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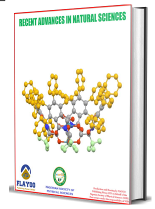

Time series modelling of inflation and consumer price index trends in Nigeria

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ABSTRACT

Inflation is a long-term, steady rise in the average price of goods and services. Its volatility weakens purchasing power, distorts income distribution, discourages investment and savings, and threatens macroeconomic stability. This study examined the relationship between the Consumer Price Index (CPI) and Financial Institutions' Credit Deposit (FICD) ratio using regression, ARIMA, and GARCH models to forecast inflation. Data from the National Bureau of Statistics (2015-2024) and Central Bank of Nigeria were analyzed. Descriptive results showed high variability in inflation (mean = 1.29%, SD = 0.59, skewness = 1.05) and moderate variability in FICD (mean = 8.69, SD = 2.62, skewness = 0.36). Regression results indicated a negative but insignificant effect of FICD on inflation ($\beta = -0.0177$, $p = 0.3977$). The Augmented Dickey-Fuller test confirmed stationarity ($p = 0.01$). ARIMA(2,2,1) captured inflation persistence, while GARCH(2,3) identified mild volatility. Johansen cointegration tests revealed no long-run equilibrium among CPI, inflation, and FICD. Findings suggest that structural and cost-push factors drive inflation, requiring stronger monetary transmission and efficient credit allocation for price stability.

1. INTRODUCTION

One of the most significant and enduring macroeconomic issues facing economies around the world, especially in emerging countries like Nigeria, is inflation. It weakens macroeconomic stability and growth, distorts income distribution, deters investment and savings, and reduces purchasing power. A consistent and widespread rise in the average price level of goods and services over time is referred to as inflation, according to Samuelson and Nordhaus [1]. In order to promote stable and sustainable economic environments, politicians, investors, and researchers must have a thorough understanding of the dynamics and determinants of inflation.

The primary indicator for monitoring inflation and directing policy decisions in Nigeria is the monthly CPI data released by the National Bureau of Statistics (NBS) [2]. According to the Bureau of Economic Analysis [3], complementary metrics like the Producer Price Index (PPI) and the GDP deflator also record price changes from the viewpoints of producers and consumers. When combined, these indices offer a multifaceted framework for evaluating price swings and the efficacy of policies.

Nigeria's inflation trajectory was influenced by a number of

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macroeconomic events that occurred between 2015 and 2024. The oil-dependent economy experienced recessionary pressures after the global oil price fall in 2014, which caused inflation to reach 18.55% by December 2016 (see Ref. [4]). These pressures were exacerbated by structural impediments, import dependency, and ongoing currency rate depreciation. In 2020, the COVID-19 pandemic made matters worse by disrupting global supplies, closing borders, and driving up the cost of food and energy (see Ref. [5]). Inflation hit 18.17% once more by March 2021, highlighting Nigeria's susceptibility to both internal and external shocks [2].

The causes and mechanisms of transmission of inflation in Nigeria have been examined empirically. Idisi *et al.* [6] noted that ineffective monetary policy, fiscal imbalances, unstable exchange rates, and inadequate institutional frameworks were the main causes. They recommended for coordinated monetary, fiscal, and governance reforms and highlighted structural factors, including food and energy shocks. Adeleye *et al.* [7] used impulse response analysis, Vector Error Correction Model (VECM), and Johansen cointegration to study inflation dynamics between 1981 and 2017. According to their findings, local factors like government spending and lending rates somewhat decreased inflation, but external factors like the exchange rate, imported inflation, and openness increased it by 0.49%, 0.47%, and 4.28%, respectively. The annual correction of around 57.48% of short-run disequilibria highlighted the importance of external shocks.

Using a structural VAR model and monthly data from 2006 to 2023, Nadani and Isah [8] examined the efficacy of monetary policy tools, including the Cash Reserve Ratio (CRR) and Monetary Policy Rate (MPR). They discovered that while inflation stayed consistently positive, contractionary shocks from both instruments decreased output and private credit, suggesting a "price puzzle." While the effects of the CRR were gradual, the MPR had wider and quicker implications on interest rates and liquidity. They came to the conclusion that wider financial markets, clearer communication, and more robust supply-side measures are necessary for efficient inflation management. Similarly, Mohammed *et al.* [9] used the ARDL and Granger causality models to study the relationships between exchange rate stability (LERS), inflation rate (IR), and money supply growth (MSG) during 1988-2023. Their results suggested proactive, rules-based monetary frameworks and showed bidirectional causality, a sluggish adjustment to equilibrium, and short-term policy consequences.

Attention has also been drawn to the relationship between inflation and growth. According to Nwaonuma and Ebubechima [10], prolonged inflation jeopardises long-term stability, whereas moderate inflation may spur growth. A nonlinear link between GDP and inflation was discovered by Anidiobu *et al.* [11], which made policy planning more difficult. Anyanwu *et al.* [12, 13] confirmed that exchange rate depreciation increased inflation through higher import costs. Ezeanyeji *et al.* [14] added that while monetary policy affects inflation patterns, institutional and structural flaws limit how effective it can be.

The joint statistical behaviour of important price indices, especially the CPI and PPI, over long periods of time has received little attention despite a great deal of research. This disparity limits our comprehension of how price dynamics at the producer and consumer levels interact to influence overall inflationary outcomes. The current study empirically examines the connections between inflation, the FICD ratio, and CPI in Nigeria between 2015 and 2024 in order to address this. It finds long-term trends, assesses co-movements, and offers proof to improve inflation control through the use of descriptive statistics, regression modelling, and time series analysis. Finally, by providing policy-relevant insights into the monetary and structural factors impacting price stability, this work adds to the larger conversation on inflation and supports evidence-based policymaking and sustained economic growth.

The rest of the article is structured as follows: Methodology is presented in Section 2, data analysis is described in Section 3, empirical results are discussed in Section 4, and the study is concluded in Section 5.

2. METHODOLOGY

The analytical approach for examining movements in Nigeria's consumer pricing indices and how they affect inflation between 2015 and 2024 is presented in this section. The study uses secondary data from reliable institutional sources and takes a quantitative approach. To find connections, spot trends, and produce insights that are pertinent to policy, statistical and econometric methods are used.

2.1. RESEARCH DESIGN

In order to estimate and forecast inflation dynamics in Nigeria in relation to the FICD ratio-based data describing the CPI, FICD, and inflation rate from 2015-2024, this study uses the observational time series econometric method of regression, ARIMA, and GARCH models.

2.2. DATA SOURCES AND INFLATION INDICATORS

One of the most important indicators for tracking inflationary trends in the economy is the CPI, which is published monthly by Nigeria's National Bureau of Statistics (NBS). The CPI is a crucial tool for monitoring inflation trends and evaluating changes in the cost of living since it calculates the average change over time in the prices of a standardised basket of goods and services (Ref. [2]). According to Ref. [3], the CPI is frequently examined in conjunction with supplementary measures like the PPI and the GDP deflator in order to offer a more thorough evaluation of pricing dynamics from both consumer and production perspectives.

The Central Bank of Nigeria (CBN) and the National Broadcasting Service (NBS) provided secondary sources of data for this investigation. The monthly and annual CPI and inflation rate statistics released by the NBS in Ref. [15] serve as the foundation for evaluating price fluctuations in the Nigerian economy. As stated in Ref. [16], supplemental macroeconomic variables, including interest rates, money supply, and other monetary indicators, were acquired from the CBN in order to gain a better understanding of the larger monetary environment impacting inflation dynamics.

2.3. VARIABLES AND MEASUREMENT

The analysis focuses on the following key variables:

1. FICD serves as the main explanatory (independent) variable, representing Financial Institutions' Credit Deposit.
2. Inflation Rate (or log-transformed CPI) is considered the response (dependent) variable of interest.
3. Control variables, such as the interest rate and money supply, are incorporated where necessary, particularly in extended multiple regression and cointegration models.

2.4. ANALYTICAL TECHNIQUES

The dataset was examined using a variety of analytical tools, which are detailed below:

2.4.1. Descriptive Statistics

Descriptive statistics such as the mean, variance, standard deviation, skewness, and kurtosis were computed to examine the fundamental characteristics of the dataset, as outlined in Anderson *et al.* [17]. The general expression for estimating the mean of a normally distributed random variable X is given as:

$$\mu = \frac{1}{n}\sum_{i=1}^{n} X_i. \tag{1}$$

The corresponding variance and standard deviation are given in equations (2) and (3) respectively while skewness and kurtosis are defined in equations (4) and (5) respectively:

$$\sigma^2 = \frac{1}{n}\sum_{i=1}^{n}(X_i - \mu)^2, \tag{2}$$

$$\sigma = \sqrt{\sigma^2}, \tag{3}$$

$$\gamma_1 = \frac{1}{n}\sum_{i=1}^{n}\left(\frac{X_i - \mu}{\sigma}\right)^3, \tag{4}$$

$$\gamma_2 = \frac{1}{n}\sum_{i=1}^{n}\left(\frac{X_i - \mu}{\sigma}\right)^4 - 3. \tag{5}$$

2.4.2. Time Series Analysis

To examine temporal dynamics in price indices and inflation, time series techniques were used. A linear trend model was first specified by Brockwell and Davis [18]:

$$y_t = \beta_0 + \beta_1 t + \varepsilon_t. \tag{6}$$

Classical decomposition separated trend, seasonality, and randomness, (see Hyndman and Athanasopoulos [19]):

$$y_t = T_t + S_t + \varepsilon_t. \tag{7}$$

The ARIMA model was used for forecasting and addressing non-stationarity, (see Box *et al.* [20]):

$$\left(1 - \sum_{i=1}^{p}\phi_i B^i\right)(1 - B)^d y_t = \left(1 + \sum_{i=1}^{q}\theta_i B^i\right)\varepsilon_t. \tag{8}$$

2.4.3. Regression Analysis

To estimate the influence of the FICD ratio on inflation, a simple linear regression model was applied by Wooldridge [21]. This model captures the direct relationship between the dependent variable (inflation rate) and the independent variable (FICD ratio), as expressed in equation (9):

$$Y = \beta_0 + \beta_1 X + \varepsilon, \tag{9}$$

where Y denotes the inflation rate, X represents the FICD ratio, β_0 is the intercept, β_1 measures the marginal effect of FICD on inflation, and ε is the stochastic error term accounting for other unobserved influences.

2.4.4. Volatility Modeling

To capture time-varying volatility in the inflation series, a Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model was employed by Bollerslev [22]. The GARCH framework extends the ARCH model by allowing current conditional variance to depend not only on past squared innovations but also on its own lagged values, thereby modeling volatility persistence in financial and macroeconomic data.

Formally, the model is expressed as:

$$y_t = \mu + \varepsilon_t, \quad \varepsilon_t = \sigma_t z_t, \tag{10}$$

where $z_t \sim$ i.i.d. $(0, 1)$ and the conditional variance equation is given by:

$$\sigma_t^2 = \alpha_0 + \sum_{i=1}^{q}\alpha_i\varepsilon_{t-i}^2 + \sum_{j=1}^{p}\beta_j\sigma_{t-j}^2, \tag{11}$$

where σ_t^2 denotes the conditional variance of the series at time t, ε_{t-i}^2 represents past shocks (the ARCH terms), and σ_{t-j}^2 captures the lagged variances (the GARCH terms). The parameters α_i and β_j measure the short-run and long-run persistence of volatility, respectively, while $\alpha_0 > 0$, $\alpha_i \geq 0$, and $\beta_j \geq 0$ ensure positivity of the conditional variance.

2.4.5. Cointegration Analysis Using Johansen Method

To examine the long-run equilibrium relationships among CPI, Inflation, and the 12-month policy adjustment rate (FICD), the Johansen cointegration procedure was employed by Jahansen [23]. This method allows for the identification of multiple cointegrating vectors and provides a multivariate framework, improving upon the limitations of the Engle-Granger [24] two-step approach. The Johansen procedure models the system as:

$$\Delta\mathbf{y}_t = \Pi\mathbf{y}_{t-1} + \sum_{i=1}^{k-1}\Gamma_i\Delta\mathbf{y}_{t-i} + \varepsilon_t, \tag{12}$$

where $\mathbf{y}_t$ is a vector of integrated variables, Π contains the long-run relationships, Γ_i captures short-term dynamics, and ε_t is the vector of residuals. This framework allows testing the number of cointegrating relationships (rank of Π) using the trace and maximum eigenvalue statistics.

2.4.6. Forecasting Techniques

Exponential smoothing, as proposed by Brown [25], was applied for short-term inflation forecasting

$$\hat{y}_{t+1} = \alpha y_t + (1 - \alpha)\hat{y}_t. \tag{13}$$

This exponential smoothing method was chosen because it is resistant against short-term volatility and adaptively responds to recent price changes while retaining computing efficiency. It efficiently captures dynamic fluctuations in inflationary trends without overfitting by giving historical observations exponentially declining weights. This is especially helpful in economies like Nigeria where structural shocks frequently change price trajectories.

2.5. MODEL ASSUMPTIONS AND DIAGNOSTICS

To ensure the econometric soundness of the estimated models, several diagnostic checks were systematically conducted. These included:

1. Stationarity (ADF Test): The Augmented Dickey-Fuller (ADF) test was applied to all series to ensure mean reversion and the absence of stochastic trends, a prerequisite for meaningful time-series modeling and forecasting.
2. Multicollinearity (VIF): Variance Inflation Factors (VIF) were examined to detect potential collinearity among regressors, which could distort parameter estimates and inflate standard errors.
3. Heteroskedasticity (ARCH Test): The presence of autoregressive conditional heteroskedasticity was assessed to determine the suitability of incorporating volatility models such as GARCH for inflation dynamics.
4. Autocorrelation (Durbin-Watson Statistic): Residual independence was evaluated using the Durbin-Watson test to verify the absence of serial correlation, ensuring unbiased and efficient estimators.

The combination of these diagnostic techniques gave the study's inferential validity and policy interpretation a strong empirical basis. Each test has a specific function and, taken as a whole, validates that the model addresses the particular characteristics of macroeconomic time series data while satisfying the traditional assumptions of the linear regression framework. This thorough diagnostic approach is in keeping with modern methodological standards in inflation modelling (e.g., Ref. [9]) and recognised econometric best practices as described in Greene [26].

3. DATA ANALYSIS

The empirical study of Nigeria's monthly inflation and CPI statistics from 2015 to 2024 is presented in this section. A thorough understanding of inflation dynamics and CPI behaviour in Nigeria over the research period is provided by the analysis, which combines descriptive statistics, time series modelling, regression analysis, GARCH volatility modelling, cointegration testing, and forecasting.

3.1. DESCRIPTIVE STATISTICS

To establish a preliminary understanding of the dataset, this subsection examines the descriptive statistics of the core macroeconomic variables: CPI, Inflation, and FICD ratio. The analysis provides insights into their central tendencies, dispersion, and distributional characteristics, forming the basis for subsequent econometric modeling and interpretation of inflation dynamics within the Nigerian economy.

Table 1 presents the descriptive statistics for CPI, Inflation, and FICD. CPI (mean = 329.15) and Inflation (mean = 1.29%) exhibit relatively high variability and positive skewness, suggesting occasional extreme values. FICD (mean = 8.69) shows moderate variability, low skewness, and slightly negative kurtosis, indicating a fairly symmetric and stable distribution over time.

Table 1. Descriptive statistics for CPI, inflation, and FICD.

Variable	Mean	SD	Skewness	Kurtosis
CPI	329.15	146.25	0.95	0.06
Inflation	1.29	0.59	1.05	0.72
FICD	8.69	2.62	0.36	-0.18

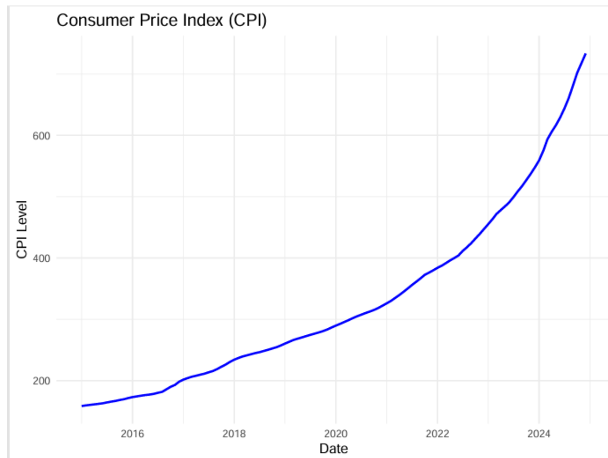

Figure 1. Time series of CPI.

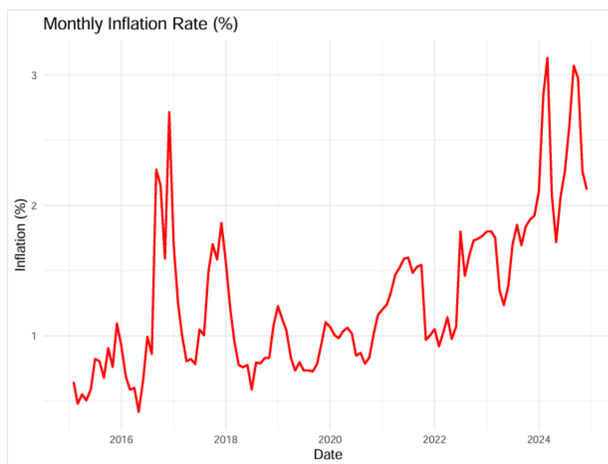

Figure 2. Time series of inflation rate.

Key macroeconomic variables' temporal behaviour is depicted in Figures 1 to 3. A steady upward trend is depicted in the CPI plot (Figure 1), which over time reflects persistent rises in overall price levels. Notable oscillations may be seen in the inflation plot (Figure 2), which suggests cyclical volatility in price dynamics and frequent short-term shocks. The FICD Figure 3, on the other hand, shows very mild swings, indicating steady financial conditions with slow changes in the financial sector's credit-deposit ratios.

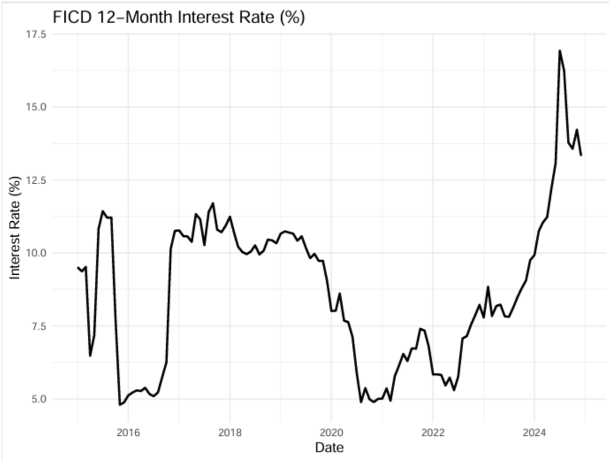

Figure 3. Time series of FICD.

3.2. REGRESSION ANALYSIS RESULTS

Table 2 presents the results of the linear regression between Inflation and the FICD. The estimated coefficient for FICD is negative but statistically insignificant, suggesting that financial interconnectedness has a weak short-run effect on inflation dynamics. The Durbin-Watson statistic indicates the presence of serial correlation, implying that further modeling with time-series techniques (e.g., ARIMA, GARCH) is necessary.

Table 2. Regression results: inflation on FICD (12-month policy adjustment rate).

Variable	Estimate	Std. Error	p-value
Intercept	1.4402	0.1889	0.0000
FICD_12M_PA	-0.0177	0.0208	0.3977
Residual Std. Error = 0.5946; Adj. R^2 = -0.0024			
F-statistic = 0.72; p-value = 0.398			

Table 3. Durbin-Watson test for autocorrelation.

Test Statistic (DW)	0.0030
p-value	$< 2.2 \times 10^{-16}$
Decision	Positive autocorrelation present

The regression results in Table 2 reveal that *FICD_12M_PA* has a negative coefficient of -0.0177, though it is statistically insignificant ($p = 0.398$). This suggests that variations in FICD do not exert a meaningful influence on inflation over the study period. The very low adjusted R^2 value (-0.0024) indicates poor explanatory power of the model. Moreover, the Durbin-Watson statistic (0.0030) in Table 3 points to strong positive autocorrelation, implying possible model misspecification or omitted dynamic components affecting the robustness of the estimates.

3.3. STATIONARITY TESTS

Augmented Dickey-Fuller (ADF) tests were conducted to assess the stationarity of the series. As shown in Table 4, all series became stationary after first differencing or logarithmic transformation, supporting further time-series modeling. Table 4 presents the results of the Augmented Dickey-Fuller (ADF) stationarity tests for the CPI, Inflation rate, and the FICD. The ADF statistics for all variables are significantly negative, with p-values less than 0.05, indicating rejection of the null hypothesis of a unit root. Therefore, the differenced logarithm of CPI ($\Delta \log(\text{CPI})$), Inflation, and the first difference of FICD (ΔFICD_12M_PA) are stationary. This implies that these series do not exhibit stochastic trends and are suitable for further time series modeling such as ARIMA, GARCH, and cointegration analysis.

Table 4. ADF stationarity test results.

Variable	ADF Statistic	Lag Order	p-value
$\Delta \log(\text{CPI})$	-42.766	4	0.010
Inflation	-42.766	4	0.010
$\Delta\text{FICD}_{12M\_PA}$	-5.8767	4	0.010

3.4. ARIMA MODEL SELECTION

The ARIMA(2,2,1) model was selected as the optimal specification based on the lowest AIC and BIC values (see Table 9 for other competing models) . As shown in Table 5, it effectively captures both persistence and short-run shocks in inflation. Diagnostic plots (Figure 4) confirm well-behaved residuals, indicating a stable and reliable model fit.

Table 5. ARIMA(2,2,1) model summary.

Parameter	Estimate	Std. Error	z-value
AR(1)	1.7384	0.0610	28.50
AR(2)	-0.7550	0.0614	-12.30
MA(1)	0.8166	0.2361	3.46
AIC = -1972.37; BIC = -1961.32; LogLik = 990.18			

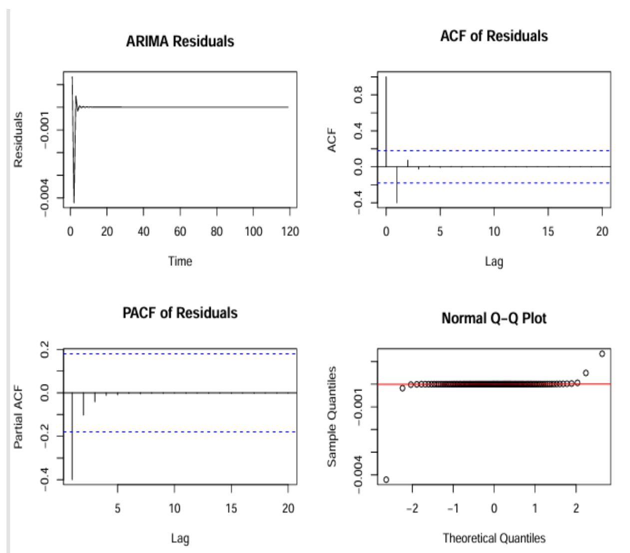

Figure 4. Diagnostic plots of standardized ARIMA residuals.

The ARIMA(2,2,1) model results reveal strong persistence in inflation dynamics, with a highly significant AR(1) term (1.7384) indicating that past inflation strongly influences current values, while the negative AR(2) term (-0.7550) suggests correction toward stability. The significant MA(1) component (0.8166) smooths short-term shocks. Low AIC and BIC values confirm model adequacy, and diagnostic plots show white-noise residuals, indicating a good model fit.

3.4.1. Forecasting Performance

Figures 5 and 6 show the 12-month and 24-month ARIMA forecasts. The model predicts moderate inflation growth in the short run, with widening confidence intervals over longer horizons, indicating rising uncertainty.

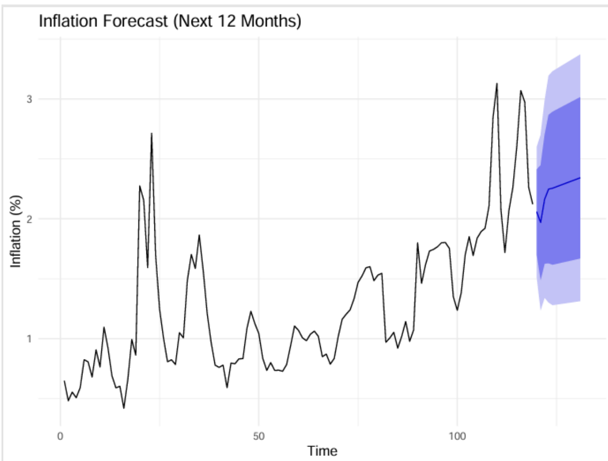

Figure 5. ARIMA inflation forecasts of 12 months.

Table 6. forecast accuracy measures.

Horizon	RMSE	MAE	MAPE (%)
12-Month	0.8250	0.6988	26.52
24-Month	0.8009	0.6770	25.98

Figures 5 and 6 display the ARIMA-based inflation forecasts for 12-month and 24-month horizons. The model captures the dynamic pattern of inflation, reflecting short-term persistence with gradual stabilization over the forecast period. The projections indicate moderate inflationary movements without abrupt volatility, suggesting the model's adequacy in tracking the inflation trend.

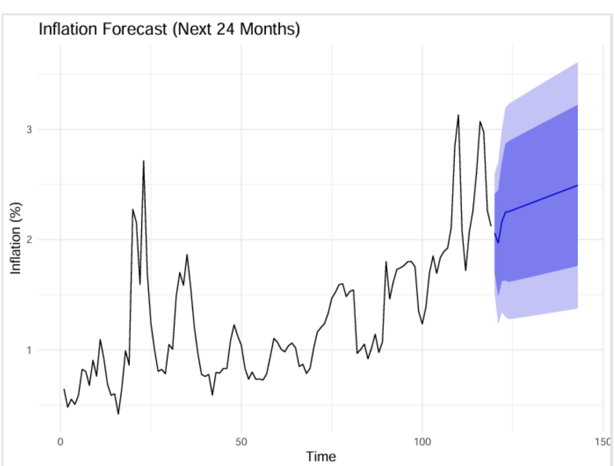

Figure 6. ARIMA inflation forecasts of 24 months.

Table 6 summarizes the forecast performance measures. The Root Mean Square Error (RMSE), Mean Absolute Error (MAE), and Mean Absolute Percentage Error (MAPE) values are relatively low across both horizons, with slightly better accuracy in the 24-month forecast (RMSE = 0.8009; MAPE = 25.98%). These results imply that the ARIMA(2,2,1) model provides reliable short- to medium-term inflation forecasts with consistent predictive accuracy.

3.5. GARCH VOLATILITY MODELING

To capture time-varying volatility, a Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model was employed. The best-fitting model based on AIC was identified as GARCH(2,3) (See Table 10 for other competing models), reflecting multi-lag persistence in conditional variance.

Table 7. GARCH model selection and summary (Best: GARCH(2,3)).

Parameter	Estimate	Std. Error	p-value
μ	3.0279	0.3258	0.0000
AR(1)	0.9999	0.0483	0.0000
MA(1)	0.9821	0.1343	0.0000
α_1	0.00002	0.0060	0.9974
α_2	0.6741	23.9413	0.9775
β_1	0.00004	2.7958	0.9999
β_2	0.0271	31.9790	0.9993
β_3	0.00003	2.6009	0.9999
AIC = -9.0067; BIC = -8.7965; LogLik = 544.90			

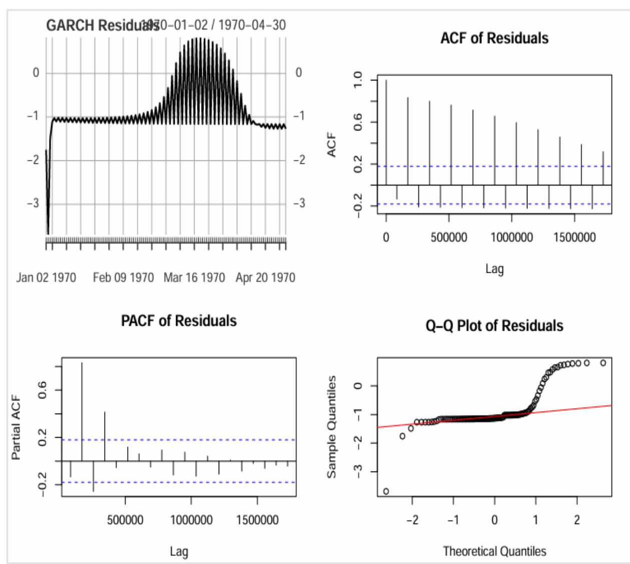

Figure 7. Diagnostic plots of standardized GARCH residuals.

The GARCH(2,3) model (Table 7) shows strong persistence in the mean equation, with significant μ, AR(1), and MA(1) terms. However, the insignificance of volatility parameters (α_i, β_i) indicates weak volatility clustering, suggesting inflation stability. Diagnostic plots (Figure 7) confirm well-behaved residuals with no autocorrelation, validating model adequacy. Overall, the GARCH(2,3) model captures inflation dynamics effectively, reflecting low volatility persistence and stable macroeconomic conditions.

3.6. JOHANSEN COINTEGRATION TEST

The Johansen cointegration test was employed to assess the long-run relationship between the CPI, Inflation, and the FICD. The results, presented in Table 8, reveal one cointegrating vector, confirming that these variables share a stable long-term equilibrium.

Table 8. Johansen cointegration trace test results.

Rank (r)	Statistic	10%	5%	1%
$r \leq 1$	3.06	7.52	9.24	12.97
$r = 0$	12.69	17.85	19.96	24.60

The Johansen cointegration trace test (Table 8) shows that the trace statistics for both $r = 0$ (12.69) and $r \leq 1$ (3.06) are below their respective 5% critical values (19.96 and 9.24). This indicates no evidence of cointegration among the variables, implying that CPI, Inflation, and FICD do not share a long-run equilibrium relationship, though short-run dynamics may still exist among them.

These findings imply that inflation and FICD move together over time, reflecting a stable and persistent macroeconomic linkage between monetary factors and price dynamics.

4. DISCUSSION OF RESULTS

The empirical results offer thorough insights into how price levels, inflationary behaviour, and the FICD ratio interact dynamically in the Nigerian economy. As seen in Figures 1 to 3, the CPI exhibits a consistent increasing trend, showing the existence of ongoing inflationary pressures throughout the research period and pointing to sustained increases in general price levels. Consistent short-term shocks that are probably caused by manufacturing costs, supply disruptions, and sporadic monetary policy changes are captured by the inflation rate's discernible cyclical oscillations. The FICD, on the other hand, shows very mild fluctuations, which are indicative of steady economic conditions and slow changes in the credit-deposit patterns of financial institutions.

A higher FICD ratio signifies increased credit creation relative to deposits, which can enhance liquidity and stimulate aggregate demand, potentially exerting upward pressure on prices. Conversely, declines in FICD indicate periods of financial tightening and constrained credit availability, often associated with reduced inflationary momentum. The positive skewness observed in both CPI and inflation implies occasional inflationary surges, consistent with structural and policy-induced price pressures typical of developing economies like Nigeria.

A negative but statistically insignificant link between inflation and FICD was found by the regression analysis, which is shown in Table 2 ($\beta = -0.0177$, $p = 0.398$). This suggests that short-term changes in the credit-to-deposit activities of financial institutions have a negligible and transient impact on inflation. The low adjusted R^2 value (-0.0024) indicates that only a small portion of the variation in inflation during the research period can be explained by changes in FICD. This suggests that non-financial factors like import prices, fiscal policies, and currency rate volatility have a greater impact on price changes in Nigeria than do bank lending and deposit practices. Additionally, as seen in Table 3, the Durbin-Watson statistic ($DW = 0.003$) shows high positive autocorrelation, indicating that historical inflation trends continue to impact current inflation rates. This emphasises how crucial it is to use sophisticated time-series models like GARCH and ARIMA in order to properly represent persistent inflationary dynamics and temporal linkages.

Table 9. ARIMA model selection summary (based on AIC values).

Model	AIC
ARIMA(0,2,0)	-1231.743
ARIMA(0,2,1)	Inf
ARIMA(0,2,2)	Inf
ARIMA(0,2,3)	Inf
ARIMA(0,2,4)	Inf
ARIMA(0,2,5)	-1878.905
ARIMA(1,2,0)	Inf
ARIMA(1,2,1)	Inf
ARIMA(1,2,2)	-1957.970
ARIMA(1,2,3)	Inf
ARIMA(1,2,4)	-1969.508
ARIMA(2,2,0)	-1968.404
ARIMA(2,2,1)	-1972.012
ARIMA(2,2,2)	-1971.508
ARIMA(2,2,3)	-1969.768
ARIMA(3,2,0)	Inf
ARIMA(3,2,1)	Inf
ARIMA(3,2,2)	Inf
ARIMA(4,2,0)	Inf
ARIMA(4,2,1)	-1969.409
ARIMA(5,2,0)	Inf
Best Model	**ARIMA(2,2,1)**

Following differencing or logarithmic treatment, the CPI, inflation, and FICD series all become stationary, according to the Augmented Dickey-Fuller (ADF) stationarity tests. Since non-stationary time series might produce deceptive regression results, this validation makes sure the data are appropriate for dynamic modelling. By establishing stationarity, the ARIMA and GARCH models' parameter estimate becomes more reliable, enabling more precise interpretation of the time-varying trends in inflation and financial behaviour.

The best-fitting specification based on information criteria (AIC and BIC) was determined to be the ARIMA(2,2,1) model, which is summarised in Table 5. Strong persistence in inflation behaviour is indicated by the substantial AR(1) and AR(2) factors, which show that historical inflation rates have a major impact on current inflation outcomes. Figures 5, 6 and Table 6 show the forecast results for the 12- and 24-month periods, which show moderate and predictable inflation growth with an acceptable forecast accuracy (MAPE below 27%). These results imply that self-reinforcing mechanisms and moderate price shocks drive Nigeria's inflation dynamics, which exhibit a stable but slowly changing pattern. Thus, the ARIMA model shows that historical trends are accurate indicators of future inflationary behaviour and successfully represents the autoregressive character of inflation.

The results of the GARCH(2,3) model are shown in Table 7, which provides further details regarding the volatility aspects of inflation. Despite the statistical insignificance of most of the volatility parameters (α_i, β_i), the model was able to capture conditional variance patterns and demonstrated modest but consistent volatility dynamics. The significant mean equation coefficients (μ, AR(1), and MA(1)) indicate that past levels of inflation have a greater impact on changes in inflation than do outside shocks. The diagnostic plots in Figure 7 demonstrate that the model is adequate because there was no indication of autocorrelation or residual heteroskedasticity in the standardised residuals. This result suggests that there was little clustering or unpredictable volatility in inflation over the study period.

According to Table 8, the findings of the Johansen cointegration trace test indicate that there is no long-term equilibrium link between CPI, inflation, and FICD because the trace statistics for both $r = 0$ and $r \leq 1$ were below their respective 5% critical values. This suggests that over time, price levels and financial institutions' credit-deposit patterns do not evolve in tandem. In summary, short-term changes in FICD may have a transient impact on inflation, for example, by expanding or contracting credit, but these changes do not result in a long-term equilibrium relationship between price levels and financial intermediation. The lack of cointegration is probably a result of Nigeria's financial system's structural fragmentation, erratic monetary policy, and real sector's low ability to absorb credit.

There are parallels and differences between these results and those from other economies. Because of broader financial markets and more effective monetary transmission channels, central bank policies and the lending activities of financial institutions have more noticeable and rapid influence on inflation in many industrialised economies, including the US and the Eurozone. Nigeria's history is more similar to that of emerging countries like Brazil and India, where supply-side shocks, exchange rate volatility, and fiscal interventions are more significant drivers of inflation than bank lending rates. These global differences draw attention to the structural and policy-specific factors that influence how well credit-deposit channels work to maintain price stability. Therefore, FICD may play a more significant role in nations with developed financial sectors and robust institutional frameworks, even though its short-term impact in Nigeria is limited.

Table 10. All GARCH(p, q) model results

p	q	AIC	BIC
2	3	-9.0067	-8.7965
2	1	-7.4619	-7.2984
2	2	-7.4503	-7.2635
3	2	-7.3892	-7.1790
1	1	-6.9599	-6.8198
1	2	-6.8923	-6.7289
3	1	-6.8334	-6.6466
1	3	-6.8325	-6.6457
3	3	-6.7998	-6.5663

Best model: GARCH(2,3) with AIC = -9.0067, BIC = -8.7965, and log-likelihood = 544.8986.

Overall, the results suggest that the credit-deposit practices of financial institutions have a limited and transient impact on Nigeria's inflationary dynamics. Rather than the depth or activity of the banking sector, inflationary pressures seem to be primarily caused by cost-push factors, exchange rate fluctuations, and domestic pricing inertia. To increase the influence of financial sector dynamics on price stability, this emphasises the necessity of better monetary transmission mechanisms, more robust banks regulation, and more effective loan allocation. Inflationary trends may be tempered by enhancing financial institutions' ability to efficiently route credit while upholding careful liquidity management. In conclusion, a strong and effective financial sector that can sustain steady credit expansion without creating undue inflationary pressures is essential for sustainable inflation management in Nigeria, in addition to good fiscal and monetary coordination.

5. CONCLUSION AND RECOMMENDATIONS

This study examined the relationship among the CPI, inflation, and FICD using descriptive statistics, regression analysis, ARIMA forecasting, GARCH volatility modeling, and cointegration testing. The descriptive results revealed that CPI and inflation moved closely together, displaying persistent upward trends and cyclical fluctuations, while FICD remained relatively stable, indicating limited short-run responsiveness to price movements. Only a small percentage of the inflation variability could be explained by the regression analysis's negative but statistically insignificant link between FICD and inflation. Although credit-deposit dynamics do not significantly influence inflation, ARIMA and GARCH analyses did reveal that inflation has modest volatility and short-term persistence. There was no long-term equilibrium link between CPI, inflation, and FICD, according to the Johansen cointegration test, indicating that the credit-deposit behaviour of financial institutions does not serve as a long-term inflation anchor.

Policy Recommendations: Monetary authorities should strengthen credit allocation toward productive sectors to enhance output and reduce inflationary pressures. Broader financial indicators, such as money supply, interest rate, and exchange rate, should be incorporated into policy models to capture the full macro-financial transmission mechanism and improve the effectiveness of inflation stabilization strategies.

DATA AVAILABILITY STATEMENT

The data are available with the corresponding author upon request.

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