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Dual exchange rate systems and food inflation in Nigeria: Does Unifying exchange rate matter?

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Abstract

Access to foreign exchange (forex) has been a persistent challenge in Nigeria, leading to calls for exchange rate unification as a potential solution. This study examines the impact of dual exchange rates on food inflation in Nigeria. The study employs the Autoregressive Distributed Lag (ARDL) model to analyze the relationship between various exchange rate measures and food inflation in Nigeria. Key variables include the Bureau De Change (BDC) exchange rate, unified exchange rate, exchange rate differentials, and the official exchange rate. The results indicate that the BDC exchange rate, unified exchange rate, and exchange rate differentials have a positive and significant impact on food inflation in both the short and long run. In contrast, the official exchange rate negatively affects food inflation but remains statistically insignificant over both periods. This implies that rising exchange rate differentials contribute to food price increases, albeit moderately under a unified exchange rate system. The study underscores the importance of exchange rate unification in stabilizing food prices. However, for effectiveness, legal backing and regulatory enforcement are necessary. Policymakers should implement forex market interventions to reduce exchange rate volatility, improve naira stability, and mitigate food inflation.

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ARDL
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1. Introduction

Food inflation has witnessed a dramatic surge in the last decade, consistently driving up the headline inflation and resulting in a deterioration of the standard of living. This is particularly worrisome in countries with low disposable income such as Nigeria, where spending on food constitutes a large chunk of household spending. According to the National Bureau of Statistics, the average Nigerian household spends about 56.65 percent of its income on food (National Bureau of Statistics (NBS), 2019). This was further compounded by the advent of the COVID-19 pandemic and the worsening of some other macroeconomic fundamentals. Thus, about 17 million Nigerians face acute food insecurity in 2022 (IMF, 2023).

Factors that impact the general price level in an economy are diverse as extensively discussed in economic theories. These factors could be monetary or structural factors coming from either domestic or external sources.

The monetary economics theory particularly highlights how monetary policy; including exchange rate policy affects inflation in an economy. This view was corroborated by the international trade theory which considers the concept of exchange rate passthrough. As one of the key prices in an economy, the exchange rate impacts the general macroeconomic behaviour, including the general level of prices (Bada et al., 2016; Musa, 2021). A devaluation or depreciation of the naira makes exports cheaper and imports costlier which increases the cost of imports. This situation increases the general price level, especially for an import-dependent economy like Nigeria where food importation remains very high despite the provision of impetus to revitalize domestic production by the central bank in recent years (IMF, 2023).

The Central Bank of Nigeria, in its pursuit of a stable and sustainable exchange rate, has tried several exchange rate policy regimes that include fixed and floating regimes. Each of these policy regimes has come with benefits and consequences as well as peculiar challenge. Noticeably, some of the challenges encountered in recent years as observed from the available data include widening the premium between the official exchange rate and the rates at the Bureau de Change (BDC).

Considering the restriction placed on 43 items, mostly food items, from accessing foreign exchange at the official window, the disparity between the official and BDC rates reached over 30 percent as importers exerted pressure on the unofficial market.

While several studies explored the impact of the exchange rate on inflation in Nigeria, only a few of them focused on food inflation (Umar & Umar, 2022). However, to the best of our knowledge, no study has distinctively sought to investigate if one segment of the market or unification of the rate exerts greater influence on food prices than the other. Additionally, most of the studies reviewed either used official or BDC exchange, and in some cases combine the two. The computation and usage of unified exchange rate in our study is one of novelty of the study. This study, therefore, not only delves into the intricate relationship between exchange rates and inflation but also into the dynamics of food inflation in Nigeria and how it is impacted by the dual exchange rates and exchange rate unification in Nigeria to determine which of the rates, official, parallel, or the unified exchange rate exerts greater influence in determining food prices. The findings of the study provide a nuanced understanding of the implications of multiple exchange rates on the country's economy.

Following the introduction, section 2 presents the literature review, section 3 is the methodology, section 4 presents the result and discussion, section 5 is the conclusion and section 6 presents the policy recommendation followed by references.

2. Theoretical Review

2.1. Monetary Economics Theory

The Monetary Economics Theory focuses on the study of money, monetary systems, and their impact on the broader economy. The theory has evolved over time through the contributions of various economists. Some early contributors to the theory include David Ricardo (1772-1823), and John Maynard Keynes (1883-1946) while the likes of Milton Friedman (1912-2006), Irving Fisher (1867-1947), and Friedrich Hayek (1899-1992) also made important contributions to monetary economics, shaping our understanding of monetary policy, central banking, inflation, and various aspects of money and its role in the economy.

The monetary economics theory provides a framework for understanding how monetary policies, specifically exchange rate systems, affect macroeconomic variables like inflation. It examines how different exchange rate regimes affect money supply, capital movements, and general price levels, including food costs. In sum, the theory explains how changes in the money supply, interest rates, and exchange rates affect inflation rates.

2.1.1. International Trade Theory

The international trade theory has evolved over time through the contributions of notable economists such as Adam Smith (1723-1790), David Ricardo (1772-1823), Eli Heckscher (1879-1952) and Bertil Ohlin (1899-1979), Paul Samuelson (1915-2009) among others. The theory considers the concept of "exchange rate pass-through," which explains how changes in exchange rates affect import and export prices. When a country's currency depreciates, the prices of its exports in foreign markets may decrease, potentially boosting export volumes. Conversely, a depreciation of the domestic currency may lead to higher import prices, potentially increasing inflation if not offset by other factors.

Trade policies, such as tariffs, quotas, and subsidies, can also impact exchange rates and inflation rates. For instance, if a country imposes tariffs on imports, it may reduce the demand for foreign goods and support domestic industries, potentially affecting the exchange rate and inflation dynamics. Hence, the theory can be used to analyse the impact of dual exchange rate systems on trade patterns, particularly on food imports and exports in Nigeria. Different exchange rates for different economic sectors may influence the competitiveness of food imports and the behaviour of domestic producers.

2.1.2. Purchasing Power Parity (PPP) Theory

The concept of Purchasing Power Parity (PPP) dates back to the 16th century but was significantly refined in the 20th century by economists. One of the earliest contributors, Gustav Cassel (1866–1945), introduced the "law of one price," which suggests that, in the long run, exchange rates between two currencies adjust to equalize the price levels of a basket of goods in both countries. Building on Cassel's ideas, Irving Fisher (1867–1947) developed the "absolute purchasing power parity" theory, arguing that exchange rates are determined by the relative price levels of goods in each country.

PPP remains a fundamental concept in international economics, offering insights into long-term exchange rate behaviour and the relationship between inflation and currency movements. In this study, PPP theory is used to examine the link between exchange rate disparities and food price levels. It helps assess whether dual exchange rate systems contribute to price differences between official and parallel markets.

2.1.3. Inflationary Expectations Theory

The Inflationary Expectations Theory, also known as the Expectations Theory of Inflation, suggests that people's expectations about future inflation can influence current inflation rates. Some of the key contributors to the development of inflationary expectations include but are not limited to Milton Friedman (1912-2006), Phillip Cagan (1927-2012), Robert Lucas (b. 1937), John F. Muth (1930-2005), Edmund Phelps (b. 1933). This theory posits that when individuals and businesses expect higher inflation in the future, they may adjust their behaviour, leading to changes in spending, investment, and pricing decisions in the present, which can, in turn, impact inflation today. In the context of this study, the theory helps to examine how the expectation of exchange rate unification may influence food prices even before the actual unification occurs.

2.2. Empirical Literature

Previous research indicates a substantial impact of exchange rate pass-through on inflation. Choudhri and Hakura (2006) demonstrate through empirical evidence that there is a positive and significant correlation between exchange rate pass-through and the average inflation rate across various countries. The transmission of changes in exchange rates to inflation tends to be more pronounced than the transmission from alterations in imported prices, particularly during periods of weaker structural and macroeconomic conditions (Mihaljek & Klau, 2001). Over the years, imported food price shocks have played a significant role in driving inflation through exchange rate, particularly in many emerging economies such as Kenya, India, and Malaysia (Aliyu & Ismail, 2017; Andrle, Berg, Morales, Portillo, & Vlcek, 2015; Lahiri, 2019). Additionally, Roger, Smith, Morrissey, and Roger (2017) establish that the extent of exchange rate pass-through to consumer prices is heavily dependent on the original shock causing the exchange rate fluctuations. Food inflation, for instance, reacts less to exchange rate shocks compared to the prices of commodities like copper or changes in money supply.

Empirical findings further show that most countries that adopted multiple exchange rate regime ended up abandoning it because of exploding exchange rate premium which creates room for arbitrage (Cerra, 2019; Hausmann, 1997; Ilzetzki, Reinhart, & Rogoff, 2017; Jorion, 1991; Pozo & Wheeler, 1999). Nonetheless, Mohanty and Bhanumurthy (2014) point out that the Reserve Bank of India's (RBI) counteracting sterilization policy, implemented during periods of expansive money supply growth through substantial interventions, aimed to stabilize exchange rate fluctuations. However, this policy rendered the exchange rate regime ineffective in influencing inflation. Edwards (2006) asserts that the level of exchange rate volatility differs between countries employing an inflation targeting regime and those with alternative monetary policy frameworks. Miyajima (2020) discloses that heightened exchange rate volatility has a limited impact on core inflation. This aligns with the conclusions drawn by Arize, Malindretos, and Nippani (2004) from their examination of 82 countries. Their study endorses the adoption of a free float policy for the successful implementation of South Africa's inflation targeting regime. Similarly, Forbes (2016) suggests that an analytical framework considering the underlying causes of exchange rate movements significantly influences the impact on import prices and inflation.

Concerning the relationship between exchange rates and inflation, Sadeghi, Feshari, Barzegar Marvasti, and Ghanbari (2015) demonstrate that the appreciation of the exchange rate significantly and positively affects domestic inflation in selected Middle Eastern and North African countries. In Western Balkan nations, Fetai, Koku, Caushi, and Fetai (2016) identifies it as the primary source of inflationary pressures. Harri, Filali, and Bonnet (2009) argue that any examination of the impact of increasing oil prices on agricultural product prices should include the exchange rate as a crucial variable. In the UK, Davidson, Halunga, Lloyd, McCorriston, and Morgan (2016) discover a substantial long-term partial elasticity in domestic food price inflation concerning world food commodity prices, the exchange rate, and oil prices. Conversely, domestic demand pressures and food chain costs have a less notable impact on food inflation. Norazman, Khalid, and Ghani (2018) find that in Malaysia, world food commodity prices and the real effective exchange rate play a pivotal role in determining food prices. In Ethiopia, Loening, Durevall, and Birru (2009) assert that the primary determinants of domestic food and non-food prices are the exchange rate and international food and goods prices.

Eregha (2022) undertakes an investigation into how domestic prices in Nigeria react to movements in both official and parallel exchange rates. The research reveals that prices exhibit a symmetric response to parallel rates, particularly during periods marked by a substantial exchange rate premium. However, the response of prices to the depreciation and appreciation of the official exchange rate in Nigeria differs. The study identifies two steady-state equilibria associated with a high premium and a low premium, corresponding to any long-run inflation rate (Shi, 2000). Consequently, an increase in the crawl rate of the official exchange rate produces two effects on the premium: the financing effect and the portfolio effect.

On exchange rate policy reforms, Bodart (1996) asserts that the extent of the immediate response of inflation to reform depends on how the public expects the multiple exchange rate arrangement to remain in place. If reforms are enduring and linked to a sustained rise in quasi-fiscal deficits, the economy will experience a lasting elevation in inflation. As a result, various trajectories may be discerned, contingent upon whether the reform is perceived as permanent or temporary.

Based on the preceding discussion, it is clear that the examined studies offer insights into the correlation between exchange rates and inflation, as well as the repercussions of exchange rate policies and reforms on the inflation rate. However, certain gaps and potential avenues for further research exist. There has been limited effort to directly investigate the dual exchange rate system and its impact on food inflation in Nigeria. Moreover, most studies concentrate on the consequences of exchange rate changes on inflation without delving into the specific causal mechanisms or transmission channels of exchange pass-through to food inflation. This study seeks to explore the enduring effects of the dual exchange rate system on food inflation in Nigeria, aiming to provide a thorough analysis of the particular factors influencing the asymmetric response to different exchange rates, especially during periods marked by substantial exchange rate premiums. A comprehensive understanding of these intricacies will contribute to the rationale behind recent initiatives to unify exchange rates in the face of escalating food prices in Nigeria.

3. Data and Methodology

The data utilized in this study was obtained from the 2022 Central Bank statistical bulletin and the 2022 annual report of the National Bureau of Statistics. The data was collected for food inflation, imported inflation, and official and BDC exchange rate in Nigeria between 2010M11 and 2022M11. We also computed a unified exchange rate for the period by taking the monthly average of the official and BDC exchange rates over the study period and estimated a separate model to see its impact on food inflation in the country. This was informed by the recent decision of the government to unify the exchange rate as a strategy to solve economic wolves in the country.

The variables in the model were found to exhibit a mix of I(0) and I(1) stationarity levels, necessitating the estimation of the model using Autoregressive Distributed Lagged (ARDL) methodology. As highlighted by Pesaran, Shin, and Smith (1999) and Pesaran, Shin, and Smith (2001) ARDL offers the advantage of being both applicable and flexible when dealing with variables of mixed integration orders, particularly I(0) and I(1). Laurenceson (2003) further emphasized and expanded upon this point. It is posited that the ARDL model incorporates a sufficient number of lags to capture the data-generating process within a general-to-specific modeling framework.

We estimated three (3) models in this study. Model one shows the relationship between food inflation, imported inflation, BDC and IER. Model two relates food inflation to imported inflation and unified exchange rate (UEXR), while model three relates food inflation with imported inflation and exchange rate differentials. The Autoregressive Distributed Lag model was specified as follows:

3.1. The Autoregressive Distributed Lag (ARDL) Model for Food Inflation

$$\triangle FINF_t = \alpha 1 + \beta 1 FINF_{t-1} + \beta 2 IMINF_{t-1} + \beta 3 lnIER_{t-1} + \beta 4 lnBDC_{t-1} + \sum_{i=1}^{p} \beta 5j \triangle FINF_{t-i} + \sum_{i=0}^{q1} \beta 6j \triangle IMINF_{t-i} + \sum_{i=0}^{q2} \beta 7j \triangle lnIER_{t-i} + \sum_{i=1}^{q3} \beta 8j \triangle lnBDC_{t-i} + \mu t1 \quad (1)$$

3.2. The ARDL - ECM Model

$$\triangle FINF_t = \alpha 2 + \sum_{i=1}^{p} \beta 9j \triangle FINF_{t-i} + \sum_{i=0}^{q1} \beta 10j \triangle IMINF_{t-i} + \sum_{i=0}^{q2} \beta 11j \triangle lnIER_{t-i} + \sum_{i=1}^{q3} \beta 12j \triangle lnBDC_{t-i} + \tau 1 ECM(-1) + \mu t2 \quad (2)$$

Where: FINF represents food inflation computed as a percentage, IMINF is imported inflation measured in percentage, IER is the official exchange rate, and BDC is the parallel market exchange rate measured in terms of the naira exchanged for US dollars.

3.3. ARDL Model for Food Inflation and Unified Exchange Rate

$$\triangle FINF_t = \alpha 3 + \beta 13 FINF_{t-1} + \beta 14 IMINF_{t-1} + \beta 15 lnUEXR_{t-1} + \sum_{i=1}^{p} \beta 16j \triangle FINF_{t-i} + \sum_{i=0}^{q1} \beta 17j \triangle IMINF_{t-i} + \sum_{i=0}^{q2} \beta 18j \triangle lnUEXR_{t-i} + \mu t3 \quad (3)$$

3.4. The ARDL - ECM Model (Unified Exchange Rate)

$$\triangle FINF_t = \alpha 4 + \sum_{i=1}^{p} \beta 19j \triangle FINF_{t-i} + \sum_{i=0}^{q1} \beta 20j \triangle IMINF_{t-i} + \sum_{i=0}^{q2} \beta 921j \triangle lnUEXR_{t-i} + \tau 2 ECM(-1) + \mu t4 \quad (4)$$

Where: FINF and IMINF as defined above, UEXR is the unified exchange rate computed as the average of IER and BDC exchange rates on a monthly basis.

3.5. ARDL Model for Food Inflation and Exchange Rate Differentials

$$\triangle FINF_t = \alpha 5 + \beta 22 FINF_{t-1} + \beta 23 IMINF_{t-1} + \beta 24 lnEXRD_{t-1} + \sum_{i=1}^{p} \beta 25j \triangle FINF_{t-i} + \sum_{i=0}^{q1} \beta 26j \triangle IMINF_{t-i} + \sum_{i=0}^{q2} \beta 27j \triangle lnEXRD_{t-i} + \mu t5 \quad (5)$$

3.6. The ARDL - ECM Model (Exchange Rate Differentials or Premium)

$$\triangle FINF_t = \alpha 6 + \sum_{i=1}^{p} \beta 28j \triangle FINF_{t-i} + \sum_{i=0}^{q1} \beta 29j \triangle IMINF_{t-i} + \sum_{i=0}^{q2} \beta 30j \triangle lnEXRD_{t-i} + \tau 2 ECM(-1) + \mu t6 \quad (6)$$

Where: EXRD is the exchange rate differentials (premium) computed by subtracting the IER from the BDC exchange rate of Naira to the US dollars on a monthly basis.

3.7. A Priori Expectation

The coefficients of IMINF, lnIER, lnBDC, and lnUEXR are expected to have positive signs, implying a positive relationship between IMINF, lnIER, lnBDC, lnUEXR, and FINF. Therefore, αi and $\beta i>0$. $\tau 1, \tau 2, \tau 3,$ and $\tau 4$ are expected to be negative and statistically significant.

4. Results and Discussion

The results of the study are presented and discussed in this section.

Table 1. Summary statistics.

Variables	FINF	BDC	IER	IMINF	UEXR
Mean	14.152	325.207	262.915	13.667	294.061
Median	13.392	359.000	305.250	15.680	332.975
Maximum	24.126	794.550	445.580	26.608	620.065
Minimum	7.877	153.125	150.240	-5.538	151.683
Std. dev.	4.280	153.407	97.302	5.017	124.234
Skewness	0.544	0.613	0.232	-0.848	0.423
Kurtosis	2.151	2.707	1.607	3.922	2.135
Jarque-Bera	11.518	9.591	13.018	22.523	8.848
Probability	0.003	0.008	0.002	0.000	0.012
Obs.	145	145	145	145	145

4.1. Discussion of Descriptive Statistic Results

The summary statistics for FINF, IMINF, IER, BDC, and UEXRT is presented in Table 1. The mean values of FINF and IMINF were 14.15 and 13.67, which implies that on average food inflation and imported inflation are 14.15 and 13.67 percent respectively for the period under study. The minimum and the maximum values are 7.88 and 24.13 percent respectively for food inflation and -5.54 and 26.61 percent respectively for imported inflation. The standard deviations of 4.28 and 5.02, imply that the FINF and IMINF deviate from their mean, from both sides by 4.28 and 5.02 percent respectively. Their skewness values of 0.54 and -0.85 with their kurtosis values of 2.15 and 3.92, show that FINF is platykurtic having a flat curve, while IMINF is leptokurtic. Similarly, the mean values of BDC, IER, and UEXR were ₦325.21, ₦262.92, and ₦294.06 respectively. The minimum and maximum values of BDC stood at ₦153.12 and ₦794.55 respectively and for IER are ₦150.24 and ₦445.58, while for UEXR are ₦151.68 and ₦620.07 respectively. The standard deviations for BDC, IER, and UEXR of ₦153.41, ₦97.30, and ₦124.23, imply that the BDC, IER, and UEXR deviate from their means, from both sides by ₦153.41, ₦97.30 and ₦124.23 respectively. The skewness values of 0.61, 0.23, and 0.42; the kurtosis values of 2.71, 1.61, and 2.14 show that BDC, IER, and UEXR are platykurtic having a flat curve and lower values than their means. The Jarque-Bera statistics for all the variables revealed that all the variables are not normally distributed.

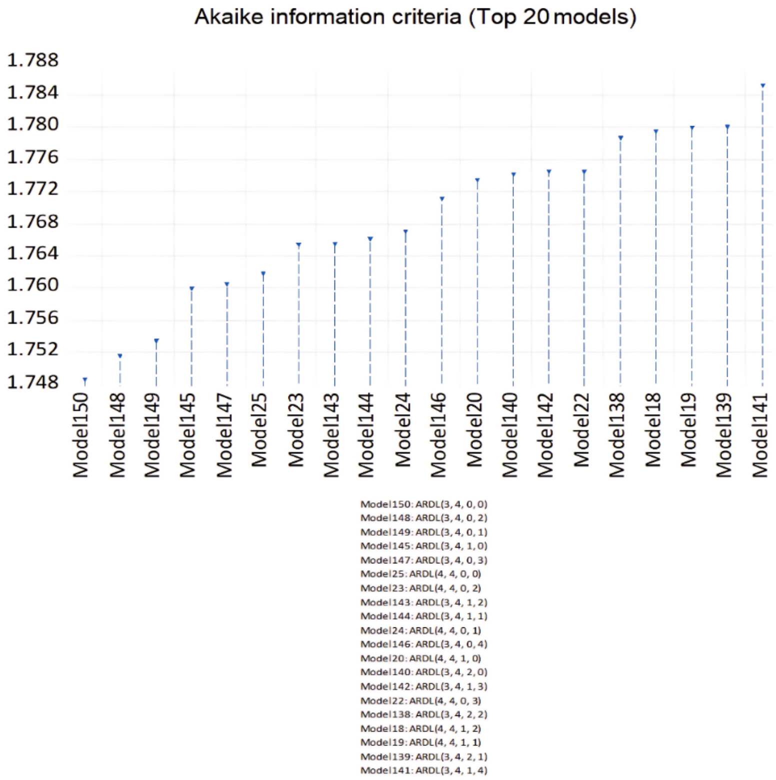
4.2. Discussion of Unit Root Results

Table 2 displays the outcomes of the unit root tests using Philip Peron (PP) and Augmented Dickey Fuller (ADF) statistics. The results from both PP and ADF indicate that all variables became stationary at the first difference I(1), with the exception of IMINF, which exhibited stationarity at levels I(0). This implies that the model's variables have a mixed order of integration, specifically I(0) and I(1). Such findings support the selection of the Autoregressive Distributed Lagged (ARDL) model as a suitable analytical technique.

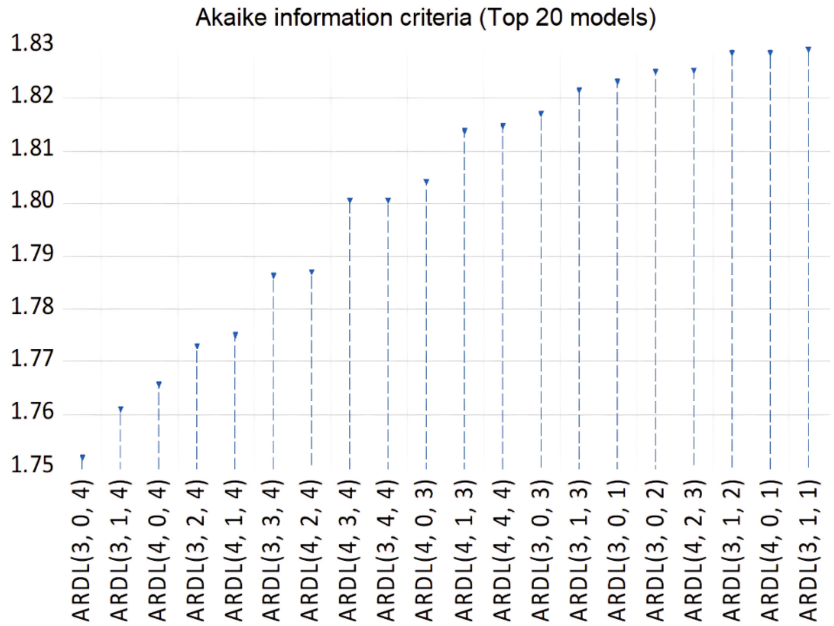
Table 2. Unit root results.

Variables	PP			ADF		
	Level T-stat.	1st diff. T-stat.	Order of integration	Level T-stat.	1st diff. T-stat.	Order of integration
△FINF	0.82	-11.17***	I(1)	-0.83	-6.87***	I(1)
△InBDC	0.98	-8.37***	I(1)	0.98	-8.31***	I(1)
△InIER	-0.24	-10.44***	I(1)	-0.24	-10.47***	I(1)
△InUEXR	0.28	-7.99***	I(1)	0.33	-7.88***	I(1)
IMINF	-5.90***		I(0)	-5.39***		I(0)
△lnEXRD	-1.13	-17.47***	I(1)	-1.54	-15.55***	I(1)

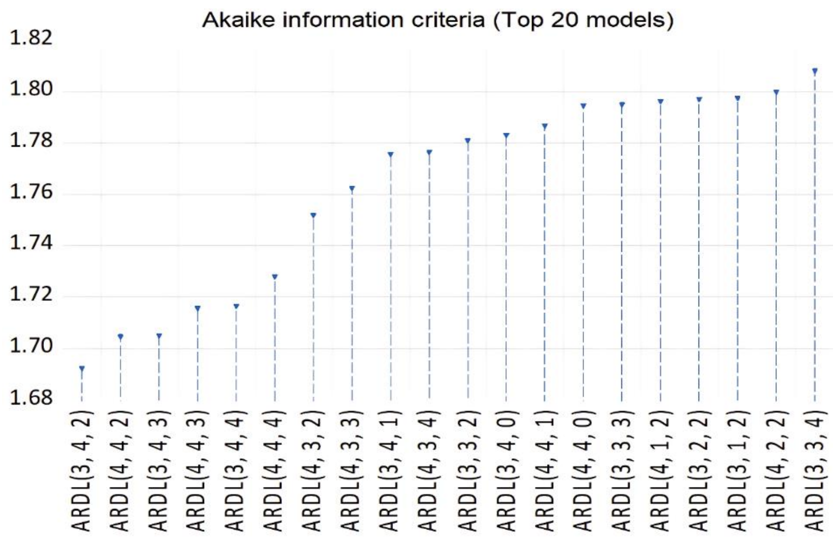
Note: *** represent 1% significance level.



Model 1



Model 2



Model 3

Figure 1. Model selection.

4.3. Discussion of Model/Lag Length Selection

We employed the automatic Akaike information criteria (AIC) in selecting the lags used in all three models. Figure 1 depicted the maximum lags for both the dependent and independent variables in the estimated ARDL models. Utilizing the model selection graph based on Akaike Information Criteria (AIC), the optimal configuration for model one was identified as ARDL (3, 4, 0, 0), for model two it was (3, 0, 4), and for model three, it was (3, 4, 2). Consequently, this study conducted estimations for the ARDL models with the specified lag structures: (3, 4, 0, 0), (3, 0, 4), and (3, 4, 2).

Table 3. ARDL bounds test.

Models	F-stat.	(5%) lower bound I(0)	(5%) upper bound I(1)	Null hypothesis	Remark
Model 1	4.91	3.23	4.35	No levels relationship	Rejected
Model 2	5.73	3.79	4.85	No levels relationship	Rejected
Model 3	6.22	3.79	4.85	No levels relationship	Rejected

4.4. Discussion ARDL Bound test Result

Table 3 displays the long-term association among the model variables through the ARDL Bound Test. The F-Statistic Values for models 1, 2, and 3, namely 4.91, 5.73, and 6.22, were observed to surpass the 5% upper bounds. This indicates the presence of a long-term relationship in all the models. Consequently, there is a need to estimate the Error Correction Model (ECM) for these models, as detailed in Table 4.

Table 4. ARDL Error correction and short-run dynamics results.

Variables	Model 1(BDC&IER)	Model 2 (UEXR)	Model 3(EXRD)
Constant	-1.596(0.217)	-2.669(0.000) ***	0.229(0.000) ***
ΔFINF (-1)	0.196(0.008) ***	0.213(0.005) ***	0.183(0.012) **
Δ FINF (-2)	0.410(0.000) ***	0.428(0.000) ***	0.443(0.000) ***
ΔlnBDC	1.083(0.028) **	-	-
ΔlnIER	-0.657(0.286)	-	-
ΔlnUEXR	-	0.654(0.013) **	-
ΔlnEXRD	-	-	-0.224(0.075) *
ΔlnEXRD (-1)	-	-	-0.468(0.000) ***
ΔlnEXRD (-2)	-	-	0.468(0.000) ***
ΔIMINF	0.136(0.000) ***	0.138(0.000) ***	0.147(0.000) ***
ECM term	-0.090(0.000) ***	-0.096(0.000) ***	-0.080(0.000) ***
R-squared	0.541	0.533	0.572
Adjusted R-square	0.516	0.508	0.542
F-statistic/prob.	22.351/0.000***	21.638/0.000	19.440/0.000
Durbin-Watson stat	1.958	1.955	1.916

Note: *, ** and *** represent 10% ,5% and 1% significance level, ( ) represent standard errors.

4.5. Discussion of ECM and Short-Run Dynamics Result

Table 4 showcases the short-term coefficients and outcomes of the Error Correction Model (ECM) for all three models under consideration. The ECM terms specifically evaluate the pace at which the food inflation model adjusts and the immediate dynamics in Nigeria. Notably, the ECM term coefficients across all models were identified as both negative and statistically significant at a 1 percent level. This confirms the presence of a level relationship between food inflation, imported inflation, BDC exchange rate, I&E official exchange rate, unified exchange rate, and exchange rate differentials in Nigeria. The observed values for ECM terms (-0.090, -0.096, and -0.080) indicate that the models are anticipated to converge by 9.0 percent, 9.6 percent, and 8.0 percent on a monthly basis, respectively.

The short-term dynamic coefficients in all models reveal a statistically significant positive correlation between food inflation and fluctuations in BDC exchange rates, imported inflation, unified exchange rates, and the second lag of exchange rate differentials. Moreover, there is a negative influence of the official exchange rate (I&E) on food inflation. These results align with theoretical expectations and support the conclusions drawn by Miyajima (2020) while contradicting the findings of Sadeghi et al. (2015) who identified a positive relationship between exchange rate appreciation and domestic inflation.

The results suggest that fluctuations in BDC exchange rate, imported inflation, unified exchange rate, and exchange rate differentials, particularly at certain levels and lag 2, contribute positively to food inflation. Conversely, the official exchange rate (I&E) exerts a negative influence on food inflation. This information can be valuable for policymakers and stakeholders in understanding the factors influencing short-term food inflation dynamics, aiding in the formulation of effective strategies to manage inflation in the specified context.

To be precise, with the dual exchange rate (official (I&E) and BDC), the coefficient of the official rate of -0.657 and the corresponding probability value of 0.2861 suggest that the official rate has a negative and insignificant potential for reducing food inflation. This is contrary to the theoretical expectation of the study. This could be attributed to difficulty accessing the forex at the official exchange rate window by all that desired it in the country.

Conversely, the coefficient for the BDC exchange rate, standing at 1.083 with a corresponding probability value of 0.0000, indicates that an increase in the BDC rate has the potential to elevate food inflation in the country by a greater magnitude compared to the increase in the official exchange rate. This may be attributed to the widespread accessibility to forex in the BDC market. This finding aligns with the observations of Eregha (2022) who reported a more systematic response of prices to the parallel market exchange rate than the official rate. Similarly, the coefficients for the unified exchange rate, marked at 0.654 with a probability value of 0.0000, suggest a positive and significant impact on food inflation. This implies that unifying the exchange rate might mitigate the influence of the exchange rate on food inflation in Nigeria, consistent with the expectations of this study. This outcome is unsurprising, as unifying the exchange rate tends to enhance forex accessibility, reduce costs, and alleviate inflationary pressures on food. Additionally, the coefficient for exchange rate differentials, recorded at 0.468 with a probability value of 0.0004 at lag 2, indicates a positive and significant lagged influence on food inflation in Nigeria, aligning with the anticipated results of this study. This underscores the importance for monetary authorities to consider exchange rate differentials when adjusting the official exchange rate.

The coefficients of imported inflation from the three models of 0.136, 0.138, and 0.147 and their corresponding probability values of 0.0000, 0.0000, and 0.0000 respectively, suggest that imported inflation has a positive and significant impact on food inflation in the country. This could be attributed to the behaviuor of Nigerians toward foreign-made goods. It is evidence that Nigerians like foreign-made goods and services more than domestically produced ones.

The F-statistic values of 22.352 for model 1, 21.638 for model 2, and 19.440 for model 3, with corresponding probability values of 0.0000, 0.0000, and 0.0000, indicate that the BDC exchange rate, official exchange rate (I&E), unified exchange rate, exchange rate differentials, and imported inflation collectively and significantly impact food inflation in Nigeria. The R2 values of 0.5405 (54.05%) for model 1, 0.5325 (53.25%) for model 2, and 0.5718 (57.18%) for model 3 suggest that 54.05%, 53.25%, and 57.18% of the total variation in food inflation in Nigeria can be explained by the included independent variables. Interestingly, the adjusted R2 values of 0.5163, 0.5079, and 0.5424 for all three models remain high after adjusting for the degrees of freedom, indicating that the models are well-fitted and reliable for policy considerations. This further affirms that activities in the forex market and importation significantly influence food inflation in Nigeria.

Table 5. Long-run Results for electricity and manufacturing output in Nigeria.

Variables	Model 1(BDC&IER)	Model 2(UEXR)	Model 3(EXRD)
InBDC	12.035(0.052) *	-	-
lnIER	-7.300(0.333)	-	-
lnUEXR	-	6.842(0.002) ***	-
lnEXRD	-	-	1.849(0.006) ***
IMINF	0.300(0.212)	0.298(0.191)	0.419(0.049) **

Note: *, ** and *** represent 10%, 5% and 1% significance level, ( ) represent standard errors.

Finally, the study concludes that in the short run, the impact of the exchange rate, particularly the BDC is higher on food inflation in Nigeria. However, unifying exchange rates and considering exchange rate differentials in decisions regarding forex tends to moderate the impact of exchange rates on food inflation.

4.6. Discussion of the Long Run Results

Table 5 presents the long-run outcomes regarding the influence of exchange rates and imported inflation on food inflation. The long-run coefficients for the BDC exchange rate, unified exchange rate, and exchange rate differentials, recorded at 12.035, 6.842, and 1.849, along with their respective probability values of 0.0523, 0.0023c, and 0.0057, indicate a positive and significant impact on food inflation over the long term. This suggests that both the BDC exchange rate and unified exchange rate, as well as exchange rate differentials, exert a notable influence on food inflation in the long run. The findings also indicate that unifying the exchange rate tends to mitigate the impact of the exchange rate on food inflation in Nigeria, aligning with the short-run results and the expectations of this study. Conversely, the coefficient for the official exchange rate (I&E) stands at -7.300, with a corresponding probability value of 0.3332, suggesting a negative but insignificant influence on food inflation in the long run. This aligns with the short-run coefficient and implies that the official exchange rate lacks the potential to significantly impact inflation in Nigeria over the long term.

The investigation revealed that, in models 1 and 2, imported inflation exerts a positive but statistically insignificant influence on food inflation in the long run. However, when exchange rate differentials were incorporated into the model, it was observed that imported inflation has a positive and significant impact on food inflation exclusively in the long run. This long-term positive influence aligns with the short-run results and is consistent with the anticipated outcomes of this study.

In summary, the BDC exchange rate, unified exchange rate, and exchange rate differentials exert a positive and significant influence on food inflation, both in the short and long run. Conversely, the official exchange rate has a negative but insignificant impact on food inflation in Nigeria. Additionally, imported inflation has a positive and significant impact on food inflation, but only in the short run.

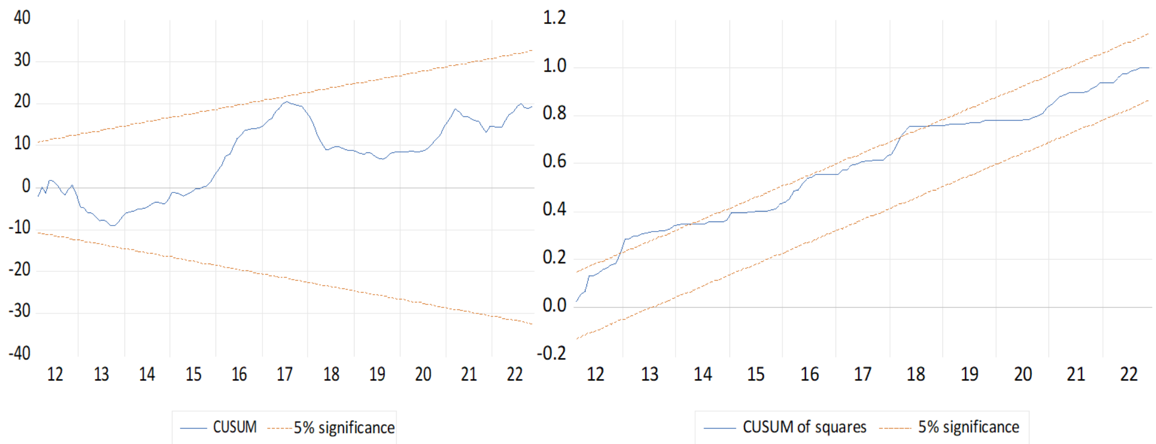
Table 6. Diagnostic test results.

Technique	F-stat & JB/(Prob)	Null hypothesis	Decision
Model 1			
Serial correlation	2.142(0.065)	No serial correlation	Accepted
Heteroscedasticity	7.542(0.000)	Homoscedascity	Rejected
Serial correlation	2.223(0.070)	No serial correlation	Accepted
Heteroscedasticity	7.858(0.000)	Homoscedascity	Rejected
Model 2			
Serial correlation	1.438(0.225)	No serial correlation	Accepted
Heteroscedasticity	6.234(0.000)	Homoscedascity	Rejected

4.7. Discussion of Diagnostic Test Results

Table 6 presents the diagnostic test results for the three models. The result suggests that all the models passed the serial correlation but do not pass the heteroscedasticity test. The null hypotheses of no serial correlation in all the models were accepted as indicated by the high probability values greater than 0.05. The null hypothesis of homoscedasticity in all the models were rejected.

Model 1



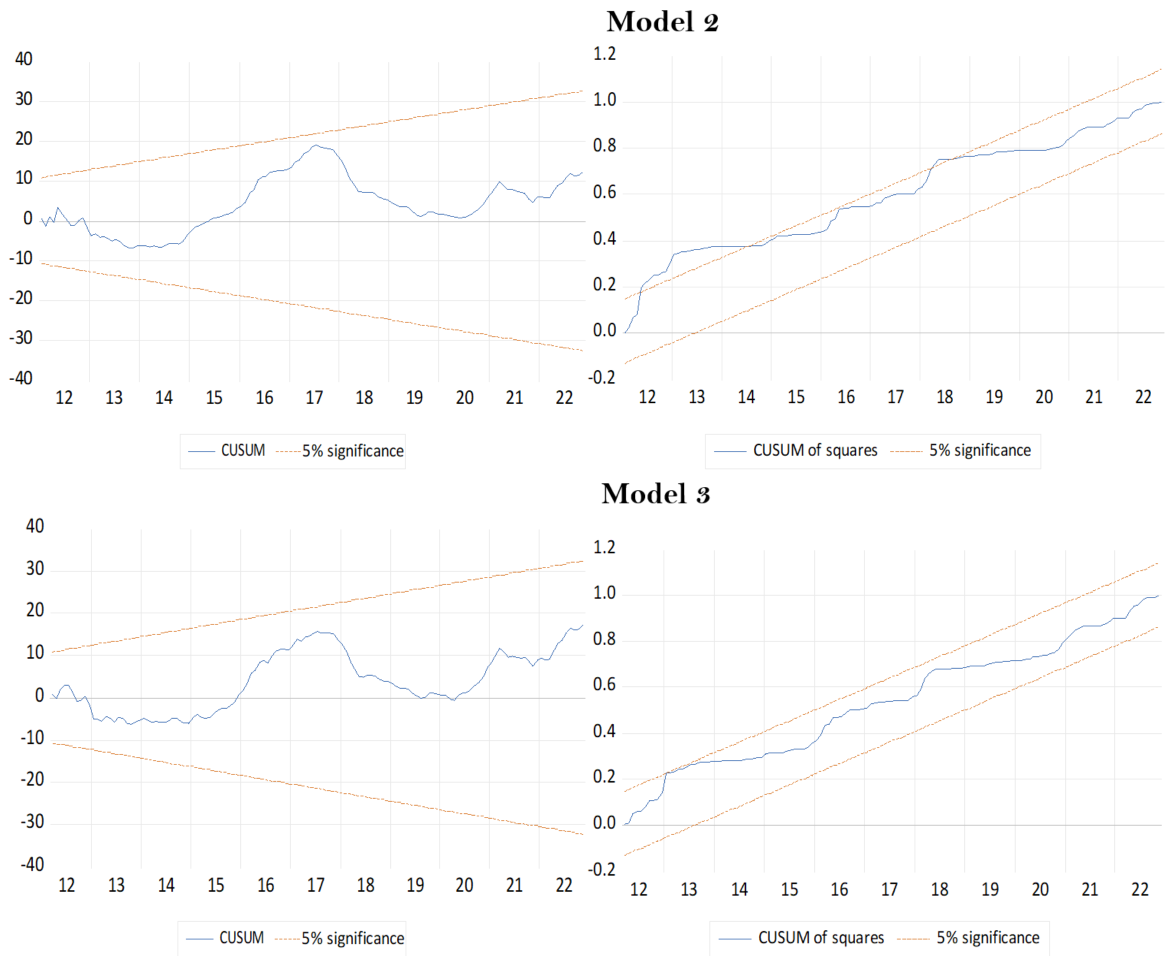


Figure 2. Stability test results using CUSM and CUSUM squares for the three models.

4.8. Discussion of Stability Test Results

Figure 2 shows stability test results. The CUSUM and CUSUM of squares revealed that all the models are stable as suggested by the blue line falling within the 5% bound. Therefore, the models of the study satisfy the stability condition.

5. Conclusion

Access to forex has become a problem and a topical issue in Nigeria over the years. Analysts have been clamoring for the unification of the exchange rate as a solution to the forex problem in Nigeria. A lot of efforts were put in place to boost access to forex in the country but these efforts seem not to yield the desired objective of stable prices. The current study investigates the impact of dual exchange rates on food inflation in Nigeria. Data were sourced from the Central Bank statistical bulletin 2022 and National Bureau of Statistics (NBS) (2019) between 2010M11 and 2022M11 and analyzed using Autoregressive Distributed Lag (ARDL) model.

To conduct this study, three distinct models were employed. Model 1, serving as the baseline, featured dual exchange rates and imported inflation, while Model 2 integrated unified exchange rates and imported inflation. Model 3, on the other hand, incorporated exchange rate differentials and imported inflation. The study's findings led to the conclusion that the BDC exchange rate, unified exchange rate, and exchange rate differentials have a positive and significant impact on food inflation, both in the short and long term in Nigeria. Meanwhile, the official exchange rate exhibited a negative but insignificant influence on food inflation in both the short and long run. This implies that a percentage increase in the BDC exchange rate, unified exchange rate, and exchange rate differentials may potentially raise food inflation in Nigeria, albeit moderately in the case of the unified exchange rate. Additionally, the study revealed that imported inflation has a positive and significant impact on food inflation in Nigeria, specifically in the short run. Consequently, a percentage increase in imported inflation may lead to an uptick in food inflation in the country.

We further concluded that the impact of the BDC exchange rate is high but unifying the exchange rate could moderate the impact of the exchange rate on food inflation in the country.

6. Policy Implications and Recommendations

Based on the findings and conclusions drawn from the study, the following policy recommendations were made.

i. The study discovered that consolidating the exchange rate has the potential to mitigate the influence of the exchange rate on food inflation. Consequently, we propose that the government endorse the unification of the exchange rate through legislation and subsequently implement monitoring mechanisms. This approach aims to enhance the value of the national currency and contribute to a decline in food inflation. Furthermore, we recommend that monetary authorities take proactive measures to intervene in the foreign exchange market, aiming to stabilize exchange rate fluctuations within the country.
ii. There is a necessity for the government and relevant authorities to enhance strategies for import substitution, with a focus on promoting the domestic production of goods that the country has a comparative cost advantage in. This approach has the potential to decrease the reliance on imports, consequently reducing both importation and imported inflation. Ultimately, it can contribute to fortifying the value of the national currency.
iii. Furthermore, the study suggests that when making decisions regarding exchange-rate-related issues in Nigeria, careful consideration should be given to exchange rate differentials. This is due to their positive and statistically significant influence on food inflation in the country.

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