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Inflation Adjustment Dynamics Under Fixed and Managed Flexible Exchange Rate Regimes in Nigeria: Nonlinear Autoregressive Distributed Lag (Nardl) Models

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ABSTRACT

This study investigates the dynamics of inflation adjustment under fixed and managed flexible exchange rate regimes in Nigeria. Using quarterly secondary data, the analysis spans 1981–1986 for the fixed exchange rate period and 1987–2023 for the managed flexible exchange rate period. The dependent variable is the consumer price index (CPI), while the independent variables include the nominal exchange rate (NEXRT), fixed and managed flexible exchange rates, and real gross domestic product (RGDP). Economic challenges, such as the Central Bank of Nigeria's (CBN) inability to maintain a fixed exchange rate due to declining foreign exchange reserves and rising demand for dollars, prompted the shift to a managed exchange rate regime. The ADF and PP unit root tests reveal that CPI is stationary at level (I(0)), while NEXRT and RGDP are stationary after first differencing (I(1)). The ARDL bounds test confirms a long-run relationship among the variables, indicating co-integration. Employing the NARDL model, the findings reveal that under the fixed exchange rate regime, short-run disequilibria are corrected by 53% in the long run, with statistical significance (p = 0.0008). For the managed flexible exchange rate regime, deviations are corrected by 85% in the long run, also statistically significant (p = 0.0000). The study recommends that monetary authorities enhance dollar availability to support policy objectives and curb inflationary pressures.

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Introduction

The primary goal of Nigeria's monetary authority is price stabilization. Despite various monetary regimes adopted by the Central Bank of Nigeria (CBN) over the decades, inflation remains a significant obstacle to economic growth in the country. As noted by the nations worldwide aim to keep inflation rates as low as possible [1]. However, over the past two decades, it has been widely accepted that monetary policies intended to boost output and reduce unemployment beyond sustainable levels often lead to higher inflation, without achieving persistent reductions in unemployment or consistent increases in output. The global commitment to price stability as a primary objective of monetary policy has gained significant traction. Defines inflation as a sustained rise in the general price level within an economy [2]. Similarly, described inflation as "one of the most dangerous economic phenomena in contemporary economies," which typically arises when the supply of money exceeds the volume of goods and services available in the economy [3]. Both developed and developing nations attempt to increase household income to enhance purchasing power, which often leads to inflation as the prices of goods and services rise [4]. Controlling inflation is particularly challenging in less developed nations compared to advanced economies. Advanced nations often experience shorter and less severe inflationary periods, while underdeveloped countries, including Nigeria, face persistent inflation compounded by widespread unemployment, low economic growth, and other structural issues [5]. These challenges make combating inflation more difficult in developing economies. Despite these difficulties, both Nigeria and developed nations have employed various strategies to mitigate the negative effects of inflation [6]. Exchange rate policy plays a crucial role in the monetary transmission mechanism within an open economy framework. According to exchange rates influence aggregate demand by affecting the relative prices of domestic and foreign goods, as well as foreign demand for domestic products [7]. The direct exchange rate channel impacts inflation through the prices of imported goods and intermediate inputs, which are components of consumer price inflation. Additionally, it influences nominal wages by affecting inflation and wage-setting mechanisms. The exchange rate also impacts aggregate demand for domestic goods through changes in foreign demand. Emphasized the exchange rate as a critical macroeconomic variable in economic policymaking and reform programs [8]. It serves as a vital price mechanism linking domestic and international markets by facilitating currency exchange between countries. The exchange rate is thus defined as the amount of domestic currency required to purchase one unit of foreign currency. In 2017, the CBN transitioned from a fixed exchange rate to a managed flexible exchange rate regime due to economic challenges, including the inability to sustain a fixed rate and currency misalignment that rendered Nigerian exports uncompetitive globally [9]. Changes in exchange rates, whether through currency appreciation or depreciation, have profound implications for the economy.

This study aims to analyze the speed of inflation adjustment under two distinct exchange rate regimes: the fixed exchange rate regime (1981–1986) and the managed flexible exchange rate regime (1987–2023) in Nigeria. These periods encompass significant economic milestones, including the adoption of the Structural Adjustment Programme (SAP), financial sector reforms marked by interest rate deregulation and financial liberalization, and periods of economic recession and recovery. Additionally, the study examines the transition to cashless policy implementation by monetary authorities. Over these years, fluctuations in inflation and exchange rates have been defining features of the Nigerian economy, making this analysis both relevant and timely.

Empirical Literature Review

Numerous studies have examined the relationship between exchange rates and inflation in both developed and developing countries, including Nigeria. Specifically, empirical research has focused on the speed of inflation adjustment under different exchange rate regimes. This section reviews selected studies to provide insights into their methodologies and findings.

Analyzed the effect of exchange rate volatility on inflation in Nigeria using annual time series data from 1986 to 2019 [10]. The study employed the Vector Error Correction Model (VECM) and Generalized Autoregressive Conditional Heteroscedasticity (GARCH) to assess the long-term impact of exchange rate volatility on inflation. Inflation was represented by the consumer price index (CPI) as the dependent variable, while nominal exchange rate (NER), money supply (MS), imports (IMP), and exports (EPT) served as explanatory variables. The findings revealed that both money supply and nominal exchange rate had a positive and statistically significant impact (at the 5% level) on inflation. Musa recommended that the Central Bank of Nigeria (CBN) should control money supply growth to minimize inflation.

Explored the implications of foreign exchange regimes on selected macroeconomic indicators in Nigeria from 1999 to 2020 [11]. Using an ex-post facto and time-series research design, secondary data were sourced from the Federal Inland Revenue Service (FIRS) and the National Bureau of Statistics. Multiple regression analysis was applied, and the results indicated a positive but not statistically significant relationship (at the 5% level) between exchange rate regimes and inflation. Similarly, the relationship between exchange rate regimes and the current account balance (CAB) was positive but not significant. The authors recommended that the CBN continuously assess Nigeria's exchange rate system, particularly due to the risk of Naira devaluation in the global currency market [12]. Studied the pass-through effects of exchange rates on inflation in Turkey for the period 2010–2018, employing the ARDL Bounds Testing approach [13]. Variables such as capacity utilization rate (CUR), world crude oil prices (OIL), domestic money supply (M3), and weighted nominal exchange rate (EXC) were used as independent variables, while the domestic producer price index (PPI) served as the dependent variable. The findings demonstrated that the nominal exchange rate had a strong and positive influence on inflation. Examined the impact of exchange rate regimes on inflation in Nigeria from 1970 to 2015 using the Autoregressive Distributed Lag (ARDL) model [14]. Their results showed that the past one-year value of the exchange rate had a negative and significant effect on the current inflation rate. Furthermore, the inflation rate was higher during the fixed exchange rate regime compared to the floating exchange rate regime. The authors recommended that the Nigerian government prioritize exchange rate and interest rate stability to mitigate inflationary pressures. These studies collectively highlight the significant role exchange rate dynamics play in influencing inflation. They underscore the need for carefully crafted monetary and exchange rate policies to achieve macroeconomic stability.

Analyzed the impact of different exchange rate regimes on inflation performance in Nigeria between 1970 and 2012 [15]. The study employed co-integrating regression estimates and revealed that crawling pegs influenced inflation through relevant dimensions, while hard pegs had a notable effect in specific contexts. The results remained robust even when controlling for growth in money supply and interest rates. Musibau found that pegged exchange rate regimes significantly anchored inflation expectations, enhanced policy credibility, and reduced inflation when backed by consistent policy behavior. The study concluded that the "hollowing out" hypothesis did not apply to Nigeria [16]. Examined the effect of exchange rates on inflation in Nigeria using annual data from 1970 to 2014 [17]. The study utilized multiple regression methods, with unit root and Johansen co-integration tests employed to ensure the stationarity and co-integration of variables such as inflation, money supply, exchange rate, real GDP, and import prices. The findings indicated that inflation responded significantly to lagged inflation, exchange rates, money supply, and import prices at the 5% significance level. The study concluded that exchange rate management is a vital tool for controlling inflation. It recommended that the Central Bank of Nigeria adopt policies targeting monetary growth and import management, alongside exchange rate policies, to curb inflation effectively. Explored the relationship between inflation and exchange rates using annual and quarterly time series data for the periods 1976–2012 and 1997:Q3–2011:Q4, respectively [18]. The study applied the Vector Autoregression (VAR) model and Hendry General-to-Specific Modeling. The Hendry model identified a direct relationship between exchange rates and inflation, revealing that higher foreign exchange rates led to increased inflation. The VAR model further demonstrated that both exchange rates and money supply positively influenced inflation, although the contribution of the exchange rate to inflation was smaller than that of the money supply. Investigated the relationship between exchange rate volatility, inflation volatility, and stock price volatility in Nigeria using quarterly data from 1986:Q1 to 2012:Q4 [19]. The study employed GARCH (1,1) models to measure volatilities and examined their relationships using GARCH (1,1)-S and extended GARCH-X models. Findings revealed a negative relationship between stock price volatility and the volatilities of exchange rates and inflation in Nigeria, highlighting the interconnectedness of these variables in the Nigerian financial market. Analyzed the exchange rate pass-through effect on import and consumer prices in Nigeria from 1995:Q1 to 2015:Q1 [20]. Variables included the consumer price index (CPI), nominal exchange rate, oil prices, real GDP, and the effective nominal exchange rate. Using Johansen co-integration and vector error correction methodologies, the study found that exchange rate pass-through into CPI inflation was incomplete, with long-run pass-through elasticities of 0.24 and 0.30 in baseline and alternative models, respectively. The study also noted a higher pass-through effect on import prices compared to consumer prices, suggesting a decline in the effect along the pricing chain. These findings provided valuable insights for the design of monetary and exchange rate policies by the Central Bank of Nigeria [21]. In summary, these studies highlight the nuanced relationships between exchange rates, inflation, and other macroeconomic variables, emphasizing the importance of exchange rate management and monetary policies in mitigating inflationary pressures in Nigeria.

Theoretical Framework

This study is tied to the New Keynesian Phillips Curve (NKPC). NKPC has set up a framework on the trade-off between the potential (efficient) output, inflation (gap), and the difference between the real outputs under the assumption of real wage rigidities. Phillips (1958), from the Simplest Phillips Curve model, firstly examined "the relationship between unemployment and inflation". According to Karanassou et al. (2010), "the original equation is given such as:

$$\pi t = c - but + \epsilon t \qquad (1.1)$$

Equation (i) states that, c and b are positive constants. πt is a rate of inflation, ut is a rate of unemployment and ϵtis the error term. In the static nature of the Equation (i), the steady-state and rate of long-run unemployment are identical". Phelps (1967; 1968) and Friedman (1968), in the seminal contributions, stated that "a dynamic extension of the Equation (i) is the so-called traditional Keynesian Phillips curve can be written as follows:

$$\pi t = c + a\pi t\text{-}1 - but \qquad (1.2)$$

Equation (ii) state that, the autoregressive parameter is |a| <1. Similarly to the static case in equation (i), there is a long-run trade-off and no natural rate of unemployment. The hypothesis of a natural rate of unemployment (un) gave rise to the Expectations Augmented Phillips Curve that can be shown as follows:

$$\pi t = \pi t\text{-}1 - b(ut - un) \qquad (1.3)$$

In the equation (iii), adaptive expectations are identical to the Expectations Augmented Phillips Curve under the random walk/rational expectations assumption". Argued that "the main difference between two frameworks is that the random walk/ rational expectations can separate the short and the long-run" [22]. Mentioned that "the standard NKPC has some fractions such as staggered price equilibrium, firms, efficient allocation (first best), people, and flexible price equilibrium (second best). The standard NKPC can also be written as follows:

$$\pi t = \beta E\pi t{+}1 + K(yt - yt^*) \qquad (1.4)$$

In the equation (iv), inflation (πt) is a function of expected future inflation (Eπt-1), of the deviation from actual (yt) and potential output (yt*) known as output gap" [23]. Also "introduced real wage rigidities into the standard NKPC framework, and re-examined flexible price equilibrium (second-best) and staggered price equilibrium". The framework "allow policy trade-offs and implications for the output cost of disinflation. They also discussed some alternative approaches, such as distortion shocks, different structures of wage and price setting and the behavior of inflation. They derived the relationship between inflation and unemployment. In addition, they firstly and explicitly introduced unemployment". "Secondly, rewrote the inflation equation in terms of unemployment that can be written as follows:

$$\pi t = \frac{1}{(1+\beta)}\pi(-1) + \frac{\beta}{(1+\beta)} E\pi(+1) - \frac{\lambda(1-\alpha)(1-\gamma)\theta}{\gamma(1+\beta)} u + \frac{\alpha\pi}{(1+\beta)} \Delta V + \epsilon \qquad (1.5)$$

In Equation (v), inflation is a function of past and expected future inflation, of the unemployment rate (u), and the change in the real price of the non-produced input (ΔV). The term (ϵ) is proportional to (π-E(π-1) so it is white noise, and orthogonal to all variables at t -1, on the other hand, λ is the price rigidity and γ is the wage rigidity". Added that "terms of trade volatility on the open economy are indirectly described within the real price of the non-produced input. In the equation (v), it is important to note that there are also different open-economy frameworks for the NKPC in the literature, such as those examined by [24-27]. The framework of the NKPC in equation (v) can be estimated by using Generalized Method of Moments (GMM) or Instrumental Variables (IV) that parameters have certain constraints".

Methodology

Model Specification

This study estimates both long-run and short-run relationships using the Nonlinear Autoregressive Distributed Lag (NARDL) model. The NARDL approach is suitable for investigating asymmetric effects and allows the simultaneous estimation of long-run and short-run dynamics. It is particularly effective for modeling relationships where adjustments to equilibrium may be nonlinear, such as the impact of exchange rate regimes on inflation [28].

The study applies the Error Correction Model (ECM) within the NARDL framework to measure the speed of adjustment toward long-run equilibrium during exchange rate regime changes in Nigeria over the period of study. The general econometric model for fixed exchange regime can be expressed as:

$$\Delta\log(\text{cpi}_t) = \sum_{i=1}^{N1} \delta_i \,\Delta\log(\text{cpi}_{t-i}) + \sum_{j=0}^{N2} \beta_{2j}\,\Delta\log(fxexr_{t-j}) + \sum_{j=0}^{N3} \beta_{3j}\,\Delta\log(rgdp_{t-j}) + \sigma ECT_{t-1} + \varepsilon_t \qquad (2)$$

cpi = Consumer Price Index (Inflation)
rgdp = Real Gross Domestic Product
fxex = Fixed Exchange Rate
Log = Logarithmic Function
ECM = Error Correction Model
δ_i,β_2-β_3= Parameter to be Estimated
ε_t = Disturbance Error

While the general econometric model for managed flexible exchange regime can be expressed as:

$$\Delta\log(\text{cpi}_t) = \sum_{i=1}^{N1} \delta_{2i}\,\Delta\log(\text{cpi}_{t-i}) + \sum_{j=0}^{N2} \beta_{4j}\,\Delta\log(flexr_{t-j}) + \sum_{j=0}^{N3} \beta_{5j}\,\Delta\log(rgdp_{t-j}) + \sigma ECT_{t-1} + \varepsilon_t \qquad (3)$$

cpi = Consumer Price Index (Inflation)
rgdp = Real Gross Domestic Product
fxex = Fixed Exchange Rate
Log = Logarithmic Function
ECM = Error Correction Model
δ_i,β_2-β_3= Parameter to be Estimated
ε_t = Disturbance Error

Data Sources
The study utilizes annual time series data from 1981 to 2023, covering the fixed exchange rate regime (1981–1986) and the managed floating exchange rate regime (1987–2023). The data is sourced from the following: Central Bank of Nigeria (CBN), Statistical bulletins, National Bureau of Statistics (NBS), World Bank Development Indicators (WDI)

The Variables Include
- **Inflation Rate (πt\pi_tπt):** Measured by the annual percentage change in the Consumer Price Index (CPI).
- **Exchange Rate (ER_t):** Measured as the nominal exchange rate (domestic currency per unit of foreign currency).
- **Control Variables:** Money supply (M2), import prices, real GDP, and interest rates, which are included to control for other factors influencing inflation.

Estimation Technique
The NARDL model will be estimated using the following steps: Stationarity Tests: Conduct unit root tests (Augmented Dickey-Fuller and Phillips-Perron) to determine the order of integration of the variables. Bounds Testing: Perform bounds testing to check for the presence of a long-run relationship among the variables. Model Estimation: Estimate the short-run and long-run coefficients of the NARDL model, including the error correction term. Diagnostic Tests: Conduct diagnostic tests for serial correlation, heteroscedasticity, and model stability. The results will help to assess the speed and direction of inflation adjustments during regime changes, providing insights into the effectiveness of exchange rate policies in Nigeria [29].

Result and Discussion

Unit Root Test Results
The stationarity of the time series variables used in this research-Consumer Price Index (CPI), Real Gross Domestic Product (RGDP), and Exchange Rate (NEXRT)-was assessed using three-unit root tests: the Augmented Dickey-Fuller (ADF), Phillips-Perron (PP), and Kwiatkowski-Phillips-Schmidt-Shin (KPSS). A 5% critical value was adopted as the benchmark for significance.

From Table 1: The Following Conclusions Can be Drawn

Variable	ADF			PP			KPSS		
	level	First Diff	I(d)	level	First Diff	I(d)	level	First Diff	I(d)
Log(rgdp)	0.136a	-4.212a**	I(1)	0.657a	-13.642a**	I(1)	1.438a	0.307a**	I(1)
Log(next)	-2.205a	-6.858a**	I(1)	-2.418a	-17.094a**	I(1)	1.065a	0.042a**	I(1)
Logcpi	-3.023a**		I(0)	-3.055a**		I(0)	0.427a**		I(0)

Source: Extracts from the E-views Output (E-views 13)

Log(RGDP): Stationary after first differencing (I(1),I(1),I(1)) according to all three tests (ADF, PP, and KPSS). Log(NEXRT): Stationary after first differencing (I(1),I(1),I(1)) based on the same tests. Log(CPI): Found to be stationary at level (I(0),I(0),I(0)) across all tests. The mixed order of integration (I(0),I(0),I(0) and I(1),I(1),I(1)) among the variables justifies the application of the ARDL framework for the analysis.

Correlation Matrix
The Correlation Matrix (Table 2) Was Analyzed to Check for Multicollinearity Among the Variables.

Correlation	logcpi	Log(rgdp)	Log(nexrt)
Logcpi	1.000000		
Log(rgdp)	-0.424204	1.000000	
Log(nexrt)	-0.263127	0.728030	1.000000

Source: Extracts from the E-views Output (E-views 13)

The key results are as follows: The correlation between Log(CPI) and Log(RGDP) is -0.424, indicating a moderate inverse relationship. The correlation between Log(CPI) and Log(NEXRT) is -0.263, indicating a weak inverse relationship. The correlation between Log(RGDP) and Log(NEXRT) is 0.728, suggesting a moderate positive relationship. Since none of the correlation coefficients exceed 1, there is no evidence of multicollinearity in the model, and the variables can be included in the regression without bias [30].

Optimal Lag Length Selection
The optimal lag length for the ARDL model was determined using various lag selection criteria, including Log-likelihood (LogL), Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Criterion (SC), and Hannan-Quinn Criterion (HQ).

Table 3: Optimal Lag Length Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-455.6994	NA	2.161316	6.446471	6.488102	6.463388
1	25.36544	941.8030	0.002610	-0.272753	-0.147859	-0.222001
2	36.21903	20.94286	0.002370	-0.369282	-0.161125*	-0.284696*
3	39.13149	5.537766	0.002407	-0.353965	-0.062545	-0.235544
4	41.91783	5.219480	0.002448	-0.336871	0.037811	-0.184615
5	52.65631	19.81325*	0.002227*	-0.431779*	0.026166	-0.245689
6	54.67602	3.669616	0.002291	-0.403888	0.137320	-0.183963
7	55.05567	0.679085	0.002413	-0.352897	0.271574	-0.099137
8	55.60321	0.963987	0.002535	-0.304271	0.403463	-0.016677
9	60.35126	8.225502	0.002510	-0.314807	0.476189	0.006622
10	61.46293	1.894534	0.002618	-0.274126	0.600133	0.081137

Source: Extracts from the E-views Output (E-views 13)

From Table 3, the model with a lag length of 5 is identified as optimal based on the following:
It has the lowest AIC (−0.431779-0.431779−0.431779) and FPE (0.0022270.0022270.002227).
The LR test statistic indicates this lag structure provides the best model fit.

This lag selection ensures that the ARDL model captures both the short-run dynamics and long-run relationships between the variables effectively.

ARDL Bounds Co-Integration Test

The result of ARDL Bound Co-Integration Test Been Captured in Table 4.

Table 4: Cointegration Test (ARDL Bounds Test)

Test Statistic	Value	K	Significant	I0(Lower Bound)	I1(Upper Bound)
F-Statistic	5.153619	5	10%	2.08	3
			5%	2.39	3.38
			2.5%	2.7	3.73
			1%	3.06	4.15

Source: Extracted from E-Views 13 Output

Having established that the variables are integrated at different orders, it is crucial to determine whether a long-run equilibrium relationship exists among them. Co-integration refers to the presence of an equilibrium or stationary relationship between two or more time series that are individually non-stationary. Since the variables in this study exhibit both I(0) and I(1) properties, the ARDL Bounds Test was used to examine the existence of a long-run relationship. As presented in Table 4, the F-statistic value (5.15) exceeds the critical values of both the lower and upper bounds, indicating the presence of a long-run relationship among the variables. This finding implies that the null hypothesis of no co-integration is rejected in Nigeria's case. Consequently, it justifies the estimation of both the short-run and long-run models [31-32].

Results of the Speed of Inflation Adjustment to Regime Changes

The short-run adjustment dynamics of inflation to changes in exchange rate regimes were analyzed using the error correction term (ECT). The ECT measures the speed at which inflation returns to its long-run equilibrium after a deviation due to shocks in exchange rate regimes. The ECM for both fixed and flexible exchange rate regimes can be represented as follows

Below are the results of the Autoregressive Distributed Lag (ARDL) model estimates for the New Keynesian Phillips Curve under fixed and managed flexible exchange rate regimes.

Table 5: Results of Inflation Adjustment Across Exchange Rate Regimes

Dependent Variable: logcpi					
Fixed Exchange Rate Regime			**Managed Flexible Exchange Rate Regime**		
Variable	**Coefficient**	**Prob.**	**Variable**	**Coefficient**	**Prob.**
D(cpi_gap(-1))	0.9680	0.0000	**D(cpi_gap(-1))**	1.1185	0.0000
D(cpi_gap(-2))	-0.3021	0.1856	**D(cpi_gap(-2))**	-0.0261	0.8976

D(cpi_gap(-3))	0.5294	0.0219	**D(cpi_gap(-3))**	0.8199	0.0003
D(fxex)	0.0006	0.8835	**D(flex)**	0.0069	0.2976
D(rgdp_gap)	-6.6565	0.4567	**D(flex(-1))**	0.0252	0.0007
			D(rgdp_gap)	1.2249	0.8704
ECM	-0.5322	0.0008**	**ECM**	-0.8525	0.0000**

Source: Extracted from E-Views 13 Output

Diagnostic Test Results
To ensure the adequacy and validity of the model, a series of diagnostic tests were conducted. The results of these tests are presented and interpreted below.

Linearity Test (Ramsey RESET Test)
The Result of the Ramsey RESET Test is Shown in Table 6.

	Value	Df	Probability
t-statistic	1.553237	102	0.1235
F-statistic	2.412547	(1,102)	0.1235

Source: Extracted from E-Views 13 Output

Table 6 presents the Ramsey RESET test results, which assess whether the model is correctly specified. The F-statistic and t-statistic test the hypothesis that the coefficients of the powers of the fitted values from the regression are jointly zero. Since the p-value (0.1235) is greater than 0.1, the null hypothesis of correct specification cannot be rejected. Hence, the model is considered correctly specified.

Autocorrelation Test (Breusch-Godfrey LM Test)
The Results of The Breusch-Godfrey Serial Correlation LM Test are Shown in Table 7.

	Value	Df	Probability
F-statistic	1.698689	Prob. F(2,101)	0.1881
Obs*R-squared	4.783784	Prob. Chi-square(2)	0.0915

Source: Extracted from E-Views 13 Output

The Breusch-Godfrey test was employed to detect serial correlation in the residuals. The null hypothesis states that there is no serial correlation in the residuals up to the specified lag order. The results indicate that the null hypothesis cannot be rejected, as both the F-statistic (p-value = 0.1881) and the Obs*R-squared (p-value = 0.0915) have values greater than 5%. Therefore, it can be concluded that the model does not suffer from serial correlation.

Stability Test
The stability of the model was assessed using two methods: the AR characteristic root test and the CUSUM residual test.

AR Characteristic Root Test: The model is considered stable if all the roots of the characteristic polynomial lie inside the unit circle. Based on the Eigenvalues, the results confirm that all the roots lie within the unit circle, satisfying the stability condition.

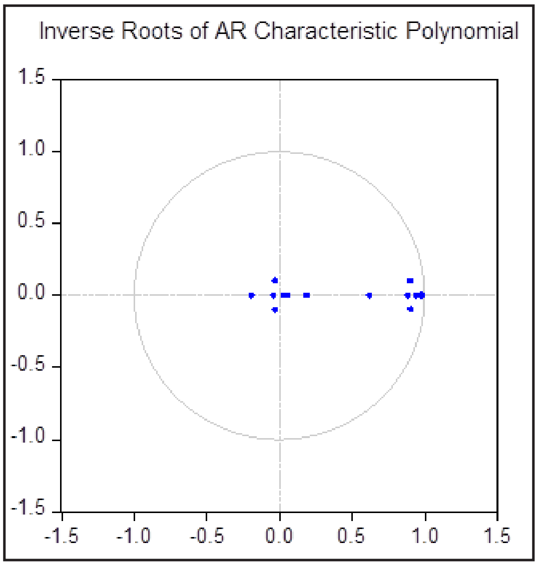

Figure 1: AR Characteristic Root Test

CUSUM Residual Test: The CUSUM test was also used to evaluate model stability. The model is considered stable if the CUSUM line (green line) lies within the boundaries (red lines) of the graph. The results confirm that the CUSUM line remains within the bounds, indicating stability.

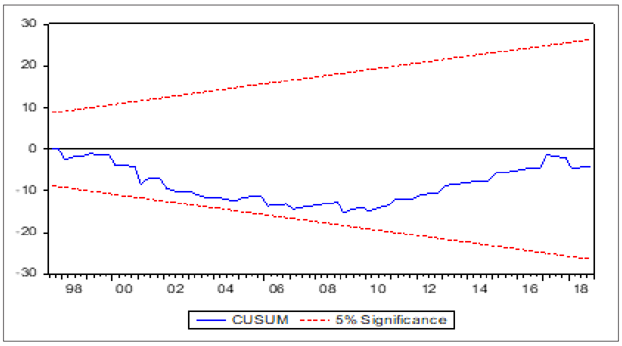

Figure 2: CUSUM Residual Test

Figures 1 and 2 below display the graphical representations of the AR characteristic root and CUSUM tests, which further validate the model's stability.

Discussion of Results
Table 5 provides a comparative analysis of the speed of adjustment between the fixed and managed flexible exchange rate regimes in Nigeria.

Under the fixed exchange rate regime, the results show that any disequilibrium in the short run will be corrected with a 53% likelihood of returning to equilibrium in the long run. This adjustment is statistically significant, with a probability value of 0.0008, which is less than the 5% critical threshold.

Conversely, the managed flexible exchange rate regime demonstrates a much faster adjustment process. The findings reveal an 85% likelihood of restoring equilibrium in the long run following short-run deviations. This adjustment is also statistically significant, with a probability value of 0.0000. The higher adjustment speed under the managed flexible regime is attributed to the active interventions by the Central Bank of Nigeria and a quicker response to external shocks.

The results suggest that the managed flexible exchange rate regime is more effective at adjusting to supply and demand changes, thereby reducing the risk of prolonged misalignments. This indicates a more dynamic mechanism in stabilizing the exchange rate and addressing inflationary pressures compared to the fixed exchange rate regime.

In summary, the Error Correction Model (ECM) coefficient in both regimes is statistically significant and negative, indicating a quick adjustment to equilibrium after any shock. Under the fixed exchange rate regime, the ECM coefficient (-0.5322) suggests a speed of adjustment of 53.22% per period, while under the managed flexible regime, the ECM coefficient (-0.8525) indicates a faster adjustment rate of 85.25%. This implies that inflation adjusts more rapidly to changes in the managed flexible exchange rate regime compared to the fixed regime.

Conclusion and Recommendations

This study examined the performance of fixed and managed flexible exchange rate regimes in Nigeria, particularly focusing on the speed of inflation adjustment during regime changes.

The Error Correction Model (ECM) results reveal that the adjustment coefficients for both regimes are consistent, exhibiting negative values. The findings show that under the managed flexible exchange rate regime, the speed of adjustment to equilibrium is 85%, which is significantly faster compared to the 53% adjustment speed under the fixed exchange rate regime. This highlights the managed flexible exchange rate regime's superior ability to restore equilibrium following short-run shocks.

The study concludes that the managed flexible exchange rate regime is more effective in responding to economic changes and external shocks, resulting in quicker adjustments to equilibrium levels.

Recommendations

Maintaining Exchange Rate Stability: The monetary authorities should continue to implement policies that enhance the stability of the managed flexible exchange rate regime to control inflation and mitigate economic disruptions.

Reducing Interest Rates: Policymakers should prioritize lowering interest rates on loans to encourage higher investment activity. Increased investment will boost productivity and foster economic growth.

Active Monitoring of External Shocks: The Central Bank of Nigeria should remain vigilant in monitoring external shocks and respond promptly with appropriate interventions to ensure continued macroeconomic stability. By adhering to these recommendations, Nigeria can sustain a dynamic exchange rate mechanism that effectively manages inflation while supporting economic development.

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