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Forecasting Nigerian Inflation: A SARIMAX and Granger Causality Analysis of Exchange Rate and Crude Oil Price Impacts

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ABSTRACT

Inflation significantly affects Nigeria's purchasing power and economic stability, thus necessitating targeted policy responses. This study assesses the Nigeria's inflation dynamics from 2008 to April 2024, with a focus on the effects of exchange rate volatility and crude oil prices on the inflation dynamics especially across Consumer Price Index (CPI) categories. Using monthly data from the National Bureau of Statistics (NBS) and the Central Bank of Nigeria (CBN), time series decomposition, Granger causality tests, linear regression, and SARIMA/SARIMAX forecasting were employed in the analysis. Results indicate that the exchange rate significantly drives inflation, while crude oil prices have a negligible direct effect. Food CPI was most sensitive to inflationary pressures, whereas communication CPI was least affected. Forecasts suggest a potential decline in inflation in 2025, indicating possible economic stabilization. Recommendations vary from stabilizing the exchange rate, intervening in the foodstuff market, diversifying the economy, investing in the communications sector, and holding policies to bring down inflation and gain sustainable growth.

1. Introduction

One of the most pressing macroeconomic challenges faced by many developing economies, such as Nigeria, is Inflation. In recent years, inflation has continued to put pressure on the economy of nations. Driven by supply chain demands, disruptions, commodity price shocks, and volatile foreign exchange rates because of dependence on commodity exports and imports. These economic pressures have resulted in less purchasing power and an elevated cost of living for households. Recent research revealed that across Sub-Saharan Africa, fiscal expansions, instability of exchange rates and external shocks are significant causes of recent inflation spikes (Olaoye *et al.*, 2024).

In Nigeria particularly, the economy has over the years faced steady inflationary pressures from inflation, caused by economic volatility. This has led to a high cost of living and other economic uncertainties that have significantly deterred investment and savings (Alexander, Andow and Danpome, 2015); (Akwe Ogu, 2020); (Ogbebor, Oguntodu and Oyinloye, 2020).

In Nigeria, inflation has persisted at elevated levels despite repeated policy interventions. The International Monetary Fund (IMF, 2022) reports that factors like dependence on imports, energy subsidies, and exchange rate adjustments have supported the inflationary pressures and has made it nearly impossible to overcome. The effects of inflation in Nigeria are numerous, some of them are the erosion of real incomes, increased food-price instability, and the potential for socio-economic unrest. Particularly, the food component of the Consumer Price Index (CPI) has shown a high level of sensitivity to external shocks and exchange rate fluctuations, thus impacting the living standards of low-income households. Recent research by (Adebiyi, Adamgbe and Odu, 2024) used a Bayesian DSGE model to show that monetary policy remains an important driver of inflation in Nigeria, affecting headline, core, and food prices. However, they note since the COVID-19 pandemic and the Russia–Ukraine crisis, its impact has weakened because of global supply disruptions and external shocks. They recommend combining monetary measures with supply-side

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policies to restore price stability, a view consistent with this study's focus on the influence of external factors such as exchange-rate volatility and crude-oil prices on inflation dynamics in Nigeria. They suggested that combining monetary measures with supply side policies to restore price stability. This work extends that view by focusing on the influence of external factors, specifically exchange rate volatility and crude oil prices, on Nigeria's inflation dynamics.

External variables play an undeniable role in Nigeria's inflation. The exchange rate, for instance, has significant pass-through effects on consumer prices. Oyadeyi et al., (2024) hold that this effect is heterogeneous, with food and tradable goods bearing the burden of naira depreciation. At the same time, the link between global crude-oil prices and domestic inflation is less direct, despite Nigeria's oil-dependent economy. Analysis by (Bawa *et al.*, 2021) for the Central Bank of Nigeria found that domestic mechanisms like subsidies and import dependencies dilute the transmission of oil-price shocks. Ding et al., (2023), showed that oil price shocks influence domestic inflation primarily through their impact on the exchange rate. This highlights the fact that a combined examination of exchange rate movements and crude oil price shocks is essential to fully capture inflationary dynamics in Nigeria. However, existing studies have often analysed exchange rate and oil price shocks in isolation. Much of this work focused on the aggregation of CPI level or uses forecasting models that failed to account for sectoral CPI categories or causality. For example, (Adelekan, Abiola and Constance, 2020) used ARIMA models to forecast Nigerian inflation but did not include external shocks into the framework. Similarly, (Nuhu, 2021) analysed the exchange rate volatility and inflation causality but omitted crude oil price dynamics across different CPI components. This gap is significant and requires an urgent solution because policy interventions may be targeted across different CPI categories. An understanding of these drivers and the pattern of inflation is vital for effective economic planning and policy development (Gachinamani, 2017; Sami and Taiwo, 2023).

As a solution to the identified gap, this study aims to analyse the relationship between inflation, the exchange rate, and crude-oil prices in Nigeria from 2008–2024, with a particular emphasis on sectoral CPI components. The following forms the objectives of the analysis:

i. Assess the relationship between inflation and the external variables (exchange rate and crude-oil price).
ii. Evaluate directional causality among these variables using statistical models.
iii. Forecast future inflation trends using SARIMA and SARIMAX models that incorporate the exchange rate and crude oil prices as exogenous variables.

The result of this analysis will serve as key insights for policymakers, including monetary and fiscal planning authorities, in the design of more targeted and effective inflation control measures.

Inflation, widely defined as the steady rise in the price of commodities, is typically measured using the Consumer Price Index (CPI) (Zubair, Adams and Aniagolu, 2022). The measurement of CPI in Nigeria faces unique challenges such as base year selection, the heavy weighting of food items, and the continued influence of imported goods (K.G. *et al.*, 2023).

The sensitivity of Nigerian inflation to external shocks is amplified by high import content of intermediate goods, exchange-rate volatility, and a consumption basket dominated by food. Therefore, effective analysis requires attention to both headline and sub-component CPI measures.

1.1 Exchange Rate and Inflation Nexus

Exchange-rate fluctuations affect inflation via exchange-rate pass-through (ERPT). Evidence from Nigeria consistently indicates that naira depreciation increases consumer prices by raising the cost of imports and intermediate goods (Ikue *et al.*, 2024). Yusuf *et al*., (2022) demonstrated significant short and long-term effects of exchange-rate changes on the CPI from 1990–2022 in their research.

The over reliance of Nigeria on import, coupled with the repeated devaluations of Naira makes prices of commodities highly sensitive. This reaction is most times asymmetric, with prices reacting more strongly to depreciation than to appreciation (Sa'ad *et al.*, 2023). This points to the fact that incorporating exchange rate channels is critical for robust inflation modelling, forecasting, and policy analysis.

1.2 Crude Oil Prices and Inflation

Given Nigeria's economic structure, global crude-oil price fluctuations are closely watched. Oil-price increases raise headline, core, and food inflation. Conversely, price declines can also elevate inflation, though indirectly, by depleting foreign reserves and triggering currency depreciation (Alimia, Olaniranb and Ayubac, 2020).

Studies such as (Bawa *et al.*, 2021) confirm these asymmetric effects, noting that oil-price drops sometimes have stronger inflationary impacts than price increases.
Olujobi *et al*., (2022) in their work stated that oil price changes do not directly impact Nigerian inflation. However, it influences the exchange rate as primary factor. This highlights that the impact of oil prices is largely managed through foreign exchange channels, fiscal responses, or structural factors like subsidies.

1.3 Forecasting Models for Inflation

ARIMA and other linear models have been applied to CPI and exchange rate series analysis (K.G. *et al.*, 2023). Their use has been more visible in inflation forecasting, which may be attributed to their relatively simple nature and availability of data. These linear models, however, often does not account for structural breaks, non-linearities, and heterogeneity across CPI components. Given the asymmetric nature of economic shocks and the variation in inflation drivers across food and non-food sectors, SARIMAX and other methods that allow for the inclusion of exogenous variables like oil prices may be better in analysing the inflation patterns. Therefore, combining traditional statistical forecasting methods with machine learning models, for instance, could better capture sudden shifts from events like currency devaluations or subsidy removals, providing more balanced forecasts across CPI categories (Abdulraheem, Muntasir and Shuaibu, 2025).

1.4 Related Works

Table 1: Comparative Analysis of some related works

No.	Authors (Year)	Relevance	Methodology	Technique(s) used	Strengths	Limitations	Knowledge contribution / Gap identified
1	(S. Alimia, D. Olaniranb and Ayubac, 2020)	Directly examines oil-price inflation in Nigeria	Time-series, nonlinear cointegration.	NARDL (Nonlinear ARDL)	Captures asymmetry in oil-price shocks; Nigeria context	Limited to the analysis of oil price but did not integrate exchange rate	Shows oil-price shocks influence inflation asymmetrically. Highlights need for combined variable models
2	(Bawa *et al.*, 2021)	Oil price effect on various inflation measures.	Nonlinear cointegration	NARDL on quarterly data (1999-2018)	Disaggregated inflation in Nigeria.	Doesn't incorporate exchange-rate variable extensively, limited forecasting.	Demonstrates oil-price shocks still relevant but there is gap in the use of combined model frameworks
3	(Sa'ad *et al.*, 2023)	Moves toward combined oil price + exchange rate → inflation in	Time-series, long period (1970-2020)	ARDL & NARDL with both oil price & FX variables	Combines both channels; long data span	Perhaps less forecast oriented; may not disaggregate CPI categories	Bridge toward your intended model by including both oil & exchange

		Nigeria				(food vs non-food) deeply	rate; still gap remains in forecasting by CPI category
4	(Ikue *et al.*, 2024)	Focuses on exchange-rate - inflation pass-through in Nigeria	ARDL/NARDL (2010Q1-2024Q2)	NARDL for exchange rate shocks onto inflation (food & headline)	Recent period; includes food & headline inflation; Nigeria context	Doesn't include oil-price variable, forecasting not central	Strong for exchange rate channel, but gap remains for integrating oil price + forecasting across CPI categories
5	(Abdullahi Umar and Umar, 2022)	Very relevant for food inflation and FX channel in Nigeria.	Nonlinear time-series (2008Q1-2020Q4)	NARDL on food inflation & exchange rate and GDP	Focus on food inflation category; asymmetric pass-through	Limited to food inflation only.	Food category-specific insight but gap remains in non-food or core categories and hybrid model forecasting
6	(Ibrahim, Sani and Olokojo, 2023)	Forecasting of CPI and exchange rate jointly for Nigeria	ARIMA modelling (monthly CPI and FX 2010-2022)	ARIMA for CPI and FX separately	Recent; models both CPI and FX; Nigeria application	Does not incorporate oil price; does not capture the impact of inflation on CPI categories	Advances forecasting of CPI and FX, but gap remains in hybrid modelling + multiple CPI components
7	(Adelekan, Abiola and Constance, 2020)	Forecasting inflation in Nigeria in-depth	SARIMA modelling many candidate models (2003-2020)	SARMA/SARIMA models	Thorough model comparison; Nigeria context; forecasting output provided	Linear time-series only; lacks exogenous variables (oil/FX); CPI category not differentiated	Useful benchmarking for forecasting but does not integrate external drivers or CPI categories
8	(Akosile, 2023)	Determinants of food inflation in Nigeria including oil price,	ARDL (1991-2023)	ARDL on food inflation with macro variables.	Updated period; includes oil price, FX, interest	Focus only on food inflation, forecasting component absent	Good category work: gap remains in broader CPI categories

		exchange rate & interest rate.			rate; food inflation category		and forecasting hybrid models.
9	(Shehu, Abdullahi and Mustapha, 2023)	Focuses on food prices & inflation dynamics in Nigeria with oil/FX variables	ARDL (1990-2021)	ARDL on food inflation with oil price, FX, money supply and govt expenditure	Long period; multiple drivers; category focus	Only food inflation; forecasting not central; non-food or core categories omitted	Adds to understanding of food inflation drivers; gap remains for non-food inflation, and impact analysis across other non-food CPI categories, forecasting hybrid modelling with CPI categories

1.5 Identified Research Gap

The reviewed works shows that, although the existing studies have explored the determinants of inflation in Nigeria, most have done so by examining exchange rate fluctuations and crude-oil price shocks independently rather than within a unified empirical framework. Furthermore, prior analyses have primarily focused on aggregate headline inflation, with limited attention to sectoral CPI components such as food, other non-food categories.
Additionally, while earlier studies like (K.G. *et al.*, 2023; Sa'ad *et al.*, 2023; Ikue *et al.*, 2024) have utilised traditional time-series techniques such as ARDL or simple ARIMA models, few have utilised hybrid forecasting approaches like SARIMA and SARIMAX that incorporate exogenous variables like exchange rate and crude-oil price within a dynamic, multivariate framework. This methodological limitation has constrained the ability to capture directional causality, non-linear dynamics, and the impact of inflation across CPI categories.
This study bridges these gaps by jointly analysing the relationship between inflation, exchange rate, and crude oil prices in Nigeria (2008–2024), focusing on sectoral CPI variations. Specifically, it conducts impact and correlation analyses, visualises inflation trends, applies linear regression to assess external influences, and employs SARIMA and SARIMAX models to forecast inflation into early 2025. This integrated approach provides deeper insights for targeted and data-driven inflation-control policies in Nigeria.

2. Methodology

This study adopted the retrospective longitudinal design using monthly time-series data from 2008 to 2024. The Inflation data were sourced from the National Bureau of Statistics (NBS), while exchange rate and crude-oil price data were obtained from the Central Bank of Nigeria (CBN) reports.

	Inflation_Rate	Crude.Oil.Price	CPI_Food	CPI_Energy	CPI_Health	CPI_Transport	CPI_Communication	CPI_Education	Exchange Rate
2008-01-01	8.60	94.260	75.53443	84.61285	83.86314	86.53004	83.12944	75.28447	117.9522
2008-02-01	8.00	98.150	75.15419	85.23163	83.36589	88.35524	82.88981	75.45762	117.4648
2008-03-01	7.80	103.730	78.24252	83.25152	86.08299	84.37630	81.89347	74.82685	116.7731
2008-04-01	8.20	116.730	79.43427	84.34883	89.44533	88.60033	93.93787	73.66425	117.5468
2008-05-01	9.70	126.570	80.78368	85.57403	90.54046	87.93283	97.55329	74.88044	117.8589
2008-06-01	12.00	138.740	84.49803	88.38744	91.62375	88.26658	96.46866	78.40122	117.7964
2008-07-01	14.00	137.740	86.70995	90.79658	93.47659	89.65895	97.28423	80.87484	117.7330
2008-08-01	12.40	115.840	87.71621	92.51681	92.42290	88.61598	97.29264	83.70300	117.7371
2008-09-01	13.00	103.820	88.45351	94.10090	92.31634	88.29266	97.73406	83.08872	117.6727
2008-10-01	14.70	75.310	88.01762	93.29236	93.25164	88.77764	97.28843	84.65534	117.7791

Figure 1: Overview of the Inflation Dataset

Data were cleaned, interpolated for missing values, and normalised before analysis. For the trends and seasonal patterns to be detected, exploratory Data Analysis (EDA) was performed on the dataset (Taherdoost, 2020).

2.1 Data Preprocessing

To preprocess the dataset and ger them set for the actual analysis, several steps were followed and some actions taken. First, the missing values in the dataset were handled through linear interpolation. This allowed the dataset to maintain monthly continuity that allows for time series analysis. The normalisation of the variables followed using min–max scaling to ensure comparability of the variables and reduced scale-related biasness in the final forecasting models. The exogenous variables introduced in the SARIMAX model (exchange rate and crude-oil prices) were also pre-processed for stationarity using differencing and log transformation to ensure that they are compliant with time-series modelling and forecasting.

2.2 Analytical Methods

The analysis phase of the research followed Exploratory Data Analysis (EDA), seasonal decomposition and trend/pattern inspection. These analyses were done to reveal and understand the hidden patterns in inflation, exchange rate movements, and oil price dynamics. Also, Pearson correlation analysis was done to quantify and understand the relationships between inflation and key CPI categories. In other to clearly show and understand the effects of exchange rate and crude-oil prices on inflation, linear regression was utilised. The Granger causality tests (using 192 monthly observations) established the direction of influence among variables. Inflation forecasting was performed using SARIMA and SARIMAX models, with SARIMAX incorporating exchange rate as an exogenous predictor based on its stronger significance. Model selection relied on Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) for optimal performance. After that, the correlation analysis and a heatmaps were used to examine relationships among inflation, exchange rate, and crude oil prices. A Linear regression model was used to show the impact of exchange rate and crude oil prices on inflation, while impact analysis was done to evaluate inflation's effect on CPI categories. Granger causality tests assessed directional influence of the variables.

3. Results and Discussions

3.1 Results

3.1.1 Impact analysis of inflation on the CPI categories

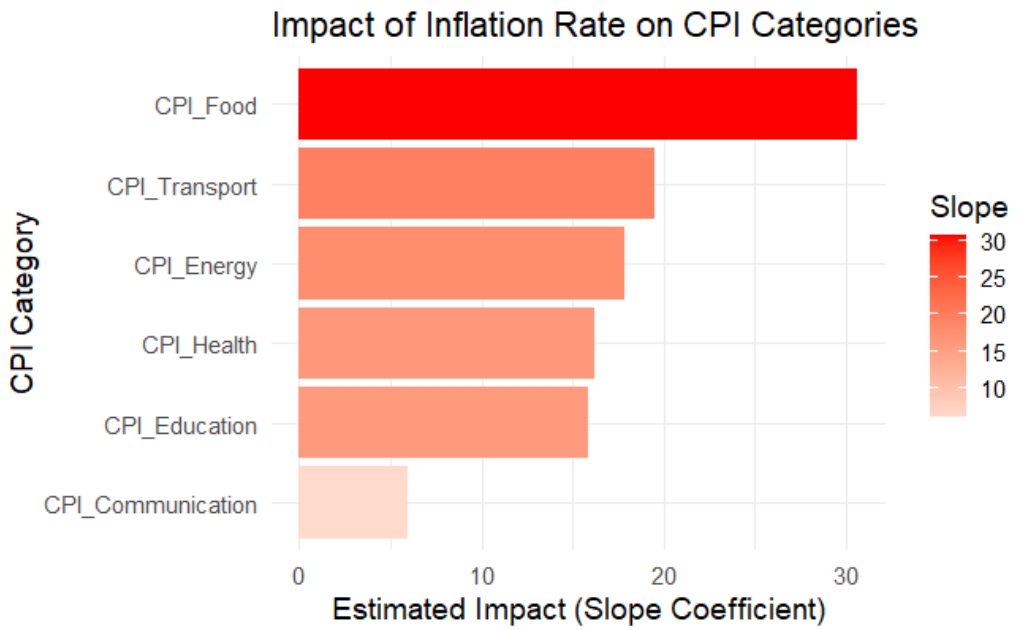

Figure 2: Impact of Inflation rate on CPI Categories

3.1.2 Relationship strength between the inflation rate and various CPIs.

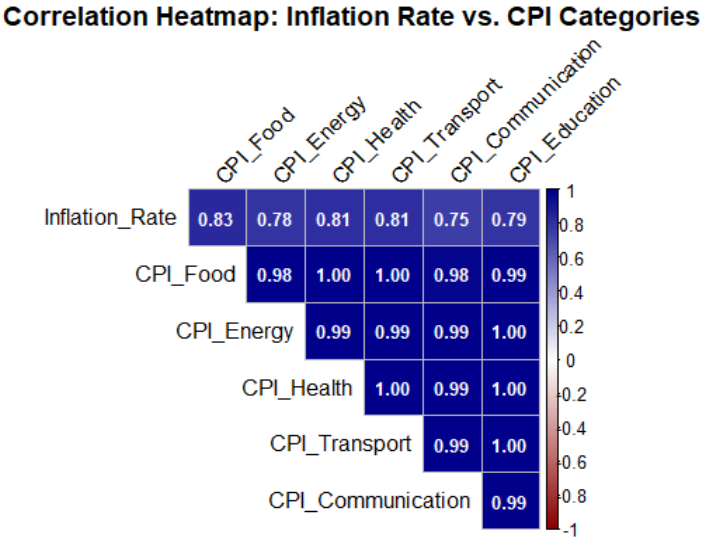

Figure 3: Strength of Impact of Inflation Rate on CPI Categories

The impact analysis as shown in figures 2 and 3, revealed a strong positive correlation between the Consumer Price Index (CPI) for food and the inflation rate, with a correlation coefficient of approximately 0.83, indicating that food prices are highly sensitive to inflationary pressures. In contrast, the CPI for communication exhibited the weakest correlation with inflation, suggesting minimal influence. These findings highlight that food commodities are disproportionately affected by inflation compared to other sectors.

3.1.3 Yearly average inflation rate from 2008 -2024

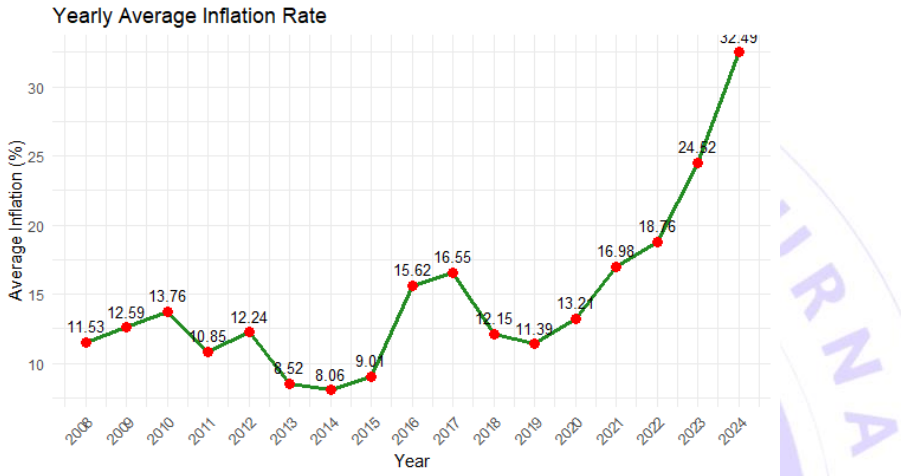

Figure 4: Yealy Average Inflation rate (2008 - 2024)

Figure 4 shows the analysis of Nigeria's yearly average inflation rates. it revealed that between 2013 and 2015, inflation remained relatively subdued, fluctuating between 8.06% and 9.01%, indicative of a period of economic stability. However, a sharp escalation commenced in 2020, with inflation peaking at 32.4% in 2024. This pronounced increase highlights the intensification of economic challenges in recent years, underscoring the urgency of strategic measures to address underlying inflationary drivers.

3.1.3 Impact of crude oil price and exchange rate on Nigeria's inflation rate

The linear regression analysis was employed to evaluate the influence of crude oil prices and exchange rates on Nigeria's inflation rate. Figure 5 shows that exchange rate has an impact on inflation while crude oil price does not.

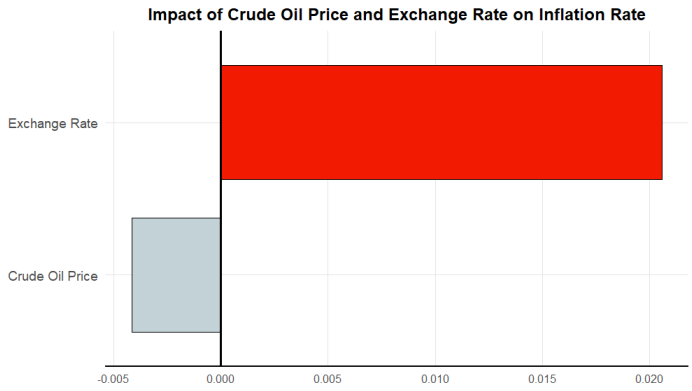

Figure 5: Impact of Crude Oil Price and Exchange Rate on Inflation Rate

The Results as shown in figures 5 and 6, indicate that the exchange rate exerts a pronounced and statistically significant positive effect on inflation, underscoring its pivotal role as a determinant. In contrast, crude oil prices were found to have no significant predictive impact on inflation, suggesting a limited influence on inflationary dynamics.

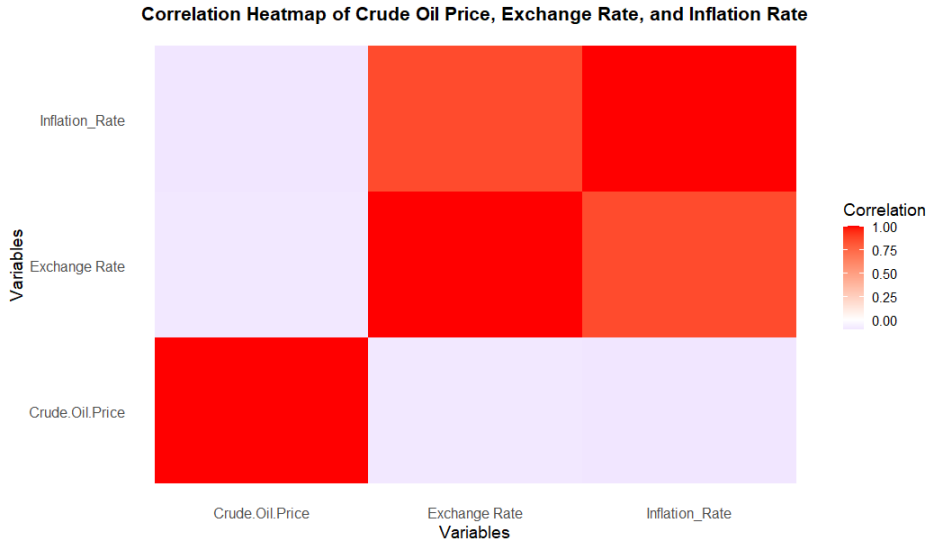

Figure 6 Relationship strength of Crude oil price, exchange rate and inflation rate

3.1.4 Time Series Seasonal decomposition

Seasonal decomposition as shown in figures 7, 8 and 9, showed clear seasonality and an upward trend in Nigeria's inflation and exchange rates. Exchange rate was used as the sole exogenous variable, as crude oil prices showed no significant impact on inflation (Das and Barman, 2025).

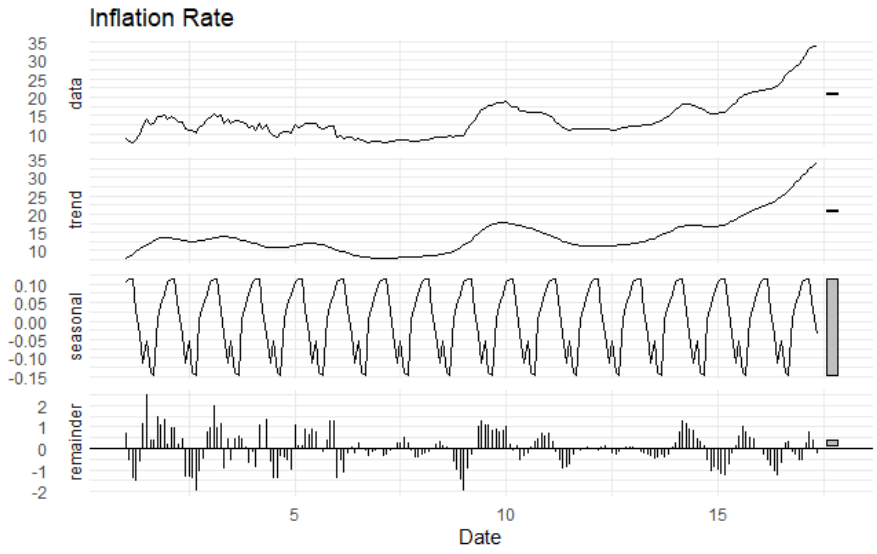

Figure 7: Inflation Rate time series decomposition plot

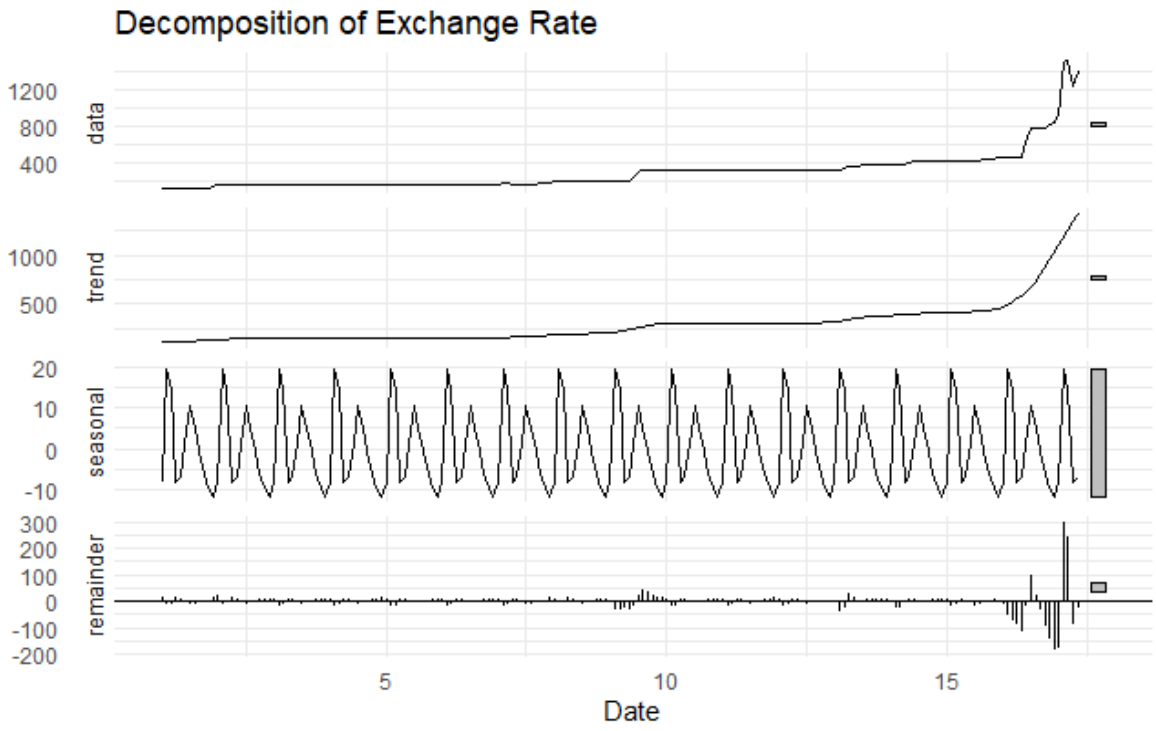

Figure 8: Exchange rate time series decomposition plot

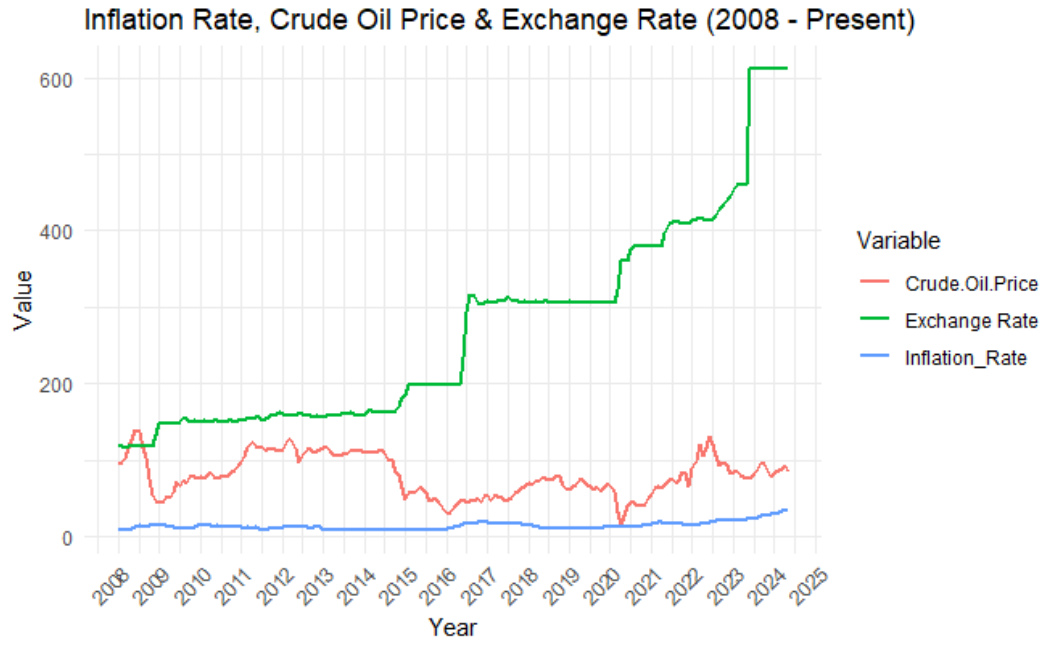

Figure 9: Time series plot of crude oil, exchange rate and inflation rate

3.1.5 Forecasting of the Future Inflation rates

SARIMA and SARIMAX were chosen for their ability to model seasonality and incorporate exogenous variables respectively, aligning with the study's goals of capturing inflation trends and external influences (Ifeanyichukwu Ugoh *et al.*, 2021; Liu *et al.*, 2021; Ade and Ade, 2023; Birari *et al.*, 2024).

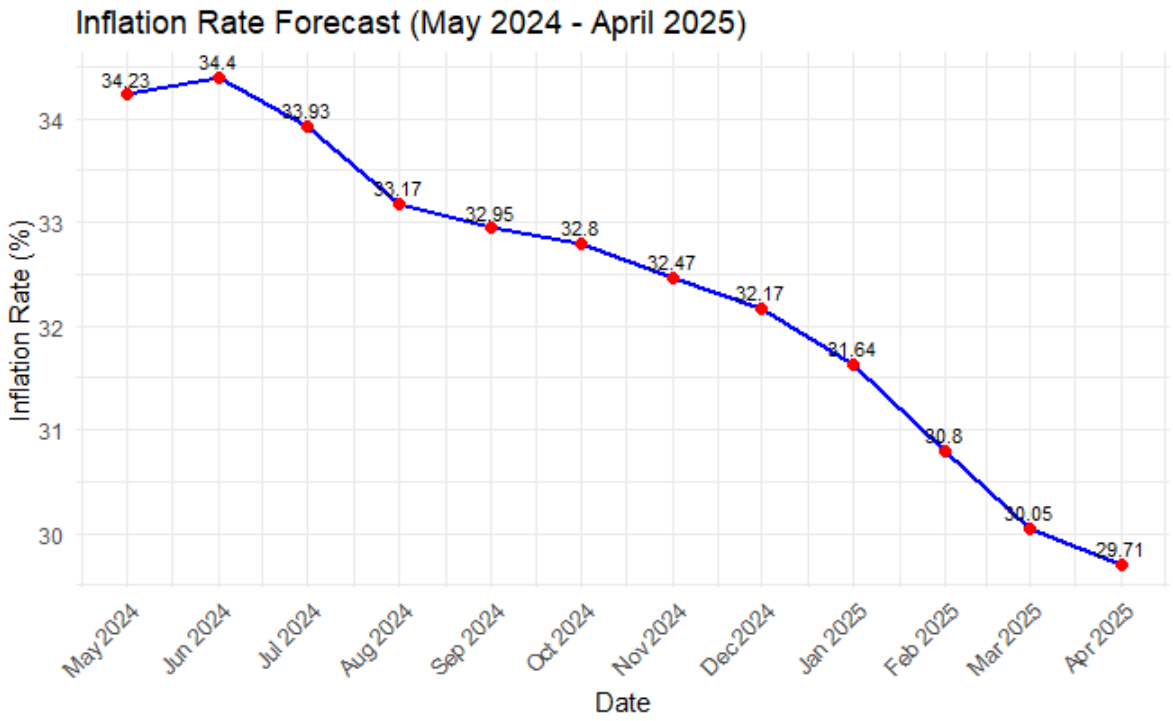

Figure 10: SARIMA Model Inflation rate forecasts (May 2024 - April 2025)

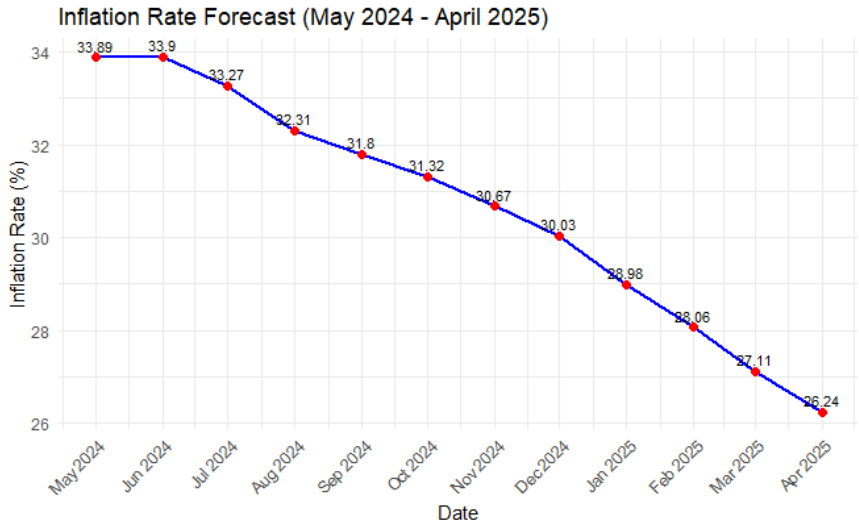

Figure 11 SARIMAX inflation rate forecasts (May 2024 - April 2025)

The SARIMA and SARIMAX forecasting models project a potential decline in Nigeria's inflation rate for 2025 as

shown in figures 10 and 11, signalling prospects for economic stabilisation. This downward trend suggests that proactive policy measures and improving macroeconomic conditions could contribute to enhanced economic resilience in the near term.

3.1.6 Pre and Post COVID-19 Inflation Rate Analysis

A comparison was made between Nigeria's Pre-COVID-19 and post-COVID-19 average inflation rates. As shown in figures 12 and 13, while the pre-COVID-19 period had an average inflation rate of 11.86%, that of the post-COVID-19 period increased significantly to 19.99%. A two-sample t-test with ANOVA yielded a t-value of -9.42 and a p-value of less than 0.001, providing strong evidence to reject the null hypothesis of equality of the two mean inflation rates. The 95% confidence interval for the mean difference between -9.87 and -6.41 establishes a non-zero true mean difference, reaffirming the statistical significance of the increase. Furthermore, a Cohen's $\boldsymbol{d}$ = -2.09 and a confidence interval of [-2.47, -1.71] is a very large effect size, indicating the strong impact of the pandemic on inflation. These results collectively demonstrate a significant and pronounced rise in inflation following the onset of COVID-19.

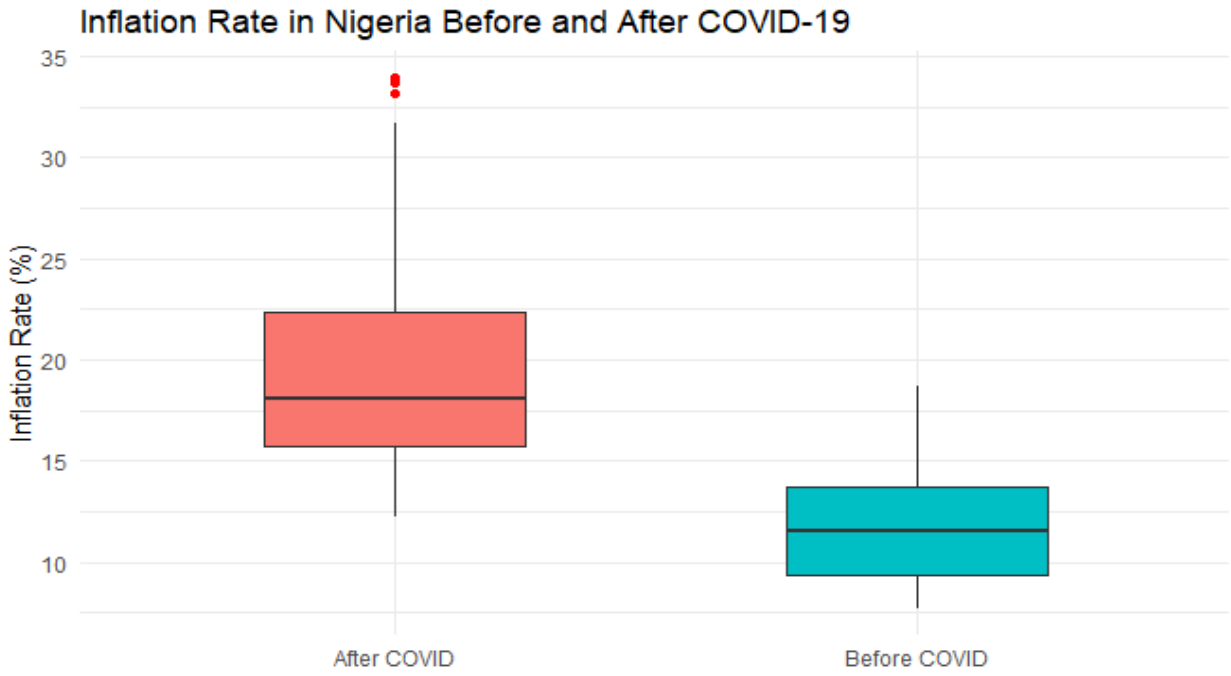

Figure 12: Pre and Post COVID-19 Box Plot

Figure 13: Pre and Post COVID-19 Inflation rates

3.2 Discussion

This results of this study align with and extend existing literature. Like (Ikue *et al.*, 2024); (Oyadeyi, Oyadeyi and Iyoha, 2024), and (Bawa *et al.*, 2021), the results confirm that inflation in Nigeria is majorly caused by exchange rate fluctuations rather than the price of global commodities. this study also provides additional insights that empirically shows that even though Nigeria is an oil exporting country, crude oil prices do not directly influence inflation. This is in opposite with other economies where domestic fuel prices closely track global crude prices. The unique Nigerian context characterised by crude-for-refined product dependency, subsidy interventions, and exchange-rate-dominated price formation weakens the oil-to-inflation transmission mechanism, thereby explaining the observed insignificance. Furthermore, the sectoral CPI results support and reinforces the argument that inflation in Nigeria is a structural problem with its impacts across consumer categories. As stated by (Abdullahi Umar and Umar, 2022) and (Shehu, Abdullahi and Mustapha, 2023), basic commodities sector such as food and other basic consumables are more susceptible to exchange rate pressures. These findings are supported by this study by empirically showing the stronger inflation pass-through into Food CPI compared to sectors like communication.

3.2.1 Comparison with some related works

The result of this study provides a more critical and integrated understanding of the inflationary pattern in Nigeria by combining exchange rate, crude-oil price movements, and CPI categories within a forecasting framework thus aligning with and extend existing empirical evidence on Nigeria's inflation dynamics.

Table 2: Comparison of the study with related works

Aspect	Prior Studies	Key Findings / Limitations	Contribution of This Study
ARIMA/SARIMA Forecasting	(Adelekan, Abiola and Constance, 2020); (Ibrahim, Sani	Did not include exogenous variables; limited ability to capture external shocks	SARIMAX model incorporates exchange rate as an exogenous variable, improving forecast accuracy and capturing external

	and Olokojo, 2023)		influences.
Nonlinear ARDL / NARDL Analysis	(S. Alimia, D. Olaniranb and Ayubac, 2020); (Sa'ad *et al.*, 2023)	Highlighted asymmetries in oil price and exchange rate effects; crude oil asymmetries emphasized	Confirms strong predictive effect of exchange rate; crude oil asymmetries less relevant in Nigerian context
COVID-19 Impact	(Adebiyi, Adamgbe and Odu, 2024)	Showed weakened influence of monetary policy post-pandemic; external shocks amplify inflation.	Confirms post-COVID-19 inflation spike; demonstrates significant effect of external shocks on inflation dynamics.

3.2.2 Granger Causality Test

Granger Causality is a statistical test that is used to determine the degree to which a variable causes another to happen (Sawyer, 2009; Shojaie and Fox, 2021). The result of the Granger causality tests shown in table 1, revealed that exchange rate significantly drives inflation in Nigeria ($F = 4.21$, $p = 0.016$), while crude oil prices have no causal impact ($F = 0.008$, $p = 0.992$), highlighting the dominant role of exchange rate in inflation dynamics.

Table 3: Granger Causality Test Result

Variable	F-Statistic	P-Value	Conclusion
Exchange Rate	4.21	0.016	Causes inflation
Crude Oil Price	0.008	0.992	Does not cause inflation

4. Conclusion

This study provides a comprehensive analysis of Nigeria's inflation pattern from 2008 to 2024, focusing on understanding the impact of crude oil price and exchange rate on inflation. it also analysed the inflationary pressure on CPI categories to understand the CPI categories that are most affected by inflation pressures. The findings shows that exchange rate volatility remains the most significant and consistent driver of inflation, highlighting the country's heavy reliance on imported goods which exposes the economy to higher currency fluctuations and inflationary shocks. in the opposite, crude oil prices did not show a direct impact on inflation. this result aligns and validates the Nigeria's dependence on imported refined products and the mitigating effects of periodic government interventions and subsidies. The sectoral CPI analysis also shows that basic commodities such as food prices are the most sensitive to inflationary moves, while communication prices maintain a comparative stability, suggesting that Nigeria's inflationary pressures are largely structural and cost driven. Inflation had appeared to be relatively stable in the early 2010s but continued to surge sharply after 2020. Forecasts for 2025 point to a possible easing of inflation, indicating emerging opportunities for stabilization if supported by timely and well-targeted policy actions. With reference to the empirical findings of this study and their alignment with evidence from other literature, some recommended actions for stabilising Nigeria's inflation projection and addressing sectoral vulnerabilities are:

i. Stabilize exchange rates via monetary policies.

ii. Subsidize food sector to ease inflationary pressure.
iii. Diversify economy to reduce oil reliance.
iv. Invest in stable communication sector.
v. Sustain fiscal and monetary policies for stability.

4.1 Limitations

Some of the limitations that could have impacted the findings of this study are:

i. Frequent naira devaluations which may have introduced high-frequency shocks that were not fully captured by monthly inflation data.
ii. Government Subsidies: The introduction of Fuel and food subsidies by the government may have masked the direct impact of crude oil prices on inflation.
iii. Limited Exogenous Variables: Macroeconomic factors such as interest rates, fiscal deficits etc were not included in the analysis.
iv. Data Frequency and Structural Changes: Monthly data may smooth short-term shocks, and policy or structural shifts may not be fully reflected.
v. Forecasting Uncertainty: SARIMA/SARIMAX forecasts assume historical trends continue; unexpected shocks may affect accuracy.

Ethical Considerations

This study upheld high ethical standards by employing use of publicly available, dependable sources of data such as NBS, CBN, and foreign energy reports for ensuring transparency and integrity. No specific entity data were used to avoid privacy concerns. Analysis was done according to strict academic procedures, with clear labelling of methodological assumptions and constraints to ensure objectivity and academic integrity. All figures on this work are author generated.

Declaration on the Use of Generative AI (GAI)

Generative AI (ChatGPT) was used to assist with code debugging, syntax clarification, and R-based modelling instruction. All the writing and analysis were completed independently, and AI assistance was within ethical and academic parameters.

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