

# EXCHANGE RATE PASS-THROUGH, MONETARY POLICY, AND PRICE STABILITY IN NIGERIA

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Received: December 5, 2025   Accepted: August 10, 2026   Online Published: January 1, 2027

## Abstract

*This research conducted a comprehensive examination of the effects of exchange rate pass-through on Nigerian monetary policy and price stability from 1981 to 2023. The Augmented Dickey-Fuller test, an extension of the Dickey-Fuller test, was employed to assess the presence of unit roots. The findings revealed that all variables, including monetary policy, real gross domestic product, domestic price index, consumer price index, nominal exchange rate, and interest rate, were integrated at order one  $I(1)$ . To confirm the long-term relationships among these variables, a Johansen Co-integration model was utilized, along with an Error Correction Model (ECM) to rectify any errors in the model. The analysis indicated that both monetary policy and price stability exhibited a positive correlation with exchange rate pass-through, albeit at a level below 100%, suggesting that the exchange rate pass-through effect is insufficient and incomplete. This finding highlights a significant long-term relationship, indicating that exchange rate depreciation is reflected in domestic prices and that fluctuations in exchange rates considerably affect monetary policy decisions and their effectiveness. Consequently, the study concludes with recommendations for policymakers to implement reforms aimed at enhancing foreign exchange earnings through export diversification, promoting non-oil exports, attracting sustainable foreign direct investment, and bolstering diaspora remittances. Furthermore, enhancing the efficiency and transparency of the foreign exchange market is essential to reduce speculation and alleviate inflationary pressures.*

**Keywords:** Exchange rate pass-through; Monetary policy; Price stability; Johansen cointegration; Error correction model; Nigeria.

## 1. Introduction

Price stability is a key macroeconomic policy goal, vital for sustainable growth, efficient resource allocation, increased investment, and enhanced household welfare. A stable price environment reduces uncertainty, boosts consumer and investor confidence, supports financial market development, and encourages long-term economic planning (Mishkin, 2022). Central banks prioritize low and stable inflation through effective monetary policy. The exchange rate is vital for the macroeconomic performance of open economies, affecting competitiveness, import and export prices, foreign investment, external reserves, and inflation dynamics. In economies dependent on imports, a depreciation of the exchange rate typically leads to higher domestic prices, known as exchange rate pass-through (ERPT), which assesses the impact of exchange rate fluctuations on domestic prices (McCarthy, 2007). There exists a direct relationship between inflation and exchange rates in an open economy.

Exchange rate fluctuations influence inflation through exchange rate pass-through (Takhtamanova, 2003), which quantifies how exchange rate movements impact domestic prices (Osbat, Sun & Wagner, 2021). Campa & Goldberg (2005) assert that ERPT assesses international price reactions to exchange rate variations. Generally, ERPT is observed when foreign-currency import prices are more elastic than local currency equivalents. A nation's exchange rate determines import costs in local currency (Goldberg & Knetter, 1997), significantly influencing consumer and retail pricing. Diverging inflation rates across countries lead to broader exchange rate transmission. ERPTs are crucial in predictive models regarding prices and trade balances, affecting monetary policy implementation and evolution. Understanding macroeconomic dynamics requires considering how exchange rate fluctuations impact domestic indicators. ERPT cannot be complete without evidence of a disconnect between exchange rates and prices, as import prices may not adjust simultaneously with exchange rate changes, and the duration of this adjustment must be examined (Osbat, Sun & Wagner, 2021). Despite extensive literature on ERPT, a consistent definition remains elusive.

A substantial body of literature has shown that fluctuations in currency values are only partially reflected in domestic pricing, with the effects diminishing throughout the production chain. The transmission to consumer prices occurs through multiple channels, including direct impacts via energy and other commodity prices, as well as indirect influences through import prices, wage formation, and profit margins (Burstein and Gopinath 2014; Ito & Sato 2008; McCarthy, 2007). As demonstrated by Bada et al. (2016), price adjustments occur swiftly under a fixed exchange rate regime, as economic agents view fluctuations in exchange rates as permanent in such contexts. Conversely, in flexible exchange rate regimes, economic agents do not experience rapid price changes, as they perceive any exchange rate variations to be temporary. In nations with high income levels, shifts in exchange rates can foster increased competition within their domestic markets, potentially undermining their pricing power. Consequently, low-income countries tend to experience the opposite effects compared to their high-income counterparts (Razafimahefa, 2012).

Exchange rate pass-through has become a vital topic in international macroeconomics, influenced by globalization, trade liberalization, financial integration, and flexible exchange rates. Burstein and Gopinath (2014) define it as the degree to which exchange rate fluctuations affect import, producer, and consumer prices. Complete pass-through occurs when a one percent depreciation of the domestic currency results in a one percent

increase in domestic prices. Incomplete pass-through means only a portion of exchange rate changes impacts domestic inflation, affected by pricing strategies, market competition, monetary policy credibility, inflation expectations, and structural rigidities. Nigeria is a significant case for studying this phenomenon due to its reliance on imports despite industrialization efforts. Depreciation raises production costs, import prices, reduces real household income, and worsens inflation. The Central Bank of Nigeria (2016) notes that exchange rate pass-through to consumer prices is incomplete but statistically significant, with stronger transmission from import to consumer prices, indicating that the impact of exchange rate shocks diminishes along the pricing chain.

In 2000, the Nigerian naira was pegged at about US\$ 1 to NGN 100. Due to high demand for foreign currency and insufficient supply, Nigeria adopted a managed float exchange rate system in 2014. From 2014 to 2023, this system allowed the central bank to maintain an artificially high exchange rate compared to unofficial market rates. By the end of 2022, the official exchange rate was US\$ 1 to ₦46.5, while the unofficial rate was US\$ 1 to ₦735, highlighting the naira's overvaluation. In June 2023, following a new government, a uniform exchange rate system was introduced, enabling access to foreign exchange at market-determined rates. This reform aimed to unify exchange rates, enhancing transparency. Consequently, the exchange rate fell to USD 1 to NGN 645.2 in December 2023 and further declined to USD 1 to NGN 1601 by September 2024, reflecting ongoing exchange rate instability. This situation has led to increased import prices and domestic inflation, with rates peaking at 34.19 percent in June 2024, before slightly decreasing to 33.40 percent in July 2024.

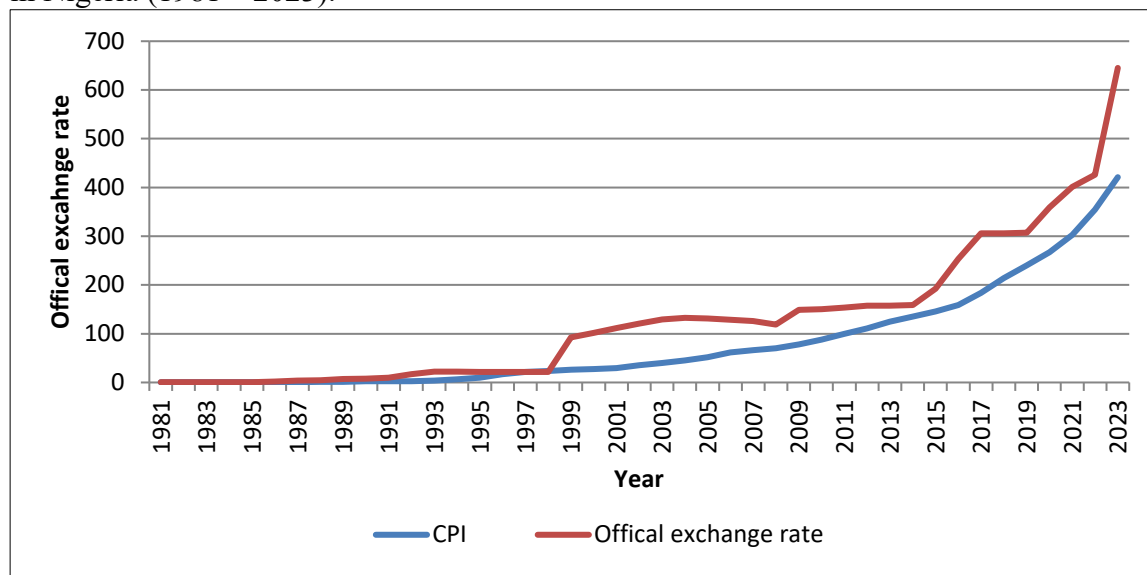
In early 2025, the US Dollar was valued at approximately NGN 1,060, about ₦840, compared to a peak of ₦1,900 per US Dollar. This suggests that market prices continue to rise, contrary to expectations that the positive exchange rate trend would lower prices and living costs. Despite this stability, the National Bureau of Statistics reported an inflation increase, with a headline rate of 33.2 percent in March 2025, up from 31.7 percent, and food inflation rising to 40.02 percent from 37 percent. They indicated that positive developments in the foreign exchange market must be sustained, and other cost factors need to decrease before the lower exchange rate can positively affect prices (Nnorom, 2024). According to the National Bureau of Statistics (NBS, 2025), Nigeria's headline inflation rate decreased for the fifth consecutive month, falling to 20.12 percent in August 2025 from 21.88 percent in July 2025, indicating a slower increase in average price levels. Food inflation was reported at 21.87 percent year-on-year, 15.65 percentage points lower than the previous rate of 37.52 percent.

Graph 1 shows the relationship between Official exchange rate and CPI (Consumer price index) in Nigeria in the period 1981 to 2023.

Graph 1 demonstrates a positive correlation between the official effective exchange rate and the consumer price index from 1981 to 2023. It is anticipated that consumer prices will increase alongside the effective exchange rate. A complete transition effect necessitates the adequate reflection of changes in both exchange rates and domestic prices. Transition effects are deemed incomplete if they are not sufficiently represented. The impact of exchange rate fluctuations on domestic prices, specifically the Consumer Price Index (CPI), is primarily explained by Exchange Rate Pass-Through (ERPT). Several factors contribute to the inadequacy of ERPT, such as trade barriers, transaction costs, and market power (Kotil, 2019). As of 2023, the exchange rate volatility of the Naira against the US dollar continues to create significant uncertainty within Nigeria's economy, thereby

affecting investor confidence. Additionally, Nigeria's foreign exchange reserves rose to \$33,340 million from \$33,240 million in 2023. This increase is attributed to the ongoing fluctuations of the Naira since the Central Bank of Nigeria allowed the currency to float in the foreign exchange market, raising concerns among industry stakeholders.

Graph 1 – Relationship between Official exchange rate and Consumer Price Index (CPI) in Nigeria (1981 – 2023).



Source: Authors compilation from CBN 2024

It is essential to determine if the exchange rate is reflected in the local currency, as Nigeria's economy is influenced by external factors. Global commodity market shocks can severely impact the economy. Examining the pass-through of exchange rates in Nigeria is crucial to enhance the external sector's competitiveness through appropriate adjustments. The implications of exchange rate pass-through (ERPT) affect domestic pricing, macroeconomic shocks, and real exchange rate volatility. An (2006) highlights three reasons for understanding ERPT: (i) assessing pass-through is vital for evaluating monetary policy impacts on prices and forecasting inflation; (ii) inflation targeting requires knowledge of the magnitude and speed of pass-through; (iii) the effects of pass-through influence the 'expensive switching' effect. Additionally, exchange rate fluctuations can be explained by purchasing power parity (PPP), which suggests countries maintain different exchange rates, known as the law of one price (LoP). The LoP establishes a correlation between domestic and foreign prices of identical goods (Kabundi, 2018). If PPP holds, the effects of pass-through are fully realized.

The pass-through effect of exchange rates also has various implications for the economy: Inflation extends beyond the local context. Sustained high inflation resulting from exchange rate fluctuations affects the environment of individuals, leading to increased poverty levels and income inequality. Furthermore, the investment climate is also influenced by the disturbances caused by exchange rate pass-through (ERPT). When inflationary pressures are intensified by exchange rate risks, it creates an unfavorable scenario for foreign investors, who may perceive such conditions as high risk. This predicament can result in a decline in foreign direct investment (FDI) inflows, hindering the country's capacity for economic diversification and sustainable development. Nigeria

must remain competitive and capable of attracting the necessary investments for its growth and economic security (Olu, Okowa & Nteegah, 2025). According to Bello and Sanusi (2019), the challenges posed by ERPT may be worsened by policy deficiencies or a lack of policy coherence. When individuals alter their behavior, such as stockpiling goods in anticipation of rising costs due to fluctuations in exchange rates, the pass-through effect may be intensified if businesses and consumers expect frequent and significant changes in exchange rates.

An economy's monetary policy governs the money supply. Expansionary monetary policy seeks to enhance the money supply by decreasing interest rates, acquiring government securities, and lowering bank reserves. Conversely, contractionary policy increases interest rates, sells bonds, and raises reserves, resulting in a reduced money supply. When economic agents perceive monetary policy as unstable, they rapidly adjust prices during contractionary phases, which diminishes exchange rate pass-through (ERPT), whereas it tends to increase during expansionary periods. The effects of ERPT are influenced by the extent of pass-through and the characteristics of economic shocks. Consequently, ERPT is essential for evaluating the effectiveness of monetary policy. Examining ERPT aids in quantifying the impact of exchange rate variations on domestic prices, thereby enhancing our comprehension of exchange rate mechanisms and their effects on monetary policy. For effective monetary policy in a small open economy such as Nigeria, it is imperative to ascertain the rate of ERPT to domestic prices, as it plays a significant role in shaping monetary policy design (Choudhri & Hakura, 2021; Ibrahim & Sanusi, 2021).

Numerous theories address price and exchange rate instability, with excessive money supply being a significant factor. Substantial monetary shocks often coincide with rising prices and depreciating exchange rates, indicating a close connection. Empirical studies by Peter (2003), Oladipo (2007), Ibrahim & Sanusi (2021), and Olu, Okowa & Nteegah (2025) show differing movements of exchange rates and prices in the short- and medium-term, supported by existing literature. Over the past thirty years, exchange rate pass-through (ERPT) to imports and consumer prices has been notably incomplete for various reasons. Research indicates significant variation in ERPT across countries, as shown by Bada et al. (2016) and Oladipo (2007). Conversely, Ude & Anochie (2012), Kotil (2019), and Takhtamanova (2003) report instances of complete pass-through. While most research examines the exchange rates and prices relationship, few investigate the pass-through effect or the impact of monetary policy on price stability. This study aims to fill this gap by exploring ERPT effects on monetary policy instruments (specifically money supply) and price stability in Nigeria from 1981 to 2023, using a Johansen cointegration model and an error correction model (ECM). This study is organized in the following manner: Section 2 presents a literature review, Section 3 outlines the research methods, Section 4 present the findings, discussion of findings and their implications, and Section 5 concludes with recommendations for policy relevance.

## 2. Literature Review.

### 2.1 *Theoretical Literature*

#### 2.1.1 The Law of One Price

Conventional exchange rate pass-through theories assert that under perfect competition, goods should be identically priced, relying on deviations from the law of one price (LOOP). As the money value rises, exchange rates decrease, facilitating complete pass-through. Fluctuations in exchange rates may leave import and domestic prices unchanged, not violating LOOP or purchasing power parity. Frenkel, Parsley, and Wei (2005) attribute non-adherence to LOOP to market imperfections, evidenced by partial pass-through. Domestic firms often transfer only a portion of exchange rate changes due to price rigidity and discrimination. LOOP posits that in a barrier-free market, identical goods should be equally priced in different currencies, but trade barriers, production costs, and exchange rate variations can disrupt this consistency (Feenstra & Taylor, 2008). The theory posits that if the exchange rate depreciates while foreign prices remain constant, domestic prices of imported goods increase proportionately; conversely, appreciation reduces these prices. This mechanism underpins exchange rate pass-through.

The Law of One Price provides one of the principle theoretical foundations for examining the relationship between exchange rate pass-through, monetary policy, and price stability in Nigeria. The theory explains how naira depreciation impacts domestic inflation in Nigeria, which relies heavily on imports. According to the Law of One Price, a weaker naira raises the local cost of these goods, increasing production costs that companies may pass on to consumers, leading to inflation. Although the theory suggests complete pass-through of exchange rate changes to domestic prices, studies indicate that factors like transport costs and market imperfections affect this. Additionally, the Central Bank of Nigeria can stabilize prices following depreciation by tightening monetary policy through measures like raising the Monetary Policy Rate or adjusting liquidity, thus mitigating inflationary effects.

#### 2.1.2 Law of Purchasing Power Parity

Developed by Cassel (1918), purchasing power parity (PPP) evaluates average goods and services costs across nations to determine exchange rates. It posits that importers and exporters influence spot exchange rate fluctuations and suggests that a nation's current account affects its foreign exchange rate. Unlike interest rate parity, which links exchange rate changes to investor behavior, PPP stems from the 'law of one price,' stating identical goods should cost the same in different markets, excluding transportation and tax differences. PPP establishes exchange rates based on price level indices, assuming prices for domestically produced and internationally traded goods change proportionately. However, critics highlight the divergence in these prices, advocating for a focus on internationally traded goods when linking exchange rates to price indices.

The Purchasing Power Parity (PPP) theory is crucial for analyzing exchange rate pass-through, monetary policy, and price stability in Nigeria. It posits that domestic currency depreciation raises import prices, leading to inflation, especially in an import-reliant economy. This inflation undermines price stability and highlights the inflationary effects of exchange rate depreciation, the study's main focus (Burstein & Gopinath, 2014). Additionally, PPP provides a basis for exchange rate pass-through (ERPT), indicating that changes in exchange rates should eventually impact domestic prices to restore purchasing

power equilibrium, despite incomplete pass-through due to various market factors (Taylor, 2000). This supports the study's investigation of the effects of exchange rate fluctuations on price stability.

### 2.1.3 Cost-Push Theory of Inflation

The Cost-Push Theory provides a framework for understanding inflation in Nigeria, particularly regarding Exchange Rate Pass-Through (ERPT). Cost-push inflation occurs when production costs rise due to factors like increased raw material prices, wage hikes, and supply chain disruptions from natural disasters or geopolitical tensions. These disruptions can lead to higher costs and inflation as businesses raise prices in response. Additionally, inflation can be influenced by rising wages, taxes, and supply chain issues, or when increased costs reduce aggregate supply. Exchange rates are crucial for Nigeria, which relies on imported goods; fluctuations lead to higher import prices, driving up the general price level through cost-push inflation. There is a strong correlation between cost-push inflation and Nigeria's import dependency, meaning that Naira depreciation results in higher costs for essential imported goods. This reliance, combined with currency depreciation, increases import costs, exerting inflationary pressure on businesses that pass these costs to consumers. Furthermore, this can lead to a wage-price inflation spiral, where rising costs prompt demands for higher wages, further escalating labor costs and contributing to inflation.

The Cost-Push Theory is vital in this study, as the depreciation of the exchange rate significantly affects rising production costs in Nigeria. A weakening naira against major currencies increases domestic prices for imported machinery, raw materials, and essentials. Many Nigerian firms rely on imports, so higher import costs raise production expenses, which are passed on to consumers as higher prices. This demonstrates how exchange rate fluctuations can cause inflation through increased production costs (Burstein & Gopinath, 2014). Furthermore, the Cost-Push Theory highlights the difficulties in achieving price stability, even with monetary policy. In Nigeria, inflation is often driven by supply-side shocks rather than just excessive demand, with factors like exchange rate depreciation, rising global oil prices, and supply chain disruptions contributing to increased production costs from 1981 to 2023.

### 2.1.4 Monetary approach to Exchange rate determination

The Monetary Approach to Exchange Rate Determination (MAERD) represents a significant theoretical framework for elucidating the relationship between exchange rate pass-through, monetary policy, and price stability. This approach was developed by notable economists including Frenkel (1976), Mussa (1976), Dornbusch (1976), and Bilson (1978). In contrast to the balance of payment (BOP) theory, which claims that exchange rates are influenced by fund flows in the foreign exchange market, the monetary approach asserts that exchange rates are determined by the equilibrium of demand and supply for national currency. This approach suggests that money demand is affected by real income levels, overall price levels, and interest rates, being directly related to income and price levels, while inversely related to interest rates. The money supply is determined independently by monetary authorities. It is assumed that the foreign exchange market starts in equilibrium. If the home country's monetary authority increases the money supply, it is hypothesized that this will lead to a proportional rise in the price level long-term, resulting in the

depreciation of the home currency, as explained by the Purchasing Power Parity (PPP) theory.

The significance of the Monetary Approach to this research is clear, as it creates a direct connection between monetary policy, fluctuations in exchange rates, and price stability. The theory posits that when the domestic money supply expands beyond the rate of real output growth, it results in excess liquidity within the economy. This surplus in aggregate demand subsequently diminishes the value of the domestic currency in comparison to foreign currencies, causing a depreciation of the exchange rate. As the domestic currency loses value, the costs of imported goods and production inputs rise, thereby introducing inflationary pressures into the domestic economy via exchange rate pass-through (Dornbusch, 1976).

## 2.2 Literature

Recent findings from the International Monetary Fund (2026) indicate that Nigeria's shift to a market-driven exchange rate system has increased both exchange rate and interest rate pass-through. The report asserts that exchange rate flexibility enhances monetary policy transmission but also raises short-term inflationary pressures. Consequently, it is vital to maintain credible monetary policy and ensure effective foreign exchange market operations to achieve price stability.

Olu, Okowa & Nteegah (2025) analyzed the impact of foreign exchange pass-through on Nigerian inflation from 2006 to 2023 using the SVAR model. Their findings highlighted that post-2014, currency depreciations led to significant cost-push inflation, demonstrating that monetary policy alone cannot fully counteract exchange rate effects. The study underscores the importance of exchange rate stability and recommends a coordinated approach integrating fiscal, monetary, and trade policies. Recommended actions include nominal exchange rate controls, inflation targeting mechanisms, a flexible interest rate system, and enhanced monitoring of exchange rate shocks to protect consumer welfare and economic stability.

Ibrahim & Sanusi (2021) examined the effects of exchange rate pass-through channels on key macroeconomic variables in Nigeria in response to two economic shocks. Using a calibrated small open economy New Keynesian DSGE model, the study showed that the effects of a channel are significantly influenced by the degree of pass-through and the nature of the shock. It was also found that inflation volatility and the output gap depend heavily on the degree of pass-through. Thus, the findings suggest that the central bank should consider the effects of exchange rate pass-through channels when formulating monetary policy in Nigeria to improve its effectiveness.

Manguinhance and Simione (2021) examined exchange rate pass-through in Mozambique from 2011 to 2019 using the Autoregressive Distributed Lag (ARDL) model by Pesaran et al. (2001). They analyzed variables such as the Consumer Price Index (CPI), nominal effective exchange rate, and import price index. The results show that exchange rate pass-throughs (ERPTs) exhibit asymmetry, significant magnitude, and rapidity, with 50% of fluctuations affecting prices in under six months. Policymakers must focus on low, stable inflation and sound macroeconomic policies to reduce ERPT.

Kotil (2020) This study examines the impact of nominal exchange rate changes on Turkey's economy from 2005:1 to 2020:4, focusing on consumer price index (CPI) and producer price index (PPI). It investigates the short- and long-term co-integration relationships among inflation, exchange rates, industrial production, and import prices

using auto-regressive distributed lag (ARDL) methodology. The findings reveal that a 1% increase in the industrial production index, nominal exchange rate, and import unit value leads to corresponding increases in consumer prices of 0.37%, 0.69%, and 0.58% in the CPI model, and 0.82% and 0.73% in the PPI model. These results confirm significant exchange rate pass-through effects on both consumer and producer prices, aligning with existing literature.

Kassa et al. (2019) analyzes the asymmetrical relationship between exchange rates and consumer prices in 40 sub-Saharan African countries from 1990Q1 to 2017Q4, using the nonlinear autoregressive distributed lag (NARDL) framework. Findings reveal short-term asymmetrical exchange rate pass-through (ERPT) in the region, with significant ERPT being incomplete and greater during currency depreciation, especially in the CFA Franc zone. Nonlinear ERPT varies with exchange rate size, being higher under fixed exchange rate regimes and low inflation. These results suggest policy adjustments to enhance monetary credibility, trade liberalization, and market competition in SSA.

Bashir (2017) studied the impact of exchange rate pass-through on import and consumer prices in Nigeria from 1986 to 2014. Using the Threshold Regression method, the research examined nonlinearity and asymmetry in exchange rate pass-through behavior, analyzing the effect from exchange rates to import prices and then to consumer prices. Findings indicated that Exchange Rate Pass-Through in Nigeria is incomplete, low, nonlinear, slow, and symmetric, with a more pronounced effect on import prices than on consumer prices, showing a decline along the pricing chain. These insights are crucial for the Central Bank of Nigeria in shaping monetary and exchange rate policies.

Bada et al. (2016) examined the effect of exchange rate fluctuations on inflation in Nigeria using Johansen cointegration methods and an Error Correction Model. Their findings showed that the exchange rate pass-through to inflation is incomplete but statistically significant, with long-run elasticities below one. The study concluded that naira depreciation mainly impacts inflation through import prices and production costs. Although the methodology is similar to the current research, the sample period does not include exchange rate reforms after 2016, such as the foreign exchange market liberalization that began in 2023.

Based on quarterly data from 1986 to 2009, Mujican & Saens (2015) examines how gradual inflation-targeting affects exchange rate pass-through to prices. Initially, inflation-targeting significantly reduces the pass-through coefficient, but later, as the monetary authority extends the policy horizon and increases exchange rate flexibility, the coefficient rises sharply. The findings indicate that pass-through sensitivity is influenced by both the inflationary environment and the monetary policy framework.

Zubaira, Okorie, & Sanusi (2013) studied exchange rate pass-through in Nigeria using quarterly data and econometric methods from the Central Bank of Nigeria. They found that exchange rate depreciation significantly affects domestic prices, but only partially influences inflation. The study also highlighted the importance of money supply in inflation dynamics. However, it is essential to consider that the sample period predates several recent monetary exchange rate reforms.

Akinbobola (2012) examined the connection between exchange rate, money supply, and inflation in Nigeria by employing cointegration and vector error correction methods from 1986:01 to 2008:04. The research indicated that a depreciation of the exchange rate significantly elevates inflation in both the short and long term, while an increase in the money supply also plays a role in driving up prices. These results reinforce the perspective

that maintaining exchange rate stability and implementing effective monetary policy are essential tools for managing inflation.

McCarthy (2007) examined exchange rate pass-through in industrialized countries using a VAR model, revealing significant effects of exchange rate depreciation on import, producer, and consumer prices, with varying pass-through levels by country. Low, stable inflation correlated with lower pass-through coefficients, while credible monetary policy weakened pass-through by stabilizing inflation expectations. However, the study's focus on advanced economies limits its relevance for developing nations like Nigeria.

Choudhri & Hakura (2006) analyzed data from twenty economies using panel regression to study inflation and exchange rate pass-through, finding that higher inflation correlated with greater pass-through effects. They concluded that monetary policy credibility is vital for reducing exchange rate shock transmission into domestic prices. Despite its strong cross-country evidence, the study lacks specific policy implications for Nigeria.

As noted by Gagnon & Ihring (2004), the research was conducted from the first quarter of 1971 to the fourth quarter of 2003 across twenty industrialized nations. Consequently, due to reduced estimates of the pass-through rate from exchange rates to consumer prices in several countries during this timeframe, along with a decrease in inflation fluctuations, inflation rates have consistently remained low and stable throughout the duration of the study.

### **2.3 Contributions to Knowledge**

This research offers significant theoretical, methodological, empirical, and policy contributions to the literature on exchange rate pass-through, monetary policy, and price stability in Nigeria. It updates existing literature by examining the interactions among these factors from 1981 to 2023, considering key macroeconomic events, such as the Structural Adjustment Programme, banking sector reforms, the 2008-2009 financial crisis, the 2014-2016 oil price shock, the COVID-19 pandemic, and 2023 foreign exchange reforms. Consequently, it enhances understanding of exchange rate pass-through and monetary policy effectiveness in Nigeria (Bada et al., 2016; IMF, 2026). Methodologically, it employs the Johansen cointegration technique with the Error Correction Model (ECM) to analyze both long-term and short-term dynamics, distinguishing itself from earlier studies that used single-equation regression or ARDL models (Johansen, 1988; Johansen & Juselius, 1990).

This research enhances the understanding of exchange rate pass-through by integrating the Purchasing Power Parity Theory, the Law of One Price, the Cost-Push Theory, and the Monetary Approach into a unified framework. Unlike prior Nigerian studies, which relied on single theories, this research offers a comprehensive view of how exchange rate fluctuations, monetary policy, and production cost shocks affect price stability. Additionally, it empirically examines exchange rate pass-through alongside monetary policy, rather than separately, addressing the gap in existing literature that focuses either on exchange rate impacts or monetary policy effectiveness. This study investigates the interplay between these factors, providing deeper insights into their joint influence on price stability. This study enhances monetary policy measurement by incorporating Broad Money Supply (M2) and Lending Interest Rate alongside exchange rate and real output, reducing omitted variable bias in assessing their impact on domestic inflation. It informs Nigeria's monetary policy discourse amid exchange rate reforms, revealing how exchange rate depreciation affects domestic prices and policy effectiveness against inflation. The

study provides practical recommendations for the Central Bank of Nigeria and policymakers to develop coordinated monetary and exchange rate policies for price stability. Additionally, it serves as a reference for researchers on exchange rate economics and inflation dynamics, contributing an updated evaluation of exchange rate pass-through and policy recommendations for Nigeria from 1981 to 2023.

### 3. Research Methods.

#### 3.1 Theoretical Framework

The Purchasing Power Parity (PPP) Theory, introduced by Gustav Cassel in 1918, is essential for understanding exchange rates and their link to domestic price levels. It suggests that exchange rates should adjust to equalize the purchasing power of currencies, keeping prices of identical goods consistent across countries. Grounded in the Law of One Price (LOOP), it holds that, without market imperfections, identical goods should cost the same when priced in a common currency. Deviations prompt arbitrage to restore equilibrium. PPP has two forms: Absolute PPP, which equates the nominal exchange rate to the ratio of overall price levels between nations. The relationship is expressed as:

$$E = \frac{P}{P^*} \quad (1)$$

Where:

E = Nominal exchange rate (domestic currency per unit of foreign currency)

P = Domestic price level

P\* = Foreign price level

The absolute version suggests that equivalent baskets of goods should have the same purchasing power across nations when considering the current exchange rate (Feenstra & Taylor, 2021). However, factors like transportation costs, tariffs, non-tradable goods, market imperfections, exchange controls, and pricing-to-market strategies often prevent Absolute PPP from holding true in practice. To address these issues, economists developed Relative Purchasing Power Parity (Relative PPP), which asserts that exchange rate fluctuations are driven by differences in inflation rates between countries, rather than by absolute price levels. It can be expressed as:

$$\frac{\Delta E}{E} = \pi - \pi^* \quad (2)$$

Where:

$\Delta E/E$  = Percentage change in the exchange rate

$\pi$  = Domestic Inflation rate

$\pi^*$  = Foreign inflation rate

Higher inflation compared to trading partners leads to currency depreciation, while lower inflation causes appreciation, explaining exchange rate behavior through relative Purchasing Power Parity (PPP) (Taylor & Taylor, 2004). PPP relies on competitive markets to eliminate price differentials (Pilbeam, 2013). Exchange rate changes impact domestic

prices, with depreciation raising import costs and inflation, while appreciation lowers them. PPP works well in advanced economies but is less effective in developing nations due to structural issues and government intervention (Rogoff, 1996). In Nigeria, frequent exchange rate adjustments and import dependence indicate that exchange rates do not fully translate to domestic prices.

### 3.2 Model Specification

The study utilizes several variables, including the Consumer Price Index (CPI) as a measure of price stability, the Official/Nominal Exchange Rate (NEXR) to represent exchange rate pass-through, Broad Money Supply (M2) proxy for monetary policy, Lending Interest Rate (LIR), Real Gross Domestic Product (RGDP) and Domestic import price (DIP). These variables have been chosen based on theoretical frameworks and empirical findings from earlier research regarding exchange rate pass-through and inflation dynamics in developing economies (Burstein & Gopinath, 2014; Mishkin, 2022).

#### *Model 1: Exchange rate pass-through and monetary policy (broad money supply)*

$$MP_t = \beta_0 + \beta_1 ERPT_t + \beta_2 LINR_t + \beta_3 CPI_t + \beta_4 RGDP_t + \mu_t \quad (3)$$

To obtain the rate of change, equation (3) is transformed as

$$\ln MP_t = \beta_0 + \beta_1 ERPT_t + \beta_2 LINR_t + \beta_3 CPI_t + \beta_4 \ln RGDP_t + \mu_t \quad (4)$$

#### *Model 2: Exchange rate pass-through and price stability*

$$CPI_t = \beta_0 + \beta_1 ERPT_t + \beta_2 LINR_t + \beta_3 DIP_t + \beta_4 RGDP_t + \mu_t \quad (5)$$

To obtain the rate of change, equation (5) is transformed as

$$CPI_t = \beta_0 + \beta_1 ERPT_t + \beta_2 LINR_t + \beta_3 \ln DIP_t + \beta_4 \ln RGDP_t + \mu_t \quad (6)$$

### 3.3 Unit Root test

Whenever a time series variable does not show stationarity, unit roots occur as a result. A null hypothesis assumes there is no root, whereas an alternative hypothesis assumes a number of roots, such as stationarity, trend stationarity, and explosive roots. The ADF (Augmented Dickey-Fuller) algorithm is used to determine whether unit roots exist.

In general, the following forms should be used as a guideline:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta y_t + \sum_{i=1}^m \alpha_1 \Delta y_{t-i} + ut \quad (7)$$

Where:

$ut$  is a pure white pure noise error term;

$\Delta$  is the difference operator;

$t-1$  is the unknown lags to be estimated.

Table 1 – Definition and Measurement of Variables

| Variable                    | Symbol | Definition                                                                                                                                                          | Measurement/Proxy                                         | Expected Sign      | Source                                                 |
|-----------------------------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|--------------------|--------------------------------------------------------|
| Consumer Price Index        | CPI    | Measures the average price change of consumer goods over time, serving as a proxy for price stability. A higher CPI indicates higher inflation and lower stability. | Annual Consumer Price Index (2010 = 100 or rebased index) | Dependent Variable | CBN Statistical Bulletin                               |
| Broad Money Supply          | M2     | Represents the total money supply in the economy, including currency and various deposits.                                                                          | Annual Broad Money Supply (₦ Billion)                     | Dependent Variable | CBN Statistical Bulletin                               |
| Official Exchange Rate      | EXR    | The price of one US Dollar in Nigerian Naira measures exchange rate movements and captures exchange rate pass-through to domestic prices.                           | Annual average official exchange rate (₦/US\$)            | Positive (+)       | CBN Statistical Bulletin                               |
| Lending Interest Rate       | LIR    | Average loan rates from banks to the private sector reflect borrowing costs.                                                                                        | Annual Lending Interest Rate (%)                          | Negative (–)       | CBN Statistical Bulletin;                              |
| Real Gross Domestic Product | RGDP   | Measures the inflation-adjusted value of goods and services in Nigeria's economy, reflecting economic activity.                                                     | Annual Real GDP (₦ Billion at Constant Prices)            | Negative (–)       | CBN Statistical Bulletin; World Development Indicators |
| Domestic Import Price       | DIP    | This measures the change in the prices of goods imported into Nigeria.                                                                                              | Import Price Index (2015 =100)                            | Negative (-1)      | World Bank Development Indicators                      |

Source: Author's Compilation (2026), based on CBN (2024) and World Bank (2024)

### 3.4 Johansen Co-integration Test

We will use the Johansen procedure to determine whether or not there is co-integration between the variables. As depicted in equations (3.9) and (3.10), two types of tests can be used to determine the significance of these canonical correlations: the trace test and the maximum eigenvalue test.

$$J_{trace} = -T \sum_{i=r+1}^n \ln(1-\lambda_i) \quad (8)$$

$$J_{max} = -T \ln(1-\lambda_{r+1}) \quad (9)$$

There are T samples and  $\lambda_i$  is the  $i$ th largest canonical correlation. Through the analysis of traces, it is demonstrated that the null hypothesis, on the other hand, that all vectors are co-integrating, is false, and that the alternative hypothesis, on the other hand, that all

vectors are co-integrating, is true, based on the test of traces. Alternatively, one can use a maximum eigenvalue test to check if there is more than one cointegration vector versus  $r + 1$  cointegration vectors rather than just  $r$  cointegration vectors.

### 3.5 Error Correction Model

Sargan (1964) introduced the error correction model to applied econometrics. In the case of single equation models, Engle & Granger (1987) and Kremers et al (1992) have developed testing procedures, while in the case of multiple equation systems, Johansen (1988) has developed testing procedures. Therefore, co-integration regression only considers the model's long-term characteristics and does not address its short-run dynamics directly. To accomplish this, we have developed an error correction model (ECM). Error correction is based on the following model:

To start, we define the error correction term by:

$$\xi_t = y_t - \beta x_t \quad (10)$$

Where  $\beta$  is a co-integrating coefficient. In fact,  $\xi_t$  is the error from a regression of  $y_t$  on  $x_t$ .

Then an ECM is simply defined as:

$$\Delta y_t = \alpha \xi_{t-1} + \gamma \Delta x_t + \mu_t \quad (11)$$

Where  $\mu_t$  is *iid*.

The ECM equation (3.3) simply says  $\Delta y_t$  can be explained by the lagged  $\xi_{t-1}$  and  $\Delta x_t$

### 3.6 Auto-correlation

Autocorrelation is the correlation among observations in time series or cross-sectional data, which classical linear regression assumes to be absent in disturbances  $U_t$ .

$$\text{cov}(u_i, u_j / x_i, x_j) = E(u_i, u_j) = 0 \quad \dots \quad (12)$$

However, if there is such a dependence, we have autocorrelation.

$$E(u_i, u_j) \neq 0 \quad (13)$$

### 3.7 Source of Data

This study analyzes secondary time-series data from 1981–2023 to examine the relationship between exchange rate pass-through, monetary policy, and price stability in Nigeria. The reliable data, sourced primarily from the Central Bank of Nigeria's Statistical Bulletin (CBN, 2024), supports long- and short-run analysis using Johansen cointegration

and Error Correction Model techniques. Additionally, data from the World Bank's World Development Indicators (WDI, 2024) ensure consistency and validate domestic statistics.

## 4. Findings and Discussions

### 4.1 Unit root test result

The purpose of this test is to determine if the mean value and variance of the variables are time invariant. Table 2 shows the Augmented Dickey Fuller unit root test to be performed by 5%.

Table 2 – Augmented Dickey Fuller unit root test

| Variables | ADF Test<br>Critical @5% | Level     | First Diff | Prob  | Order of<br>Integration |
|-----------|--------------------------|-----------|------------|-------|-------------------------|
| MP        | -3.595026                | -3.545125 | -9.211052  | 0.000 | I(1)                    |
| ERPT      | -3.529758                | -2.486904 | -5.102634  | 0.009 | I(1)                    |
| RGDP      | -3.526609                | -1.687488 | -6.993883  | 0.000 | I(1)                    |
| DIP       | -3.526609                | -3.065509 | -7.421630  | 0.000 | I(1)                    |
| CPI       | -3.526609                | -1.454252 | -4.319079  | 0.002 | I(1)                    |
| LINT      | -3.526609                | -2.390834 | -5.871502  | 0.001 | I(1)                    |

Source: Author's computation using E-views 10

Table 2 shows that the Augmented Dickey Fuller unit root tests for monetary policy (MP), real GDP (RGDP), domestic import price (DIP), normal effective exchange rate (NEER), consumer price index (CPI), and interest rate (INT) indicate a unit root presence. However, first differencing all series allows us to robustly reject the null hypothesis of a unit root, indicating integration of order one, I(1). We can now examine the long-run relationship using the Johansen Co-integration test and estimate the ECM model.

### 4.2 Johansen System Co-integration test.

The trace statistic indicates a maximum of one co-integrating relationship, while the null hypothesis for the Max-Eigenvalue statistic is rejected when  $r$  exceeds critical values (see table 3)

Table 3 – Unrestricted Co-integration Rank Test (Trace)

| Hypothesized<br>No. of CE(s) | Eigenvalue | Trace<br>Statistic | 0.05 Critical<br>Value | Prob** |
|------------------------------|------------|--------------------|------------------------|--------|
| $r=0$                        | 0.801952   | 183.6870           | 125.6154               | 0.0000 |
| $r=1$                        | 0.855009   | 118.9171           | 95.75366               | 0.0005 |
| $r=2$                        | 0.483153   | 76.34766           | 69.81889               | 0.0137 |
| $r=3$                        | 0.382174   | 49.94736           | 47.85613               | 0.0314 |
| $r=4$                        | 0.359116   | 30.68542           | 29.79707               | 0.0394 |
| $r=5$                        | 0.241707   | 12.88914           | 15.49471               | 0.1189 |
| $r=6$                        | 0.044522   | 1.821745           | 3.841466               | 0.1771 |

Source: Author's computation using Eviews 10

A trace test shows five equations cointegrated at a 5% level, with trace statistic values below the critical value. The maximum eigenvalue statistic further supports this, with null hypothesis rejection when statistics exceed a critical value, as detailed in column 2 of table 4.

Table 4 – Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

| Hypothesized<br>No. of CE(s) | Eignvalue | Max-Eigen<br>Statistic | 0.05 Critical<br>Value | Prob** |
|------------------------------|-----------|------------------------|------------------------|--------|
| $r0$                         | 0.801952  | 64.76991               | 46.23142               | 0.0002 |
| $r1$                         | 0.855009  | 42.56944               | 40.07757               | 0.0257 |
| $r2$                         | 0.483153  | 26.40030               | 33.87687               | 0.2969 |
| $r3$                         | 0.382174  | 19.26194               | 27.58434               | 0.3945 |
| $r4$                         | 0.359116  | 17.79628               | 21.13162               | 0.1377 |
| $r5$                         | 0.241707  | 11.06739               | 14.26460               | 0.1509 |
| $r6$                         | 0.044522  | 1.821745               | 3.841466               | 0.1771 |

Source: Author's computation using E-views 10

At the 5% significance level, the Max-Eigenvalue test reveals two co-integrating equations, indicating a long-term relationship among monetary policy, consumer price index, exchange rate pass-through, real GDP, domestic import price, and interest rate. We proceed to the Error Correction Model.

#### 4.3 Exchange rate pass-through and monetary policy (broad money supply)

Table 5 – Dependent Variable: LOG(MP)

| Variable           | Coefficient | Std. Error            | t-Statistic | Prob.    |
|--------------------|-------------|-----------------------|-------------|----------|
| ERPT               | 0.011601    | 0.002807              | 4.132593    | 0.0004   |
| INT                | -0.008646   | 0.006506              | -1.328935   | 0.1975   |
| LOG(RGDP)          | 4.205696    | 0.948496              | 4.434068    | 0.0002   |
| CPI                | 0.000283    | 0.012174              | 0.023224    | 0.9817   |
| C                  | -45.39095   | 11.09083              | -4.092656   | 0.0005   |
| ECM(-1)            | -0.765980   | 0.097716              | -7.838830   | 0.0000   |
| R-squared          | 0.980038    | Mean dependent var    |             | 5.667807 |
| Adjusted R-squared | 0.975502    | S.D. dependent var    |             | 2.054788 |
| S.E. of regression | 0.321614    | Akaike info criterion |             | 0.756479 |
| Sum squared resid  | 2.275580    | Schwarz criterion     |             | 1.041951 |
| Log likelihood     | -4.590707   | Hannan-Quinn criter.  |             | 0.843751 |
| F-statistic        | 216.0238    | Durbin-Watson stat    |             | 1.851797 |
| Prob(F-statistic)  | 0.000000    |                       |             |          |

Source: Author's computation using E-views 10

The error correction model (ECM) findings show no auto-correlation or serial correlation. Exchange rate pass-through (ERPT) and real gross domestic product (RGDP)

have a statistically significant positive relationship with monetary policy. In contrast, the consumer price index (CPI) and interest rate (INT) lack statistical significance regarding monetary policy. Estimates indicate that a one percent change in ERPT results in a 1.00% increase in monetary policy, while a one percent change in GDP leads to a 4.2% increase in money supply. The significance and negativity of ECM(-1) suggest a long-term relationship between ERPT and monetary policy in Nigeria. The R-square indicates a high goodness of fit at approximately 97.5%, and the F-statistics yield a significant result of 216.0238, exceeding 5. This implies an incomplete pass-through of exchange rate fluctuations to import prices, both domestically and internationally.

#### 4.4 Exchange rate pass-through and price stability

Table 6 – Dependent Variable: CPI

| Variable           | Coefficient | Std. Error            | t-Statistic | Prob.    |
|--------------------|-------------|-----------------------|-------------|----------|
| ERPT               | 0.757803    | 0.041496              | 18.26193    | 0.0000   |
| INT                | -0.779596   | 0.333833              | -2.335290   | 0.0252   |
| LOG(RGDP)          | 45.18698    | 14.06946              | 3.211707    | 0.0028   |
| LOG(DIP)           | -22.79030   | 9.057609              | -2.516150   | 0.0165   |
| C                  | -461.5052   | 147.9073              | -3.120232   | 0.0036   |
| ECM01(-1)          | -0.747302   | 0.122981              | -6.076546   | 0.0000   |
| R-squared          | 0.980677    | Mean dependent var    |             | 95.20884 |
| Adjusted R-squared | 0.977993    | S.D. dependent var    |             | 124.8526 |
| S.E. of regression | 18.52164    | Akaike info criterion |             | 8.807320 |
| Sum squared resid  | 12349.84    | Schwarz criterion     |             | 9.055559 |
| Log likelihood     | -178.9537   | Hannan-Quinn criter.  |             | 8.898310 |
| F-statistic        | 365.4060    | Durbin-Watson stat    |             | 1.689905 |
| Prob (F-statistic) | 0.000000    |                       |             |          |

Source: Author's computation using E-views 10

The error correction model (ECM) showed no autocorrelations or serial correlations. For the consumer price index (price stability), exchange rate pass-through and real gross domestic product have positive, significant relationships, while domestic import prices and interest rates negatively affect the consumer price index. A one percent change in exchange rate pass-through and real GDP increases the consumer price index by 75% and 45%, respectively. In contrast, a one percent change in interest rates and domestic import prices decreases the consumer price index by 77% and 22%. Thus, the significance and negativity of ECM(-1) suggest a long-term relationship between exchange rate pass-through and price stability in Nigeria. The model has an R-square of 98% and a significant F-statistic of 365.4060.

#### 4.5 Discussions of Findings

Empirical evidence indicates a significant correlation between exchange rate pass-through and monetary policy in Nigeria from 1981 to 2023. Increased pass-through due to naira depreciation results in stricter monetary policy responses by the Central Bank of Nigeria

(CBN). This supports the Purchasing Power Parity (PPP) Theory, the Monetary Approach to Exchange Rate Determination, and the Cost-Push Theory of Inflation, which assert that exchange rate depreciation raises import prices and creates inflationary pressures, necessitating monetary interventions for stability. The CBN has adjusted key tools, particularly the Monetary Policy Rate (MPR) and liquidity management, in response to these pressures. This underscores the growing significance of exchange rate movements in Nigeria's monetary policy, especially with the shift to a market-driven exchange rate system. The findings corroborate Bada et al. (2016), which highlighted the impact of exchange rate depreciation on inflation, and align with the IMF (2026), noting that pass-through effects have become more pronounced following Nigeria's recent exchange rate reforms, enhancing monetary policy's role in stabilizing inflation expectations.

The results show a significant correlation between exchange rate pass-through, real GDP, and price stability, indicating that exchange rate fluctuations and economic performance impact domestic price trends in Nigeria. A depreciation of the exchange rate raises domestic prices due to increased import and production costs, confirming imported inflation. Nigeria's reliance on imports means a weaker naira elevates production costs for firms, which are then passed to consumers. This aligns with Burstein and Gopinath (2014), who noted that exchange rate fluctuations influence domestic inflation via import prices and production costs. Additionally, Johansen cointegration analysis reveals a long-term equilibrium relationship among exchange rate pass-through, monetary policy, and price stability in Nigeria. While short-term deviations may occur, these factors generally align over time, confirming the interconnected dynamics of exchange rates, monetary policy, and price stability. Therefore, ongoing exchange rate depreciation and monetary expansion have long-term implications for inflation and macroeconomic stability. In conclusion, maintaining exchange rate stability is crucial for sustainable price stability in Nigeria.

## 5. Conclusion and Policy Recommendation

An extensive analysis of exchange rate pass-through, monetary policy, and price stability in Nigeria from 1981 to 2023 was conducted. The Johansen Co-integration test identified long-term relationships, while the Error Correction Model (ECM) provided further insights. Money supply and the consumer price index served as indicators for monetary policy and exchange rate pass-through. The results show that exchange rate pass-through significantly and positively impacts both monetary policy and price stability. Furthermore, real GDP positively influences price stability, establishing a long-term equilibrium among these factors in Nigeria. Consequently, several policy recommendations are proposed.

(1) The pass-through effect of exchange rates significantly impacts price stability; thus, the Central Bank of Nigeria should maintain a transparent, credible, and market-oriented exchange rate framework to ensure price stability and minimize excessive volatility, while managing naira depreciation through effective foreign reserve management and enhancing investor confidence.

(2) A strong relationship exists between exchange rate pass-through and monetary policy effectiveness, highlighting the need for the CBN to enhance its inflation-targeting framework. This can be achieved by improving policy credibility, communication with financial markets, and coordinating monetary, fiscal, and exchange rate policies to boost inflation expectations and stability (Taylor, 1993; Mishkin, 2022).

(3) Real GDP's positive impact on price stability suggests that enhancing domestic productivity can mitigate imported inflation. The Federal Government should therefore pursue policies that promote industrialization, agricultural modernization, and export diversification to reduce import reliance and strengthen long-term price stability.

(4) Policymakers should implement reforms to enhance foreign exchange earnings through export diversification, promote non-oil exports, attract sustainable foreign direct investment, and strengthen diaspora remittances. Additionally, improving the foreign exchange market's efficiency and transparency will reduce speculation and mitigate inflationary impacts from exchange rate fluctuations (IMF, 2026).

(5) A long-run relationship among exchange rate pass-through, monetary policy, and price stability suggests that macroeconomic stability necessitates coordinated policy actions. Thus, authorities must ensure consistent policies for low inflation, sustainable finances, exchange rate stability, and growth. Addressing fiscal deficits, enhancing expenditure efficiency, and strengthening institutional credibility will improve monetary policy effectiveness and enhance price stability in Nigeria.

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