International Journal of Allied Research in Economic
Volume.15, Number 5; September-October-2024;
ISSN: 2836-7995 | Impact Factor: 5.93
https://zapjournals.com/Journals/index.php/ijare
Published By: Zendo Academic Publishing

EXCHANGE RATE VOLATILITY AND MACROECONOMIC PERFORMANCE IN SELECTED AFRICAN COUNTRIES

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Article Info
Keywords: Exchange Rate, Volatility, Macroeconomic performance, panel data, Africa countries

DOI
10.5281/zenodo.13735928

Abstract
This study examines the effect of exchange rate volatility on the macroeconomic performance of Selected African Countries (Kenya, Nigeria, South Africa, and Egypt). The study period spans from 1990 to 2022, and data were sourced from the Central Bank of Nigeria Statistical Bulletin and World Bank's Development indicators (WDI). The specific objective is to examine the impact of exchange rate volatility on economic growth and Balance of Payments. In order to achieve the objective, the study adopted an ex-post facto design, panel regression methodology, and classical least squares (CLS) regression techniques for analysis. Findings from the study revealed that exchange rate volatility has a positive impact on balance of payments. However, exchange rate volatility has a negative impact on economic growth, implying that upward swings in exchange rate volatility will hurt economic growth eventually. Based on these findings, this study suggests that to reduce the effect of exchange rate volatility on economic growth, governments of various countries should strive to encourage foreign remittances by creating an appropriate atmosphere and also ensure a stable exchange rate that would reduce uncertainties for producers, especially in the importation of raw materials.

1.0 Introduction

Volatility of the Exchange rate is accompanied by fluctuations in macroeconomic variables like inflation rate, external reserve, GDP growth rate, trade openness, balance of payments, and foreign direct investment Exchange rate volatility is essential because it plays a key role in countries' pricing systems and in the pricing of real resource allocation between tradable and non-tradable sectors. Various macroeconomic policies, notably fiscal and monetary policies, have from time to time, been adopted to address the problem of exchange rate volatility. Unfortunately, these measures have met with little or no success, and they have hindered achievement of other macroeconomic objectives.

Following the end of dollar convertibility to gold by President Richard Nixon of the United States in 1971, there has been an increasing importance attached to exchange rates in many countries, which could be attributed to factors such as floating exchange rate variability and volatility as well as the need for effective foreign exchange

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risk exposure management. Other factors include the globalization process, the resultant increased rate and volume of funds flow among nations and the trade liberalization undertaken by developing countries and the SSA since the 1980s resulting in the opening up of their economies. Factors such as the internationalization of modern business; the continuing growth in world trade relative to national economies; trends toward economic integration in some regions; and the rapid pace of change in the technology of money transfer (Gadanecz & Mehrotra, 2013). Volatility, as it suggests, implies frequent, unstable, and unpredictable changes in the value of any economic aggregate. Volatility provides a huge basis for economic planning and decisions. The exchange rate is believed to be the most volatile price in the economy if it is closely followed by stock and crude oil prices (Erich & Robert, 2012). This trend has mostly been observed in Nigeria, particularly after the adoption of a floating exchange rate regime (Sanusi, 2004).

The impact of sustained exchange rate movements on the competitive position of domestic industry vis-à-vis foreign industry in both domestic and foreign markets is the key transmission mechanism. In effect, uncertainties resulting from unanticipated changes in domestic and international macroeconomic environments are also key factors. This trend is more striking in developing countries that heavily depend on external trade, such as exports and imports of capital goods, as well as external borrowing to finance infrastructure and other foreign exchange gaps (Holland, Allan & Mork, 2019).

According to the International Monetary Fund "Regional Economic Outlook Analytical Note" on Sub-Saharan Africa, it noted that SSA, like other regions, has been challenged by significant exchange rate pressures orchestrated mainly by external factors, like tighter financing conditions and adverse terms of trade, which are expected to be durable. It is further noted that currency depreciation has led to higher public debt and inflation and worsened trade balances in the short term. Thus, with foreign reserves running low, most non-pegged nations are left with exchange rate adjustments and tightening monetary policy to mitigate inflation. To preserve external stability, pegged nations are then left with adjusting their monetary policy in tandem with the country in question. In both nations' groups, fiscal consolidation may help to rein in external imbalances and contain the increase in debt related to currency depreciation (IMF, 2023).

Like most African countries, Nigeria has adopted various exchange rate regimes in line with the macroeconomic stance of the government, these includes: Second-Tier Foreign Exchange Market (SFEM); the Dutch Auction System (DAS); Autonomous Foreign Exchange Market (AFEM); Inter-bank Foreign Exchange Market (IFEM); Retail Dutch Auction System (RDAS); Wholesale Dutch Auction System (WDAS). Currently, the managed float regime is still in operation, including a window for investors and Exporters commonly called the (I & E) .X.F.X. window. (Dada & Oyeranti, 2021), CBN (2022).

The objective of this study is to investigate the effect of exchange rate volatility on the macroeconomic performance of selected Africa Countries (Kenya, Nigeria, South Africa, and Egypt). More specifically, this study intends to examine the extent of exchange rate volatility in these countries and assess the impact of exchange rate volatility on economic growth and Balance of Payments. The four (4) countries selected are the major economies in their respective regions. This study contributes to the existing literature by exploring the volatility of exchange rates on selected African countries.

The paper is structured and organized as follows: Section 2 presents the theoretical framework and literature review, which includes a detailed review of the relevant empirical literature. Section 3 settles on the methodology and the econometric model used in the study, while Section 4 deals with data presentation, analyses and interpretation of the results. Finally, Section 5 presents conclusions and recommendations.

2.0 Literature review and theoretical literature review

The theoretical framework chosen for this study is the balance of trade theory propounded by (Krueger, 1967) and extended by (Johnson, 1977) and (Makin, 2002). The balance of trade theory, also known as the demand supply theory of the exchange rate, is modern and one of the most satisfying theories of determining the exchange rate. According to this theory, the rate of exchange in a foreign market is determined by the balance of the trade position, where the balance of trade is also determined by the exchange rate.

The balance of trade theory was tested to be the most acceptable theory to be used as the theoretical framework for this study. This is because the theory maintains that the rate of exchange of currency between one country and another is determined by factors that are autonomous of internal price level and money supply (Chamberlin &Yaeh, 2006). This indicates that the rate of exchange is significantly influenced by the balance of the trade position of a country. For instance, a deficit in the balance of trade of a country indicates a situation in which the demand for foreign exchange (currency) exceeds its supply at a given rate of exchange (Danmola, 2013). Demand for foreign exchange arises from demand for foreign goods and services. In contrast, the supply of foreign exchange arises from the supply of goods and services by the home country to the foreign country. In other words; the excess of demand for foreign exchange over the supply of foreign exchange is coincidental to the BoT deficit. Demand pressure results in appreciation in the exchange value of foreign currencies. Consequently, the exchange rate of the home currency to the foreign currency undergoes depreciation.

(Usman & Bukar, 2020) established that the exchange rate has a negative and significant impact on the balance of payments and an insignificant impact on imports in Nigeria. Additionally, banks lose out in terms of loan performance and profitability as domestic currency depreciates (Taiwo & Adesola, 2013).

3.0 Empirical literature review

Exchange rate volatility has had mixed results on macroeconomic performance in African countries. While some studies revealed the existence of a negative relationship, others established a positive nexus and others found no significant relationship. (Olamide, 2022) observed the nexus between exchange rate instability, inflation, and economic growth in the Southern African Development Community (SADC). The study employed the pooled mean group (PMG), generalized moments (GM) and dynamic fixed effects (DFE) for analysis. GARCH was also used to generate exchange rate instability. The results indicate that exchange rate instability and inflation have a negative relationship with economic growth in SADC. In addition, the results reveal that economic growth in SADC is unfavorably influenced by the significant effect of exchange rate instability on inflation: the higher the level of exchange rate instability, the worse the inflationary growth relationship of the region. Thus, the study recommends that policies to ensure the appreciation of local currencies should be a priority for member nations.

(Magwedere & Chisasa, 2023) observed that the South African rand has been volatile with low economic growth and high unemployment. This research uses quarterly time series data from 2008Q1 to 2018Q4 to ascertain the effect of the exchange rate on credit risk in South African banking portfolios. The econometric model included co-integration and error correction models and the results indicate that macroeconomic shocks significantly affect bank asset quality.

Exchange rate reforms according to (Bakare & Olobukun, 2011) are expected to put the Nigerian economy on the path of macroeconomic stability, recovery and sustainable development. However, the country has continued to be at a disadvantage in terms of macroeconomic performance. The different regimes are accompanied by instability and uncertainty. Uncertainties in exchange rates following macroeconomic reforms can be decomposed into two components. The first reflects the systematic movement of the exchange rate and the second reflects exchange rate volatility.

The volatility of the exchange rate affects economic performance through various channels, including savings/investments, lending, interest, inflation, financial development/deepening, economic growth, and sectoral performance indicators. Hence, Nigeria continues to be confronted with many economic problems due to the exchange rate reforms. Among these problems are low levels of savings and investments, high inflation rates, unfavorable balances of payments, low productivity of the industrial sector, unemployment, and economic recessions (CBN, 2020, NBS, 2019).

(Bello et al. 2022) investigated the asymmetric relationship between exchange rate volatility and macroeconomic performance in Nigeria. Using the Non-linear Generalized Autoregressive Distributive Conditional Heteroscedasticity (GARCH) model and data from 1986Q1 to 2019Q4. The result shows that exchange rate volatility has a positive relationship with trade balance, inflation and industrial output. The research noted that good news prevailed more than bad news in the foreign exchange market and consequently recommended that Nigeria's monetary authorities regulate the exchange rate and other macroeconomic variables to ensure that the general price level is well managed.

In similar research, (Tarawalie, 2012) investigated the effects of exchange rate volatility on output growth and inflation in the West African Monetary Zone (consisting of Ghana, The Gambia, Guinea, Liberia, Nigeria and Egypt) following an exchange rate regime shift. Results from the study revealed that, while exchange rate volatility is inflationary across all countries, but its effects on output growth differ. Specifically, volatility and depreciation negatively affect real GDP growth in Egypt and have a positive impact output in other countries. The differences in direction and magnitude of effects are not farfetched from the differences in macroeconomic conditions in each country.

4.0 Methodology

The study was designed to be an ex-post facto research design.

Sources and Measurements of Data

This study adopts a panel data approach and data were, sourced from the World Development indicators and International Financial Statistics. The data collected are annual data on the variables defined in the model (from 1990 – 2022).

The functional form of the model proposed in this study is as follows:

$$GDP_t = \alpha_o + \alpha_1 EXCH_t + \alpha_2 INFL_t + \alpha_3 TO_t + U_t \ldots\ldots\ldots\ldots (1)$$

$$BOP_t = \alpha_o + \alpha_1 EXCH_t + \alpha_2 INFL_t + \alpha_3 TO_t + U_t \ldots\ldots\ldots\ldots (2)$$

Where GDP_t is the gross domestic product proxy for economic growth; BOP_t is balance of payment $EXCH_t$ connotes exchange rate; $INFL_t$ represents inflation rate; TO_t is trade openness and U_t = Error.

$$\Delta lnGDP_t = \delta_o + \delta_1 lnEXCH_{t-1} + \delta_2 lnINFL_{t-1} + \delta_3 lnTO_{t-1} + \sum_{i=0}^{q} \varphi_1 \Delta lnEXCH_{t-1} + \sum_{i=0}^{q} \varphi_2 \Delta lnINF_{t-1} + \sum_{i=0}^{q} \varphi_3 \Delta lnTO_{t-1} + \lambda ECM_{t-1} + \varepsilon_t \ldots. (3)$$

$$\Delta lnBOP_t = \delta_o + \delta_1 lnEXCH_{t-1} + \delta_2 lnINFL_{t-1} + \delta_3 lnTO_{t-1} + \sum_{i=0}^{q} \varphi_1 \Delta lnEXCH_{t-1} + \sum_{i=0}^{q} \varphi_2 \Delta lnINF_{t-1} + \sum_{i=0}^{q} \varphi_3 \Delta lnTO_{t-1} + \lambda ECM_{t-1} + \varepsilon_t \ldots.. (4)$$

where $\delta_1 - \delta_3$ are the long-run parameters; $\varphi_1 - \varphi_4$ are the short-run parameters; δ_0 and ε are the intercept term and the white noise stochastic term respectively; λ is the parameter of the error correction mechanism (ECM); ln is the natural logarithm of the variables, and; Δ is the difference operator. The ECM_{t-1} is a one-lag error correction term that accounts for the speed of adjustment to the long-run equilibrium.

Method of Data Analysis

The panel regression model was used to explore the impact of exchange rate volatility on macroeconomic performance.

Hausman's test was applied to determine the appropriate estimation method, which could be either a fixed effect (FE) or Random Effect (RE). It is essential to determine which (fixed or random effect) method is more consistent and efficient.

Analysis and Results

Table 1. Summary of Hausman test results

	H_0 is true	H_0 is not true
$\hat{\beta}_{GLS}$ (Random Effect estimator)	Consistent Efficient	Inconsistent
$\tilde{\beta}_{within}$(Fixed Effect estimator)	Consistent Inefficient	Consistent

The data analysis began with descriptive statistics, which demonstrated the statistical properties of the variables.

Table 2. Descriptive Statistics

	GDP	EXCH	TO	INFL	BOP
Mean	160.9726	49.51263	44.74375	8.66063	-2.025313
Median	96.37000	13.86500	46.00000	6.10000	-0.495000
Maximum	574.1800	425.9800	73.00000	41.1000	29.92000
Minimum	5.750000	0.700000	9.000000	0.600000	-25.41000
Std. Dev.	150.8408	77.55688	12.65619	20.35960	7.932302
Skewness	0.899997	2.610058	-0.475989	1.564804	0.093535
Kurtosis	2.464409	10.69659	3.374911	5.426143	6.432411
Jarque-Bera	23.51223	576.5808	6.978810	104.5374	78.77626
Probability	0.000008	0.000000	0.030519	0.000000	0.000000
Sum	25755.62	7922.020	7159.000	1225.70	-324.0500
Sum Sq. Dev.	3617717.	956396.2	25468.49	1104863.	10004.50
Observations	128	128	128	128	128

Table 2 presents the descriptive statistics of the dataset used to analyze the volatility of the exchange rate on the macroeconomic performance of selected African countries captured in this study. The goal of descriptive statistics was to reveal trends in the dataset. The result also indicates the statistical properties of the variables such as the mean, median, maximum, minimum etc. as well as the pattern of distribution of the variables.

Table 3. Panel-unit root test

Variable	LLC Statistic	Prob	Decision
EXCH	-3.42816	0.0002	Stationary at Level (I)
GDP	-2.52861	0.0024	Stationary at Level (I)

BOP	-4.51762	0.0000	Stationary at Level (I)
INFL	-3.35921	0.0000	Stationary at Level (I)
TO	-3.46122	0.0001	Stationary at Level (I)

Source: Authors' Computation

Table 3 presents the unit root test using the LLC root test. From the unit root test, all variables (EXCH, GDP, BOP, INFL and TO) were stationary at level (I), as shown from the LLC test statistic. The probability of the LLC test statistic given as 0.0002, 0.0029, 0.0000, 0.0000, and 0.0001 was lower than 0.05 (5% level of significance) implying that the variables were all stationary at level (I).

Table 4. Model Selection

Hausman's Test				
Test Summary	Chi-Sq Statistic	Chi-Sq. d. f	Prob.	Decision
Cross-section random	0.000247	1	0.8645	Random Effect

Source: Authors' Computation

From table 4, with the Hausman's test statistic of 0.000247 and the probability of 0.8645, we accept the null hypothesis because the probability is higher than 0.05 (5 percent level of significant), therefore, the random effect model is the correct model.

After establishing that the RE model is superior to the fixed effect model in estimating the impact of exchange volatility on economic growth, the RE model results are presented in this section.

Economic Growth

Table 5: $GDP_t = \alpha_o + \alpha_1 EXCH_t + et$

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**	**Decision**
C	3.642135	0.251052	12.56591	0.0002	Significant
EXCH	-123.7240	42.67284	-2.523735	0.0065	Significant
Diagnostics					
F-statistic		4.142935			
Prob(F-statistic)		0.000805			

Source: Authors' Computation

From table 5, the result conforms with prior expectations, as the coefficient of exchange rate volatility is negative. The result reveals that a unit change in exchange rate volatility results in a 123.7240 decrease in GDP. The result is statistically significant. From model diagnostics, the F-statistic also indicates that the model is significant at 5 percent given the probability of the F statistic as 0.000805 (less than 0.05).

Balance of Payment

Table 6. Model Selection

Hausman's Test				
Test Summary	Chi-Sq Statistic	Chi-Sq. d. f	Prob.	Decision

Cross-section random	0.000001	1	0.9999	Random Effect

* Cross-sectional test variance is valid. The Hausman statistic was set to zero. Source:

From table 6, with the Hausman's test statistic of 0.000001 and the probability of 0.9999, we accept the null hypothesis because the probability is higher than 0.05 (5 percent level of significant). Therefore, the random-effects model is the correct model.

After establishing that the RE model is superior to the fixed effect model in estimating the impact of exchange volatility on balance of payments, the RE model results are presented in this section.

Table 7: $BOP_t = \alpha_o + \alpha_1 EXCH_t + e$

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Decision
C	-0.015211	0.021213	-0.603321	0.4542	Significant
EXCHV	2.815765	0.832127	3.244635	0.0015	Significant
Diagnostics					
F-statistic		6.563265			
Prob(F-statistic)		0.006315			

Source: Computed using the E-Views Software Package

From table 7, the coefficient of exchange volatility has a positive sign that conforms to the prior expectations. The implication is that an upward swing in exchange rate volatility should have a positive impact on the balance of payments, where exchange rate depreciation will make imports more expensive, thereby discouraging excessive importation and improving the BOP position. The result is statistically significant at the 5% level of significance, as indicated by the probability value of 0.0015, which is lower than 0.05. From model diagnostics, the F-statistic also indicates that the model is significant.

5.0 Conclusion

The empirical result shows that exchange rate volatility has a negative impact on economic growth. This finding is supported by earlier studies by Iyeli Utting (2017), Yakubu et al. (2017); Victoria (2019). This finding also suggests that exchange rate volatility has played an important role in fluctuations in macroeconomic performance of the selected African countries over the years.

In conclusion, it is pertinent to note that defective exchange rate management is a major macroeconomic problem that confronts selected African countries' economies. In this study, we discovered that the macroeconomic uncertainties associated with exchange rate volatility have serious effects on macroeconomic performance, such as balance of payments and economic growth.

Recommendations

The findings suggest that to mitigate the menace of exchange rate fluctuations against balance of payments and economic growth, sound macroeconomic and exchange rate policies will help put these shocks under effective control and dampen exchange rate fluctuations. Viable exchange rate regimes should be adopted to reduce risk associated with exchange rate volatility in selected African countries.

Governments should deepen reforms of diversification to reduce the mono-economic nature of economies of countries and to reduce over-reliance on particular sectors. For instance, manufacturing and the industry can be empowering and encouraging entrepreneurs to enter the manufacturing and processing industry through the provision of technical assistance, easy access and non-interest loans to existing manufacturers and those willing

to enter the industry. Diversifying the economy from its monotonicity will ease its vulnerability to adverse and persistent external shocks.

Furthermore, from these findings, to reduce the effect of exchange rate volatility on economic growth, the government should strive to encourage foreign remittance by creating the right atmosphere and ensuring a stable exchange rate that reduces uncertainties for producers, especially in the importation of raw materials, which may affect production levels.

The findings also shows that exchange rates have a significant effect on the Gross Domestic Product of the selected African countries. This suggests that proper regulation of the exchange rate will have a positive effect on GDP.

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