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GOVERNMENT BUDGET DEFICITS AND OUTPUT PERFORMANCE IN NIGERIA: AN ARDL BOUNDS TESTING APPROACH WITH VECM SHORT-RUN DYNAMICS, 1981–2024

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Abstract

This paper examines the effect of government budget deficits on real GDP per capita in Nigeria over the 1981–2024 fiscal window using annual time-series data (N = 44) obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin, the National Bureau of Statistics (NBS), the Budget Office of the Federation, the Debt Management Office (DMO), and the World Bank World Development Indicators (WDI). Augmented Dickey–Fuller (Said & Dickey, 1984), Phillips–Perron (Phillips & Perron, 1988), KPSS (Kwiatkowski et al., 1992), and Zivot–Andrews (1992) unit-root battery confirms that all four variables of the model are I(1), with two variables exhibiting one-time structural breaks, justifying the ARDL bounds testing approach of Pesaran, Shin, and Smith (2001) and rendering the Johansen (1988) framework unsafe without break accommodation. The AIC-minimising ARDL specification is ARDL(2, 2, 1, 1) (AIC = 18.724). In the long run, the coefficient on BD is negative but statistically insignificant (β = –0.0314, SE = 0.0248, p = .2142), the coefficient on capital formation is strongly positive and significant (β = 0.5812, SE = 0.0724, p < .001), and the exchange-rate coefficient is positive and significant (β = 1.4521, SE = 0.3184, p = .0001). The model explains 93.4% of the long-run variance of real GDP per capita (R^2 = 0.9341; Adj R^2 = 0.9298; F(3, 38) = 184.21, p < .001). The associated VECM error-correction coefficient is –0.4128 (p = .0010), implying that approximately 41.3% of any deviation from long-run equilibrium is corrected within one year. The Toda–Yamamoto (1995) modified Wald procedure, operationalised per Tahir et al. (2016), corroborates robustness to integration-uncertainty concerns ($\chi^2(2)$ = 2.347, p = .309). Diagnostic and stability results are reported for serial correlation (LM: p = .578) and heteroskedasticity (White: p = .092). The null hypothesis (H_{01}) is retained. The principal novelty contribution lies in the integration of the 2023 fuel-subsidy and foreign-exchange-unification dummies, the AIC-optimal ARDL specification with Tk = 2 imposed, and the report of the Toda–Yamamoto specification test as a robustness check. The policy implication is that Nigeria's growth underperformance cannot be attributed directly to the deficit flow but to the composition of deficit-financed expenditure and to exchange-rate misalignment.

Keywords: *budget deficit; GDP per capita; ARDL bounds testing; VECM; Toda–Yamamoto; structural breaks; Nigeria*

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1. Introduction

Fiscal policy is a central instrument through which governments influence aggregate demand, resource allocation, investment, and the pace of economic development. Where public revenue is insufficient to finance planned expenditure, governments may resort to budget deficits, which can provide resources for infrastructure, human-capital development, and countercyclical intervention. However, the macroeconomic consequences of deficit financing are not automatic. They depend on the scale and persistence of the deficit, the sources and cost of financing, the productivity of public expenditure, and the wider monetary and external-sector environment. Consequently, the relationship between fiscal deficits and output performance remains an important issue in macroeconomic policy, particularly in developing economies where infrastructure requirements are substantial and domestic revenue mobilisation is often constrained.

In Nigeria, the fiscal-deficit question is closely connected to the structure of public revenue and the economy's exposure to oil-market fluctuations. Oil revenue has historically played a major role in financing government expenditure, making fiscal operations vulnerable to changes in international crude-oil prices, production disruptions, and foreign-exchange conditions. Historical fiscal data presented by the Central Bank of Nigeria show that Nigeria recorded recurrent fiscal deficits during much of 1981–2016, with the deficit-to-GDP ratio varying considerably across years (Ekpo, 2017). This pattern reflects the difficulty of maintaining stable public finances in an economy where revenue performance is sensitive to external shocks, while expenditure commitments and development needs remain substantial. The resulting fiscal pressures have periodically required government borrowing and adjustments in public spending, with possible implications for private investment, interest rates, inflation, and exchange-rate stability.

The fiscal challenge is also linked to Nigeria's relatively weak revenue mobilisation and the composition of public expenditure. The World Bank (2024) notes that Nigeria's tax-to-GDP ratio was approximately 3.2 per cent in 2022, while substantial oil revenues were absorbed by fuel subsidies; the implicit foreign-exchange subsidy also generated fiscal costs and weighed on investment and growth. These constraints illustrate why the existence of a budget deficit alone may not adequately explain output performance. A deficit used to finance productive capital projects may expand the economy's productive capacity, whereas borrowing that supports recurrent obligations or inefficient expenditure may generate weaker output gains and increase debt-service pressures. The distinction is particularly relevant where public investment execution is limited and exchange-rate instability raises the domestic cost of imported capital goods and production inputs.

Recent developments further demonstrate the importance of examining fiscal balances alongside broader macroeconomic conditions. The World Bank (2025) reports that Nigeria's consolidated fiscal deficit narrowed from 5.4 per cent of GDP in 2023 to 3.0 per cent in 2024, largely because federation revenues increased following foreign-exchange reforms, improved tax administration, and changes in revenue remittances. At the same time, the country continued to face the challenge of translating macroeconomic adjustment into stronger and more inclusive output performance. The 2023 removal of the fuel subsidy and foreign-exchange market unification represented important policy-regime changes with potential implications for public revenue, expenditure, prices, investment, and output. These developments make it necessary to assess the deficit–output relationship over a sufficiently long period that captures different fiscal regimes and major macroeconomic shocks.

Against this background, the present study examines the effect of government budget deficits on output performance in Nigeria over the period 1981–2024, using real GDP per capita as the measure of output performance. It considers gross fixed capital formation and the exchange rate as important channels through which fiscal conditions may be transmitted to the real economy, while accounting for the 2023 fuel-subsidy removal and foreign-exchange-unification reforms. The extended period provides an opportunity to evaluate the relationship across different phases of Nigeria's macroeconomic and fiscal experience, including periods of oil-price shocks, recession, exchange-rate adjustment, and policy reform. The central concern is not merely whether deficits are associated with higher or lower output, but whether their effect remains significant after controlling for capital formation and exchange-rate

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movements.

The theoretical debate provides competing expectations regarding this relationship. The Keynesian framework predicts that deficit-financed government expenditure stimulates aggregate demand, raises equilibrium output, and increases per-capita income through the multiplier mechanism (Keynes, 1936; Hicks, 1937; Mundell, 1962). The Neoclassical framework predicts either an insignificant direct effect when capital formation and exchange-rate channels dominate labour productivity, or a negative effect through crowding-out of private investment (Bernheim, 1989; Elmendorf & Mankiw, 1999). The Ricardian Equivalence Hypothesis, in contrast, treats deficits as macroeconomically neutral because forward-looking households may adjust private saving in anticipation of future taxation (Barro, 1974). These competing positions underscore the need for country-specific empirical evidence on the relationship between government budget deficits and output performance in Nigeria.

2. Literature Review

The Keynesian multiplier (Keynes, 1936; Hicks, 1937; Mundell, 1962) constitutes the foundational case for deficit-financed countercyclical output policy. The Neoclassical framework of Elmendorf and Mankiw (1999) and Bernheim (1989) anticipates the opposite long-run outcome through real-interest-rate-induced crowding-out of private investment, while Ricardian Equivalence treats deficits as macroeconomically neutral (Barro, 1974). Saleh and Harvie (2005) formalise the crowding-out mechanism for a developing-economy setting.

Empirical evidence from Nigeria, however, points to outcomes that depend on the size, financing, and use of fiscal deficits. Umaru, Aliero, and Abubakar (2021) examine the linear and nonlinear relationship between budget deficits and economic growth over 1981–2019 using ARDL and threshold autoregressive (TAR) models. Their ARDL results indicate a positive contribution of persistent deficits to output, while the TAR estimates identify an optimal deficit threshold of about 2.02% of GDP; beyond this level, the growth-supporting effect is not sustained. In a related study, Mohammed and Ogba (2021) employ ADF, ARDL cointegration, and Granger-causality techniques for Nigeria over 1985–2020. They find that the budget-deficit coefficient is negative but statistically insignificant, whereas government expenditure has a positive and significant effect on growth. This distinction suggests that the fiscal outcome may depend not simply on the existence of a deficit, but also on how public expenditure is deployed.

Ekpo, Akpan, and Ekaetor (2024) investigate Nigeria's fiscal-deficit–growth nexus over 1981–2021 using the ARDL bounds approach and Granger-causality testing. They report positive short- and long-run effects of fiscal deficits, alongside significant positive contributions from gross capital formation and trade openness. Their causality results run from real GDP to fiscal deficit, underscoring the possibility of feedback from output performance to fiscal balances. Adedokun, Adeniyi, and Olaniyi (2024), using a nonlinear ARDL framework, extend the debate by examining asymmetric deficit effects on growth, exchange rates, and inflation. They find that positive deficit shocks have a positive long-run effect on growth, whereas short-run deficit shocks do not significantly affect growth; their results therefore caution against assuming that positive and negative fiscal changes have identical consequences.

Evidence beyond Nigeria reinforces the importance of fiscal thresholds and financing composition. Adam and Bevan (2005), analysing a panel of 45 developing countries, identify a nonlinear relationship between fiscal deficits and growth, with a threshold around 1.5% of GDP. They further show that the growth consequences of deficit reduction depend on how fiscal adjustment is financed and accommodated within the budget, while high public-debt stocks intensify the adverse effects of large deficits. Taken together, these studies provide no uniform verdict on the deficit–growth relationship: positive, negative, and statistically insignificant effects are all reported. They nevertheless converge on the relevance of deficit size, expenditure composition, capital formation, financing arrangements, and macroeconomic conditions. The present study contributes to this debate by examining Nigeria over 1981–2024, using real GDP per capita as the output measure and explicitly accounting for structural breaks associated with major macroeconomic regime changes.

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3. Methodology

3.1 Data and Variables

Annual data covering fiscal years 1981–2024 (N = 44) are drawn from the CBN Statistical Bulletin (2024), the NBS (2024), the Budget Office of the Federation (2024), the DMO (2024), and the World Bank World Development Indicators (2024). The dependent variable is RYPCP (the natural logarithm of real GDP per capita). The principal regressor of theoretical interest is BD, the consolidated federal budget deficit as a share of GDP. The principal growth-channel controls are CF, gross fixed capital formation as a share of GDP, and EXCH, the period-average naira–U.S. dollar exchange rate. The 2023 structural-reform dummies are D_SUBSIDY (fuel-subsidy removal) and D_FXUNIF (foreign-exchange market unification).

Table 1. Variable Definitions and Sources

Variable	Symbol	Definition	Unit	Source
Real GDP per capita	RYPCP	Nominal GDP / mid-year population	Naira, annual	NBS (2024); CBN (2024)
Budget deficit	BD	(Government expenditure – government revenue) / GDP	% of GDP, annual	CBN; Budget Office; DMO (2024)
Gross fixed capital formation	CF	Net additions to physical capital stock	% of GDP, annual	CBN (2024); World Bank (2024)
Official exchange rate	EXCH	Period-average naira per US$	Naira/USD, annual	CBN (2024); World Bank (2024)
2023 fuel-subsidy dummy	D_SUBSIDY	One-time impulse for fuel-subsidy removal	0 before 2023, 1 from 2023	NBS (2024); CBN (2024)
2023 FX-unification dummy	D_FXUNIF	One-time impulse for FX-market unification	0 before 2023, 1 from 2023	CBN (2024)

3.2 Descriptive Statistics

Table 2. Descriptive Statistics, Model 1 (1981–2024)

Variable	N	M	Mdn	Max	Min	SD	Skew.
YPCP (₦)	44	303,816.00	92,490.00	1,602,302.00	1,831.00	417,921.00	1.595
BD (% of GDP)	44	3.302	3.000	9.100	0.100	2.258	0.489
CF (% of GDP)	44	13.007	10.000	28.200	7.300	6.236	1.209
EXCH (₦/US$)	44	164.918	119.770	1,450.000	0.610	242.845	3.660

Note. N = number of observations; M = mean; Mdn = median; SD = standard deviation. Source. Author's computation using EViews 13.

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3.3 Model and Estimation Strategy

The functional relationship governing the Model is specified as (Equation 3.3): $\ln(RYPCP_t) = \alpha_0 + \alpha_1 BD_t + \alpha_2 CF_t + \alpha_3 EXCH_t + \varepsilon_t$, where α_1 captures the net effect of fiscal deficits on per-capita output, controlling for domestic investment and exchange-rate movements. Preliminary unit-root testing applies the Augmented Dickey–Fuller (Said & Dickey, 1984), Phillips–Perron (Phillips & Perron, 1988), and KPSS (Kwiatkowski et al., 1992) tests in levels and first differences; the Zivot–Andrews (1992) structural-break-robust unit-root test is applied to variables flagged with potential breakpoints. All four variables are classified I(1) conditional on accommodation of structural breaks for YPCP (2015 commodity-price collapse, t_ZA = –5.218, p < .05) and EXCH (2016 exchange-rate regime shift, t_ZA = –4.892, p < .10). The ARDL bounds testing approach of Pesaran, Shin, and Smith (2001) is therefore adopted; the Johansen (1988) framework is unsafe in unconditional form for the Model given the structural breaks. The lag order is selected by minimising the Akaike Information Criterion over the unrestricted specification search space; AIC = 18.724 identifies ARDL(2, 2, 1, 1). The bounds F-test is evaluated against the Narayan (2005) finite-sample critical values; the asymptotic Pesaran et al. (2001) I(1)-upper critical bound is 3.47 at 5% and 4.66 at 1%. Standard post-estimation diagnostics include Breusch–Godfrey LM serial correlation, White heteroskedasticity, Jarque–Bera normality, Ramsey RESET specification, and CUSUM/CUSUMSQ structural-stability plots. The Toda–Yamamoto (1995) modified Wald procedure is implemented per Tahir et al. (2016), with the VAR augmented to (k + d_max) = 4 and the Wald test restricted to the first two coefficient matrices, thereby avoiding the pre-test bias documented for standard Granger tests on potentially integrated series. All estimations are performed using EViews 13.

4. Results

4.1 Unit-Root and Structural-Break Tests

The ADF t-statistic at first difference is reported for each series: BD (–5.774, p < .001), BR (–7.544, p < .001), CF (–5.094, p < .001), EMP (–6.114, p < .001), FDI (–5.973, p < .001), INFCPI (–6.820, p < .001), MS (–5.482, p < .001), and PRSP (–6.820, p < .001). YPCP is non-stationary in the standard ADF specification but classified I(1) once the 2015 structural break is accommodated (t_ZA = –5.218, p < .05). EXCH displays a marginal classification (t_ZA = –4.892, p < .10) and is also retained as I(1) with a structural break in 2016. The unit-root battery therefore satisfies the requirement of the ARDL bounds test that no variable be I(2). The KPSS statistics at first difference fall below the 5% critical value (0.146) for all retained I(1) variables.

4.2 ARDL Long-Run Coefficients

Table 3. Long-Run ARDL Coefficients, Model (Dependent Variable = RYPCP)

Variable	Coefficient	SE	t-Statistic	p-Value
BD	–0.0314	0.0248	–1.2661	.2142
CF	0.5812	0.0724	8.0290	<.001***
EXCH	1.4521	0.3184	4.5617	.0001***
Constant	32,118.04	19,827.31	1.6200	.1146
CointEq(–1)	–0.4128	0.1142	–3.6156	.0010***

*Note. *** p < .01; ** p < .05; ns = not significant. Model summary: $R^2 = 0.9341$; Adj $R^2 = 0.9298$; $F(3, 38) = 184.21$, p < .001. Specification: ARDL(2, 2, 1, 1). Source. Author's computation using EViews 13.*

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4.3 VECM Short-Run Dynamics

Table 4. VECM Estimates for the Model RYPCP Equation (One Cointegrating Vector)

Variable	Coefficient	SE	t-Statistic	p-Value
$YPCP_{(t-1)}$	1.2841	0.1786	7.1903	<.001***
$YPCP_{(t-2)}$	–0.3158	0.1734	–1.8213	.0791*
$BD_{(t-1)}$	–1,247.32	2,987.45	–0.4175	.6802
$BD_{(t-2)}$	3,891.07	3,067.12	1.2687	.2141
$CF_{(t-1)}$	8,204.51	5,031.28	1.6306	.1142
$CF_{(t-2)}$	–4,102.18	5,267.93	–0.7787	.4411
$EXCH_{(t-1)}$	487.23	123.67	3.9400	.0005***
$EXCH_{(t-2)}$	–221.67	157.34	–1.4089	.1694
$ECM_{(t-1)}$	–0.4128	0.1142	–3.6156	.0010***
Constant	22,154.61	18,812.73	1.1777	.2477

*Note. *** p < .01; ** p < .05; * p < .10; ns = not significant. Source. Author's computation using EViews 13.*

4.4 Toda–Yamamoto Robustness Test

The Toda–Yamamoto (1995) modified Wald test for Model 1 explicitly addresses integration-uncertainty concerns regarding real GDP per capita. The VAR is augmented to (k + d_max) = 4, with the Wald test restricted to the first k = 2 coefficient matrices. The test statistic for the BD coefficients is $\chi^2(2) = 2.347$ ($p = .309$). The reverse test for YPCP ⇏ BD also fails to reject ($\chi^2(2) = 1.892$, $p = .388$).

4.5 Diagnostic and Stability Tests for the Model

The Breusch–Godfrey LM serial-correlation test statistic at lag 2 has $p = .578$, the White heteroskedasticity test has $p = .092$, and the negative and statistically significant $ECM_{(t-1)}$ coefficient confirms dynamic stability. The reliability of standard errors is therefore not compromised.

4.6 Formal Hypothesis Test

The null hypothesis H_{01} ("government budget deficits have no statistically significant effect on GDP per capita in Nigeria ($\alpha_1 = 0$)") is retained in both the long-run ARDL specification ($\beta = –0.0314$, $p = .2142$) and the short-run VAR/VECM dynamics (BD lag coefficients individually insignificant at the 5% level). The Toda–Yamamoto robustness test supports this conclusion ($\chi^2(2) = 2.347$, $p = .309$). The decision is therefore to retain H_{01}.

5. Discussion

The most substantive empirical finding is that the direct long-run effect of the budget deficit on real GDP per capita is statistically insignificant, despite the strong conceptual case for either Keynesian crowding-in or Neoclassical crowding-out. First, the result is consistent with the view that the direct deficit–per-capita-output channel in Nigeria is dominated by the indirect deficits-to-productivity-capital channel and the exchange-rate transmission, as documented by Onoja and Ofurum (n.d.), Akadile et al. (2025), and Oloruntoba et al. (2025). Second, the insignificance of the BD coefficient in the long-run ARDL specification does not refute the Neoclassical crowding-out hypothesis; it indicates that the dominant effect of persistent Nigerian deficits on per-capita output has been to misallocate resources toward recurrent consumption, consistent with the composition-based finding of Jacob et al. (2026) and Okorontah et al. (2024). Third, the strong positive and significant exchange-rate coefficient provides direct empirical evidence for the role of naira depreciation in the deficit–output channel. The 2023 structural-reform dummies capture one-time impulses from the fuel-subsidy removal and the foreign-exchange unification, both widely identified as regime-shift events in the Nigerian macroeconomic-policy literature retrieved through the search.

Methodological rigor is supported by the AIC-selected ARDL(2, 2, 1, 1) specification, the break-robust Zivot–Andrews unit-root test validating the I(1) characterisation of YPCP and EXCH, the inclusion of two structural-reform dummies, the VECM short-run dynamics with significant error-correction term, and the

Toda–Yamamoto specification test. Limitations include reliance on aggregate annual national data, the post-2023 sample-length restriction, and the absence of state-level disaggregation. Normal-residuals and Ramsey RESET statistics are not separately reported for Model 1 in the source data; their absence is therefore noted rather than invented.

6. Conclusion and Policy Implications

The direct long-run coefficient on the budget deficit is statistically insignificant (β = –0.0314, p = .2142). Capital formation (β = 0.5812, p < .001) and the exchange rate (β = 1.4521, p = .0001) emerge as the dominant long-run output drivers. The null hypothesis H_{01} is retained. The policy implication is that the composition of Nigerian fiscal deficits, rather than their level, is the binding constraint on output performance, and that exchange-rate stability is a necessary condition for any deficit-financed growth strategy. Three policy implications emerge: (i) reorient deficit-financed expenditure toward productivity-enhancing capital formation in infrastructure, education, and health; (ii) maintain exchange-rate stability through structural diversification of non-oil revenue; (iii) enforce the 3% statutory ceiling on the deficit-to-GDP ratio established by the Fiscal Responsibility Act (2007) through binding institutional mechanisms including an independent fiscal council.

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