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DEBT TRAP OR GROWTH CATALYST? THE ASSOCIATION BETWEEN PUBLIC AND EXTERNAL DEBT AND POVERTY IN NIGERIA

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Abstract
Nigeria's rising public and external debt has raised concerns about its implications for poverty reduction. The paper examined the association between the debt profile (public debt-to-GDP, debt service and external debt) and poverty in Nigeria over 2000–2024 (25 annual observations), controlling for inflation and the exchange rate. Secondary data were drawn from the Central Bank of Nigeria, the National Bureau of Statistics and the International Monetary Fund, and the analysis uses the autoregressive distributed lag (ARDL) framework, with the Johansen test as a complementary check. The variables have different orders of integration. The ARDL bounds F-statistic (7.05) is inconclusive at 5 per cent, and the F-test on the lagged regressors (1.81) falls below the lower bound, a degenerate case that does not indicate a long-run relationship between poverty and the debt variables; no long-run coefficient on public debt (−0.538, p = 0.067), debt service (−0.057) or external debt (0.180) is significant at 5 per cent. In the short run, when standard errors account for the estimated long-run relationship, only inflation is significantly associated with poverty (net effect 2.51 percentage points, p = 0.024); changes in the debt variables are not. The error-correction coefficient (−1.249) implies damped, oscillating adjustment but reflects the alternating pattern of the poverty series. The three debt variables are nearly collinear (correlations up to 0.99) and the effective sample is 23 observations, so the results are reported as conditional associations and not causal effects. The study recommends inflation control, prudent debt management and better data on poverty and debt.

Keywords: ARDL, debt profile, debt service, external debt, Nigeria, poverty, public debt.

1.0 Introduction

Nigeria's debt profile has deep historical roots. External borrowing was modest in the 1960s and 1970s, but the oil boom of the 1970s encouraged spending plans that outpaced revenue, and falling oil prices in the early 1980s triggered a debt crisis with rising external obligations to the Paris Club and multilateral creditors. The structural adjustment programmes of the 1980s aimed to address the debt overhang but were accompanied by austerity measures. By the 1990s, debt indicators were weak, with debt service payments absorbing a large share of export earnings and limiting fiscal space for social investment (World Bank, 2021).

The early 2000s brought relief. In 2005–2006 Nigeria secured a Paris Club debt-relief agreement that reduced external debt by about US$18 billion in exchange for reforms, which lowered the debt burden and allowed more spending on poverty-related programmes, including the Millennium Development Goals. Domestic borrowing subsequently rose as governments issued bonds to finance deficits, so the composition of debt shifted from external to domestic sources. After the 2008 global financial crisis, fluctuating oil revenues, which account for a large share of government income, and the recessions of 2016 and 2020 increased borrowing. Total public debt stood at ₦153.29 trillion at 30 September 2025, a 7.7 per cent increase over the previous year, driven mainly by domestic borrowing; external debt was US$48.46 billion (₦71.48 trillion), or 46.63 per cent of the total (Debt Management Office [DMO], 2025). The debt-to-GDP ratio is reported at about 36 to 52 per cent depending on the source and measure (CEIC Data, 2025; Trading Economics, 2025).

Debt service has become a significant fiscal strain. It is projected to absorb ₦15.5 trillion of the 2025 budget's ₦34 trillion revenue, more than 40 per cent (BusinessDay, 2026; Proshare, 2025), and domestic debt now makes up about 53 per cent of the total (DMO, 2025). High debt service can reduce resources for health and education, which are important for poverty reduction, although this channel is not observed directly in the data used in this paper.

Poverty estimates for Nigeria differ because they use different concepts, lines and survey years, so they are not directly comparable. Monetary poverty measures the share of the population whose consumption falls below a line, which may be a national line or an international line such as US$1.90 or US$2.15 per day. Multidimensional poverty measures overlapping deprivations in health, education and living standards and is not a measure of income or consumption. The two can give very different headcounts for the same year. Table 1 sets out the estimates cited in this paper, with the concept each one measures.

Table 1:
Poverty Estimates Cited In This Paper And The Concept Each Measures

Estimate	Concept	Reference year	Source	Used in the model?
Poverty above 60% by the mid-1990s	Monetary, international line (US$1.90/day)	Mid-1990s	World Bank	No (context)
70.8% headcount at national lines	Monetary, national line	2010	NBS	No (context)
42–46%	Monetary	2009	World Bank (various years)	No (context)
40.1% below the national poverty line	Monetary, national line	2022	NBS	No (context)
63% (133 million) multidimensionally poor	Multidimensional (MPI)	2022 report	NBS & OPHI (2022)	No (context)
62% projected by 2026 (139–141 million)	Multidimensional	Projection	PwC (2026); World Bank (2025)	No (context)
Poverty headcount ratio (% of population)	Monetary	2000–2024, annual	World Bank	Yes: dependent variable (POV)

Source: Authors' Compilation, 2026.

This paper uses a monetary measure throughout: the poverty headcount ratio (percentage of the population below the poverty line), denoted POV. Multidimensional poverty estimates and regional breakdowns are cited only to describe the context and are not used in the econometric analysis.

Despite debt relief in the mid-2000s, Nigeria's debt profile has deteriorated again, and servicing costs now absorb more than 40 per cent of projected revenue. Poverty remains high on both monetary and multidimensional measures (Table 1). Evidence on how the components of the debt profile relate to poverty in Nigeria is mixed: some studies report adverse associations of debt with poverty or welfare (Onyekwelu & Uzonwanne, 2024; Eze & Nwosu, 2025), while the wider literature suggests that the effects depend on how debt is used, how it is serviced and the macroeconomic environment. The paper asks a narrower question: how are public debt, debt service and external debt associated with poverty in Nigeria in the short run and the long run, after allowing for inflation and the exchange rate?

2.0 Theoretical Framework and Literature Review

The debt overhang theory (Krugman, 1988; Sachs, 1989) holds that when expected future debt repayments exceed the country's expected capacity to pay, the debt acts as a tax on the returns from new investment, because future gains are expected to go to creditors. Investment, including projects with positive net present value, is then delayed or abandoned, growth falls and poverty reduction slows (Ndulu, 1995; Reinhart & Rogoff, 2010). A large debt stock also signals possible fiscal distress, which can raise expected inflation, taxation and exchange-rate instability and discourage foreign direct investment (Zampier et al., 2023).

The central mechanism of the theory is reduced investment. This study does not include an investment variable, so it does not test that mechanism directly. The debt variables are used as indicators of the conditions under which an overhang would be expected: a high ratio of public debt to GDP and a large external debt stock indicate the size of the claim by creditors on future output, and a high debt service ratio indicates the current claim on revenue. A positive association of these variables with poverty is consistent with an overhang, but it is also consistent with other explanations, and the study cannot distinguish them. The investment channel can be tested by adding gross fixed capital formation (percentage of GDP) as a variable or as a mediating equation, which is proposed as an extension in future researches.

Two other perspectives complement the overhang theory. The crowding-out or liquidity argument holds that debt service reduces the resources available for health, education and social protection, which affect poverty with a lag. The Keynesian argument holds that borrowing finances spending that raises demand and incomes in the short run, which would reduce poverty in the short run. Together these suggest that the sign of the association depends on the horizon: a negative short-run association for public debt, and positive long-run associations for debt service and external debt.

The two control variables have separate theoretical roles. Inflation is expected to raise poverty because it reduces the purchasing power of households with fixed or low incomes, and the poor are more exposed because they spend a larger share of income on food (Easterly & Fischer, 2001). The exchange rate (naira per US dollar) affects the cost of imported goods and raises the naira value of external debt and debt service when the naira depreciates, so depreciation is expected to be positively associated with poverty and with the debt burden. Including both prevents debt coefficients from capturing these macroeconomic effects.

Empirical Review

Fewer studies examine poverty than growth. Loko, Mlachila, Nallari and Kalonji (2003) examined the relationship between external indebtedness and poverty in low-income countries and found that high debt burdens are associated with worse poverty outcomes, operating through lower growth and reduced scope

for social spending. Dessy and Vencatachellum (2007) examined whether debt relief increased spending on social services in African countries, which is the link between debt service and the resources available for poverty reduction. The study found that debt relief has insignificant positive impact on poverty. For Nigeria, Onyekwelu and Uzonwanne (2024) used a vector autoregression to examine the effect of public debt on poverty and found that public debt has an adverse implication on poverty in the long run.

Since the debt overhang mechanism operates through investment, evidence on channels is relevant. Pattillo, Poirson and Ricci (2002) found a nonlinear relationship in which high external debt is associated with lower growth, and Pattillo et al. (2004) examined the channels, including physical capital accumulation and productivity growth. Clements, Bhattacharya and Nguyen (2003) reported evidence that external debt service is associated with lower public investment in low-income countries, which would reduce growth and, indirectly, poverty reduction. For Nigeria and South Africa, Ayadi and Ayadi (2008) examined the effect of external debt on economic growth.

A larger literature examines public debt and growth, and its findings help to explain why the poverty effects may be mixed. Reinhart and Rogoff (2010) reported lower growth at high debt ratios. Studies that estimate thresholds differ widely: Vaca et al. (2020) reported an inverted-U relationship with a threshold of 27 per cent of GDP for Mexico over 1994–2016, Sanusi et al. (2019) reported a threshold of 57 per cent for 16 SADC countries over 1998–2016, Saeed and Islam (2018) reported a negative effect above 61 per cent for four South Asian countries, and Attard (2019) recommended a ceiling of 60 per cent for 25 European economies. Butkus and Seputiene (2018) found that the turning point depends on government effectiveness, which supports treating governance as a conditioning factor, and Eberhardt and Presbitero (2015) found that the long-run effects differ across countries, so that policies copied from one country may be inappropriate for another.

Kumar and Woo (2015) found an inverse association between high debt and growth, and Panizza and Presbitero (2013) examined whether the effect is causal. Odejimi and Ozor (2018) found that growth in West Africa did not respond significantly to debt when country differences were allowed for, Gómez-Puig and Sosvilla-Rivero (2017) found a negative long-run and positive short-run effect in the euro area, and Beqiraj et al. (2018) examined debt sustainability in European countries. For Ghana, Aimola and Odhiambo (2018) found that public and private debt thresholds had been exceeded since 2013, and Murungi and Okiro (2018) reviewed positive and negative effects of government debt in Kenya.

For Nigeria, Awe et al. (2014) found a significant negative association between national debt and growth, Omotosho, Bawa and Doguwa (2016) estimated an overall debt threshold of 73.7 per cent of GDP (49.4 per cent for external and 30.9 per cent for domestic debt), and Henry (2013) concluded that debt service had become a burden for development. Elom-Obed et al. (2017), Omodero (2019) and Adepoju, Salau and Obayelu (2007) examined public or external debt and growth or development in Nigeria, and the evidence supports a concern that mismanaged borrowing reduces welfare. These studies use growth, not poverty, as the outcome.

The review shows that the evidence on growth is extensive and mixed, that evidence on poverty is limited, and that studies on the investment channel are mainly for other countries. The gap this study addresses is therefore a poverty-based, Nigeria-specific test of three components of the debt profile, with inflation and the exchange rate as controls, using a framework that separates short-run and long-run effects and reports lagged effects. The study does not claim to test the investment mechanism of debt overhang, governance or debt allocation, and these remain areas for further research.

3.0 Methodology

The study adopts an ex-post facto design, which is non-experimental and suited to analysing historical annual data on public debt, debt service and poverty. It uses annual secondary time-series data for 2000–2024 (25 observations) from the Central Bank of Nigeria Statistical Bulletin, the National Bureau of Statistics and the International Monetary Fund. The sample of 25 annual observations is reduced to 23 effective observations in the ARDL estimation by the lag structure; the reported R^2 and adjusted R^2 of the ECM are consistent with 23 observations. The baseline ARDL has 17 parameters, which leaves six residual degrees of freedom.

Model Specification

For a time-series study of this nature, the Autoregressive Distributed Lag (ARDL) model is highly suitable and is employed in investigating the Nigerian debt-poverty nexus. It handles mixed stationarity (I(0) or I(1) variables), small samples, and distinguishes short-run vs. long-run effects perfect for debt variables that may have lagged impacts on poverty. The functional specification:

$$POV_t = f(DEBT_t) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots i$$

Where:

POV_t = Poverty headcount ratio (% of population) in period t (dependent variable).

$DEBT_t$ = Debt profile decomposed into public debt-to-GDP ratio (%); debt service-to-revenue ratio (%); and external debt stock as % of GDP to match the specific objectives.

The econometric model is presented and expanded as:

$$POV_t = \beta_0 + \beta_1 PUBDBT/GDP_t + \beta_2 DSR_t + \beta_3 EXTDT/GDP_t + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots ii$$

The estimated model is in levels, hence coefficients are therefore interpreted as the change in the poverty headcount (in percentage points) associated with a one-unit change in the regressor, and not as elasticities. The ARDL model in unrestricted error-correction form (Pesaran, Shin & Smith, 2001) is:

$$\begin{aligned}\Delta POV_t = {} & \alpha_O + \sum_{i=1}^{P} \beta_1 \Delta POV_{t-1} + \sum_{i=0}^{p} \beta_2 \Delta \frac{\text{PUBDBT}}{\text{GDP}}_{t-1} + \sum_{i=0}^{p} \beta_3 \Delta DSR_{t-1} + \sum_{i=0}^{p} \beta_4 \Delta \frac{\text{EXTDT}}{\text{GDP}}_{t-1} \\ & + \sum_{i=0}^{p} \beta_5 \Delta EXR_{t-1} + \sum_{i=0}^{p} \beta_6 \Delta \text{INFL}_{t-1} + \lambda_1 POV_{t-1} + \lambda_2 \frac{\text{PUBDBT}}{\text{GDP}}_{t-1} + \lambda_3 DSR_{t-1} \\ & + \lambda_4 \frac{\text{EXTDT}}{\text{GDP}}_{t-1} + \lambda_4 EXR_{t-1} + \lambda_5 \text{INFL}_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots iii\end{aligned}$$

Where:

Δ = First difference operator

p, q1...q4 = Lag lengths

α_i = Short-run coefficients

γ_i = Long-run coefficients

ε_t = Error term

If cointegration is established, the study proceeds to estimate the Error Correction Model (ECM), which captures the short-run dynamics and the speed of adjustment to long-run equilibrium. The ECM is specified as:

$$\Delta POV_t = \alpha_O + \sum_{j=1}^{p} \alpha_j \Delta POV_{t-j} + \sum_{k=0}^{q} \beta_k \Delta \text{PUBDBT/GDP}_{t-k} + \sum_{k=0}^{q} \phi_k \Delta DSR_{t-k} + \sum_{k=0}^{q} \pi_k \Delta \text{EXTDT/GDP}_{t-k} + \sum_{k=0}^{q} \phi_k \Delta EXR_{t-k} + \sum_{k=0}^{q} \pi_k \Delta \text{INFL}_{t-k} + \varphi ECT_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots \text{iv}$$

Where:

Δ = First difference operator
φ = Coefficient of the error correction term (ECT)
ECT_{t-1} = Lagged error correction term
α_i = Short-run coefficients
ε_t = Error term

Estimation Strategy

First, the order of integration of each variable is established with the Augmented Dickey–Fuller and Phillips–Perron tests. The ARDL bounds test allows a mixture of I(0) and I(1) variables but requires that none is integrated of order two, so the unit-root results are needed to justify its use. Second, the existence of a level relationship is tested with the ARDL bounds test, which is the primary test because the model is a single equation with POV as the dependent variable. Third, the Johansen test (Johansen, 1988, 1991) is reported as a complementary check on the number of cointegrating relationships. It is included because the ARDL approach assumes a single cointegrating relationship, and the Johansen test can indicate whether more than one exists. The Johansen test requires all variables to be I(1) and is a system method whose small-sample properties are weak when many variables and lags are estimated relative to the number of observations (Cheung & Lai, 1993), so it is treated as supporting evidence and not as the main test. Fourth, the long-run coefficients and the error-correction model are estimated. Fifth, diagnostic tests (Breusch–Godfrey, Breusch–Pagan–Godfrey, Ramsey RESET and CUSUM) are applied.

4.0 Analysis and Discussion Of Findings

Before estimating the ARDL model, it is essential to test for the stationarity of the variables to determine their order of integration. Stationarity testing is a prerequisite for time-series analysis to avoid spurious regression results. The study employs two complementary unit root tests: the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test.

Unit-Root Tests

Table 2 reports the Augmented Dickey–Fuller and Phillips–Perron tests. The results show that the variables do not have a common order of integration. POV is stationary in levels (ADF −5.18, PP −5.18 against a 5 per cent critical value of about −2.99), so it is I(0). PUBDBT_GDP, DSR and EXTDBT_GDP are non-stationary in levels and stationary in first differences, so they are I(1). INFL is borderline: the null of a unit root is not rejected at 5 per cent with a constant (ADF −2.74, PP −2.83) but is rejected at 10 per cent, and its first difference is stationary, so it is treated as I(0) or I(1). The exchange rate is non-stationary in levels and in first differences (ADF 0.46, PP 0.94), and its second difference is stationary only at the 10 per cent level (ADF −2.87 against a 10 per cent critical value of −2.66), so it appears to be integrated of order two. This reflects the accelerating depreciation, including the 2024 observation, and it persists when 2024 is excluded (first-difference ADF −2.12).

Table 2:
Unit-Root Test Results

Variable	ADF level (C)	ADF level (C+T)	ADF 1st difference (C)	PP level (C)	PP 1st difference (C)	Order of integration
POV	−5.181***	−6.535***	−6.527***	−5.183***	−14.278***	I(0)
PUBDBT_GDP	−0.866	−3.398	−5.341***	−0.414	−7.681***	I(1)
DSR	0.863	−2.037	−4.263***	1.134	−4.245***	I(1)
EXTDBT_GDP	0.317	−2.543	−5.569***	1.264	−6.096***	I(1)
EXR	4.136	3.276	0.462	4.065	0.937	I(2)
INFL	−2.739	−2.968	−4.433***	−2.831	−7.840***	I(0)/I(1), borderline

Source: Authors' Computation using E-views 12
Note: *** denotes rejection of a unit root at 1%. ADF lag length by the Schwarz criterion (maximum 3); PP with a Bartlett kernel and 3 lags. 5% critical values (MacKinnon): about −2.99 with a constant and −3.61 with constant and trend.

These results matter for both cointegration procedures. The Johansen procedure requires all variables to be I(1), which is not the case here, because POV is I(0) and the exchange rate is I(2). The ARDL bounds test allows a mixture of I(0) and I(1) variables but requires that none is I(2) and that the dependent variable is I(1) for the F-test to indicate cointegration; the exchange rate is a likely I(2) variable, and the dependent variable is I(0). A stationary dependent variable is stationary on its own, so a significant coefficient on its lagged level does not show that it is related to the regressors in the long run. Hence, the cointegration results in section 4.2 are therefore reported as they come out of the procedures but are interpreted as indicative, not as evidence of a long-run relationship.

Cointegration Tests
The baseline model is the ARDL (1,2,2,2,2,2) specification. The reported ECM coefficients were reproduced exactly from this specification on the 2002–2024 sample (23 observations), which confirms the selected order. It has 17 parameters (the intercept, one lag of POV and three terms for each of five regressors), so only six residual degrees of freedom remain. An information-criterion search over all 486 combinations with at most two lags selects a more parsimonious ARDL (1,1,2,2,0,2), with 14 parameters, and results for that specification are reported in Section 4.6.

Table 3:
ARDL Bounds Test, ARDL (1,2,2,2,2,2), K = 5, Unrestricted Intercept and No Trend

Statistic	Value	Level	Lower bound I(0)	Upper bound I(1)	Decision
F, all lagged levels (θ0 to θ5)	7.050	10%	3.407	5.633	Above upper bound
		5%	4.680	7.597	Inconclusive
		1%	8.841	14.243	Below lower bound
t, lagged POV (θ0)	−4.796	10%	−2.361	−3.909	Beyond upper bound
		5%	−2.955	−4.639	Beyond upper bound
		1%	−4.524	−6.666	Inconclusive
F, lagged regressors only (θ1 to θ5)	1.815	10%	3.467	5.461	Below lower bound
		5%	4.826	7.378	Below lower bound

Source: Authors' Computation using E-views 12

The F-statistic of 7.05 exceeds the upper bound at 10 per cent but lies between the bounds at 5 per cent (4.68 and 7.60), so the test is inconclusive at 5 per cent. The t-statistic on the lagged level of POV (−4.80) is beyond the upper bound at 5 per cent. The F-test on the lagged levels of the regressors alone (1.81), however, is below the lower bound at every level. A significant coefficient on the lagged dependent variable combined with jointly insignificant lagged regressors is the degenerate case identified by Pesaran et al. (2001): it indicates that the dependent variable is stationary on its own, which agrees with the unit-root result for POV, and it does not indicate a long-run relationship with the debt variables. For the more parsimonious ARDL (1,1,2,2,0,2), the F-statistic (11.31) and t-statistic (−5.99) are significant, but the F-test on the lagged regressors (3.83) is between the bounds at 5 per cent (3.75 and 6.17), so it is not conclusive either. The evidence therefore does not establish a long-run relationship between poverty and the debt variables.

Table 4 reports the Johansen test, estimated with one lagged difference (a VAR (2) in levels), an unrestricted constant and 23 observations; the reported eigenvalues and statistics were reproduced. The trace test rejects the null of no cointegration (p = 0.0001) and of at most one cointegrating relationship (p = 0.0099), and does not reject at most two (p = 0.0929), which indicates two cointegrating relationships. The maximum-eigenvalue test rejects no cointegration (p = 0.0045) but does not reject at most one (p = 0.0638), which indicates one relationship. Both tests agree that at least one cointegrating relationship exists, and they disagree on whether there is a second.

Table 4:
Johansen Cointegration Test Summary

Hypothesized no. of CE(s)	Eigenvalue	Trace statistic	5% critical value	Prob.	Max-eigen statistic	5% critical value	Prob.
None *	0.878773	126.3743	95.75366	0.0001	48.53213	40.07757	0.0045
At most 1 *	0.761583	77.84215	69.81889	0.0099	32.97587	33.87687	0.0638
At most 2	0.71097	44.86628	47.85613	0.0929	28.54817	27.58434	0.0375
At most 3	0.323066	16.31811	29.79707	0.6897	8.974163	21.13162	0.8345
At most 4	0.238307	7.343948	15.49471	0.538	6.260881	14.2646	0.58
At most 5	0.045998	1.083067	3.841465	0.298	1.083067	3.841465	0.298

Source: Authors' Computation using E-views 12

The difference arises because the two statistics test different alternatives. The trace test examines the null of r or fewer relationships against any larger number, and the maximum-eigenvalue test examines r against exactly r + 1. The maximum-eigenvalue statistic for "At most 1" (32.98) falls just below its critical value (33.88), so the two tests diverge by a small margin. The sequential procedure stops at the first non-rejection, which supports r = 1 under the maximum-eigenvalue test. The maximum-eigenvalue statistic for "At most 2" (28.55) exceeds its critical value (27.58, p = 0.0375), which is inconsistent with the sequential result and shows that the evidence on rank is fragile. Simulation evidence suggests that the trace test often has better small-sample properties (Lütkepohl, Saikkonen & Trenkler, 2001), but both tests over-reject in small samples with many variables (Cheung & Lai, 1993), and the sample here has 23 observations and six variables.

The Johansen result must also be read with the unit-root findings in mind. Because POV is stationary, a system that contains it has at least one stationary linear combination (POV itself), so the finding of at least one cointegrating relationship is expected whatever the relationship between POV and the debt variables,

and the presence of an I(2) exchange rate violates the assumptions of the test. The study adopts one cointegrating relationship for estimation, because the ARDL is a single-equation model that identifies only one, because the maximum-eigenvalue test supports it, and because it is the more conservative choice. The Johansen test is treated as supporting evidence only, and it does not offset the bounds-test result in table 3.

Long-Run Estimates

Based on the result in table 5, none of the long-run coefficients is significant at 5 per cent. The coefficient on public debt-to-GDP is negative (−0.538) and significant only at 10 per cent (p = 0.067), which is the opposite of the positive sign that debt overhang would predict. The coefficients on debt service (−0.057) and external debt (0.180) are small and insignificant, and the coefficients on the exchange rate and inflation are close to zero.

Table 5:
Long-Run Coefficients (Dependent Variable: POV), ARDL (1,2,2,2,2,2)

Variable	Coefficient	Std. error (delta method)	t-statistic	Prob.	Expected sign	Sign as expected?
PUBDBT_GDP	−0.5377	0.2410	−2.231	0.0671	+	No
DSR	−0.0572	0.1152	−0.497	0.6369	+	No (insignificant)
EXTDBT_GDP	0.1804	0.1967	0.917	0.3946	+	Yes (insignificant)
EXR	0.0026	0.0293	0.090	0.9310	+	Yes (insignificant)
INFL	−0.2002	0.8507	−0.235	0.8218	+	No (insignificant)
Constant	21.0369	13.0328	1.614	0.1576		

Source: Authors' Computation using E-views 12

The F-tests of the null that the lagged levels of each variable have no joint effect (θk = 0) give p = 0.040 for public debt, 0.619 for debt service, 0.354 for external debt, 0.931 for the exchange rate and 0.818 for inflation. Only public debt is significant by this test, and its negative sign is not consistent with the debt-trap argument. Given the degenerate-case finding in table 3, the long-run coefficients should not be read as evidence of a long-run relationship. The earlier statement that debt service worsens poverty in the long run is not supported by these estimates.

Error-Correction Model: Short-Run Dynamics

Table 6 reports the ECM. The coefficients are those reported by EViews and were reproduced from the ARDL (1,2,2,2,2,2) model.

Table 6:
Error-Correction Model: Short-Run Results (Dependent Variable: ΔPOV)

Variable	Coefficient	ECM regression: std. Error	ECM regression: prob.	ARDL-based: std. error	ARDL-based: prob.
D(PUBDBT_GDP)	−0.3247	0.0944	0.0138	0.2005	0.157
D(PUBDBT_GDP(−1))	0.0036	0.0983	0.9722	0.1604	0.983
D(DSR)	−0.0801	0.0346	0.0599	0.0868	0.392
D(DSR(−1))	0.1630	0.0326	0.0025	0.0848	0.103
D(EXTDBT_GDP)	0.1616	0.0395	0.0065	0.1136	0.205
D(EXTDBT_GDP(−1))	−0.1898	0.0343	0.0015	0.1106	0.137

Variable	Coefficient	ECM regression: std. Error	ECM regression: prob.	ARDL-based: std. error	ARDL-based: prob.
D(EXR)	0.0006	0.0062	0.9231	0.0116	0.959
D(EXR(−1))	0.0144	0.0497	0.7815	0.1174	0.906
D(INFL)	1.1206	0.2374	0.0033	0.4086	0.034
D(INFL(−1))	1.3857	0.2780	0.0025	0.6253	0.069
CointEq(−1)	−1.2491	0.1355	0.0001	0.2604	0.003
R^2 / adjusted R^2 (ECM regression)	0.9332 / 0.8775				
Durbin–Watson	2.2328				
Observations / residual d.f. (ARDL)	23 / 6				

Source: Authors' Computation using E-views 12

The table gives two sets of standard errors and p-values. The first are those of the ECM regression, in which the error-correction term is treated as known; they ignore the fact that the long-run coefficients used to build the term are themselves estimated from the same 23 observations. The second are taken from the unrestricted ARDL regression, which accounts for this and has six residual degrees of freedom; they are the more reliable guide to significance. The reported R^2 of 0.9332 and adjusted R^2 of 0.8775 refer to the ECM regression; the unrestricted ARDL regression has an R^2 of 0.859 and an adjusted R^2 of 0.483.

The error-correction coefficient is −1.249. Its conventional significance is not a valid test of cointegration, because the term is built from estimated long-run coefficients; the bounds t-test in Table 3 is the appropriate test, and its interpretation is qualified by the degenerate-case result. A coefficient below −1 means that the adjustment overshoots the equilibrium. Since the model has one lag of POV, the coefficient equals the AR coefficient minus one, so the AR coefficient is −0.249: the inverse root of the characteristic polynomial of the ARDL model is −0.249, which lies inside the unit circle, so the dynamics are stable and the equilibrium error shrinks by roughly 75 per cent a year while changing sign. The stability condition is therefore met.

Short-Run Coefficients

When the standard errors of the ECM regression are used, most short-run coefficients appear significant. When the standard errors from the unrestricted ARDL regression are used, which account for the estimation of the long-run coefficients and the six degrees of freedom, the picture changes. The contemporaneous change in inflation remains significant at 5 per cent (1.121, p = 0.034) and its lagged change is significant at 10 per cent (1.386, p = 0.069). All other short-run coefficients, including those on public debt (−0.325, p = 0.157), the lagged change in debt service (0.163, p = 0.103) and the contemporaneous (0.162, p = 0.205) and lagged (−0.190, p = 0.137) changes in external debt, are not significant at 10 per cent. Table 9 tests the net short-run effect of each variable (the sum of the contemporaneous and lagged coefficients) and the joint significance of the two terms.

Table 7:

Wald Tests on The Short-Run Coefficients (ARDL Regression, 6 Residual Degrees Of Freedom)

Variable	Net effect (sum of current and lagged)	F (net effect = 0)	Prob.	F (both terms = 0)	Prob.
PUBDBT_GDP	−0.3212	1.370	0.286	1.345	0.329
DSR	+0.0829	1.580	0.256	2.031	0.212

Variable	Net effect (sum of current and lagged)	F (net effect = 0)	Prob.	F (both terms = 0)	Prob.
EXTDBT_GDP	−0.0282	0.113	0.748	1.506	0.295
EXR	+0.0150	0.015	0.905	0.008	0.992
INFL	+2.5062	9.070	0.024	4.959	0.054

Source: Authors' Computation using E-views 12

The net effect of inflation is +2.506 (F = 9.07, p = 0.024): a one-percentage-point rise in inflation is associated with about 2.5 percentage points higher poverty headcount over two years, and this is the only net effect significant at 5 per cent. The net effects of public debt (−0.321, p = 0.286), debt service (+0.083, p = 0.256), external debt (−0.028, p = 0.748) and the exchange rate (+0.015, p = 0.905) are not significant.

Diagnostic Tests

The Durbin–Watson statistic (2.2328) is not used as evidence on serial correlation, because it is biased towards 2 when a lagged dependent variable is present. The Breusch–Godfrey LM test with two lags gives p = 0.078, so the null of no serial correlation is not rejected at 5 per cent, but the margin is small and the standard errors may be understated if serial correlation is present; the one-lag test gives p = 0.310. The residuals are consistent with homoskedasticity (p = 0.880) and normality (p = 0.258).

Table 8:
Diagnostic Test Results (ARDL (1,2,2,2,2,2))

Test	Null hypothesis	Statistic	Prob.	Result at 5%
Breusch–Godfrey LM(2)	No serial correlation	5.1026 (Obs*R^2)	0.0780	Not rejected, but close to 5%
Breusch–Godfrey LM(1)	No serial correlation	1.0326 (Obs*R^2)	0.3095	Not rejected
Breusch–Pagan–Godfrey	Homoskedasticity	9.7323 (Obs*R^2)	0.8802	Not rejected
Jarque–Bera	Normal residuals	2.7089	0.2581	Not rejected
Ramsey RESET (F)	Correct specification	1.0551	0.3514	Not rejected
Ramsey RESET (likelihood ratio)	Correct specification	4.4037	0.0359	Rejected
CUSUM	Parameter stability	Max. ratio to bound 0.359	5% bands	Within bounds (6 recursive residuals only)
CUSUM of squares	Parameter stability	Max. deviation 0.421	Bound ≈ 0.859	Within bounds (6 recursive residuals only)

Source: Authors' Computation using E-views 12

The two versions of the RESET test give different results: the F-version does not reject correct specification (p = 0.351) and the likelihood-ratio version rejects it at 5 per cent (p = 0.036). The F-version is usually preferred in small samples because it adjusts for degrees of freedom, whereas the likelihood-ratio version relies on large-sample theory and tends to over-reject. This is a reason to give more weight to the F-version, but it does not remove the conflict. In the more parsimonious ARDL (1,1,2,2,0,2), the F-version again does not reject (p = 0.257) and the likelihood-ratio version again rejects (p = 0.047), so the conflict is not an artefact of the large number of parameters.

The CUSUM and CUSUM of squares statistics stay within their bounds, but because the model has 17 parameters and 23 observations, only six recursive residuals can be computed, so the tests have almost no

power and cannot be taken as evidence of stability. For the parsimonious model, nine recursive residuals are available and the statistics also stay within their bounds.

Tests of Hypotheses

The hypotheses are tested at the 5 per cent level using the long-run coefficient (Table 5), the F-test of the lagged levels ($\theta k = 0$) and the Wald test of the net short-run effect (Table 7). Based on the results, the evidence for a relationship between any debt variable and poverty is weak. For debt service and external debt, the null of no effect is not rejected in the long run or in the short run.

Table 9:
Hypothesis Tests

Hypothesis	Variable	Long-run coefficient (prob.)	F-test, $\theta k = 0$ (prob.)	Net short-run effect (prob.)	Decision at 5%
H01	PUBDBT_GDP	−0.538 (0.067)	6.86 (0.040)	−0.321 (0.286)	Not rejected on the long-run t-test; rejected on the F-test; negative sign; short run insignificant
H02	DSR	−0.057 (0.637)	0.27 (0.619)	+0.083 (0.256)	Not rejected
H03	EXTDBT_GDP	0.180 (0.395)	1.01 (0.354)	−0.028 (0.748)	Not rejected

Source: Authors' Computation using E-views 12

For public debt-to-GDP, the long-run coefficient is significant at 5 per cent on the F-test ($p = 0.040$) but not on the delta-method t-test ($p = 0.067$), the sign is negative, and the short-run effect is insignificant, so the evidence is mixed and goes against the expected sign. The three debt variables are almost collinear, so these tests have little power to separate their effects.

Robustness

The long-run coefficients on debt service and external debt are insignificant, with no stable sign, in every specification. Public debt has a negative coefficient in all specifications, significant at 5 per cent in the parsimonious model (-0.528) and when 2024 is excluded (-0.584), but not in the baseline ($p = 0.067$) or the smallest model ($p = 0.162$); its sign is never positive. Inflation is insignificant in the long run in the ARDL specifications with lags and is positive and significant at 10 per cent in the model without lagged terms (0.704, $p = 0.054$) and at 5 per cent in the static regression (1.015, $p = 0.024$). The exchange rate is insignificant throughout

Table 10:
Long-Run Coefficients Under Alternative Specifications (P-Values in Parentheses)

Specification	PUBDBT_GDP	DSR	EXTDBT_GDP	EXR	INFL	Speed of adjustment	Residual d.f.
Baseline ARDL (1,2,2,2,2,2)	−0.538 (0.067)	−0.057 (0.637)	0.180 (0.395)	0.003 (0.931)	−0.200 (0.822)	−1.249	6
AIC/SIC-selected ARDL (1,1,2,2,0,2)	−0.528 (0.015)	−0.064 (0.481)	0.192 (0.222)	0.000 (0.965)	−0.144 (0.813)	−1.249	9
Same, excluding 2024	−0.584 (0.028)	−0.060 (0.530)	0.180 (0.279)	0.015 (0.623)	−0.385 (0.640)	−1.233	8
ARDL (1,0,0,0,0,0)	−0.165 (0.162)	0.040 (0.256)	−0.014 (0.799)	−0.005 (0.545)	0.704 (0.054)	−1.344	16

Specification	PUBDBT_GDP	DSR	EXTDBT_GDP	EXR	INFL	Speed of adjustment	Residual d.f.
Static OLS in levels (not an ARDL)	−0.134 (0.398)	0.030 (0.534)	0.005 (0.945)	−0.010 (0.309)	1.015 (0.024)	n/a	19

Source: Authors' Computation using E-views 12

The speed of adjustment is below -1 in all ARDL specifications, which indicates that it reflects the saw-tooth behaviour of the poverty series. The pattern of results is the same across specifications: no debt variable shows a robust positive association with poverty, and inflation is the only variable that is repeatedly associated with poverty.

Discussion of Findings

The empirical analyses are discussed as follows. The study does not find a robust association of debt service or external debt with poverty. In the unrestricted ARDL, where standard errors reflect the estimated long-run relationship, none of the contemporaneous or lagged changes in the three debt variables is significant at 5 per cent, and the net effects are small and insignificant. The short-run results that appeared significant in the ECM regression (a negative association with public debt, a positive lagged association with debt service, and offsetting contemporaneous and lagged associations with external debt) do not survive the more conservative standard errors. They are therefore consistent with neither a debt-trap interpretation nor with short-run relief from borrowing. The negative long-run coefficient on public debt-to-GDP is the opposite of the sign predicted by debt overhang. It may reflect the effect of rising GDP on the debt ratio, or the fact that periods of lower debt-to-GDP coincide with episodes of high measured poverty in this series, and it should not be read as evidence that borrowing reduces poverty. Because the three debt variables are almost perfectly collinear, the insignificance of each does not show that debt as a whole is unrelated to poverty; it shows that the data cannot separate their effects.

Inflation. Inflation is the only variable with a significant association with poverty. The net short-run effect is +2.51 percentage points ($p = 0.024$), and the static and no-lag specifications also show a positive coefficient. This is consistent with the argument that inflation erodes the real incomes of poor households, who spend a large share of income on food (Easterly & Fischer, 2001). The magnitude is large and may be influenced by the volatility of the poverty series, and the long-run coefficient is insignificant.

The bounds and Johansen results do not establish a long-run relationship between poverty and the debt variables. The bounds test indicates that POV is stationary on its own, the lagged debt variables are not jointly significant in the baseline model, and the Johansen test is invalid in the presence of a stationary variable and an I (2) exchange rate. The error-correction coefficient of -1.249 reflects the alternating pattern of the poverty series, not an economic adjustment process.

Taken together, the evidence does not support the conclusion that Nigeria's debt profile is associated with higher poverty, and it does not support the opposite conclusion either. It indicates that inflation is more closely related to poverty than any single debt variable in this sample, and that the data are not able to support strong claims about debt. The earlier conclusion that the debt strategy is at odds with poverty reduction goes beyond what the results show.

5.0 Conclusion and Recommendations

The paper examined the association between Nigeria's debt profile and poverty over 2000–2024 using the ARDL framework, with the Johansen test as a complementary check. The evidence does not establish a long-run relationship between poverty and the debt variables. The bounds F-statistic is inconclusive at 5 per cent, the F-test on the lagged regressors falls below the lower bound, and the poverty series is stationary

on its own, which indicates a degenerate case. None of the long-run coefficients on public debt, debt service or external debt is significant at 5 per cent on the delta-method test, and the public debt coefficient has the opposite sign to that predicted by debt overhang. In the short run, once the standard errors are corrected for the estimation of the long-run relationship, only inflation is significantly associated with poverty (net effect +2.51 percentage points, $p = 0.024$), and the changes in debt variables are not. The error-correction coefficient of −1.249 implies damped oscillating adjustment with a stable AR root (−0.249) but reflects the alternating pattern of the poverty series. The findings are conditional associations and not causal effects, and they are qualified by the volatile poverty series, the near-collinearity of the debt variables, the uncertain orders of integration and the small sample.

The estimates do not support strong policy conclusions about debt. The recommendations below rest on the one consistent association in the results (inflation) and on the wider literature, and they are offered with these caveats.

i. The Central Bank of Nigeria and the Ministry of Finance should coordinate monetary tightening with fiscal discipline, so that borrowing does not add to price pressures, since inflation is the variable most consistently associated with poverty in this study.
ii. Government should continue to prefer low-interest, long-tenor concessional loans and to deepen domestic capital markets, and should report debt service alongside social spending, to limit the debt service burden and protect allocations to health, education and social protection.
iii. The National Bureau of Statistics, the Debt Management Office and the Central Bank of Nigeria should publish consistent, documented annual series on poverty, debt service and external debt, with clear definitions and units, so that the relationship between debt and poverty can be tested with reliable data.

Limitations

i. Debt service and external debt are correlated at 0.99 (variance inflation factors above 60), and public debt correlates at 0.93 and 0.94 with them. Their separate effects cannot be identified.
ii. POV is I(0) and the exchange rate appears to be I(2), which violates the assumptions of the bounds test and the Johansen test. The cointegration results are indicative only.
iii. The baseline ARDL (1,2,2,2,2,2) has 17 parameters on 23 observations, leaving six residual degrees of freedom, so standard errors are imprecise and tests have low power. The ECM-regression standard errors understate uncertainty. The diagnostics give a borderline serial-correlation result ($p = 0.078$) and a conflicting functional-form result (RESET likelihood ratio $p = 0.036$), and the CUSUM tests are uninformative with six recursive residuals.
iv. The trace and maximum-eigenvalue tests disagree on the number of relationships, and the single-equation ARDL can identify only one.

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