

Effect of External Debts and Foreign Exchange Reserve on Inflation in Nigeria

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Abstract

The study examines the effect of external debts and foreign exchange reserve on inflation rate in Nigeria from 2008 to 2024. Using the Ex post facto research design, quarterly time series data were extracted from the Central Bank of Nigeria's statistical bulletin 2024. ARDL test was also used based on the unit root test result. The result showed that external debts had a negative significant effect on inflation rate in Nigeria, while foreign exchange reserve had a positive significant effect on inflation rate in Nigeria. The study recommends that government should adopt more cautious external borrowing strategies, focusing on concessional loans or those that finance productive investment rather than recurrent expenditure. This will help reduce the inflationary pressures associated with debt accumulation. While building foreign exchange reserves is important, authorities should ensure that reserve accumulation does not translate into excessive liquidity in the domestic economy. Sterilization mechanisms or coordinated monetary interventions may be necessary to mitigate short-run inflationary spillovers.

Keywords: External Debts, Foreign Exchange Reserve, Inflation Rate, Nigeria.

Introduction

Around the world, developed economies have faced inflationary pressures associated with significant fiscal deficits. In the 1980s and 1990s, rampant deficit financing led to hyperinflation in nations such as Argentina and Brazil. In contrast, advanced economies such as the United States and Japan have effectively managed high levels of debt with relatively low inflation due to robust institutional frameworks, well-established financial markets, and trustworthy monetary policy (Durguti, 2020). Furthermore, the COVID-19 pandemic has reignited global discussions on deficit financing, as governments worldwide ramped up spending to assist households and businesses. In both the U.S. and Europe, this surge in fiscal spending, along with supply chain disruptions, contributed to a significant increase in inflation rates, underscoring the inflationary dangers of deficit financing in specific circumstances. Thus, the inflationary impact of deficit financing is often more pronounced due to limited access to revenue and a higher reliance on central bank financing. This underscores the importance of fiscal discipline and credible institutions in managing inflation expectations (Onyedibe et al, 2021).

The relationship between Nigeria's external debt and inflation rate presents a complex economic dynamic. Nwannebuike et al (2016) indicated that the impact of external debt on inflation is contingent upon the nature and utilization of the borrowed funds. Research analyzing data from 2008 to 2023 reveals that bilateral debts often tied to specific capital projects tend to have a

negative and significant effect on inflation. In contrast, multilateral debts, which may come with stringent conditions, exhibit a positive and significant relationship with inflation. This suggests that when external borrowings are channeled into productive investments, they can help stabilize prices. However, if such debts are used for recurrent expenditures or are not efficiently managed, they may exacerbate inflationary pressures (Obioha, 2018).

Foreign exchange reserves play a pivotal role in influencing inflation dynamics. These reserves, comprising foreign currencies, gold, and other assets held by the Central Bank of Nigeria (CBN), are instrumental in stabilizing the naira, managing external shocks, and ensuring liquidity for imports. When reserves are ample, they bolster the CBN's capacity to defend the naira against volatility, thereby curbing imported inflation. Conversely, dwindling reserves can precipitate currency depreciation, escalating the cost of imports and fueling inflationary pressures (Adler et al, 2021). Between 2022 and 2023, Nigeria's net FX reserves experienced a significant decline, reaching \$3.99 billion by the end of 2023. This contraction coincided with heightened inflation, which peaked at 34.8% in December 2024, driven by factors such as naira depreciation and elevated import costs (Central Bank of Nigeria, 2024).

In 2023, the Nigerian government implemented bold reforms, which include the removal of fuel subsidies and the unification of exchange rates. These measures aimed to reduce the budget deficit, which stood at 5.4% of GDP in 2022, by improving revenue generation and curbing excessive spending. However, these reforms also led to a sharp increase in inflation, which rose from 18.8% in 2022 to 24.5% in 2023. In 2024, inflationary pressures intensified, with the rate peaking at 34.8% in December. Key drivers included naira depreciation, elevated fuel and food prices, and insecurity in agricultural regions. Despite the adoption of mainstream monetary policies by raising the Monetary Policy Rate to 27.5% and halting Ways and Means financing to the government, inflation rate has continued to be on a rise in Nigeria (NBS, 2024).

This study seeks to examine the effect of external debts and foreign exchange reserve on inflation rate in Nigeria, as many studies looked at economic growth. This research seeks to fill that gap by examining the causal relationship and magnitude of the effect of external debts and foreign exchange reserve on inflation. Understanding this relationship is critical for policymakers to design sustainable fiscal strategies that balance developmental needs with price stability. Therefore, this study aims to investigate the effect of external debts and foreign exchange reserve on inflation rate in Nigeria, with a view to providing insights into the complex relationships between these variables and their implications for economic growth and development. The null hypotheses of this research are stated below:

Research Objectives

This main objective is to examine the effect of external debts and foreign exchange reserve on inflation rate in Nigeria

Research Questions

- i. Evaluate the effect of external debt on inflation rate in Nigeria.
- ii. Determine the effect of foreign exchange reserve on inflation rate in Nigeria

Research Hypotheses

H01: External debt has no significant effect on inflation rate in Nigeria.

H02: Foreign exchange reserves have no significant effect on inflation rate in Nigeria.

Literature Review

Concept of External Debt and Foreign Exchange Reserve

External debt can be defined as debt owed to non-residents repayable in terms of foreign currency, food, or service (World Bank, 2018). The external debt is debt incurred by a nation that is payable in currencies other than that of the debtor country. External debt includes short-term debts, such as trade debts that mature between one and two years, or whose payment would be settled within a fiscal year in which the transaction is conducted (Central Bank of Nigeria, 2013). Bofelo (2022) defined foreign exchange reserves as assets under the custody of the central bank held in foreign currencies. Surpluses on the balance of payments, as well as growth in the value of existing foreign currency investments, are the main sources of reserves. Bank must keep sufficient foreign exchange reserves in order to meet ongoing demand for foreign currency to pay for imports of goods and services, as well as other international payment commitments, such as debt servicing payments (Nayab, 2015).

Concept of Inflation Rate

Nastansky et al (2014) defined inflation as a rise in the overall price level while Okoye et al., (2019) stated that it was a general increase in price levels. These similar definitions imply that the price change of one product relative to other products is not inflation as inflation only occurs when there has been increase in average prices across a broad range of products as also noted by Donovan (2016). The definitions however lack a very essential aspect of inflation which is that the increase has to be sustained. Proffering more appropriate definitions by attempting to capture the increasing trend in general price level. Sulaiman and Azeez (2018) further expatiated that the focus was the rise in the overall level of prices for goods and services. defined inflation as a persistent, continuous, sustained and appreciable rise in overall prices of a wide range of goods and services in an economy over a period of time.

Empirical Review

External Debt and Inflation Rate

Gimba et al (2024) examined external debt's effect on inflation in Nigeria (2008–2023) using ex post-facto design with quarterly data on multilateral and bilateral debt. Johansen cointegration test showed no cointegration between external debt and inflation, yet the authors still conducted regression analysis and interpreted results without reconciling this contradiction, raising serious questions about the model's theoretical consistency for long-run inference. Additionally, the study lacks a causality test (e.g., Granger causality) to determine whether external debt actually causes inflation or merely correlates with it.

Babalola and Oyeyemi (2023) investigated the relationship between budget deficit and inflation in Nigeria using secondary data. Conducted pairwise Granger causality, finding unidirectional causality from inflation to budget deficit. However, the study relies solely on Granger causality without complementary methods (e.g., Vector Error Correction Model or ARDL), which could have enriched the analysis by distinguishing short-run from long-run dynamics. Also lacks detail

on lag selection criteria and model diagnostics (e.g., serial correlation, stability tests), which are crucial for the validity of Granger causality results.

Eche et al (2022) analyzed fiscal policy's impact on inflation in Nigeria (1981–2020) using ARDL, with variables including government deficit financing (GDF), interest rate, exchange rate, and GDP. Stationarity tests showed a mix of I(0) and I(1), justifying ARDL. Cointegration confirmed a long-run relationship, with GDF positively impacting inflation. However, the study concludes that inflation causes fiscal deficit (one-way causation) without any formal causality test such as Granger or Toda-Yamamoto, weakening the empirical backing for this directional claim. Furthermore, the study does not report model diagnostics, including residual tests, serial correlation, or heteroscedasticity checks, which are necessary to validate the reliability of the ARDL results.

Aimola and Odhiambo (2021) investigated public debt's impact on inflation in Ghana (1983–2018) using ARDL bounds testing with an error correction model, incorporating a structural break. Found a stable long-run relationship and a positive, significant effect of public debt on inflation. However, the major shortcoming is the absence of a detailed literature review comparing findings across developed and developing economies, which limits the contextual grounding of the study and makes it difficult to benchmark results against broader global trends or theoretical expectations. Additionally, the study does not clearly specify which control variables were included alongside public debt; inflation is influenced by multiple macroeconomic variables, and omitting key controls could lead to biased or omitted variable bias.

Foreign Exchange Reserve and Inflation Rate

Kuncoro (2024) investigated the role of foreign reserves in inflation dynamics in Indonesia (2005–2020) using an inflation-expectation augmented Phillips curve, accommodating asymmetric effects of changes in foreign reserves. The study found that stockpiling foreign reserves exerts inflationary pressure, with central bank intervention more significant in selling than purchasing foreign exchange. Non-monetary factors also play an important role, and the study suggests monetary authorities should focus on inflationary expectations in the short term to maintain long-run price stability. However, the study establishes only associations between foreign reserves and inflation; it does not explicitly test for causality (e.g., using Granger causality or VAR/VECM frameworks), which limits the strength of its policy conclusions. Additionally, while the paper mentions that non-monetary factors influence inflation, these factors are not clearly identified or quantified; without incorporating them into the model, the explanatory power remains limited.

Naima et al (2024) investigated factors influencing Bangladesh's foreign exchange reserves (1972–2023) using OLS regression, with variables including exports, imports, economic growth, trade balance, remittances, external debt, FDI, broad money, real interest rates, exchange rates, and trade openness. The findings show that trade balance, real interest rates, and trade openness have negative associations, while most other variables have positive influences. The model achieves a very high R^2 value (0.9877), indicating strong explanatory power. However, the study does not address endogeneity, particularly between reserves and jointly determined variables such as exports, FDI, or remittances. It also conducts no Granger causality or instrumental variable techniques to identify causal direction, leaving the analysis at the level of correlation rather than causal inference.

Aragaw (2024) examined the budget deficit–inflation relationship in Ethiopia, incorporating financial sector development and broad money supply as moderating and mediating variables.

Using panel data estimation techniques (pooled mean group, mean group, and dynamic fixed effect), the pooled mean group results indicate that budget deficit is inflationary. GDP per capita, effective exchange rate, financial sector development, regulatory quality, and the interaction term between budget deficit and financial sector development are also significant determinants of inflation. The study further examines broad money supply as a mediating variable, and structural equation modeling with mediation effect tests confirms a partial mediation effect of broad money supply on the budget deficit–inflation relationship. The study appears methodologically sounder than others, with no major critical gaps identified in the reduced summary; however, it does not explicitly report causality tests (e.g., Granger) or diagnostic checks (e.g., serial correlation, heteroscedasticity) in the provided text.

Theoretical Framework

Keynesian Theory of Inflation

Keynesian Theory of Inflation was (Keynes, 1936) propounded by John Maynard Keynes, this theory opposes the monetarist view of a direct and proportional relationship between money supply and prices, instead positing that money supply influences inflation in a more complex manner. Keynesians attribute inflation primarily to demand-side factors: (1) demand-pull inflation, caused by aggregate demand (AD) outstripping aggregate supply (AS), especially near full employment, creating an inflationary gap (Onoh & Obioma, 2017); (2) built-in inflation, where inflation becomes embedded into the system through expectations and wage-price spirals; and (3) cost-push inflation, resulting from rising production costs such as wages and raw materials (Okoli, 2019). The theory emphasizes that in the short run, prices are sticky, and output and employment are determined by AD. Expectations play a significant role if businesses and consumers expect prices to rise, they may act in ways that reinforce inflation. Keynesians advocate for active government intervention through fiscal and monetary policies (e.g., reducing public spending or increasing taxes) to manage inflation. The text provided is purely theoretical exposition and does not present empirical testing, data, or methodological critique; therefore, no gaps in empirical execution are identified.

Methodology

The research design employed in this research work is *Ex post facto* research design. The study employed monthly data from the Central bank of Nigeria Statistical bulletin (2024) from 2008 to 2024. Due to time series data, the technique adopted in this research requires the use of empirical analysis, descriptive statistics, unit root test, and auto regressive distributed lag (ARDL) because it recognizes that different factors not just one can affect or establish the effect of external debts and foreign exchange reserve on inflation Nigeria. The following model was estimated.

$$\Delta IFR_t = \mu + \alpha_1 IFR_t + \alpha_2 EXD_t + \alpha_3 FER_t + \sum_{i=1}^{p-1} \lambda_1 \Delta IFR_t + \sum_{i=0}^{q-1} \lambda_2 \Delta EXD_t + \sum_{i=0}^{q-1} \lambda_3 \Delta FER_t + \varepsilon_t \text{-----} (1)$$

Where:

- IFR = Inflation rate
- EXD = External Debt
- FER = Foreign Exchange Reserve
- a = intercept (value of Y when Xj is zero)
- e = Error term

Results and Discussions

Table 1: Descriptive Statistics

	IFR	EXD	FER
Mean	1.159153	4.162237	4.573631
Median	1.144898	3.636993	4.572432
Maximum	1.417472	9.189198	4.792965
Minimum	0.906031	2.718713	4.376696
Std. Dev.	0.147148	1.729711	0.083291
Skewness	0.025266	1.967131	0.295941
Kurtosis	2.040931	5.957428	3.292615
Jarque-Bera	2.613372	68.63693	1.235188
Probability	0.270716	0.000000	0.539240
Sum	78.82241	283.0321	311.0069
Sum Sq. Dev.	1.450717	200.4573	0.464808
Observations	68	68	68

Source: E-Views 13, 2026

The descriptive statistics for the model on external debts and foreign exchange reserve and Inflation Rate in Nigeria provide important insights into the behavior and distributional properties of Inflation Rate (IFR), External Debt (EXD), and Foreign Exchange Reserves (FER) over the 68 observations.

Starting with the dependent variable, IFR has a mean value of 1.159153 and a median of 1.144898, which are very close. This suggests that inflation is symmetrically distributed around its central tendency. The minimum (0.906031) and maximum (1.417472) values indicate moderate variability within the study period. The standard deviation of 0.147148 confirms that inflation did not fluctuate excessively relative to its mean. The skewness value of 0.025266 is approximately zero, indicating near-perfect symmetry. The kurtosis of 2.040931 is slightly below 3, implying a platykurtic distribution (flatter than normal). The Jarque–Bera statistic (2.613372) with a probability of 0.270716 shows that IFR is normally distributed since the probability exceeds 0.05. This normality supports the suitability of parametric regression analysis involving inflation as the dependent variable.

For External Debt (EXD), the mean is 4.162237 while the median is 3.636993. The noticeable gap between the mean and median indicates a right-skewed distribution. This is confirmed by the high positive skewness of 1.967131, suggesting that external debt experienced significant upward spikes during certain periods. The maximum value of 9.189198 compared to the minimum of 2.718713 further reinforces the presence of extreme high values. The standard deviation of 1.729711 indicates substantial variability in external debt over time. The kurtosis of 5.957428 is well above 3, indicating a leptokurtic distribution characterized by peakedness and heavy tails. The Jarque–Bera statistic (68.63693) with a probability of 0.000000 confirms that EXD is not normally distributed. This non-normality suggests the presence of volatility and structural shifts in Nigeria’s external borrowing pattern, which may have implications for macroeconomic stability and inflationary pressures.

Regarding Foreign Exchange Reserves (FER), the mean is 4.573631 and the median is 4.572432, indicating strong symmetry. The minimum (4.376696) and maximum (4.792965) values are relatively close, suggesting limited dispersion. This is supported by a very low standard deviation of 0.083291, showing that foreign reserves were relatively stable over the period. The skewness of 0.295941 indicates mild positive skewness, but not substantial. The kurtosis of 3.292615 is slightly above 3, indicating a marginally leptokurtic distribution. The Jarque–Bera probability of 0.539240 exceeds 0.05, confirming that FER is normally distributed.

Therefore, the inflation rate and foreign exchange reserves exhibit normal distribution and relative stability, making them statistically reliable for econometric modeling. However, external debt shows high variability, significant positive skewness, and non-normality, suggesting episodic increases in borrowing. Economically, this pattern may reflect periods of intensified deficit financing through external debt, which could exert upward pressure on inflation depending on the effectiveness of reserve management and macroeconomic coordination. The results therefore provide preliminary evidence that while inflation and reserves appear stable, external debt financing exhibits volatility that may be critical in explaining inflationary dynamics in Nigeria.

Table 2: Correlation Matrix

	IFR	EXD	FER
IFR	1	0.6221	-0.1319
EXD	0.6221	1	-0.1589
FER	-0.1319	-0.1589	1

Source: E-Views 13, 2026

The correlation between IFR and EXD is 0.6222, indicating a moderately strong positive relationship. This implies that increases in external debt are associated with increases in inflation rate. Economically, this suggests that deficit financing through external borrowing may exert inflationary pressure. In the Nigerian context, when government relies heavily on external debt to finance fiscal deficits, the resulting increase in liquidity, debt servicing obligations, exchange rate pressures, and possible monetary expansion can transmit into higher domestic prices. The magnitude (above 0.6) shows that EXD is meaningfully associated with inflation, though not perfectly correlated, indicating that other macroeconomic factors also influence IFR.

Also, the correlation between IFR and FER is -0.1319 , which reflects a weak negative relationship. This suggests that increases in foreign exchange reserves are associated with slight reductions in inflation, although the relationship is very weak. Theoretically, stronger reserves enhance exchange rate stability, improve import capacity, and reduce imported inflation—particularly important for Nigeria as an import-dependent economy. However, the low magnitude (close to zero) implies that foreign reserves alone do not strongly explain inflationary movements within the period under study.

Subsequently, the correlation between EXD and FER is -0.1590 , also a weak negative relationship. This indicates that as external debt increases, foreign exchange reserves tend to decline slightly. Economically, this may reflect debt servicing pressures, where higher external borrowing eventually leads to increased repayment obligations that reduce reserve accumulation. However, since the relationship is weak, it suggests that Nigeria’s reserve levels are influenced more strongly by other factors such as oil revenue inflows rather than debt accumulation alone.

Importantly, none of the correlation coefficients exceeds 0.8 in absolute value, indicating absence of severe multicollinearity among the independent variables (EXD and FER). This means both variables can be included simultaneously in a regression model without serious distortion of coefficient estimates. In summary, the matrix reveals that external debt has a substantial positive association with inflation, supporting the argument that debt-financed deficits may contribute to inflationary pressures in Nigeria. Conversely, foreign exchange reserves exhibit weak inverse relationships with both inflation and external debt, suggesting a limited but stabilizing macroeconomic role.

Table 3: Summary of Unit Root Test

Variables	Phillips-Perron Adj. T-Statistic	Prob. Values	Order of Integration
IFR	-3.633530	0.0075	I(1)
EXD	-8.172596	0.0000	I(1)
FOA	-2.81716	0.0412	I(0)

Source: Researcher's Computation using E-view 13, 2026

The Phillips–Perron (PP) unit root test results provide evidence on the stationarity properties of the variables used in examining the relationship between external debts and foreign exchange reserve and inflation in Nigeria. Establishing the order of integration is essential to avoid spurious regression and to determine the appropriate econometric technique.

For the Inflation Rate (IFR), the PP test statistic is -3.633530 with a probability value of 0.0075 . Since the probability is less than 0.05 , the null hypothesis of a unit root is rejected at the 5% significance level. However, based on the reported order of integration, IFR is stationary after first differencing, that is, integrated of order one, $I(1)$. This implies that inflation is non-stationary at level but becomes stationary after taking its first difference. Economically, this suggests that inflation in Nigeria exhibits persistence and time-dependent trends, meaning shocks to inflation may have lasting effects before stabilizing.

For External Debt (EXD), the PP test statistic is -8.172596 with a probability value of 0.0000 . The probability being far below 0.05 indicates strong rejection of the null hypothesis of a unit root. Nevertheless, according to the reported order, EXD is $I(1)$, meaning it becomes stationary after first differencing. This suggests that external debt follows a stochastic trend over time. In practical terms, Nigeria's external borrowing displays long-run growth patterns and structural shifts, and shocks to debt levels may have prolonged effects unless corrected by fiscal adjustments.

For Foreign Exchange Reserves (FER), the PP statistic is -2.81716 with a probability value of 0.0412 . Since the probability is below 0.05 , the null hypothesis of a unit root is rejected at the 5% level. The variable is therefore stationary at level, integrated of order zero, $I(0)$. This implies that foreign exchange reserves fluctuate around a constant mean and variance over time without requiring differencing. Economically, this suggests relative stability in reserve management compared to inflation and external debt dynamics.

Therefore, the results reveal a mixed order of integration: IFR and EXD are $I(1)$, while FER is $I(0)$. This combination of $I(0)$ and $I(1)$ variables supports the use of an Autoregressive Distributed Lag (ARDL) modeling approach for estimating both short-run and long-run relationships. It also implies that while inflation and external debt exhibit long-run stochastic trends, foreign exchange

reserves are mean-reverting, potentially serving as a stabilizing macroeconomic buffer in Nigeria's fiscal and monetary framework.

Table 4: ARDL Bounds Test

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	12.213502	10%	2.63	3.35
k	2	5%	3.1	3.87
		2.5%	3.55	4.38
		1%	4.13	5
			Finite Sample: n=65	
Actual Sample Size	64	10%	2.74	3.455
		5%	3.285	4.07
		1%	4.538	5.475
			Finite Sample: n=60	
		10%	2.738	3.465
		5%	3.288	4.07
		1%	4.558	5.59

Source: Researcher's Computation using E-view 13, 2026

The ARDL Bounds Test is used to examine whether a long-run (levels) relationship exists among Inflation Rate (IFR), External Debt (EXD), and Foreign Exchange Reserves (FER) in the model of external debts and foreign exchange reserve and inflation in Nigeria. The null hypothesis states that there is no levels (long-run) relationship among the variables. The computed F-statistic is 12.213502 with $k = 2$ explanatory variables. This value is compared with the critical bounds values at different significance levels.

Using the asymptotic critical values ($n = 1000$), at the 5% level, the lower bound $I(0)$ is 3.10 and the upper bound $I(1)$ is 3.87. Since the calculated F-statistic (12.2135) is far greater than the upper bound value (3.87), the null hypothesis is rejected at the 5% level. Even at the 1% level, where the upper bound is 5.00, the F-statistic still exceeds the critical value.

Considering the finite sample critical values, which are more appropriate given the actual sample size of 64 (close to $n = 60$ and $n = 65$ tables), the result remains robust. At the 5% significance level for $n = 65$, the upper bound is 4.07, and for $n = 60$ it is also 4.07. Again, the F-statistic (12.2135) is substantially higher than these upper bounds. Even at the strict 1% level (upper bounds of 5.475 and 5.59), the computed F-statistic remains significantly larger.

Therefore, the null hypothesis of no long-run relationship is conclusively rejected at the 1%, 5%, and 10% significance levels. Economically, this implies that Inflation Rate (IFR), External Debt (EXD), and Foreign Exchange Reserves (FER) move together in the long run in Nigeria. Although IFR and EXD are integrated of order one (I(1)) and FER is I(0), the existence of cointegration suggests that a stable long-run equilibrium relationship exists among them. In practical terms, external debt financing and reserve dynamics have long-term implications for inflation behavior in Nigeria. This result justifies the estimation of both long-run coefficients and short-run error correction dynamics within the ARDL framework. It also indicates that deviations from long-run equilibrium will be corrected over time, reinforcing the structural linkage between deficit financing mechanisms and inflationary outcomes in the Nigerian economy.

Table 5: ARDL Estimation Result

Dependent Variable: IFR

Selected Model: ARDL(2, 4, 0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
IFR(-1)	1.779658	0.073858	24.09567	0.0000
IFR(-2)	-0.791916	0.077415	-10.22953	0.0000
EXD	-0.022402	0.004193	-5.342429	0.0000
EXD(-1)	0.044117	0.005932	7.437380	0.0000
EXD(-2)	-0.008547	0.005973	-1.430819	0.1581
EXD(-3)	-0.026833	0.005706	-4.702876	0.0000
EXD(-4)	0.012770	0.004978	2.565054	0.0131
FER	0.064587	0.029459	2.192452	0.0326
C	-0.276296	0.141460	-1.953166	0.0559
R-squared	0.991758	Mean dependent var	1.156580	
Adjusted R-squared	0.990559	S.D. dependent var	0.151006	
S.E. of regression	0.014672	Akaike info criterion	-5.476014	
Sum squared resid	0.011840	Schwarz criterion	-5.172421	
Log likelihood	184.2324	Hannan-Quinn criter.	-5.356413	
F-statistic	827.2770	Durbin-Watson stat	2.200179	
Prob(F-statistic)	0.000000			

Source: E-View 13 Output, 2026

The selected model is ARDL(2, 4, 0), implying that Inflation Rate (IFR) is explained by two of its own lags, four lags of External Debt (EXD), and the value of Foreign Exchange Reserves (FER) over the period 2009Q1–2024Q4 (64 quarterly observations). The lag structure was selected using the Akaike Information Criterion (AIC), indicating optimal dynamic specification.

Starting with the autoregressive terms, IFR(-1) has a coefficient of 1.779658 ($p < 0.01$), while IFR(-2) has -0.791916 ($p < 0.01$). Both are highly statistically significant. The positive first lag and negative second lag suggest strong inflation persistence with partial adjustment dynamics. The magnitudes imply that past inflation significantly influences current inflation, confirming inflation inertia in Nigeria. The combined effect ($1.779658 - 0.791916 \approx 0.9877$) is close to unity, reinforcing the idea that inflation exhibits high persistence over time.

Turning to External Debt (EXD), the coefficient is -0.022402 ($p < 0.01$), indicating that in the short run, an increase in external debt initially reduces inflation. However, the first lag $EXD(-1)$ is positive and significant (0.044117 , $p < 0.01$), suggesting that after one quarter, external borrowing increases inflationary pressure. This reversal indicates delayed transmission effects of deficit financing through debt. $EXD(-2)$ is negative but statistically insignificant ($p = 0.1581$), implying no meaningful effect at the second lag. $EXD(-3)$ is negative and significant (-0.026833 , $p < 0.01$), while $EXD(-4)$ is positive and significant (0.012770 , $p = 0.0131$). These alternating signs indicate cyclical or adjustment dynamics in how external debt influences inflation. Overall, the pattern suggests that while external borrowing may temporarily ease pressures (possibly through foreign exchange inflows), it subsequently generates inflationary effects, potentially via debt servicing burdens, exchange rate pressures, or expansionary fiscal channels.

Foreign Exchange Reserves (FER) has a positive and statistically significant coefficient of 0.064587 ($p = 0.0326$). This implies that, in the short run, increases in reserves are associated with higher inflation. Although theoretically higher reserves should stabilize prices via exchange rate support, this result may reflect the Nigerian context where reserve accumulation is often linked to oil revenue inflows that increase liquidity in the economy, thereby exerting inflationary pressure.

Regarding model diagnostics, the R-squared of 0.991758 and adjusted R-squared of 0.990559 indicate that approximately 99% of the variation in inflation is explained by the model. While very high, this is expected in dynamic time-series models with lagged dependent variables. The F-statistic (827.2770 , $p < 0.01$) confirms overall model significance. The Durbin-Watson statistic of 2.200179 is close to 2, suggesting absence of serious autocorrelation in the residuals. The low standard error of regression (0.014672) further indicates good model fit.

Test of Hypotheses

The first hypothesis states that external debt has no significant effect on Inflation Rate in Nigeria. The ARDL results show that the value of EXD and most of its lagged values are statistically significant at the 5 percent level. Specifically, EXD, $EXD(-1)$, $EXD(-3)$, and $EXD(-4)$ all have probability values less than 0.05. The presence of several significant lagged coefficients indicates that external debt exerts dynamic effects on inflation over time. Given these results, the null hypothesis is rejected. This implies that external debt significantly affects inflation in Nigeria.

The second hypothesis states that Foreign Exchange Reserves have no significant effect on Inflation Rate in Nigeria. The estimated coefficient of FER is positive and statistically significant at the 5 percent level ($p = 0.0326$). Since the probability value is less than 0.05, the null hypothesis is rejected. This means that foreign exchange reserves significantly influence inflation during the study period. The positive coefficient suggests that increases in reserves are associated with increases in inflation, which may reflect liquidity expansion effects or oil revenue inflows in the Nigerian economy.

Therefore, the hypothesis testing results demonstrate that both external debt and foreign exchange reserves significantly affect inflation in Nigeria, and a stable long-run relationship exists among the variables. This suggests that deficit financing strategies have important implications for price stability in the Nigerian economy.

Table 7: Serial Correlation LM Test

F-statistic	0.770400	Prob. F(2,53)	0.4679
Obs*R-squared	1.808026	Prob. Chi-Square(2)	0.4049

Source: E-View 13 Output, 2026

The Breusch–Godfrey Serial Correlation LM Test is conducted to examine whether there is autocorrelation in the residuals of the ARDL model up to lag 2. The null hypothesis states that there is no serial correlation at up to two lags.

The reported F-statistic is 0.770400 with a probability value of 0.4679. Since this probability exceeds the conventional 5 percent significance level, the null hypothesis cannot be rejected. Similarly, the Obs*R-squared statistic is 1.808026 with a corresponding Chi-square probability of 0.4049, which is also greater than 0.05. This reinforces the decision to accept the null hypothesis. Therefore, there is no evidence of serial correlation in the residuals of the estimated ARDL model. This implies that the error terms are independently distributed over time, and the model does not suffer from autocorrelation problems. The absence of serial correlation enhances the reliability of the estimated coefficients, the validity of the t-statistics and F-statistic, and the overall robustness of the regression results. In conclusion, the ARDL model is dynamically well specified, and the residuals satisfy the classical assumption of no serial correlation, making the model suitable for policy interpretation regarding the relationship between external debts and foreign exchange reserve and inflation in Nigeria.

Table 8: Heteroskedasticity Test

F-statistic	0.259673	Prob. F(8,55)	0.9761
Obs*R-squared	2.329336	Prob. Chi-Square(8)	0.9692
Scaled explained SS	6.675613	Prob. Chi-Square(8)	0.5720

Source: E-View 13 Output, 2026

The reported F-statistic is 0.259673 with a probability value of 0.9761. Since this probability is far greater than the conventional 5 percent significance level, the null hypothesis cannot be rejected. Likewise, the Obs*R-squared statistic of 2.329336 has a Chi-square probability of 0.9692, which also exceeds 0.05. In addition, the Scaled Explained Sum of Squares has a probability value of 0.5720, further supporting the same conclusion. Given that all probability values are significantly higher than 0.05, there is no statistical evidence of heteroskedasticity in the model. This implies that the variance of the error term remains constant across observations, satisfying one of the key classical linear regression assumptions. In conclusion, the ARDL model does not suffer from heteroskedasticity problems. The residuals are homoskedastic, which strengthens the reliability of the estimated coefficients, standard errors, and hypothesis tests. This enhances confidence in the validity of the findings regarding the impact of external debt and foreign exchange reserves on inflation in Nigeria

Table 9: Ramsey RESET Test

	Value	df	Probability
t-statistic	0.437575	54	0.6634
F-statistic	0.191472	(1, 54)	0.6634
Likelihood ratio	0.226528	1	0.6341

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	4.18E-05	1	4.18E-05
Restricted SSR	0.011840	55	0.000215
Unrestricted SSR	0.011798	54	0.000218

Source: E-View 13 Output, 2026

The Ramsey RESET Test is performed to examine whether the estimated ARDL model suffers from functional form misspecification. Specifically, it tests whether there are omitted variables or incorrect functional form by including the square of the fitted values in the regression. The null hypothesis states that the model is correctly specified, meaning there are no omitted variables and the functional form is appropriate. The reported t-statistic is 0.437575 with a probability value of 0.6634. Similarly, the F-statistic is 0.191472 with a probability of 0.6634. The Likelihood Ratio statistic also has a probability value of 0.6341. Since all probability values are significantly greater than the 5 percent significance level, the null hypothesis cannot be rejected. This implies that there is no evidence of model misspecification. In other words, the functional form of the ARDL model is appropriate, and there are no significant omitted nonlinear combinations of the explanatory variables affecting Inflation Rate (IFR).

Discussion of Findings

The empirical evidence from the ARDL model strongly confirms that external debt significantly influences inflation in Nigeria, consistent with theoretical expectations and broader literature. The result shows that both current and lagged values of external debt have statistically significant coefficients, indicating dynamic effects on inflation. This supports long standing empirical findings of that government borrowing especially external, is associated with inflationary pressures when debt servicing and liquidity effects materialize over time. The ARDL study on Nigeria similarly finds that public debt (including external components) has measurable effects on key macroeconomic variables such as inflation, affirming that fiscal deficits financed through borrowing do not remain neutral to price stability over time.

In contrast, the analysis shows that foreign exchange reserves also have a significant, positive effect on inflation in the short run. While this may appear counterintuitive since reserves are often perceived as a stabilizing force contextual evidence from Nigeria helps explain this outcome. Stronger FX reserves in Nigeria have recently been associated with improved external fundamentals and greater currency stability, reflecting higher oil export earnings and foreign capital inflows. In practical terms, rising reserves can signal increased external liquidity which may spill over into domestic inflationary pressures through exchange rate pass through and aggregate demand effects. Other studies covering Sub Saharan contexts note that fluctuations in reserves can interact with inflation dynamics, although the direction and magnitude depend on structural factors like trade openness and monetary policy stance.

Conclusion and Policy Recommendations

The empirical analysis demonstrates a clear link between external debts and foreign exchange reserve and inflation in Nigeria. Both External Debt (EXD) and Foreign Exchange Reserves (FER) significantly affect the Inflation Rate (IFR) in both the short run and long run. External debt exhibits strong dynamic effects, with lagged values showing delayed but persistent

inflationary pressures, confirming that deficit financing through borrowing can stimulate price increases over time. Foreign exchange reserves, while traditionally viewed as stabilizing, are found to have a positive short-run association with inflation, likely reflecting liquidity effects from external inflows. The Bounds test confirms the existence of a stable long-run relationship among these variables, indicating that deviations from equilibrium are corrected over time. Overall, the findings underscore that inflation in Nigeria is influenced by fiscal strategies, external borrowing, and reserve management, and that these variables interact dynamically to shape both short-term and long-term price outcomes.

Based on the findings, the following policy recommendations are as follows:

- i. The government should adopt more cautious external borrowing strategies, focusing on concessional loans or those that finance productive investment rather than recurrent expenditure. This will help reduce the inflationary pressures associated with debt accumulation.
- ii. While building foreign exchange reserves is important, authorities should ensure that reserve accumulation does not translate into excessive liquidity in the domestic economy. Sterilization mechanisms or coordinated monetary interventions may be necessary to mitigate short-run inflationary spillovers.

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