EXCHANGE RATE DEPRECIATION AND FOOD PRICES IN NIGERIA

Queen Chijindu OKEKE[1], Collins Chidubem UMEGHALU[2], and Ignatius Okoye MACHI[3]
[1,2,&3]Department of Economics, Nnamdi Azikiwe University, Awka, Nigeria

Corresponding Author: cc.umeghalu@unizik.edu.ng

Abstract

Prompted by the consistent rise in food prices that seems to follow the depreciation of the exchange rate, despite a significant portion of the nation's food being produced locally, this study examines the effects of exchange rate fluctuations on food prices in Nigeria over the period 2000-2024. The Autoregressive Distributed Lag (ARDL) approach was used to analyse the secondary data used for the study which were sourced from the World Bank Development Indicators, the National Bureau of Statistics, and the Central Bank of Nigeria Statistical Bulletin. The results indicate a significant and positive relationship between exchange rates and food prices in Nigeria, both in the short and long terms. Additionally, while trade openness exhibits a positive and statistically significant influence on food prices in the short term, its long-term effect appears to be insignificant. On the other hand, the interest rate shows a negative but statistically insignificant correlation with food prices in the short term, with no substantial long-term impact either. These findings highlight the necessity for long-term strategies aimed at stabilizing the exchange rate, managing trade liberalization effectively, and handling interest rates to lessen their detrimental effects on food prices. The study recommends the government to focus on strong monetary policies that reinforce the Naira, implement targeted tariffs or subsidies on key food imports, and offer low-interest loans to farmers to boost local agricultural production.

Keywords: Exchange rate, Depreciation, Food prices, Economic growth, Nigeria, Africa

INTRODUCTION

The exchange rate is the price one pays to trade one country's currency for another. While it can reflect nominal and real values, a consistent definition remains elusive due to its fluidity in various economic situations. Essentially, it represents the value at which currencies are traded, shaped by market dynamics and government policies. The exchange rate often experiences fluctuations, which can be swift and unpredictable. In Nigeria, these fluctuations have intensified over the years, with the naira's ongoing depreciation threatening consumers' purchasing power and the overall health of the economy (Ajani & Okota, 1986; Dwivedi, 2001; Umeghalu, Machi, & Chukwuka, 2025).

Historically, Nigeria's economy heavily relied on agriculture before the oil discovery in 1956. During the period of agricultural prominence, this key non-oil sector significantly contributed to domestic productivity and export revenues, supporting stable economic growth. However, with the oil boom in the 1970s, government focus shifted towards oil exportation, often neglecting crucial non-oil sectors, such as agriculture and manufacturing. This shift has been linked to a decline in contributions from these productive industries to GDP, heightening the country's economic vulnerability. The resulting dependence on oil revenue, along with the inherent price volatility in the international market, compromised Nigeria's ability to maintain steady economic

growth. The consistent depreciation of the naira disrupts trade and inflates production costs, which further complicates economic stability (Ogunjimi, Adreinto, & Ogunro, 2015; Ezenekwe, Umeghalu, & Uzodigwe, 2017).

The depreciation of the exchange rate in Nigeria has far-reaching consequences, fostering inflation, diminishing purchasing power, and hindering industrial progress. These impacts are especially pronounced in sectors reliant on imported materials, where currency depreciation drives up costs and stifles growth (Owoeye, 2022). Nigeria's shift from a pegged to a managed float exchange rate system—where the naira's value is partly influenced by market dynamics with periodic interventions from the central bank—has yet to stabilize the domestic currency, further escalating economic unpredictability. Despite concerted policy efforts from the Central Bank, the naira has continued its decline since the 1980s, undermining the foundation of Nigeria's economy (Aliyu, 2011; Benson & Victor, 2012; Ismaila, 2016).

Data from the National Bureau of Statistics highlight that Nigeria's economic growth has encountered considerable obstacles, particularly with GDP growth slowing in the face of exchange rate volatility. The COVID-19 pandemic intensified these issues, causing economic setbacks and magnifying the instability of the naira (Oni Adebayo, 2021). Igbokwe-Ibeto et al. (2023) observed that youth unemployment, closely tied to sluggish economic growth, points to underlying structural challenges, including an education system that is out of sync with market demands. A review of GDP trends from 2013 to 2023 shows the significant impact of exchange rate shifts: in 2013, growth was around 5.4%, but it fell to 2.7% in 2015 as oil prices dropped and the currency depreciated. The recession in 2016 saw growth plunge to -1.6%, driven by exchange rate shocks and instability in the oil market. The recovery was gradual, with growth rates of 0.8% in 2017 and 1.9% in 2018, hindered by inflation and structural weaknesses. By 2019, growth had rebounded to 2.3%, but the 2020 pandemic reversed these gains, pushing GDP growth down to -1.8%. In 2021, growth improved to 3.4%, but exchange rate volatility continued, with estimates for 2022 and mid-2023 at 3.1% and 2.8%, respectively, reflecting ongoing economic difficulties (NBS, 2023).

This study aims to delve into the impact of exchange rates on food prices in Nigeria. It specifically seeks to analyze how the exchange rate, interest rates, and trade openness affect food prices from 2000 to 2024. This timeframe is selected to ensure a thorough statistical analysis based on available data. By investigating how exchange rates influence food prices, especially among vulnerable populations, this study aspires to provide valuable insights into a key aspect of Nigeria's economic challenges. The study strives to understand the underlying mechanisms inherent in the relationship between exchange rate and food prices, and propose strategies to foster greater stability and resilience within Nigeria's economy.

Domestic and Global Economic Crisis and Food Prices in Nigeria

Since Nigeria achieved independence in 1960, the nation has faced numerous economic challenges

impacting the cost of living, especially concerning food prices. Throughout the years, the government has implemented various policies and initiatives aimed at stabilizing the economy and tackling issues like inflation, all while adapting to the changing needs of its citizens. In the initial years after independence, Nigeria's economy was largely agrarian, with agriculture being crucial for food supply and livelihoods.

Recognizing the importance of economic diversification, the First National Development Plan (1962-1968) was introduced to foster industrial growth and bring about economic stability. This plan included significant initiatives to develop industries that would enhance agricultural production and bolster economic resilience (Adebayo, 1999). However, the political turmoil and civil unrest encountered in the late 1960s and 1970s severely disrupted these efforts, leading to increased economic vulnerabilities and volatile food prices.

The economic struggles of the 1980s led to the implementation of the Structural Adjustment Program (SAP) in 1986, which introduced market-driven reforms like privatization, deregulation, and the promotion of exports. These reforms were designed to stabilize the naira and stimulate economic growth. Yet, the resultant currency devaluation under SAP caused the prices of imported goods, including food products and agricultural inputs, to rise, subsequently driving up food prices (NDE, 2021). While the SAP was intended to rectify macroeconomic imbalances, it inadvertently worsened food affordability for many Nigerians seemingly due to exchange rate depreciation and decreased government subsidies. (Obstfeld & Rogoff, 1995)

The return to democratic governance in 1999 sparked renewed efforts to address economic challenges, including the instability of food prices. Launched in 2004, the National Economic Empowerment and Development Strategy (NEEDS) aimed at fostering economic growth and reducing poverty by supporting micro, small, and medium enterprises (MSMEs), many of which play a role in food production and distribution (Federal Republic of Nigeria, 2004). Additionally, initiatives such as the Youth Enterprise with Innovation in Nigeria (YOUWIN) program, introduced in 2011, sought to empower young entrepreneurs in agriculture and related sectors. Despite these initiatives, ongoing fluctuations in exchange rates continued to escalate the costs of imported food and inputs, undermining the stability of food prices (Otame, 2016).

The 2008 global financial crisis laid bare Nigeria’s economic vulnerabilities, prompting a decline in the naira against major currencies and a spike in food import costs. In response, the Nigerian government rolled out stimulus measures aimed at revitalizing the economy. The Economic Recovery and Growth Plan (ERGP), which came into effect in 2017, focused on diversifying the economy and encouraging agricultural development to lessen the dependency on imported food (Federal Republic of Nigeria, 2017). Nevertheless, ongoing instability in exchange rates continued to inflate food prices, particularly in urban areas where the demand for imported goods was notably high (Ozughalu & Ogwumike, 2013).

Despite these interventions, food prices in Nigeria remain unpredictable. By the first quarter of 2024, inflation—including food inflation—had risen sharply, leading to a misery index (the combination of unemployment and inflation rates) of 36.9%, up from 30.5% in Q3 2023. This situation points to a dire cost-of-living crisis, with many Nigerians experiencing diminished purchasing power due to escalating food prices and a weakening naira. Urban populations are especially affected, as their reliance on imported food intensifies the effects of exchange rate fluctuations (Todaro & Smith, 2015).

The Foreign Exchange Market and International Trade in Nigeria

The dynamics between exchange rate volatility and international trade can be affected by reverse causality, whereby trade flows contribute to stabilizing exchange rate fluctuations, potentially mitigating volatility (Broda and Romalis, 2010). Depending on the source of these fluctuations, exchange rate volatility can either bolster or hinder the volume of international trade. Generally speaking, increased exchange rate volatility tends to inhibit international trade by creating uncertainty in the pricing of imports and exports. In response, countries may implement trade policies to counteract the impacts of an overvalued currency or to manage ongoing imbalances in their trade profiles.

In Nigeria, the influence of exchange rates on foreign trade has become increasingly pronounced since the early 2000s. The country's economic growth has relied heavily on the expansion of foreign trade, making exchange rates a vital element in shaping economic outcomes. Between 1999 and 2009, the Nigerian naira (₦) was fixed to the US dollar (USD), which resulted in a stable exchange rate and little disruption to foreign trade levels. However, in 2010, the Central Bank of Nigeria (CBN) shifted to a floating exchange rate system, ushering in considerable fluctuations. The devaluation of the naira led to surging import costs and diminished export competitiveness, adversely affecting trade (Nwogwugwu & Umeghalu, 2021).

Since 2010, the CBN has implemented various measures to stabilize the exchange rate and promote foreign trade. Notably, in 2014, it introduced a flexible exchange rate regime, followed by the creation of a single foreign exchange market in 2017. These initiatives have brought about a period of relative stability, enhancing the competitiveness of Nigerian exports. Still, with the new system, the value of the naira has become increasingly subject to market forces, making the economy vulnerable to external shocks. Consequently, exchange rate volatility remains high, leading to significant swings in Nigeria's balance of trade.

The CBN's ban on foreign currency sales to Bureau de Change (BDC) operators in 2021, along with the suspension of new BDC licenses, was a move intended to stabilize the foreign exchange market and enhance transparency. While aimed at curbing illegal market activities, this policy has had far-reaching repercussions throughout the economy. The instability of exchange rates has particularly impacted businesses in Nigeria, creating a triple-layered challenge. With the naira

losing value, many companies engaged in international trade now find it essential to secure foreign currencies, especially the US dollar, for their transactions (Onwuka et al., 2025). This scenario has led to several obstacles for businesses:

(i) Increased Exchange Costs: Firms involved in international trade face elevated exchange fees, including additional expenses for customs and clearing goods, which inflate overall import costs. Typically, these increased costs are transferred to consumers, resulting in higher prices for goods and services.

(ii) Price Increases: With the depreciating naira, the costs of imported goods are on the rise, forcing businesses to hike their prices in order to manage the escalating procurement costs. This situation contributes to inflationary pressures within the domestic economy.

(iii) Decline in Production Quality: The limited access to high-quality raw materials, coupled with the soaring costs of imports, has led to a noticeable decline in the quality of products produced locally. Additionally, restricted domestic production capabilities have resulted in decreased output, further aggravating supply shortages.

These challenges have resulted in diminished consumer patronage, as many individuals are seeking alternatives to the now higher-priced goods, which may include reducing purchase sizes or choosing smaller packaging. In light of these issues, there is an urgent call for the Central Bank of Nigeria to loosen restrictive foreign exchange regulations, thereby allowing the market forces of supply and demand to more effectively balance the foreign exchange landscape, ultimately improving trade conditions in Nigeria.

REVIEW OF RELATED LITERATURE

The purchasing power parity (PPP) theory, introduced by Gustav Cassel in 1918, argues that exchange rates between two currencies should shift to equalize the purchasing power of each, ensuring that a standard basket of goods, like food items, carries the same cost across different countries when expressed in a common currency. Emerging from a period focused on international trade and price stability, the PPP theory underscores the direct impact of exchange rate fluctuations on domestic prices, especially for imported goods such as food. This theory is highly relevant in the current context, as Nigeria’s reliance on food imports—like rice and wheat, which accounted for 20% of total food import costs in 2023—renders food prices particularly sensitive to variations in the naira (Central Bank of Nigeria, 2023).

The pass-through effect, rooted in general economic theory regarding exchange rates, describes how changes in exchange rates are reflected in the prices of goods, especially imports. This theory, developed within the framework of international trade and price dynamics, emphasizes that currency depreciation raises the costs of imported goods, thus directly impacting domestic food prices. This study recognizes the significance of the pass-through effect, particularly as Nigeria's

increased dependence on imports for staples like wheat and rice—amounting to 25% of food consumption in 2023—will likely be influenced by the depreciation of the exchange rate (National Bureau of Statistics, 2023). The theory posits that fluctuations in exchange rates directly affect import prices, with the extent of the pass-through influenced by market competition and demand elasticity, allowing firms to adjust their pricing strategies to absorb or pass on these costs.

The law of one price (LOP), implicitly discussed by David Ricardo in 1817 and formalized in modern international economics, posits that identical goods should sell for the same price across markets when expressed in a common currency, assuming no transportation costs or trade barriers. Developed within the context of classical economics and global trade, the LOP suggests that exchange rate fluctuations directly affect the price of imported food items, leading to domestic price adjustments. The LOP is relevant in this study, since Nigeria's reliance on imported food (e.g., 30% of rice consumed in 2023 were imported) ties domestic prices to exchange rate movements (National Bureau of Statistics, 2023).

The monetary model of exchange rates, developed by economists like Jacob Frenkel and Michael Mussa in the 1970s, posits that exchange rates are determined by relative money supply and demand, influencing domestic price levels, including food prices. Emerging during a period of flexible exchange rate regimes, the model emphasizes that monetary policy and money supply growth affect exchange rates, which in turn impact prices of goods. For this study on the impact of exchange rate volatility on food prices in Nigeria, The model has bearing to this study, since Nigeria's loose monetary policies and high money supply growth (25% annually as at 2023), contribute to Naira depreciation and food inflation (Central Bank of Nigeria, 2023).

Several empirical studies have examined the impact of exchange rate fluctuations on food prices, with some focusing on Nigeria. The following is an overview of key studies in this area. Afolabi and Olowookere (2024) evaluated the impact of exchange rate depreciation on manufacturing output in Nigeria over the period 1990–2022 using the Autoregressive Distributed Lag (ARDL) technique. The results of the analyses show that exchange rate depreciation increases production costs, thereby reducing manufacturing competitiveness. The study recommended stabilizing the naira and providing subsidies for imported raw materials.

Eze and Okonkwo (2023) made effort to examine the effect of exchange rate fluctuations on trade balance in Nigeria over the period 1985–2021 using the Vector Error Correction Model (VECM). Findings of the study reveal that exchange rate fluctuation has a long-run negative impact on trade balance, and the estimated impact was deciphered to be due to import dependence. The study suggests export diversification and exchange rate stabilization as the means of improving trade outcomes.

Chukwu and Adebayo (2023) investigated how exchange rate volatility influences foreign direct investment (FDI) in Nigeria from 1990 to 2020, employing the Ordinary Least Squares (OLS)

method alongside GARCH to analyze the volatility of exchange rates. Their results indicate that increased exchange rate volatility discourages FDI inflows. To attract more investors, the authors recommend establishing a more stable and predictable exchange rate regime.

In a separate study, Okafor and Ibrahim (2022) examined the effects of exchange rate fluctuations on domestic prices in Nigeria from 1980 to 2020, using the Ordinary Least Squares (OLS) technique. Their findings confirm a significant pass-through effect of exchange rates on domestic prices, which tends to exacerbate inflation. To mitigate this issue, the authors suggest enhancing domestic production capabilities to decrease reliance on imports.

Salami and Yusuf (2022) focused on the impact of exchange rate volatility on the performance of small and medium enterprises (SMEs) in Nigeria between 1995 and 2020. Utilizing the Autoregressive Distributed Lag (ARDL) method to analyze their secondary data, the study revealed that exchange rate volatility raises input costs, ultimately diminishing SME profitability. The authors recommend providing foreign exchange subsidies to support SMEs during volatile periods.

Umar and Umar (2022) explored the relationship between exchange rate fluctuations and food inflation using a Non-Linear Autoregressive Distributed Lag (ARDL) model, analyzing quarterly data from 2008Q1 to 2020Q4. Their research identified a notable long-term relationship among exchange rate changes, food inflation, and GDP, highlighting an asymmetric positive effect of exchange rate depreciation on food inflation while indicating that GDP negatively influences it.

Nuhu (2021) studied the impact of exchange rate volatility on inflation, employing annual data from 1986 to 2019. Using both Generalized Autoregressive Conditional Heteroskedasticity (GARCH) and the Vector Error Correction Model (VECM), the findings suggested that money supply and the nominal exchange rate significantly affect the consumer price index (CPI) inflation. The author advises implementing tighter control over the money supply to help lower inflation rates.

Lastly, Nwachukwu and Obi (2021) aimed to assess the effect of exchange rate depreciations on oil export revenue in Nigeria over the period from 1980 to 2019. Using the Vector Error Correction Model (VECM) for their analysis, the findings revealed that a depreciating Naira enhances oil export earnings but simultaneously increases domestic inflation. The researchers recommend adopting more balanced exchange rate policies to navigate these challenges effectively.

Adeyemi and Ojo (2021) conducted an analysis on how exchange rate volatility affects agricultural productivity in Nigeria from 1985 to 2019. They utilized the Ordinary Least Squares (OLS) method for data analysis while employing the GARCH model to evaluate exchange rate volatility. The study's findings indicate that increased exchange rate volatility leads to higher input costs, ultimately resulting in decreased productivity. To mitigate these effects, they recommend

subsidizing agricultural inputs.

Ibrahim and Musa (2020) explored the relationship between exchange rate fluctuations and consumer goods prices in Nigeria from 1975 to 2018. They applied the Autoregressive Distributed Lag (ARDL) technique to analyze secondary data. The analysis revealed that fluctuations in the exchange rate significantly impact consumer goods prices, especially for imported items. The authors suggest the development and enforcement of import substitution strategies.

Obiageli (2020) investigated how exchange rates influence agricultural output, using the Ordinary Least Squares (OLS) regression method. Results indicated that both the exchange rate and money supply positively influence agricultural output, whereas interest rates and inflation have negative but insignificant effects. Moreover, exchange rate volatility was found to impede agricultural investments, highlighting the need for stable exchange rate policies.

Bala and Abdullahi (2019) assessed the connections between oil prices, exchange rates, and food prices using the Autoregressive Distributed Lag (ARDL) model from 1972 to 2016. Their findings demonstrated a long-term relationship between the variables analyzed, with exchange rate fluctuations having a more pronounced impact on food prices than oil prices, which is largely due to Nigeria's reliance on imports.

Adekunle and Ndukwe (2018) studied the effects of exchange rate dynamics on agricultural output in Nigeria between 1981 and 2016. Through the Ordinary Least Squares (OLS) technique, they analyzed secondary data and found no long-term relationship between real exchange rate and agricultural output, although short-term effects were apparent. They recommend collaboration on more result-oriented fiscal and monetary policies to enhance agricultural production in the nation.

Alegwu et al. (2018) investigated the impact of real exchange rate volatility on agricultural exports in Nigeria from 1970 to 2013. Utilizing the Vector Error Correction Model (VECM) for their analysis, they discovered a long-term negative effect on exports of commodities like coffee and rubber. Additionally, they noted a bidirectional causality between cocoa exports and exchange rate volatility, underscoring the importance of achieving exchange rate stability.

RESEARCH METHODOLOGY

Theoretical Framework

This study primarily revolves around the Purchasing Power Parity (PPP) theory. Introduced in the early 20th century by economists like Gustav Cassel, the PPP theory suggests that, over time, exchange rates between two currencies should adjust to reflect the relative price levels of their respective countries. Essentially, it indicates that the exchange rate should balance the purchasing power of both countries, leading to the expectation that a basket of goods—like food items—would cost the same when priced in a common currency.

When drastic fluctuations occur in the exchange rate, particularly with respect to a domestic currency, this balance can be disrupted, causing domestic prices to fluctuate, especially for imports such as food. This scenario is particularly relevant for countries like Nigeria, which are heavily reliant on food imports. As the Nigerian Naira often depreciates, the cost of imported foods rises, subsequently affecting domestic food prices and overall inflation. By examining exchange rate movements through the lens of PPP, this study seeks to evaluate how such fluctuations impact food affordability and economic stability in Nigeria, contributing to the development of efficient monetary and trade policies.

Empirical Model Specification

The model employed in this study takes inspiration from the work of Adekunle and Ndukwe (2018), who articulated consumer prices as a function of exchange rate fluctuations. The model has been slightly modified to align with the perspectives offered by the PPP theory and the specific focus of this research. The functional form is specified as follows:

$$CPI = f(EXR, INR, PRO, TRO) \quad (1)$$

The econometric form of the model is as specified in (2)

$$CPI_t = \beta_0 + \beta_1 EXR_t + \beta_2 INR_t + \beta_3 PRO_t + \beta_4 TRO_t + \mu_t \quad (2)$$

Where: CPI = Consumer Price Index EXR = Exchange Rate INR = Interest Rate PRO = Productivity (RGDP TRO = Trade Openness, β_0 = Constant term/ Intercept of the model, β_1-β_4 = coefficients of the explanatory variables, and μ_t = Error term.

Data and Data Sources

This study draws on secondary data from various reputable sources, including the World Bank's World Development Indicators, the National Bureau of Statistics, and the Central Bank of Nigeria Statistical Bulletin. The time series data encompasses the years from 2000 to 2024.

Food Prices (FP): Food Prices represent the average costs of food consumed in Nigeria, generally measured by the food consumer price index (CPI). This index monitors the price changes of a basket of essential food items over time, which includes staples such as grains, vegetables, meats, and imported products. Food Prices are crucial indicators of inflation and the overall cost of living. They have a direct impact on household purchasing power, food security, and economic stability. Given Nigeria's significant food importation, these prices are sensitive to external factors such as exchange rate fluctuations, as well as domestic inflation, making them an important measure of economic well-being and the effectiveness of policy.

Exchange Rate (EXR): The Exchange Rate reflects the variations in the value of the Nigerian Naira against other currencies, particularly the US Dollar. It is often measured by the standard deviation of the exchange rate over a designated period. This measure captures the extent of uncertainty or variability in currency value, which influences the cost of imported goods, including food items. In Nigeria, the volatility of the exchange rate plays a significant role in shaping food prices by affecting the costs associated with imported food and raw materials. As such, it serves as an important indicator of inflation, economic stability, and the effectiveness of monetary policy as well as external trade dynamics.

Interest Rate (INT): The Interest Rate denotes the cost of borrowing money or the return on savings as determined by the Central Bank of Nigeria through the Monetary Policy Rate (MPR) or commercial lending rates. This rate significantly influences consumer spending, investment decisions, and the cost of financing agricultural and food-related enterprises. In Nigeria, an increase in interest rates can dampen credit demand, which in turn affects food production and distribution. Conversely, lower rates could encourage investment but may also risk sparking inflation. Interest rates play a vital role in monetary policy and indirectly impact food prices through their effect on economic activity and cost structures.

Productivity (RGDP): For this study, Real Gross Domestic Product (RGDP) serves as a proxy for productivity. It measures the overall value of goods and services produced in Nigeria, adjusted for inflation, and reflects the economy's general activity and efficiency. RGDP captures the real output across various sectors, including agriculture, which notably influences food supply and pricing. In Nigeria, a higher RGDP signifies enhanced productivity, which can help stabilize food prices by boosting domestic food production and decreasing reliance on imports, thereby acting as a key gauge of economic growth and development.

Trade Openness (TRF): Trade openness is a measure of how actively Nigeria participates in international trade, usually expressed as the ratio of total exports and imports to GDP. This metric indicates how well the economy is integrated into global markets, particularly in terms of food imports and agricultural exports. In Nigeria, trade openness plays a significant role in influencing food prices by affecting the availability and cost of imported food products, which are particularly vulnerable to fluctuations in exchange rates and global price shifts. It acts as a vital indicator of how effective trade policies are and highlights Nigeria's vulnerability to external economic shocks, which can impact food security and price stability.

Estimation Technique and Procedure

To ensure the accuracy of this study's data, several preliminary tests were conducted. Descriptive statistics were used to check for normal distribution, helping to pinpoint any outliers in the dataset. This included various central tendency measures like the mean and median, as well as dispersion

metrics such as minimum, maximum, and standard deviation, accompanied by normality checks like skewness, kurtosis, and the Jarque-Bera test.

Recognizing the risks of potential inaccuracies in time series data—which might show significant trends without reverting to a constant mean—a unit root test was employed to examine the data's stationarity. The Augmented Dickey-Fuller (ADF) test was selected for this task because it accommodates serial correlation. Additionally, a cointegration test was carried out to determine if specific sets of non-stationary time series variables maintain long-term equilibrium relationships. These tests are essential for grasping the connections between various variables.

To investigate these long-term relationships among the study's variables, we used the ARDL bounds testing approach. Developed by Pesaran et al. (2001), this method is particularly effective in assessing the impact of aggregate demand on SME performance and has advantages over other approaches, especially in smaller sample sizes. It establishes bands of critical values, distinguishing between stationary and non-stationary variables, and removes the necessity to classify them as I(1) or I(0).

DATA ANALYSIS AND RESULTS PRESENTATION

Table 1: Summary of Descriptive Statistics Results

	CPI	INR	NER	TRO
Mean	13.66192	5.207886	257.7274	3.05E+09
Median	12.87658	5.685580	157.3112	5.58E+09
Maximum	26.50000	18.18000	1200.000	2.44E+10
Minimum	5.388008	-5.627968	102.1052	-3.20E+10
Std. Dev.	5.122101	5.626625	236.4100	1.65E+10
Skewness	0.750329	0.251670	2.812542	-0.611048
Kurtosis	3.384485	2.675325	11.32593	2.583158
Jarque-Bera	2.499797	0.373714	105.1695	1.736746
Probability	0.286534	0.829562	0.000000	0.419634
Sum	341.5480	130.1972	6443.184	7.63E+10
Sum Sq. Dev.	629.6621	759.8139	1341353.	6.55E+21
Observations	25	25	25	25

Source: Researchers' Computation using Eviews 10

Descriptive statistics play a crucial role in helping us understand the characteristics of time series data. They provide insights into whether our data follows a normal distribution and allow us to identify any outliers present in the dataset. These statistics encompass measures of central tendency such as the mean and median, measures of dispersion including the minimum, maximum,

and standard deviation, and measures of normality such as skewness, kurtosis, and the Jarque-Bera test. The analysis was conducted using the raw data of the variable rather than any transformed version, and the findings are summarized in Table 1.

As indicated in Table 1, the mean represents the average value of the various time series variables in the study, which sits comfortably between the maximum and minimum values for each variable. The median provides the central value obtained by organizing the observations in either ascending or descending order, while the standard deviation reveals the extent to which the observations deviate from the sample average.

Skewness assesses the asymmetry of the dataset. A skewness of 0 suggests that the distribution is symmetric around its mean. A positive skewness indicates a longer right tail, meaning there are higher values in comparison to the sample mean, while negative skewness signals a longer left tail, suggesting a preponderance of lower values. Generally, skewness values between -0.5 and 0.5 are considered slightly symmetrical, indicating normality. From our analysis, the nominal exchange rate (NER) and interest rate (INR) exhibit normal skewness, while the consumer price index (CPI) and trade openness (TRO) show positive skewness.

Kurtosis evaluates the "peakness" or "flatness" of the distribution. A kurtosis value around 3 indicates a mesokurtic distribution, which adheres to normal distribution characteristics. Values exceeding 3 are categorized as leptokurtic (positive kurtosis), signifying a peaked distribution with more high values than the sample mean. Conversely, values below 3 classify as platykurtic (negative kurtosis), indicating a flatter curve with more low values than the sample mean. According to our findings, both the consumer price index (CPI) and nominal exchange rate (NER) display leptokurtic traits, whereas the interest rate (INR) and trade openness (TRO) exhibit platykurtic characteristics.

The Jarque-Bera statistic evaluates how the skewness and kurtosis of the dataset compare to those expected from a normal distribution. If the probability value associated with the Jarque-Bera statistic exceeds the significance level of 0.05, it suggests that the data is normally distributed. From the analysis above, all variables except the nominal exchange rate (NER) were statistically significant.

The correlation coefficient is a vital statistical tool that gauges how closely two variables move in relation to one another, with values ranging from -1.0 to 1.0. A value of -1.0 indicates a perfect negative correlation, while 1.0 represents a perfect positive correlation. A value of 0.0 signifies no correlation between the two variables. Values exceeding 1.0 or falling below -1.0 suggest an error in the measurement. The closer the coefficient is to 1, the stronger the correlation, and vice versa. For further details, please refer to Table 2.

2: Summary of Correlational Matrix

Variables	Correlation Coefficients	Decision
CPI and INR	-0.265014	Weak Negative Correlation
NER and CPI	0.733544	Strong Positive Correlation
NER and INR	-0.233807	Weak Negative Correlation
TRO and CPI	-0.165168	Weak Negative Correlation
TRO and INR	-0.144898	Weak Negative Correlation
TRO and NER	-0.304516	Weak Negative Correlation

Source: Researchers' Computation using EViews 10

Next, we conduct a unit root test to verify if our variables exhibit stationarity. It is essential to establish stationarity at level I(0) or at the first difference I(1) in time series data because non-stationary data can lead to misleading results. To apply the ARDL model, we must also ensure that none of the variables are integrated at the second difference I(2), as this would also result in spurious findings. We utilized the Augmented Dickey-Fuller (ADF) test for this purpose, with results summarized in Table 3.

Table 3: Summary of the ADF Unit Root Test Results

Variables	ADF Test Statistic	ADF Critical Value @ 0.05	Order of Integration
CPI	-3.785555	-3.004861	I(1)
INR	-3.354107	-3.004861	I(0)
NER	3.145372	-3.012363	I(1)
TRO	-4.750362	-3.004861	I(1)

Source: Researchers' Computation using EViews 10

According to our decision rule, we reject the null hypothesis if the calculated absolute value of the ADF test statistic exceeds the critical value at a significance level of 5%. The results indicate that our variables are stationary, leading us to reject the null hypothesis. Specifically, the interest rate (INR) is stationary at level I(0), whereas the Consumer Price Index (CPI), exchange rate (NER), and trade openness (TRO) are all stationary at first difference integration I(1).

Finally, selecting the optimal lag length is crucial as it determines the timeframe for the independent variable to influence the dependent variable. If the model includes too many lagged values, it can reduce the degrees of freedom, potentially causing multicollinearity. Conversely, using too few lags could lead to specification errors.

Table 4: Lag Selection and Lag Order Results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-822.2131	NA	4.90e+27	75.11028	75.30866	75.15702
1	-768.7959	82.55394	1.69e+26	71.70872	72.70057	71.94237
2	-734.8257	40.14655*	3.91e+25*	70.07507	71.86041*	70.49564
3	-715.2478	16.01831	4.66e+25	69.74980*	72.32863	70.35729*

Source: Researchers' Computation using EViews 10

The optimal lag length and order selection criterion results are presented in Table 4 and further

detailed in Appendix 3. According to the table, the Akaike Information Criterion (AIC) with a lag length of 3 has the lowest value at 69.74980, making it the chosen model.

To determine whether a set of non-stationary time series variables exhibits a long-term equilibrium relationship, a cointegration test is conducted. This test assesses the sensitivity between two or more variables. We will employ the ARDL bounds testing approach to examine the long-run relationship among the variables being studied. The results from this bounds testing approach are shown in Table 5.

Table 5: ARDL Bound Test Results

Model 1	Value	Significance	1(0)	1(1)
F-statistics	5.443759	10%	2.37	3.20
K	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

Source: Researchers' Computation using EViews 10

From Table 5, we observe that the F-statistic, which indicates the joint significance of the lagged level variables, is 5.443759. This value surpasses the upper bound of I(1) at the 5% significance level. Consequently, we reject the null hypothesis, leading us to conclude that a long-run relationship exists between the dependent variable, consumer price index, and the independent variables being analyzed.

Evaluation of Long-Run and Short-Run Estimates

Panel A: Long-Run Estimates

Having confirmed the existence of a long-run relationship among the variables in our study, we will employ the ARDL model's long-run form to identify the coefficients of the regression model. The estimated long-run coefficients can be found in Appendix 10 and are also summarized in Table 6.

Table 6: Summary of Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INR	0.289868	0.290983	0.996168	0.3388
NER	0.009502	0.019818	0.479499	0.6402
TRO	-9.12E-11	9.83E-11	-0.927944	0.3717
C	10.26206	4.931937	2.080737	0.0595

Source: Researchers' Computation using EViews 10

Table 6 presents the estimated long-term coefficients for the models analyzed in this study. The findings indicate that while most variables align with our theoretical expectations over the long run, trade openness is an exception, and none of the variables show statistical significance. Specifically, the long-run partial coefficient for interest rate stands at 0.289868, suggesting that a

1% rise in interest rates (INR) is associated with an average increase of 0.29% in Nigeria's consumer price index (CPI) over time. This indicates a positive relationship between interest rates and food prices in the long run.

Furthermore, the long-run partial regression coefficient for the nominal exchange rate (NER) is 0.009502, which implies that a 1% increase in government capital expenditure is generally linked to a 0.0095% rise in Nigeria's consumer price index (CPI) in the long term. Hence, we conclude that the nominal exchange rate also positively influences food prices in the country.

In contrast, the long-run partial coefficient for trade openness (TRO) is -9.12E-11. This suggests that, on average, a 1% increase in trade openness corresponds with a significant reduction of 9.12% in Nigeria's consumer price index (CPI). Thus, we find that, in the long run, trade openness negatively impacts food prices in Nigeria.

Table 7: Summary of Short Run Coefficients (Error Correction Regression)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INR)	-0.159008	0.107382	-1.480772	0.1644
D(INR(-1))	-0.145926	0.089232	-1.635359	0.1279
D(NER)	0.044812	0.011842	3.784003	0.0026
D(NER(-1))	-0.090735	0.031730	-2.859617	0.0144
D(TRO)	1.25E-10	4.82E-11	2.595140	0.0234
D(TRO(-1))	1.89E-10	6.71E-11	2.822555	0.0154
CointEq(-1)*	-0.963267	0.159898	-6.024261	0.0001
R-squared	0.759031	Mean dependent var		0.331580
Adjusted R-squared	0.668668	S.D. dependent var		3.897861
S.E. of regression	2.243666	Akaike info criterion		4.699889
Sum squared resid	80.54457	Schwarz criterion		5.045474
Log likelihood	-47.04873	Hannan-Quinn criter.		4.786803
Durbin-Watson stat	2.317291			

Source: Researchers' Computation using EViews 10

The short-run estimation results are detailed in Table 7. Analyzing this table indicates that both the exchange rate and trade openness positively influence food prices in Nigeria for the short term, with coefficients of 0.044812 and 1.25E-10, respectively. This suggests that a 1% rise in the nominal exchange rate and trade openness will generally result in a 0.04% and 1.25% increase in short-term food prices, respectively. On the other hand, the interest rate presents a short-run coefficient of -0.159008, indicating that a 1% increase in interest rates is likely to decrease food prices in Nigeria by approximately 0.16%. Additionally, it is noteworthy that all variables, except for the interest rate, are statistically significant.

To assess the overall significance of the estimated model, we utilize the F-test. By comparing the calculated F-value to the F-table value, where F-calculated = $F_{\alpha}(V_1, V_2)$, V_1 and V_2 represent the degrees of freedom. Here, V_1 is calculated as k-1 = 3 – 1 = 2, and V_2 as n-k = 25 - 3 = 22. According to the F-table, $F_{0.05(3, 18)} = 3.443$, while our F-statistics yield 5.443759. Since the F-calculated value

exceeds the F-table value, we conclude that the impact of the explanatory variables on the dependent variable is statistically significant.

For post-estimation analysis, we examined various statistics including the coefficient of determination, adjusted R^2, Durbin-Watson statistic, as well as tests for heteroscedasticity, multicollinearity, and stability. The R^2 value from our regression results in Table 7 is 0.759031, indicating robust explanatory power, with roughly 24% of the variation in food prices left unexplained by the model. The adjusted R^2 further supports this, showing a value of 0.668668, meaning that about 67% of the total variation in the consumer price index is associated with the independent variables. The Durbin-Watson statistic of 2.317291, close to 2, suggests no autocorrelation issues in the model's residuals. With a P(F) value of 0.188341, which is above the 0.05 significance level, we can confidently state that the model does not exhibit heteroscedasticity, confirming the reliability of the data for predictions. Regarding multicollinearity, the analysis indicates that the explanatory variables do not demonstrate a perfect linear correlation, as the correlation coefficients fall below 0.8, as evidenced by Table 8.

Table 8: Summary of Multicollinearity Test

Variables	Correlation Coefficients	Decision
NER and INR	-0.233807	No Multicollinearity
TRO and INR	-0.144898	No Multicollinearity
TRO and NER	-0.304516	No Multicollinearity

Source: Researchers' computation using EViews 10

The model's stability was assessed through the CUSUM and CUSUM of squares tests. As illustrated in figures 1 and 2, the stability test results indicate that the CUSUM plot lines for both models 1 and 2 remain within the range of -2 to +2 standard errors.

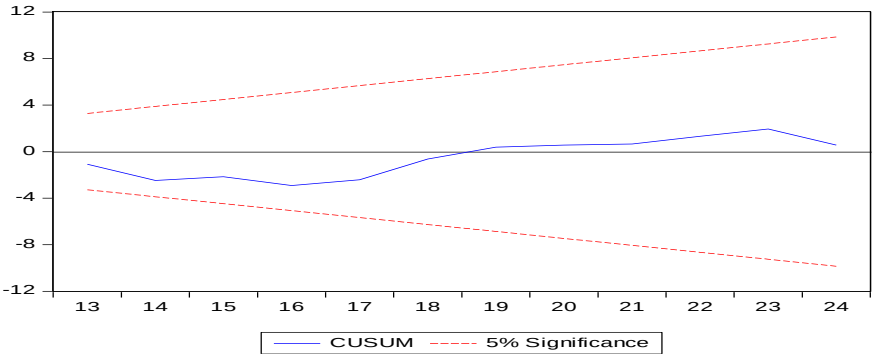

Figure 1: CUSUM Stability Test
Researchers' computation using EViews 10

Furthermore, the CUSUM of squares plot lines fall between -0.4 and +4 standard errors, all at a 5% significance level. These findings confirm that the model remains stable throughout the study period.

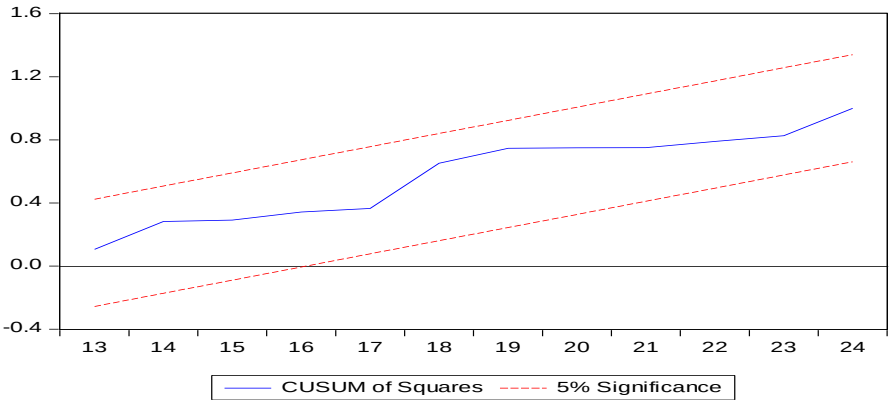

Figure 1: CUSUM of Squares Stability Test
Researchers' computation using EViews 10

Evaluation of Research Hypothesis

Hypothesis 1

H_0: Exchange rate depreciation does not significantly affect food prices in Nigeria.

H_1: Exchange rate depreciation significantly affects food prices in Nigeria.

In assessing the first hypothesis, the computed absolute t-value of 3.784003 surpassed the critical absolute t-value of 2.074. Consequently, we reject the null hypothesis and accept the alternative hypothesis, concluding that exchange rate volatility has a significant impact on food prices in Nigeria during the study period.

Hypothesis 2

H_0: Trade openness does not have a significant impact on food prices in Nigeria.

H_1: Trade openness has a significant impact on food prices in Nigeria.

For the second hypothesis, the calculated absolute t-value of 2.595140 exceeded the tabulated absolute t-value of 2.074. As a result, we reject the null hypothesis and accept the alternative hypothesis, indicating that trade openness significantly influences food prices in Nigeria within the specified timeframe.

Hypothesis 3

H_0: Interest rates do not significantly impact food prices in Nigeria.

H_1: Interest rates significantly impact food prices in Nigeria.

Evaluating the third hypothesis, the computed absolute t-value of -1.480772 was lower than the

critical absolute t-value of 2.074. Therefore, we accept the null hypothesis, suggesting that interest rates do not have a significant influence on food prices in Nigeria for the study's duration. The absence of statistical significance regarding interest rates could imply either a negligible effect in this context or that the study lacked the power necessary to detect a difference due, in part, to sample size or data variability.

Discussion of Findings

This study investigated the effects of exchange rate volatility on food prices in Nigeria from 2000 to 2024. It employed contemporary econometric techniques, specifically cointegration and an error correction model within the ARDL framework. The results indicate that some variables align with theoretical expectations and have an impact on food prices in Nigeria over both the short and long term.

The study's results showed that exchange rate volatility has a notably positive impact on economic growth in Nigeria, affecting both the long and short terms at a significance level of 5%. The analysis revealed that in both timeframes, the exchange rate volatility is associated with a coefficient of 0.044812. Additionally, the findings highlight that this volatility has a substantial influence on food prices in Nigeria, again observable in both the short and long run, marked by the same positive effect at the 5% significance level. Specifically, in the short term, heightened exchange rate volatility correlates with a slight increase in food prices, reflected in the positive coefficient of 0.044812. This trend continues into the long term, indicating that fluctuations in the exchange rate might lead to elevated food prices. This could be attributed to the rising costs of imported food items or inputs, potentially intensifying inflationary pressures within the Nigerian food market.

Furthermore, the study uncovered that trade openness also positively affects food prices in Nigeria, observed in both the short and long terms with a consistent coefficient of 1.249663 for each period. In the short run, increased trade openness correlates with a significant rise in food prices at the 5% significance level. However, while this positive impact on food prices persists in the long run, it does not reach statistical significance. This finding implies that while greater trade openness might lead to higher food prices due to increased imports or market exposure in the short term, its long-term effects—though still positive—are less clear, possibly due to market adjustments or other influencing economic factors.

Interest rates have shown a distinct impact on food prices, demonstrating different effects over the long and short term. In the long run, a positive correlation was observed, with a coefficient of 0.279220, indicating that higher interest rates could lead to increased food prices. This relationship can be attributed to the higher borrowing costs for agricultural producers, which ultimately raise production costs and are passed on to consumers. Conversely, in the short term, interest rates exhibited a negative effect on food prices, reflected in a coefficient of -0.159008. This short-term

impact likely stems from a reduction in consumer purchasing power brought on by elevated interest rates, resulting in decreased demand and lower food prices. Importantly, both coefficients were deemed statistically insignificant, suggesting that these influences may not be strong enough to draw definitive conclusions.

The analysis also highlights that the error correction term is statistically significant at the 5% level, indicating that any imbalances in the model's variables are corrected over time. Furthermore, the ARDL regression results revealed promising outcomes through various significance tests (R^2, Adjusted R^2, F-statistic, and p-value), demonstrating the model's effectiveness in capturing the dynamics at play.

CONCLUSION

This study explored the influence of exchange rates on food prices in Nigeria from 2000 to 2024. Using the Auto Regressive Distributive Lag estimation technique, we analyzed secondary data sourced from the World Bank Development Indicators (WDI), the National Bureau of Statistics, and the Central Bank of Nigeria Statistical Bulletin (CBN). The findings reveal a positive correlation between exchange rates and food prices in Nigeria, affecting both the short run and long run. Additionally, trade openness significantly boosts food prices in both time frames. The statistical and econometric assessments affirmed that the model's estimated parameters were reliable and justified.

In conclusion, while exchange rate fluctuations and trade openness are vital factors influencing food price trends, effective management of monetary policies and trade strategies is essential to lessen their negative impact on consumers. The study highlights the importance of a balanced economic policy that focuses on stabilizing exchange rates, moderating trade liberalization, and managing interest rates to maintain food affordability. By implementing the recommendations outlined in this study, Nigeria can achieve notable advancements toward its macroeconomic objectives of food price stability and agricultural sustainability. The government should focus on stabilizing exchange rates through solid monetary policies, enhancing foreign exchange reserves, diversifying exports, and finding a balance between trade liberalization and consumer protection by applying targeted tariffs or subsidies on essential food imports, all while upholding manageable interest rates.

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