10 percent level under automatic lag selection ($p = 0.059$), which weakens the case for a full long-run error-correction specification in this short annual sample. The models are accordingly estimated and interpreted as conservative short-run dynamic regressions in stationary changes, with HC3-robust standard errors, rather than as evidence of long-run cointegrating relationships.

➤ Dynamic Regression Results

Table 1 reports the GDP growth model. The model was statistically significant as a whole (robust $F(6,26) = 2.523$, $p = 0.046$) and explained 45.3 percent of the variation in annual GDP growth (adjusted $R^2 = 0.327$). Lagged GDP growth was positive and significant ($\beta = 0.496$, $p = 0.025$), indicating meaningful persistence in annual growth performance. Tax-revenue growth and public-debt growth carried positive coefficients but were not individually significant at the 5 percent level. Exchange-rate change carried a negative coefficient significant only at the 10 percent level, consistent with, but not conclusive evidence for, a growth-dampening effect of currency depreciation.

Table 1. HC3 Robust Dynamic Regression Results for GDP Growth, 1992–2025

Variable	Coefficient	Robust SE	t-value	p-value	Decision
Constant	1.7769	1.2561	1.415	0.1691	Not significant
Lagged GDP growth	0.4963	0.2088	2.377	0.0251	Significant

Variable	Coefficient	Robust SE	t-value	p-value	Decision
Tax-revenue growth	0.0324	0.0278	1.166	0.2542	Not significant
Public-debt growth	0.0348	0.0294	1.182	0.2478	Not significant
Change in interest rate	-0.0942	0.0922	-1.022	0.3163	Not significant
Change in FDI	0.1036	0.2848	0.364	0.7190	Not significant
Exchange-rate change	-0.0287	0.0152	-1.884	0.0707	Marginal (10%)

Note: Dependent variable: *GDPG*. $N = 33$; $R^2 = 0.453$; Adjusted $R^2 = 0.327$; robust $F(6,26) = 2.523$, $p = 0.046$.

Table 2 reports the inflation-dynamics model. Although the unadjusted R^2 was 0.410, the Breusch-Pagan test detected heteroscedasticity, and after applying HC3 correction the model was not statistically significant as a whole ($p = 0.246$). Neither

tax-revenue growth nor public-debt growth was significantly associated with the annual change in inflation. The public-debt-growth coefficient was positive, consistent with a debt-financed inflationary channel, but the estimate was imprecise.

Table 2. HC3 Robust Dynamic Regression Results for Change in Inflation, 1992–2025

Variable	Coefficient	Robust SE	t-value	p-value	Decision
Constant	-1.1038	3.9859	-0.277	0.7840	Not significant
Lagged change in inflation	0.1215	0.3472	0.350	0.7293	Not significant
Tax-revenue growth	0.0402	0.1181	0.340	0.7366	Not significant
Public-debt growth	0.1060	0.1800	0.589	0.5608	Not significant
Change in interest rate	-0.6847	0.4547	-1.506	0.1442	Not significant
Change in FDI	0.3678	0.8277	0.444	0.6605	Not significant
Exchange-rate change	0.0383	0.2425	0.158	0.8758	Not significant

Note: Dependent variable: *DINF*. $N = 33$; $R^2 = 0.410$; Adjusted $R^2 = 0.274$; robust $F(6,26) = 1.416$, $p = 0.246$.

Table 3 reports the exchange-rate-volatility model, which was not statistically significant overall (robust $F(5,27) = 0.690$, $p = 0.635$) and returned a negative adjusted R^2 (-0.030). Tax-revenue growth carried a negative coefficient and public-debt growth a positive coefficient, but neither was statistically significant, indicating that the available fiscal variables did not explain the exchange-rate shocks observed over the period.

Table 3. HC3 Robust Dynamic Regression Results for Exchange-Rate Volatility, 1992–2025

Variable	Coefficient	Robust SE	t-value	p-value	Decision
Constant	14.5893	8.3753	1.742	0.0929	Marginal (10%)
Lagged exchange-rate volatility	0.0581	0.4746	0.122	0.9034	Not significant
Tax-revenue growth	-0.2116	0.2077	-1.019	0.3175	Not significant
Public-debt growth	0.3793	0.4457	0.851	0.4022	Not significant
Change in interest rate	-0.6467	0.4775	-1.354	0.1868	Not significant
Change in FDI	4.6660	3.3270	1.402	0.1722	Not significant

Note: Dependent variable: *EXRV*. $N = 33$; $R^2 = 0.131$; Adjusted $R^2 = -0.030$; robust $F(5,27) = 0.690$, $p = 0.635$.

➤ Diagnostic Tests and Hypothesis Testing

Diagnostic tests (Table 4) showed no serious multicollinearity in any model, with maximum VIF values well below the conventional threshold of 10, and no evidence of first-order serial correlation at the 5 percent level. The inflation model displayed heteroscedasticity (Breusch-Pagan $p = 0.0003$), while the GDP-growth and exchange-rate-volatility models displayed non-normal residuals (Jarque-Bera $p = 0.009$ and $p < 0.001$, respectively). These results justify the use of HC3-robust standard errors throughout.

Table 4. Diagnostic Tests for the Dynamic Regression Models

Model	Max VIF	BP p	BG(1) p	JB p	RESET p
GDP growth	1.941	0.935	0.919	0.009	0.694
Change in inflation	1.380	0.0003	0.064	0.078	0.535
Exchange-rate volatility	1.286	0.934	0.234	<0.001	0.206

Note: BP = Breusch-Pagan; BG(1) = Breusch-Godfrey first-order serial correlation; JB = Jarque-Bera normality; RESET = Ramsey functional-form test.

Table 5 summarizes the joint hypothesis tests on the fiscal-policy block (tax-revenue growth and public-debt growth) in each model.

Table 5. Summary of Hypothesis Tests

Hypothesis	Test statistic	p-value	Decision
H ₀₁ : Fiscal variables do not significantly affect GDP growth	HC3 joint F(2,26) = 1.398	0.265	Fail to reject
H ₀₂ : Fiscal variables do not significantly affect inflation dynamics	HC3 joint F(2,26) = 0.238	0.790	Fail to reject
H ₀₃ : Fiscal variables do not significantly affect exchange-rate volatility	HC3 joint F(2,27) = 0.850	0.439	Fail to reject

In all three models, the fiscal-policy block was not jointly significant at the 5 percent level. This does not establish that fiscal policy is irrelevant to macroeconomic stability in Nigeria; rather, it indicates that the available short annual series did not yield statistically precise evidence of an independent short-run fiscal effect once persistence and the selected controls were taken into account.

V. DISCUSSION

The central empirical finding is that growth in tax revenue and public debt shows the expected signs in the GDP growth and inflation models but does not reach conventional levels of statistical significance in any of the three stability indicators once persistence and controls are included. This pattern is broadly consistent with the view that fiscal policy's effectiveness as a stabilization tool is conditional rather than automatic (Fatás & Summers, 2018; Combes et al., 2017): where fiscal space is constrained by rising debt, as has been the case in Nigeria over much of the study period, the capacity of tax and debt instruments to move growth, inflation, and the exchange rate in a stabilizing direction may be correspondingly limited.

The strongest and most robust result in the study is the persistence of GDP growth itself, captured by the significant lagged-growth coefficient in Model One. This suggests that current-year growth performance in Nigeria is shaped substantially by the momentum of the previous year's performance, independent of the fiscal variables considered here. For inflation and exchange-rate volatility, the weak explanatory power of the fiscal variables is consistent with the argument that these outcomes are driven by a wider set of forces including oil-revenue fluctuations, exchange-rate policy regime changes, and external market conditions that lie outside the

scope of a purely fiscal model (Alagidede & Ibrahim, 2017; World Bank, 2023).

Two caveats temper the interpretation of these results. First, the effective estimation sample of 33 annual observations, after differencing and lagging, limits the statistical power available to detect fiscal effects that may nonetheless be economically meaningful. Second, the absence of a complete government-expenditure series means the fiscal-policy concept tested here is narrower than the concept implied by standard fiscal-policy theory, which typically emphasizes the balance between revenue and expenditure rather than revenue and debt growth alone.

VI. CONCLUSION AND RECOMMENDATIONS

This study set out to examine whether fiscal policy, represented by the growth of tax revenue and public debt, significantly affects macroeconomic stability in Nigeria, measured separately through GDP growth, inflation dynamics, and exchange-rate volatility. Using annual data from 1990 to 2025 and HC3-robust dynamic regression models, the study finds no statistically significant joint fiscal effect on any of the three stability indicators, while confirming strong persistence in GDP growth. These findings should be read as evidence of the limits of a narrow, annual-frequency fiscal dataset rather than as proof that fiscal policy does not matter for macroeconomic outcomes in Nigeria.

Based on these findings, four recommendations follow. First, government should prioritize the productive allocation of tax revenue toward infrastructure, education, and other growth-enhancing sectors, since revenue mobilization on its own showed only a positive but statistically imprecise association with growth. Second, public debt should be tied more closely to

projects with clear economic returns, given its positive but insignificant association with inflation and exchange-rate volatility, which nonetheless warrants caution regarding debt-financed spending. Third, fiscal and monetary authorities should strengthen coordination, since inflation and exchange-rate outcomes appear to be driven substantially by forces beyond the direct reach of fiscal policy alone. Fourth, future empirical work should move to quarterly or monthly data and incorporate a fuller set of fiscal variables, including government expenditure, fiscal deficit, and oil revenue, to permit a more precise test of the fiscal-stability relationship than the annual series used here allows.

REFERENCES

- [1]. Alagidede, P., & Ibrahim, M. (2017). On the causes and effects of exchange rate volatility on economic growth: Evidence from Ghana. *Journal of African Business*, 18(2), 169–193.
- [2]. Combes, J.-L., Minea, A., & Sow, M. (2017). Is fiscal policy always counter- (pro-) cyclical? The role of public debt and fiscal rules. *Economic Modelling*, 65, 138–146.
- [3]. Fatás, A., & Summers, L. H. (2018). The permanent effects of fiscal consolidations. *Journal of International Economics*, 112, 238–250.
- [4]. International Monetary Fund. (2025). *Regional Economic Outlook: Sub-Saharan Africa*. Washington, DC: International Monetary Fund.
- [5]. World Bank. (2023). *Global Economic Prospects*. Washington, DC: World Bank.