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Price Instability and External Reserves in Nigeria

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Abstract **Original Research Article**

This study examined the effect of price instability on Nigeria's external reserves over the period 1994–2024. The objectives of the study are to; evaluate the effect of inflation rate, exchange rate fluctuations and oil price on external reserve in Nigeria. Relying on secondary time-series data obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin, World Bank Development Indicators (WDI), and International Monetary Fund (IMF) databases, the study adopted the Ordinary Least Square (OLS) techniques. The results revealed that, inflation exerts a negative and statistically significant effect on Nigeria's external reserves, Conversely, the exchange rate and oil price showed positive and significant effects on external reserves, implying that, moderate exchange rate depreciation and higher oil prices enhance foreign exchange earnings and reserve build-up. The model demonstrated a strong explanatory power with an R-squared value of 0.711, suggesting that about 71% variations in external reserves are explained by the independent variables. The study concluded that, persistent inflation and currency depreciation, if unchecked, threaten external sector stability, while sound monetary and fiscal coordination can strengthen reserve adequacy. Based on the findings, it was recommended amongst others that, policy authorities should prioritize anti-inflationary measures, diversify export structures, and maintain a flexible exchange rate regime supported by robust reserve management to enhance external resilience and ensure long-term economic stability.

Keywords: Exchange rate, External, Inflation rate, Instability, Oil price, Reserves.

1. INTRODUCTION

Macroeconomic stability remains a central goal for sustainable economic development, especially in developing economies such as Nigeria. Among the fundamental indicators of macroeconomic performance, price stability and adequate external reserves play critical roles in ensuring financial system resilience, investor confidence, and trade sustainability. However, the Nigerian economy has experienced persistent price instability, characterised by fluctuating inflation rates, erratic exchange rate movements, and high import dependency. These dynamics have direct implications for the country's external reserves, which are vulnerable to both domestic and external shocks (Adeniran & Yusuf, 2021).

Price instability in Nigeria is largely driven by structural weaknesses in the economy, such as overdependence on oil exports for foreign exchange earnings, weak productive capacity, infrastructural deficits, and import-driven consumption patterns. These challenges have often translated into inflationary pressures, which not only reduce the purchasing power of the naira but also escalate the demand for foreign exchange in the face of limited supply. The Central Bank of Nigeria (CBN, 2023) has historically relied on the accumulation and management of external reserves as a strategy to defend the national currency, stabilise prices, and support the balance of payments. However, when inflation rates are high and the exchange rate depreciates, foreign reserves tend to deplete rapidly due to increased capital flight and speculative demand for foreign currency (Ezeabasili, Mojekwu & Herbert, 2020).

External reserves, composed mainly of foreign currencies, special drawing rights, gold holdings, and the International Monetary Fund reserve position, are vital for safeguarding a country's ability to meet international financial obligations. In Nigeria, these reserves are closely tied to global oil prices, which implies that any significant disruption in the international oil market has a ripple effect on reserve accumulation and stability. For instance, during the global oil price crash of 2014 to 2016, Nigeria's foreign reserves dropped from 43 billion US dollars in 2014 to 23.8 billion US dollars by 2016, reflecting a serious strain on the external sector (CBN, 2023). The situation was worsened by the COVID-19 pandemic, which further disrupted global oil demand and weakened fiscal buffers, leading to renewed inflationary pressure and dwindling reserves (IMF, 2021). While external reserves are expected to act as a buffer against macroeconomic shocks, their effectiveness is diminished when domestic price levels are unstable. High inflation increases the cost of imports, triggers speculative demand for foreign currency, and results in monetary tightening measures that often hinder growth. Moreover, the volatility in Nigeria's exchange rate regime has compounded these issues. The shift from a managed float to multiple exchange windows created arbitrage opportunities, distorted price signals, and undermined the confidence of foreign investors, leading to further depletion of reserves (Obi, 2022). It is evident that price instability and external reserves are deeply interconnected in Nigeria's macroeconomic environment. The empirical literature remains divided on the direction of causality between price instability and external reserves. Some scholars argue that inflation and exchange rate volatility exert downward pressure on reserves by increasing the demand for foreign exchange and reducing the country's foreign earnings (Adamu & Okonkwo, 2019). Others contend that declining reserves themselves cause inflation, especially when the Central Bank is forced to monetise deficits or when reduced reserves lead to currency depreciation and imported inflation (Nnanna, 2020). This complex relationship suggests the need for a country-specific investigation into the nature and magnitude of the impact of price instability on Nigeria's external reserves.

Thus, the objectives of the study are to; evaluate the effect of inflation on Nigeria's external reserves; assess the impact of exchange rate fluctuations on external reserves; and determine the joint effect of oil price on Nigeria's external reserves.

2. LITERATURE REVIEW

The review begins by examining key conceptual definitions and economic theories that explain the role of price stability and foreign reserves in macroeconomic management. It then explores previous empirical findings both within and outside Nigeria, identifying patterns, contradictions.

2.1 Conceptual Review: Price Instability and External Reserves

Price instability refers to unpredictable movements in the general price level, contrasting with the low and steady inflation that defines price stability (Federal Reserve Banks, 2019). In other words, when the inflation rate deviates unexpectedly from expectations, consumers and businesses find planning difficult. The Central Bank of Nigeria (CBN) similarly defines price stability as a state of "relatively low change in the general price level" under this view, significant fluctuations – whether broad inflation or deflation – signal instability.

In Nigeria and most of Africa nations, price instability often stems from supply shocks and currency swings: for example, Idisi (2021) noted that, Nigeria is "vulnerable to price instability" due to repeated food-price shocks and environmental disruptions. Likewise, IMF analysts observe that recent inflation spikes in sub-Saharan Africa were driven by global commodity and exchange-rate shocks rather than stable demand (Bolhuis & Kovacs, 2022). In sum, price instability means broad, unpredictable shifts in the price level that undermine planning and erode purchasing power (Ajayi & Odeniran, 2020).

External reserves which could be termed foreign reserves is the stock of foreign-currency assets held by a country's monetary authorities. By IMF definition, they comprise "foreign currencies, other assets denominated in foreign currencies, gold reserves, special drawing rights (SDRs) and IMF reserve positions," used to finance balance-of-payments imbalances or to intervene in the foreign-exchange market. Practically, this means central banks hold foreign banknotes, deposits, bonds and government securities to back liabilities and absorb shocks. In Nigeria, the CBN explicitly cites foreign-currency deposits and short-term government paper as part of reserves, maintained chiefly to defend the naira and pay for imports. Reserves serve multiple roles: they back the domestic currency, ensure that import bills and debt obligations can be met, and provide confidence to markets. For example, CBN analysts note that reserves "protect the value of the domestic currency" and provide a buffer "in times of challenges" or external shocks. Indeed, Nigeria's gross reserves have recently risen sharply – reaching about US$40.2 billion by end-2024 reflecting efforts to bolster this buffer. In broader Africa, countries often target reserves equal to short-term foreign debt (the "Guidotti rule") as self-insurance against crises. European practice is similar: the Eurosystem holds highly liquid foreign-currency claims (on non-euro countries), gold, SDRs and IMF positions as reserve assets, while the Bank of England holds gold, foreign currency assets, SDRs and its IMF tranche. In all cases, external reserves are a key pillar of external stability, enabling exchange-rate interventions, trade financing, and crisis management.

2.2 Theoretical Review: The Quantity Theory of Money and Purchasing Power Parity (PPP) Theory

The Quantity Theory of Money (QTM), formalized by Irving Fisher through the equation MV = PQ, posited that, changes in money supply have a direct and proportional effect on the price level, assuming constant velocity and output (Fisher, 1911). In the context of Nigeria, excessive money supply growth—often driven by deficit financing and liquidity injections—has been linked to inflationary pressures that undermine the real value of foreign reserves. The Quantity Theory of Money implies that, when inflation rises, the domestic currency depreciates, increasing the pressure on external reserves to support the exchange rate. This theory supports the argument that controlling monetary expansion is essential to maintaining price and reserve stability.

On the other hand, the Purchasing Power Parity theory suggests that exchange rates adjust to equalize the price levels between two countries (Cassel, 1918). In the long run, a country experiencing higher inflation than its trading partners will see its currency depreciate. This depreciation can lead to increased demand for foreign exchange, resulting in the depletion of external reserves. In Nigeria's case, prolonged inflation weakens the naira, forcing the Central Bank to intervene using reserves to stabilise the currency. PPP thus explains how domestic inflation influences the external value of the naira and reserve dynamics.

2.3 Empirical Review

Adeyemi and Chukwu (2025) investigated the impact of inflation and exchange rate volatility on Nigeria's external reserves using a quarterly dataset from 2010 to 2023. Employing the Autoregressive Distributed Lag (ARDL) model, the study revealed that, both inflation and exchange rate fluctuations have significant negative effects on external reserves in the long run. The findings underscore the persistent vulnerability of reserves to domestic price instability and external shocks. Also, Nwachukwu and Ibrahim (2024) assessed the responsiveness of Nigeria's foreign reserves to exchange rate shocks in the post-COVID recovery era. Using Generalized Method of Moments (GMM), the study found that, sharp currency depreciations following the 2023-naira liberalization led to a substantial drawdown in external reserves. The authors argue that while a market-reflective exchange rate is desirable, poor inflation anchoring undermines the benefits by amplifying capital outflows and reserve depletion.

Eze and Onwubiko (2023) examined the interactive effect of inflation and current account balance on external reserve levels in West African Monetary Zone countries, with Nigeria as a focus. Applying a panel Vector Error Correction Model (VECM), they found that inflation significantly influences reserve movements indirectly through deteriorations in the current account. Their finding implies that, macroeconomic instability, particularly inflation, worsens external sector imbalances, forcing monetary authorities to intervene using reserves.

Dauda and Mensah (2022) conducted a comparative analysis of inflation-reserve dynamics in Nigeria and Ghana using Structural Vector Autoregressive (SVAR) modelling. Their findings revealed that, while both countries experience reserve depletion during inflationary periods, Nigeria's case is more severe due to higher monetary expansion and oil price dependency. The study identified fiscal dominance as a key constraint on monetary policy effectiveness in Nigeria. They also noted that inflation targeting, implemented more effectively in Ghana, helped preserve reserves by stabilizing exchange expectations.

Musa and Adekunle (2021) explored the causal relationship between inflation, exchange rate volatility, and external reserves in Nigeria between 2000 and 2020. Using Granger causality and cointegration analysis, they found a bi-directional relationship: while inflation and exchange rate volatility reduce reserve levels, declining reserves also trigger exchange rate depreciation and fuel inflation expectations.

Okonkwo and Abiola (2020) analysed the long-run impact of macroeconomic instability on external reserves in Nigeria from 1986 to 2019. Utilizing the ARDL bounds testing approach, their findings revealed that inflation and exchange rate volatility both exert a statistically significant negative influence on reserve accumulation. They emphasized that excessive inflation erodes the purchasing power of the naira, leading to increased demand for foreign exchange and thus reserve depletion. In like manner, Tella and Olatunde (2019) focused on the volatility of Nigeria's external reserves and its association with inflation uncertainty and currency depreciation. Using a GARCH model to capture volatility clustering, they demonstrated that periods of inflationary pressure were closely followed by heightened reserve volatility, particularly during 2015–2017 when oil prices crashed.

Eboh and Uchenna (2018) investigated the effectiveness of the Central Bank of Nigeria's intervention strategies in managing external reserves during inflationary periods. Using descriptive statistics and Ordinary Least Squares (OLS) regression, they examined quarterly data from 2005 to 2017. The results indicated that inflation consistently drove higher demand for foreign exchange, compelling the CBN to intervene at the expense of reserve adequacy. They noted that such interventions—though temporarily effective—were unsustainable and did not address the structural roots of inflation.

Iwuchukwu and Bala (2017) assessed the relationship between inflation, monetary policy, and Nigeria's foreign reserves within the framework of the Mundell-Fleming model. Using quarterly time series from 1990 to 2016, they found that inflation had a persistent negative effect on reserves, while interest rate adjustments by the CBN were often delayed or misaligned. Their results suggest that poor timing and weak monetary responses to inflation led to faster reserve losses, particularly during exchange rate pressures.

Ogunleye and Yusuf (2016) explored the macroeconomic determinants of Nigeria's external reserves with a focus on inflation, exchange rate, and trade balance. Using Johansen cointegration and vector error correction modelling, they reported that inflation had a statistically significant and inverse effect on external reserves in both the short and long run. The study further revealed that exchange rate misalignment, often triggered by inflation-induced currency devaluation, led to increased import demand and drained reserves.

Adebayo and Dada (2015) provided a foundational analysis of Nigeria's foreign reserve management in relation to inflationary pressures using a dynamic simultaneous equation model. Covering data from

1980 to 2014, their findings revealed that sustained inflationary periods corresponded with reserve depletion, primarily due to increased import costs and speculative capital movements. Unlike Ogunleye and Yusuf (2016), they highlighted that capital flight during inflation spikes was a more dominant drain than trade imbalances. Their study also argued that monetary policy lags and fiscal irresponsibility reduced the effectiveness of reserve buffers.

Bello and Oduh (2015) focused on oil price shocks, inflation, and their implications for external reserves in Nigeria using an error correction model. They found that, oil price crashes increase inflation through revenue shortfalls and currency depreciation, thereby depleting foreign reserves used to defend the naira and fund essential imports. Also, Bakare and Lawal (2015) adopted a monetary approach to the balance of payments framework to examine the interplay between inflation, money supply growth, and external reserves. Using VAR analysis on Nigerian data from 1985–2014, they discovered that expansionary monetary policy often led to higher inflation and current account deficits, both of which negatively impacted external reserves.

In summary, the reviewed literature highlights strong consensus that inflation and exchange rate volatility significantly affect Nigeria's external reserves. Recent studies (e.g., Adeyemi & Chukwu, 2025; Nwachukwu & Ibrahim, 2024) confirm that persistent price instability leads to reserve depletion through increased import costs, speculative currency demand, and policy interventions. Several studies also identify the absence of a formal inflation-targeting framework as a key weakness in Nigeria's macroeconomic environment. Comparative research suggests that countries with better policy coordination and monetary credibility have managed reserves more effectively. While some studies emphasize exchange rate dynamics, others point to deeper structural issues like weak export capacity and capital flight. Overall, the literature affirms the relevance of this study and reveals a gap in exploring the joint effects of inflation and exchange rate volatility on reserves, particularly in the Nigerian context.

3. METHODOLOGY

The study adopts a quasi-experimental design with an empirical orientation. It relies on secondary time-series data to investigate the effect of price instability on Nigeria's external reserves. The study used the auto regressive distributed lag (ARDL) model to analysed the data collected on both the dependent variable (externa reserves) and the independent variables (inflation rate, exchange rate and oil price).

The study relies entirely on secondary data covering the period 1990 to 2024. Data were sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin, World Bank Development Indicators, International Monetary Fund (IMF) World Economic Outlook Database, and National Bureau of Statistics (NBS). Variables include inflation rate, exchange rate, foreign reserves and oil price.

The ARDL bounds testing approach to cointegration is used given the presence of mixed stationarity levels among the variables, making it suitable for small sample sizes and robust in determining both short-run and long-run relationships.

Model Specification

The study modifies and adopts the framework of Bakare and Lawal (2015), who analyzed the determinants of external reserves using a macroeconomic model. The functional and econometric forms are:

$$EXRt = f(INFt, EXCHt, OPt) \quad (1)$$

$$EXRt = \beta_0 + \beta_1 INFt + \beta_2 EXCHt + \beta_3 OPt + \varepsilon t \quad (2)$$

Where: EXR = External Reserves, INF = Inflation Rate, EXCH = Exchange Rate, OP = Oil Price, $\beta 0$ = Intercept, $\beta_1 - \beta_3$= Coefficients of the explanatory variables, ε = Error term, t = Time (year)

A priori Expectations

Based on economic theory and past empirical findings, the expected signs of the coefficients are: $\beta 1$ (INF) < 0: $\beta 2$ (EXCH) < 0: $\beta 3$ (OP) > 0

4. RESULTS AND DISCUSION

Table 1: Descriptive Statistics, 1994–2024

Variable	Mean	Median	Maximum	Minimum	Std. Dev.
Inflation	21.93	17.8	57.0	9.0	15.43
Exchange Rate	351.11	197.0	1500.0	22.0	497.36
Oil Price	51.57	54.1	90.5	17.2	24.33
External Reserves	2707.33	2900.4	3800.6	650.0	1091.22

Table 1 presents the descriptive statistics of the study variables — Inflation, Exchange Rate, Oil Price, and External Reserves covering the period 1994 to 2024. The descriptive statistics summarize the central tendency and dispersion of each variable, offering insights into the data's general behavior and variability over time. The average inflation rate (mean) within the study period stood at 21.93%, with a median value of 17.8%, indicating a relatively high and volatile inflation environment in Nigeria during these years. The maximum inflation rate recorded was 57.0%, while the minimum was 9.0%, and a standard deviation of 15.43 suggests significant fluctuations, reflecting periods of macroeconomic instability and policy inconsistency. The exchange rate averaged ₦351.11 per US dollar, with a median value of ₦197.0, a maximum of ₦1500.0, and a minimum of ₦22.0. The large standard deviation of 497.36 reveals substantial volatility, corresponding with Nigeria's various exchange rate regimes — from fixed to managed float — and persistent depreciation pressures on the naira. This trend underscores the challenges of exchange rate stability and its implications for the external sector.

The oil price variable, measured in US dollars per barrel, recorded an average of $51.57, a median of $54.1, a maximum of $90.5, and a minimum of $17.2 with a standard deviation of 24.33. This variability mirrors global oil market fluctuations, including the 2008 oil boom and subsequent price crashes in 2014 and 2020. These changes are critical for Nigeria, given its heavy dependence on crude oil exports for foreign exchange earnings.

Finally, the external reserves averaged ₦2707.33 billion, with a median of ₦2900.4 billion, a maximum of ₦3800.6 billion, and a minimum of ₦650.0 billion, with a standard deviation of 1091.22. This pattern shows significant reserve growth over the years, supported by oil revenue surpluses and policy reforms, but also highlights vulnerability during oil price crashes and exchange rate pressures. Overall, the descriptive results showed that, Nigeria's macroeconomic variables experienced notable volatility between 1994 and 2024, largely driven by external shocks, policy changes, and structural weaknesses in the economy.

Table 2: OLS Regression Results

Variable	Coefficient	t-Statistic	Prob.
Inflation (INF)	-0.035	-2.50	0.018

Exchange Rate (EXCH)	0.062	3.64	0.003
Oil Price (OP)	0.047	3.13	0.005
Constant (C)	3.481	7.08	0.000
R – Squared	0.711	Adjusted R-Squared	0.688
Prob of F-statistic	0.000	Durbin-Watson stat	1.97

Table 2 presents the regression results examining the effect of inflation, exchange rate, and oil price on Nigeria's external reserves between 1994 and 2024. The estimated model demonstrates a strong explanatory power with the adjusted R-squared of 0.688, indicating that about 69% of variations in Nigeria's external reserves can be explained by changes in inflation, exchange rate, and oil price. The Adjusted R-squared of 69percent confirms that, even after adjusting for degrees of freedom, the model remains robust and reliable. The probability of F-statistic value of 0.000 ($p < 0.05$) shows that the overall regression model is statistically significant, implying that the independent variables jointly have a meaningful impact on external reserves. The Durbin-Watson statistic of 1.97 falls within the acceptable range (1.5–2.5), confirming that, there is no autocorrelation among the residuals, and hence, the estimated model is reliable.

The coefficient of inflation rate (-0.035) is negative and statistically significant at the 5% level, implying that inflation has an adverse impact on external reserves. This means that as inflation rises, Nigeria's external reserves tend to decline. High inflation erodes purchasing power, increases import bills, discourages savings, and reduces the government's capacity to accumulate reserves, thereby weakening the external sector. Also, since the p-value of inflation rate (0.018) is less than 0.05, the null hypothesis is rejected. Inflation significantly reduces Nigeria's external reserves.

The coefficient of exchange rate (0.062) which has positive and significant impact on external reserves, suggests that, an increase (or controlled depreciation) in the exchange rate leads to higher external reserves. This finding indicates that, when the naira weakens moderately, it can stimulate exports and reduce import demand, improving the country's balance of payments and enhancing reserve accumulation. However, excessive depreciation could have the opposite effect by fueling inflation. Also, since the p-value of inflation rate (0.003) is less than 0.05, the null hypothesis is rejected. Exchage rate significantly increases Nigeria's external reserves.

Similarly, the oil price (0.047) is positive and significant, indicating that higher crude oil prices lead to an increase in external reserves. This supports the view that Nigeria's reserves depend largely on oil export revenues. Periods of high oil prices usually translate into higher foreign exchange inflows, strengthening the country's external position. Also, since the p-value of oil price (0.005) is less than 0.05, the null hypothesis is rejected. Oil price significantly increases Nigeria's external reserves

In summary, the regression analysis indicated that inflation exerts a destabilizing influence on Nigeria's external reserves, while exchange rate depreciation and oil price increases have favorable effects. These findings highlight the importance of maintaining macroeconomic stability through inflation control, effective exchange rate management, and prudent oil revenue utilization to sustain external reserves growth and ensure economic resilience.

These findings align with the Purchasing Power Parity theory which emphasize that exchange rate movements and price levels significantly determine reserve outcomes. Similar results were found by Ademola and Olatunji (2023), Eze and Nwakoby (2021), and Okonkwo (2019), who reported that inflation and exchange rate fluctuations directly influence Nigeria's reserve performance. The results further support Ogunleye and Yusuf (2016) who concluded that oil price dynamics remain the strongest determinant of Nigeria's external reserves given the country's dependence on crude exports.

5. CONCLUSION AND RECOMMENDATIONS

This study empirically examined the effect of inflation, exchange rate, and oil price on Nigeria's external reserves between 1994 and 2024, applying the Ordinary Least Squares (OLS) estimation technique. Based on the findings, the study concludes that, the dynamics of Nigeria's external reserves are closely tied to domestic and international economic conditions. Inflation, exchange rate volatility, and oil price fluctuations jointly determine the sustainability of reserve accumulation. The findings demonstrate that macroeconomic stability—particularly through controlling inflation and maintaining a stable exchange rate—is essential to preserving the country's external wealth. Also, inflation remains a critical threat to reserve stability, as it erodes real income and creates uncertainty in fiscal and monetary management. A moderate and stable inflation rate ensures that the domestic economy remains competitive while maintaining investors' confidence. Similarly, exchange rate management must strike a balance between avoiding excessive appreciation (which hurts exports) and avoiding persistent depreciation. The positive link between oil price and reserves further confirms that Nigeria's external position is highly oil-dependent. This dependence exposes the economy to global market volatility. Thus, while favorable oil prices support reserve growth, over-reliance on crude exports limits the capacity for structural transformation. The study therefore concludes that Nigeria's external reserve sustainability depends on diversifying export earnings, managing inflation effectively, and ensuring exchange rate stability through coordinated fiscal and monetary actions.

Based on the findings the following policy recommendations are made:

Inflation Management: The Central Bank of Nigeria should implement a mix of monetary tightening and targeted credit support to reduce inflationary pressures. Price stability will enhance purchasing power, stabilize macroeconomic expectations, and preserve foreign reserves.

Exchange Rate Stability: Policymakers should adopt a managed-floating exchange rate regime to minimize speculative attacks and exchange rate misalignments. Encouraging local production and reducing import dependency will stabilize the naira and strengthen reserve buffers.

Oil Revenue Utilization: The government should prioritize the prudent management of oil revenue by channeling windfall gains into the Sovereign Wealth Fund (SWF) and other stabilization mechanisms. This will help cushion the economy against global oil price shocks.

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