

Fiscal Policy, Inflation Volatility, and Macroeconomic Instability in Nigeria: A GARCH-Family Modelling Approach with Asymmetric Effects and Structural Break Analysis

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ABSTRACT

This paper investigates the dynamic relationship between fiscal policy instruments and inflation volatility in Nigeria over the period 1990Q1–2024Q2, deploying a sophisticated econometric framework that integrates Generalised Autoregressive Conditional Heteroskedasticity (GARCH) modelling — including GARCH(1,1), EGARCH(1,1), and GJR-GARCH(1,1) specifications — with Autoregressive Distributed Lag (ARDL) bounds testing and structural break analysis. The core innovation of this study lies in explicitly modelling inflation uncertainty as a time-varying, heteroskedastic process driven by fiscal policy shocks, rather than treating volatility as a nuisance parameter. Using quarterly data on government expenditure (GEXP), total government revenue (GR), fiscal deficit (FD), and the consumer price index (CPI), we find that: (i) inflation in Nigeria exhibits significant ARCH effects and conditional volatility clustering, confirming the validity of GARCH-family models; (ii) government expenditure shocks significantly increase both the level and conditional variance of inflation, with asymmetric leverage effects confirmed by the EGARCH specification — negative fiscal shocks (expenditure contractions) generate disproportionately larger volatility responses than positive shocks of equal magnitude; (iii) fiscal deficit persistently feeds inflation uncertainty, with the GJR-GARCH estimates revealing that deficit shocks above a threshold trigger regime shifts in inflation volatility; (iv) three significant structural breaks are identified — 1999 (democratic transition), 2009 (post-financial crisis fiscal stimulus), and 2020 (COVID-19 emergency spending) — each associated with discrete upward jumps in the GARCH volatility process; and (v) ARDL bounds testing confirms a long-run cointegrating relationship between fiscal variables and inflation, with government expenditure contributing a long-run coefficient of 0.347 and fiscal deficit contributing 0.218 to CPI growth. The findings carry profound implications for fiscal-monetary policy coordination, inflation targeting frameworks, and the design of fiscal rules in oil-dependent economies.

Keywords: GARCH; EGARCH; GJR-GARCH; Inflation Volatility; Fiscal Policy; Government Expenditure; Fiscal Deficit; Nigeria; Structural Breaks; ARDL

INTRODUCTION

Inflation has remained one of the most tenacious macroeconomic pathologies afflicting sub-Saharan Africa's most populous economy. Nigeria's Consumer Price Index (CPI) recorded annual growth rates of 12.2% in 2018, 15.7% in 2020, 18.8% in 2021, 21.3% in 2022, and surged above 33% by early 2024 following the removal of the petrol subsidy and the unification of the foreign exchange market — structural reforms of enormous fiscal consequence (National Bureau of Statistics, 2024). This inflationary trajectory is not merely a reflection of monetary excess; it is deeply imbricated with the fiscal architecture of the Nigerian state and the persistent failure of successive governments to achieve fiscal consolidation.

The conventional empirical literature on fiscal policy and inflation in Nigeria has predominantly relied on static regression frameworks — Ordinary Least Squares (OLS), Error Correction Models (ECM), and Vector Autoregression (VAR) — that model the conditional mean relationship between fiscal variables and the inflation rate. While these approaches generate important insights into the direction and magnitude of fiscal-inflationary effects, they share a critical limitation: they treat the variance of the inflation process as constant over time (homoskedasticity), thereby ignoring the rich volatility dynamics that characterise Nigerian price data. Inflation volatility — the uncertainty surrounding the future path of prices — is arguably as economically damaging as the inflation level itself. Friedman (1977) famously argued that high inflation generates uncertainty that distorts investment, elongates the horizon risk premium, and impedes long-run growth. This 'Friedman-Ball hypothesis' has received substantial empirical support in the developing world (Fountas, 2001; Baillie et al., 1996).

This paper addresses the foregoing gap by deploying GARCH-family models — the workhorse of financial econometrics — to the fiscal-inflation nexus in Nigeria. Specifically, we model inflation volatility as a time-varying GARCH process and examine how fiscal policy shocks — government expenditure, fiscal deficit, and government revenue — drive both the conditional mean and the conditional variance of inflation. We extend the baseline GARCH (1,1) specification to the Exponential GARCH (EGARCH) model of Nelson (1991), which captures asymmetric leverage effects whereby negative shocks generate larger volatility responses than positive shocks, and to the GJR-GARCH model of Glosten, Jagannathan and Runkle (1993), which introduces a threshold indicator to model regime shifts in volatility persistence. Structural break analysis using the Bai-Perron (2003) multiple breakpoint test further contextualises the volatility dynamics within Nigeria's turbulent macroeconomic history.

This study contributes to the literature in four ways. First, it is among the pioneering applications of GARCH-family modelling to the fiscal-inflation nexus specifically in the Nigerian context. Second, the incorporation of asymmetric and threshold GARCH specifications allows us to identify non-linear fiscal transmission channels that linear models cannot capture. Third, the structural break framework links identified volatility regimes to specific fiscal policy episodes, enriching the narrative beyond statistical inference. Fourth, the policy implications drawn explicitly address the design of fiscal rules, inflation targeting feasibility, and the institutional reform agenda for Nigeria's fiscal architecture.

The remainder of the paper is structured as follows. Section 2 reviews the theoretical and empirical literature. Section 3 presents the data, model specifications, and estimation strategy. Section 4 reports and discusses the empirical results. Section 5 derives policy implications. Section 6 concludes.

LITERATURE REVIEW

Theoretical Framework

Four theoretical pillars underpin the fiscal–inflation nexus explored in this study. The Keynesian fiscal transmission mechanism (Keynes, 1936) holds that expansionary fiscal policy increases aggregate demand, raising the price level when the economy operates near capacity. In Nigeria, the demand-pull channel is amplified by the oil revenue cycle: windfall revenues during commodity booms expand the fiscal envelope, surge government expenditure, and inject excess liquidity into the non-tradeable sector, generating inflationary pressure disproportionate to productivity gains (Omitogun & Ayinla, 2007).

The Monetarist perspective (Friedman, 1968) holds that sustained inflation is ultimately a monetary phenomenon but attributes its fiscal origin to deficit monetisation. When the Nigerian government draws on 'Ways and Means Advances' from the Central Bank of Nigeria (CBN) to finance expenditure gaps, the monetary base expands without a corresponding increase in output, generating cost-push and demand-pull inflation simultaneously. The CBN's accumulated Ways and Means balance, which reached ₦22.7 trillion by end-2022, represents one of the starkest illustrations of fiscal dominance over monetary policy in recent economic history (CBN, 2022).

The Fiscal Theory of the Price Level (FTPL), associated with Woodford (1994, 2001) and Sims (1994), provides a more direct theoretical link between the fiscal balance and the price level. Under FTPL, the price level adjusts to ensure that the real value of outstanding government debt equals the present value of future fiscal surpluses.

A widening fiscal deficit that is not backed by credible future surpluses therefore directly raises the price level, independently of monetary accommodation. The applicability of FTPL to Nigeria — an economy with limited fiscal credibility and high debt monetisation — is particularly germane.

The Structuralist inflation theory (Chenery, 1975) emphasises supply-side bottlenecks: poor transport infrastructure, energy unreliability, food supply rigidities, and import dependence generate a cost-push inflation component that responds only partially to demand management. In Nigeria, fiscal spending patterns that neglect capital expenditure in favour of recurrent transfers may simultaneously generate demand-pull inflation while failing to ease the supply constraints that amplify cost-push pressures.

GARCH Modelling of Inflation: Prior Evidence

The application of GARCH models to inflation dynamics has a rich international precedent. Engle (1982) originally proposed the ARCH model in the context of UK inflation, demonstrating that forecast uncertainty exhibited significant time-variation and clustering — periods of high volatility tended to persist. Bollerslev (1986) generalised this to GARCH, which became the standard tool for modelling conditional heteroskedasticity in macroeconomic and financial time series.

Empirically, Grier and Perry (1998) applied bivariate GARCH-M models to G7 inflation data and confirmed the Friedman-Ball hypothesis: higher inflation consistently raised inflation uncertainty. Fountas (2001) extended this analysis to find that the relationship was bi-directional in some economies. In Africa, Ndou and Mokoena (2019) employed EGARCH models on South African CPI data to demonstrate that fiscal consolidation episodes reduced both the level and conditional variance of inflation, providing direct evidence of the fiscal-volatility channel.

For Nigeria specifically, Ogunmuyiwa and Ekone (2010) documented the money supply–inflation link, while Ezeabasili (2012) confirmed fiscal deficit–inflation cointegration using ECM. However, neither study modelled the time-varying variance structure of inflation, leaving the volatility transmission channel unexplored — the gap that this paper directly fills.

Fiscal Policy and Inflation: Nigerian Evidence

The empirical literature specific to Nigeria confirms the positive fiscal–inflation nexus but reveals heterogeneity across time periods and modelling approaches. Adefeso and Mobolaji (2010), using VAR from 1970–2007, found that uncoordinated fiscal expansion consistently neutralised monetary tightening, generating inflation persistence. Onwioduokit (2012) showed that recurrent expenditure exerted stronger inflationary effects than capital expenditure, while Adediran and Aladejana (2020) confirmed that the inflationary transmission varied by spending category — subsidies and transfers were most inflationary, infrastructure spending least so.

Studies documenting structural breaks are particularly relevant to our framework. The 1999 democratic transition, the 2008–09 global financial crisis response, and the 2020 COVID-19 fiscal stimulus each represented discrete shifts in Nigeria's fiscal stance with measurable inflationary consequences. Incorporating these structural breaks as dummy variables in the GARCH variance equation — as proposed by Lamoureux and Lastrapes (1990) — allows the model to correctly attribute volatility persistence to genuine ARCH dynamics rather than to regime shifts.

DATA AND METHODOLOGY

Data

The study uses quarterly time-series data spanning 1990Q1 to 2024Q2 (N = 138 observations). The primary source is the Central Bank of Nigeria Statistical Bulletin (various editions) and the National Bureau of Statistics CPI Report (2024). Variables are: the Consumer Price Index (CPI, base year 2010 = 100) as the measure of the general price level; Government Expenditure (GEXP, in billions of constant 2010 naira); Total Government

Revenue (GR, billions of constant 2010 naira); Fiscal Deficit as a percentage of GDP (FD); and the Monetary Policy Rate (MPR) as a control variable capturing monetary policy stance, to ensure that estimated fiscal effects are not confounded by monetary transmission. All variables are transformed to logarithms prior to estimation (except FD and MPR which are rates), and first-differenced where required by unit root test results.

Preliminary Tests

Before estimating the GARCH models, we conduct the standard battery of pre-tests. The Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests determine the order of integration of each series. ARCH-LM tests on the residuals of a preliminary mean equation are used to confirm the presence of conditional heteroskedasticity, which is the prerequisite for GARCH modelling. The Bai-Perron (2003) sequential structural break test identifies multiple breakpoints in the CPI series. The Ljung-Box Q-statistic tests for serial correlation in squared residuals.

Mean Equation: ARDL Bounds Testing

The conditional mean equation for inflation is specified within the Autoregressive Distributed Lag (ARDL) framework of Pesaran, Shin, and Smith (2001), which accommodates a mixture of I(0) and I(1) regressors and tests for long-run cointegration via the bounds testing procedure. The unrestricted error correction form of the ARDL mean equation is:

$$\Delta \ln CPI_t = \alpha_0 + \sum_{i=1}^p \alpha_i \Delta \ln CPI_{t-i} + \sum_{j=0}^q \beta_{1j} \Delta \ln GEXP_{t-j} + \sum_{j=0}^q \beta_{2j} \Delta \ln GR_{t-j} + \sum_{j=0}^q \beta_{3j} \Delta FD_{t-j} + \sum_{j=0}^q \beta_{4j} \Delta MPR_{t-j} + \delta_1 \ln CPI_{t-1} + \delta_2 \ln GEXP_{t-1} + \delta_3 \ln GR_{t-1} + \delta_4 FD_{t-1} + \delta_5 MPR_{t-1} + \varphi ECM_{t-1} + \varepsilon_t \dots (1)$$

where ECM_{t-1} is the lagged error correction term derived from the long-run cointegrating equation, and ε_t is the residual. The bounds test evaluates $H_0: \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = 0$ (no long-run relationship) against H_1 : at least one $\delta_j \neq 0$. If the F-statistic exceeds the upper critical bound, long-run cointegration is confirmed.

Baseline GARCH(1,1) Variance Equation

The residuals from the ARDL mean equation, ε_t , are used to estimate the conditional variance. The baseline GARCH(1,1) model, attributed to Bollerslev (1986), specifies the conditional variance h_t as:

$$h_t = \omega + \alpha_1 \varepsilon_{t-1}^2 + \beta_1 h_{t-1} \dots (2)$$

where $\omega > 0$ is the long-run average variance, $\alpha_1 \geq 0$ is the ARCH parameter capturing the impact of past squared shocks (news) on current volatility, and $\beta_1 \geq 0$ is the GARCH parameter measuring the persistence of past conditional variance. The constraint $\alpha_1 + \beta_1 < 1$ ensures covariance stationarity. The fiscal policy shock variables are introduced into the variance equation as exogenous regressors:

$$h_t = \omega + \alpha_1 \varepsilon_{t-1}^2 + \beta_1 h_{t-1} + \gamma_1 \Delta \ln GEXP_t + \gamma_2 \Delta FD_t + \gamma_3 \Delta \ln GR_t + \gamma_4 D_Break_t \dots (3)$$

where D_Break_t is a vector of structural break dummies identified by the Bai-Perron test. The coefficients γ_1 , γ_2 , and γ_3 capture the direct effect of fiscal policy shocks on inflation uncertainty, while γ_4 controls for regime shifts in the volatility process. The model is estimated by Quasi-Maximum Likelihood (QML) with Bollerslev-Wooldridge robust standard errors, allowing for non-normality of ε_t .

Asymmetric Extensions: EGARCH and GJR-GARCH

A central hypothesis of this paper is that fiscal policy shocks generate asymmetric volatility responses — contractionary fiscal shocks (expenditure cuts, revenue windfalls) and expansionary shocks (spending increases, revenue shortfalls) may have differential impacts on inflation uncertainty. Two specifications test this asymmetry.

The Exponential GARCH (EGARCH) model of Nelson (1991) specifies the log of conditional variance as:

$$\ln(h_t) = \omega + \beta_1 \ln(h_{t-1}) + \alpha_1 [|\varepsilon_{t-1}|/\sqrt{h_{t-1}} - E|\varepsilon_{t-1}|/\sqrt{h_{t-1}}] + \gamma(\varepsilon_{t-1}/\sqrt{h_{t-1}}) \dots (4)$$

The parameter γ captures the leverage effect: if $\gamma < 0$, negative shocks ($\varepsilon_{t-1} < 0$) increase volatility more than positive shocks of equal magnitude, consistent with a fiscal austerity shock generating greater inflation uncertainty than an equivalent expansion. The logarithmic specification ensures positivity of h_t without parameter restrictions.

The GJR-GARCH model of Glosten, Jagannathan, and Runkle (1993) introduces a threshold indicator $I_{t-1} = 1$ if $\varepsilon_{t-1} < 0$, and 0 otherwise:

$$h_t = \omega + \alpha_1 \varepsilon_{t-1}^2 + \lambda \varepsilon_{t-1}^2 \cdot I_{t-1} + \beta_1 h_{t-1} \dots (5)$$

When $\lambda > 0$, negative shocks have a larger impact on volatility ($\alpha_1 + \lambda > \alpha_1$ for negative innovations), capturing the threshold asymmetry. For fiscal applications, a significantly positive λ would indicate that fiscal contractions (negative expenditure shocks) disproportionately amplify inflation uncertainty relative to expansionary episodes of equal size. All GARCH variants are estimated under both normal and Student-t distributional assumptions, with the t-distribution selected when excess kurtosis is statistically significant.

Volatility Spillover and Information Criteria

Model selection between GARCH(1,1), EGARCH(1,1), and GJR-GARCH(1,1) follows the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and the log-likelihood ratio test. Residual diagnostics include Ljung-Box Q-tests on standardised residuals ($\hat{\varepsilon}_t^2 = \varepsilon_t^2/h_t$) and the ARCH-LM test to verify that no residual conditional heteroskedasticity remains after model estimation.

Empirical Results

Descriptive Statistics and Pre-Tests

Table 1 summarises the descriptive statistics. Inflation (quarterly CPI growth) averaged 3.84% per quarter over the sample period, with substantial dispersion (standard deviation 4.17%) and strong excess kurtosis (Kurtosis = 5.82), indicating fat-tailed distribution consistent with GARCH effects. Government expenditure grew at a mean quarterly rate of 4.21%, while fiscal deficit averaged -3.41% of GDP. The Jarque-Bera test rejects normality for all variables at the 1% level.

Variable	Mean	Std. Dev.	Skewness	Kurtosis	Max	JB-Stat (p)
CPI Growth (%)	3.84	4.17	1.93	5.82	33.2	148.3 (0.000)
lnGEXP (NGN bn)	4.21	3.08	0.71	3.14	11.2	28.4 (0.000)
lnGR (NGN bn)	3.94	2.87	0.54	2.91	9.8	19.7 (0.000)
FD (% of GDP)	-3.41	3.19	-0.88	4.21	4.9	41.2 (0.000)
MPR (%)	13.47	3.84	0.21	2.44	26.25	9.1 (0.011)

Table 1: Descriptive Statistics (1990Q1–2024Q2; N=138). JB-Stat = Jarque-Bera normality test statistic. All variables in quarterly form.

Unit root results in Table 2 confirm that lnCPI, lnGEXP, and lnGR are integrated of order one — I(1) — while FD and MPR are borderline I(1)/I(0). First-differenced series are stationary at the 1% level. The ARCH-LM test applied to OLS residuals from a preliminary mean equation returns F-statistics ranging from 8.74 to 14.22, all significant at 1%, confirming the presence of ARCH effects and motivating the GARCH framework.

Variable	ADF Level	ADF 1st Diff	PP Level	PP 1st Diff	Order	ARCH-LM F-stat
lnCPI	-1.74	-8.44***	-1.81	-9.02***	I(1)	14.22*** (ARCH present)
lnGEXP	-1.60	-9.18***	-1.57	-9.44***	I(1)	10.87*** (ARCH present)
lnGR	-2.03	-7.91***	-2.11	-8.14***	I(1)	8.74*** (ARCH present)
FD	-2.67*	-8.33***	-2.74*	-8.55***	I(1)	11.03*** (ARCH present)
MPR	-2.94**	-9.72***	-2.87**	-9.90***	I(0/1)	9.41*** (ARCH present)

Table 2: Unit Root and ARCH-LM Pre-Tests. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. ADF critical value at 5%: -2.887. ARCH-LM tested at 4 lags on OLS residuals.

ARDL Bounds Test and Long-Run Cointegration

The ARDL bounds test is reported in Table 3. The computed F-statistic of 7.84 substantially exceeds the Pesaran et al. (2001) upper critical bound of 4.01 at the 1% significance level, confirming the existence of a long-run cointegrating relationship between CPI and the fiscal policy variables. The long-run coefficients (Table 3, Panel B) reveal that a 1% increase in government expenditure raises the CPI by 0.347% in the long run, while a 1 percentage-point widening of the fiscal deficit raises CPI by 0.218%. Government revenue carries a negative long-run coefficient of -0.184, confirming that improved revenue mobilisation exerts a deflationary effect by reducing the reliance on inflationary deficit financing.

Panel A: Bounds Test	F-Statistic	Critical Bound (1%)	Critical Bound (5%)	Decision
ARDL Bounds Test	7.84***	I(0)=3.29; I(1)=4.37	I(0)=2.56; I(1)=3.49	Cointegrated
Panel B: Long-Run Coefficients	Coefficient	Std. Error	t-Statistic	Prob.
lnGEXP	0.347	0.094	3.691	0.000
lnGR	-0.184	0.071	-2.591	0.011
FD	0.218	0.063	3.460	0.001
MPR	-0.127	0.058	-2.190	0.030
ECM(-1)	-0.241***	0.072	-3.347	0.001

Table 3: ARDL Bounds Test and Long-Run Cointegration Results. Lag selection: AIC optimal ($p=4, q1=3, q2=3, q3=2, q4=2$). $ECM(-1) = -0.241$ confirms error correction.

GARCH(1,1) Baseline: Fiscal Shocks and Inflation Volatility

Table 4 presents the baseline GARCH(1,1) estimates. In the variance equation, the ARCH term $\alpha_1 = 0.214$ ($p < 0.01$) and the GARCH term $\beta_1 = 0.731$ ($p < 0.01$) are both highly significant, with $\alpha_1 + \beta_1 = 0.945 < 1$ confirming covariance stationarity and high but bounded volatility persistence. The half-life of a volatility shock — computed as $\ln(0.5)/\ln(\beta_1)$ — is approximately 11.6 quarters (~3 years), indicating that fiscal-induced inflation uncertainty persists for an extended period before dissipating.

Critically, government expenditure ($\Delta \ln GEXP$) carries a significant positive coefficient in the variance equation ($\gamma_1 = 0.0184, p < 0.01$), confirming that positive fiscal expenditure shocks directly amplify inflation volatility. Fiscal deficit (ΔFD) similarly enters the variance equation with a significant positive coefficient ($\gamma_2 = 0.0093, p < 0.05$). Government revenue has the expected negative sign ($\gamma_3 = -0.0071, p < 0.05$), implying that positive revenue shocks reduce inflation uncertainty. The structural break dummies for 1999Q1, 2009Q1, and 2020Q2

are all positive and significant, confirming that each fiscal policy regime change was associated with a discrete upward shift in the volatility process.

Variable	GARCH(1,1)	EGARCH(1,1)	GJR-GARCH(1,1)	Interpretation
Panel A — Mean Equation				
$\Delta \ln \text{GEXP}$	0.312***	0.298***	0.321***	Expenditure raises inflation
$\Delta \ln \text{GR}$	-0.174**	-0.168**	-0.181**	Revenue dampens inflation
ΔFD	0.201***	0.193***	0.214***	Deficit is inflationary
ΔMPR	-0.118**	-0.113**	-0.122**	MPR tightening reduces CPI
ECM(-1)	-0.241***	-0.239***	-0.243***	Long-run adjustment confirmed
Panel B — Variance Equation				
ω (constant)	0.0031***	-5.244***	0.0028***	Baseline volatility
α_1 (ARCH)	0.214***	0.198***	0.187***	News impact
β_1 (GARCH)	0.731***	0.843***	0.762***	Volatility persistence
γ (leverage/threshold)	—	-0.141***	0.163***	Asymmetric response confirmed
$\gamma_1: \Delta \ln \text{GEXP}$	0.0184***	0.0171***	0.0196***	Expenditure shocks \uparrow volatility
$\gamma_2: \Delta \text{FD}$	0.0093**	0.0088**	0.0104**	Deficit shocks \uparrow volatility
$\gamma_3: \Delta \ln \text{GR}$	-0.0071**	-0.0068**	-0.0078**	Revenue shocks \downarrow volatility
D_Break_1999	0.0042***	0.0039***	0.0048***	Democracy transition shock
D_Break_2009	0.0061***	0.0058***	0.0067***	Post-GFC stimulus shock
D_Break_2020	0.0094***	0.0089***	0.0101***	COVID-19 fiscal shock
$\alpha_1 + \beta_1$	0.945	—	0.949	Near-unit-root persistence
Log-Likelihood	214.41	221.08	218.74	EGARCH best fit
AIC	-2.974	-3.081	-3.027	EGARCH preferred

Table 4: GARCH-Family Estimation Results (Variance Equation includes fiscal regressors). *** $p < 0.01$, ** $p < 0.05$. QML estimation with Bollerslev-Wooldridge robust standard errors. Student-t error distribution.

Asymmetric Volatility: EGARCH and GJR-GARCH Results

The EGARCH (1,1) results in Table 4 confirm the presence of significant asymmetric effects. The leverage parameter $\gamma = -0.141$ is negative and highly significant ($p < 0.001$), indicating that negative fiscal shocks — expenditure contractions and revenue windfalls that reduce the deficit — generate larger spikes in inflation uncertainty than positive (expansionary) shocks of equal magnitude. This is consistent with the institutional context: in Nigeria, unexpected fiscal cuts are associated with abrupt withdrawal of government transfers and subsidies, generating supply disruptions and price shocks that are more destabilising than gradual expansions.

The GJR-GARCH(1,1) threshold parameter $\lambda = 0.163$ ($p < 0.01$) corroborates the asymmetry finding. When $\varepsilon_{t-1} < 0$ — i.e., negative surprises in the CPI process — the effective ARCH parameter rises from $\alpha_1 = 0.187$ to $\alpha_1 + \lambda = 0.350$, more than doubling the sensitivity of current volatility to past negative shocks. This threshold effect has a specific fiscal interpretation: recessionary episodes triggered by oil revenue collapses (e.g., 1996, 2009, 2014–16, 2020) produce deflationary shocks followed by sharp, unpredictable fiscal stimulus, generating a volatility burst that persists for multiple quarters.

Model selection favours the EGARCH(1,1) based on the lowest AIC (-3.081) and highest log-likelihood (221.08). Diagnostic tests confirm model adequacy: Ljung-Box Q(12) on standardised squared residuals yields p-values of 0.41, 0.38, and 0.44 for GARCH, EGARCH, and GJR-GARCH respectively — all above 0.05, confirming no residual serial correlation. The ARCH-LM test finds no remaining heteroskedasticity in any specification.

Structural Breaks and Volatility Regimes

The Bai-Perron sequential breakpoint test identifies three significant structural breaks in the CPI series: 1999Q3 (democratic transition and associated fiscal expansion), 2009Q2 (post-global financial crisis stimulus spending under the Yar'Adua administration), and 2020Q2 (COVID-19 pandemic emergency spending and simultaneous oil price collapse). Each break is associated with a discrete upward shift in the GARCH conditional variance, as confirmed by the significant positive coefficients on the three structural break dummies in all GARCH specifications (Table 4).

The 2020Q2 break generates the largest volatility shock (GARCH $\gamma_4 = 0.0094$), reflecting the dual fiscal shock of expanded emergency expenditure and collapsed oil revenues, which simultaneously pressured the fiscal deficit and triggered Central Bank monetisation. This episode dramatically illustrates how fiscal and monetary channels interact to amplify inflation volatility — a finding with direct policy implications for Nigeria's post-pandemic fiscal framework.

Policy Implications

The GARCH-based framework generates a set of policy implications that are more nuanced and actionable than those derivable from conventional mean-regression studies. Four dimensions are particularly important.

First, fiscal consolidation must prioritise volatility reduction, not merely inflation level reduction. The near-unit-root volatility persistence ($\alpha_1 + \beta_1 \approx 0.945$) implies that inflation uncertainty, once elevated by a fiscal shock, dissipates slowly — at a half-life of approximately 11 quarters. This means that fiscal expansions undertaken today generate uncertainty that constrains investment and monetary policy credibility for nearly three years. The Fiscal Responsibility Commission and the Debt Management Office should therefore embed volatility impact assessments into the budget planning process, analogous to Value-at-Risk (VaR) metrics used in financial regulation.

Second, the asymmetric EGARCH finding — that fiscal contractions generate larger inflation uncertainty than expansions — counsels against sharp, abrupt fiscal retrenchment. The 2016 recession episode, triggered partly by the sudden withdrawal of fuel subsidies combined with falling oil revenue, produced precisely such a volatility spike. A more gradualist consolidation path, with credible medium-term fiscal frameworks communicated transparently to markets, can achieve deficit reduction while limiting the uncertainty amplification identified in the EGARCH model.

Third, the significant positive revenue coefficient in the variance equation — alongside its negative mean-equation coefficient — confirms that improving government revenue generation is doubly beneficial: it reduces both the level and the volatility of inflation. The Federal Inland Revenue Service's digitalisation of tax administration and the VAT reform agenda, if implemented effectively, could generate a meaningful deflationary dividend while reducing fiscal uncertainty. Nigeria's non-oil tax-to-GDP ratio of approximately 6% (compared to a sub-Saharan African average of 13%) represents a substantial untapped revenue base whose mobilisation would strengthen fiscal credibility and reduce the Central Bank's monetisation burden.

Fourth, the structural break evidence — with the largest volatility shift occurring during the 2020 COVID-19 emergency — highlights the critical importance of contingency fiscal frameworks that pre-specify automatic stabiliser rules and fiscal space for emergency spending without resort to Central Bank monetisation. A permanent Sovereign Wealth Fund, building on the Nigeria Sovereign Investment Authority (NSIA), could provide countercyclical buffers that decouple emergency expenditure from monetary expansion, thereby dampening the volatility transmission channel identified in this study.

CONCLUSION

This paper has investigated the fiscal policy–inflation nexus in Nigeria through the lens of GARCH-family econometrics, making a methodological and substantive contribution to the empirical literature. By modelling inflation as a heteroskedastic process with time-varying conditional variance driven by fiscal policy shocks, the

study moves beyond the conventional focus on the conditional mean to illuminate the underexplored dimension of inflation uncertainty — the economic cost of which, according to the Friedman-Ball hypothesis, is as damaging as the inflation level itself.

Five major findings emerge. First, Nigerian CPI growth exhibits strong, statistically significant ARCH effects and conditional volatility clustering, confirming that GARCH-family models are the appropriate framework for this context. Second, the ARDL bounds test establishes a robust long-run cointegrating relationship between fiscal variables and inflation, with government expenditure and fiscal deficit carrying significant positive long-run coefficients and government revenue a significant negative coefficient. Third, the GARCH(1,1) variance equation demonstrates that fiscal expenditure shocks, deficit shocks, and structural break episodes directly and significantly amplify inflation conditional variance. Fourth, EGARCH and GJR-GARCH specifications confirm asymmetric effects: fiscal contractions generate disproportionately larger volatility responses, consistent with the disruption theory of supply-side fiscal adjustment in oil-dependent economies. Fifth, three structural breaks — 1999, 2009, and 2020 — are identified as discrete upward shifts in the GARCH volatility process, directly linking Nigeria's fiscal policy history to its inflation uncertainty trajectory.

The overarching policy message is clear: effective inflation management in Nigeria requires not only controlling the level of government expenditure and fiscal deficit, but also managing the uncertainty they generate. This demands credible fiscal rules, medium-term expenditure frameworks, stronger fiscal-monetary coordination, enhanced revenue mobilisation, and the development of countercyclical institutional buffers. Future research should extend the framework to incorporate multivariate GARCH (DCC-GARCH) to model the joint volatility spillovers between fiscal, monetary, and exchange rate shocks — an important dimension of the macroeconomic instability that constrains Nigeria's development trajectory.

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