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EXCHANGE RATE VOLATILITY AND MACROECONOMIC PERFORMANCE IN SUB SAHARA AFRICA

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Abstract

This study takes a critical look at the effect of exchange rate volatility and the macroeconomic performance in Selected Sub-Saharan African Countries of Botswana, Ghana, Kenya, Nigeria, South Africa, and Uganda. The transmission of various endogenous and exogenous economic shocks particularly fluctuations in the exchange rate over time has the tendency of influencing macroeconomic variables. To this end, the study utilized panel data from 2000 to 2021 for Botswana, Ghana, Kenya, Nigeria, South Africa, and Uganda to examine the impact of exchange rate volatility on macroeconomic performance, represented by, inflation rate, economic growth, and balance of payment. Exchange rate volatility was measured using the GARCH model after which panel data models were used to analyse the effect of exchange rate volatility on inflation rate, economic growth and balance of payment. The result showed that exchange rate volatility has a positive impact on inflation rate and balance on payment indicating that an upward swing in exchange rate volatility (depreciation) will result to more

inflation. However, exchange rate volatility has a negative impact on economic growth which implies that upward swings in exchange rate volatility will hurt economic growth in the long run. Based on these findings, the study therefore recommended amongst others that in order to reduce the effect of exchange rate volatility on economic growth, the individual SSA governments should strive to encourage foreign remittance by creating the right atmosphere and also ensure a stable exchange rate that would reduces uncertainties for producers especially in the importing of raw materials and which may affect productive activities
Keywords: Exchange Rate, Volatility, Macroeconomic performance, Sub-Sahara Africa

INTRODUCTION

Exchange rate volatility is accompanied by fluctuation in macroeconomic variables like growth rate, trade openness, balance of payment, foreign direct investment, etc. It is a key macroeconomic measure in the context of general economic reform programs and because of its importance, government all over the world takes active part in its determination. Specifically, it is important as the connection between the pricing systems of countries also, as a price in the allocation of real resources among tradable and non-tradable sectors, as a promoter or otherwise of imports and exports, and as an instrument in the design of the balance of trade program of a country. Various macroeconomic policies notably, fiscal and monetary had from time to time been adopted to address this problem of exchange rate volatility. Unfortunately, these measures have met with little or no success and this has hindered the achievement of other macroeconomic objectives.

The choice of exchange rate regime can affect economic growth through its effects on financial system which are important determinants of growth. Factors such as domestic prices, international trade, liquidity, capital flows are highly affected by the variation of exchange rate. Since the 1970s, and following the end of dollar convertibility to gold by President Richard Nixon of the USA in August 1971, there has been an increasing importance attached to exchange rate in many countries, which could be attributed to factors such as the floating exchange rate variability and volatility as well as the need for effective foreign exchange 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 SSA since 1980s, resulting in the opening up of their economies. Also, factors such as the internationalization of modern business; the continuing growth in world trade relative to national economies; the trends towards economic integration in some regions; and the rapid pace of change in the technology of money transfer (Gadanecz and Mehrotra, 2013).

Exchange rate directly influences prices and/or profitability of traded and non-traded goods including banks and other financial institutions. It is a relative price and as such affects the allocation of resources over the short to medium term. The impact of sustained movements of the exchange rate 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 the domestic and international macroeconomic environments are also key factors. This is more striking in developing countries which depend heavily on external trade such as exports, imports, and capital goods as well as external borrowing to finance, infrastructure, and other foreign exchange gap (Holland, Allan and Mork, 2011).

According to Gadanecz and Mehrotra (2013), analysis of exchange rate movement showed that there exists a causal relationship between the exchange rate movements and macroeconomic and financial aggregates such as inflation, money supply, interest rate and economic growth. Consequently, the persistent depreciation of the exchange rate trended with major economic variables such as inflation, investment, savings, GDP, unemployment and balance of trade. In this context, the exchange rate movement in the 1990's trended with economic growth and balance of trade of African countries.

According to 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 further noted that currency depreciations have led to higher public debt and inflation, worsened the trade balance in the short term. Thus, with foreign reserves running low, most non-pegged nations are left with exchange rate adjust and tighten monetary policy to mitigate the effect on inflation. To preserve external stability, pegged nations are then left with adjusting monetary policy in tandem with the country of the peg. In both nations' groups, fiscal consolidation may assist to rein in external imbalances and contain the increase in debt related to currency depreciation (IMF, 2023)

Like most SSA countries, Nigeria, had adopted various exchange rate regimes in line with 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. Ugwu and Udeh (2021), Dada (2022), CBN (2021).

The objective of the study is to investigate the behavior of the exchange rate volatility in enhancing macroeconomic performance in Sub- Sahara Africa Countries represented by Botswana, Ghana, Kenya, Nigeria, South Africa, and Uganda. More specifically, the study intends to examine the extent of exchange rate volatility in these countries and assess the impact of exchange rate volatility on economic growth, inflation and Balance of Payments. The six (6) countries selected comprises of major blocs in SSA; West Africa (Nigeria and Ghana), East Africa (Kenya and Uganda) and Southern Africa (Botswana and South Africa). This paper contributes to existing literature by exploring the impact of exchange rate volatility on some macroeconomic variables in SSA.

The paper is structured and organized as follows: Section 2 presents theoretical framework and literature review, which would include detailed review of relevant empirical literature. Section 3 settles on the methodology and the econometric model used would be clearly presented, while Section 4 deal on data presentation and analyses as well as interpretation of results. Finally, Section 5 would have conclusion and recommendation.

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Theoretical Framework

The theoretical framework chosen for this work 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 demand and supply theory of exchange rate is modern and one of the most satisfying theory of determination of the exchange rate. According to this theory, the rate of exchange in the foreign market is determined by the balance of trade position where balance of trade is also determined by exchange rate

The balance of trade theory has been tested to be the most acceptable theory to use as the theoretical framework for this study. This is because the theory maintains that the rate of exchange of the currency of one country with the other is determined by the factors which are autonomous of internal price level and money supply (Chamberlin &Yaeh, 2006). It emphasizes that the rate of exchange is influenced in a significant way by the balance of trade position of a country. For instance, a deficit in the balance of trade of a country signifies a situation in which the demand for foreign exchange (currency) exceeds the supply of it at a given rate of exchange (Danmola, 2013). The demand for foreign exchange arises from the demand for foreign goods and services. The supply of foreign exchange, on the contrary, 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. The demand pressure results in an appreciation in the exchange value of foreign currency.

Consequently, the exchange rate of home currency to the foreign currency undergoes depreciation.

Empirical Literature Review

Since exchange rate volatility has had a mixed result on the macroeconomic performance in SSA countries. While some studies revealed the existence of a negative relationship, others established a positive nexus, while others found no significant relationship. Olamide (2022) observed the nexus between exchange rate instability, inflation and economic growth in Southern African Development Community (SADC). The study employed Pooled Mean Group (PMG), Generalised Moments (GM) and Dynamic Fixed Effect (DFE), for the analysis. The GARCH was also used to generate exchange rate instability. The results indicates that exchange rate instability and inflation have a negative relationship with economic growth in SADC. Also, it results reveals that economic growth in SADC is unfavorably influenced by the significant effect of exchange rate instability on inflation: the higher the level of instability in exchange rate, the worse the inflationary-growth relationship of the region. The study thus recommended that policies to ensure appreciation of local currencies should be the priority of member nations.

Magwedere & Chisasa (2023) observed that the South African rand has been volatile with low economic growth and high rate of unemployment. The research used quarterly time series data from 2008Q1-2018Q4 to ascertain the effect of exchange rate on credit risk in South African banking portfolios. The econometric model included cointegration and error correction model and the results indicate that macroeconomic shocks significantly affect bank asset quality. A 1% increase in exchange rate increases impaired loans by 0.57%. Thus, the authors recommended that since Banking sector stability is a important to economic growth and performance, policymakers should study macroeconomic fundamentals that mainly affect bank asset quality in order to know the right policies to pursue.

Garr et al. (2022) investigated the impact of exchange volatility among Ghana's three major trading currencies. The paper employed econometric model of multiple regression analysis conducting a unit root and co-integration tests. The study concludes that a significant and positive nexus exists between foreign exchange rate movement and economic performance especially with the US Dollar and the British pound sterling. The result observed that the devaluation would lead to increase in the exchange rate which dovetails to an expansionary impact on the GDP. Also a depreciation of the Ghanaian local currency would culminate to decreases in the prices ofdomestic goods while, at the same time, making imported goods to be

more expensive. Hence, a depreciation of the exchange rate initially increases the volume of net export and then the growth rate of the economy.

Titus et. al. (2022) analyzed Exchange rate volatility and international trade in Botswana from 1966 to 2018 using error correction model. The findings revealed that interest rate. inflation rate and GDP, foreign exchange reserve was statistically significant and positive with a moderating effect at 5% significant level on the relationship between foreign exchange rate volatility and international trade with R2 of 0.9557. The research recommends the maintaining of sufficient stock of foreign exchange reserves to reduce the adverse effects of exchange rate volatility on the economy. The result encourages the application of an effective monetary policy that will encourage exchange rate stability and enhance Botswana economic performance in international trade

Katusiime et al. (2015) analyzed Exchange Rate volatility and economic growth nexus in Uganda. The paper used data spanning from 1960 to 2011, the findings revealed that in Uganda, exchange rate volatility positively affects economic growth in both the short run and the long run. Though, in the short run, political instability negatively controls the exchange rate volatility–economic growth nexus. The result is robust to alternative specifications of the economic growth model. For Opolot (2018) the paper studied the impact of innovations in the exchange rate on macroeconomic performance in Uganda, employing quarterly data from 1995Q1 – 2014Q4, the econometric model of structural vector autoregressive model was used to investigate the impact of exchange rate volatility and macroeconomic aggregates, in Uganda. The finding indicates that high depreciation of exchange rate is re-disruptive to the economy and also innovations to the nominal exchange rate have major implications for domestic prices, domestic interest rates, private sector credit, exports and imports.

Modisaatsone & and Motlaleng (2013) studied the impact of the Rand/Pula exchange rate volatility on Botswana's disaggregated imports. The Vector Error Correction Model (VECM) framework was employed as it allows for the use of impulse response functions. The finding indicates that exchange rate volatility does have effect on imports. However, its size, significance and the direction vary substantially across four groups of imports studied being, Food, Fuel, Textiles, and Metals. From the result observed that exchange rate volatility impact has been stronger in the long run than short run. The result of the paper implies that though the Rand/Pula exchange rate volatility affects imports, the impact is not robust. Imports are observed to be more responsive to changes in GDP.

Sebego, et al (2020) researched on the impact of the Rand/Pula exchange rate volatility on Botswana's economic growth. The Generalized Method of Moment (GMM) was employed and the paper used annual time series data, from 1977 to 2018 to evaluate the impact of the

real exchange rate volatility on Botswana's economic growth. The GARCH model results found the Pula/Rand exchange rate to be volatile. The Rand/Pula exchange rate volatility does not have an impact on Botswana's economic growth. The empirical findings reveal that Botswana's economic growth is mainly explained by trade openness and growth of labour force and not influenced by the Rand/Pula exchange rate volatility.

Oseni (2016) in his research on Exchange rate volatility and private consumption in Sub-Saharan African countries employed system-GMM dynamic panel and GARCH (1, 1) to generate exchange rate volatility series between 1999 and 2014, the result revealed that exchange rate volatility has significant negatively impact on private consumption in SSA countries.

Umaru et al. (2019) in their study of the Effects of Exchange Rate Volatility on Economic Growth of West African English-Speaking Countries observed that real exchange rate is statistically significant and negatively related to GDP in West African English-speaking countries of Nigeria, Ghana, Gambia, and Sierra Leone. However, individually the finding revealed that the effect of exchange rate volatility on economic growth is statistically significant in Ghana and Nigeria with a negative nexus on economic growth of the duo. While an insignificant result was observed for Gambia and Sierra Leone. The result would aid these countries to enhance their monetary policy to ensure effective monetary policy.

Bello et. al (2022) in their study investigated the asymmetric relationship between exchange rate volatility and macroeconomic performance in Nigeria. Using the Non-linear Generalised Autoregressive Distributive Conditional Heteroscedasticity (GARCH) model and data from 1986Q1 to 2019Q4. The result showed that exchange rate volatility displayed a positive relationship with trade balance, inflation and industrial output. The research noted that good news prevailed more over bad news in the foreign exchange market and consequently, recommended that Nigeria's monetary authorities should regulate exchange rate and other macroeconomic variables to ensure that 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 Sierra Leone) following exchange rate regime shift. Results from the study revealed that, while exchange rate volatility is inflationary across all the countries, its effects on output growth differ. Specifically, volatility and depreciation in particular negatively affect real GDP growth in Liberia and Sierra Leone but positively impact on output in the other countries albeit weakly. The difference in direction and magnitude of effect is not far-fetched from the differences in macroeconomic conditions prevailing in each country. The time frame for the study was limited to 2012 and was not current enough to show the current realities

in sub–Saharan African countries. The present study intends to close the gap with 2021 as the current time frame.

Similarly, Ngerebo and Ibe (2013) examined Exchange Rate and Macroeconomic Performance in Nigeria: A Causal Post Structural Adjustment Programe Investigation. The study used cointegration and granger causality. The Granger causality test between the dependent and independent variables showed a unidirectional causality from exchange rate to BOP, inflation and gross domestic product growth rate. The study inferred that exchange rate affects external reserve and BOP. While the authors used inflation, they did not adopt market capitalization, credit to private sector and timeframe up to 2021. The absence of all these created a gap which this study intends to fill.

In the same vein, Danmola (2013) analyzed the impact of exchange rate volatility on macroeconomic variables in Nigeria. The Ordinary least square and Granger Causality was used to test the relationship between them. The variables used were exchange rate, GDP and investment. It was observed that exchange rate has a significant impact on economic growth. The study then recommended exchange rate control. The methodology is not ARCH/GARCH and the study did not use inflation as a variable to specify the independent variable and the absence this variable shall be closed by this study.

METHODOLOGY

The study is designed to be an ex-post facto research design, which is also called causal comparative research, as a design used when the researcher intends to determine cause-effect relationship between the dependent and independent variables with a view to establishing a causal link between them, this also will lead to the adoption of this research design for this study.

The population of the study includes all Sub-Saharan African countries however, due to time, data and resource constraints, the study only covers a sample of 6 African countries namely Nigeria, Ghana, Kenya, Uganda, South Africa and Botswana. The countries were selected to cover the major blocs in the Sub-Sahara which are the western, eastern and southern blocs. These countries are selected based on availability of updated data in the world statistics, as well as time and financial constraint limiting the scope.

The period 2000 to 2021 was chosen as it covers recent issues on exchange rate volatility over the last two decades, it also covers pre and post Global Financial Crisis which is a major event of our time and has changed the global financial landscape. The year 2000 as the base year was selected due to data limitation beyond this period on some key financial and macroeconomic variables used in the study.

Measuring Exchange Rate Volatility

The Generalized Auto-Regressive Conditional Heteroscedasticity (GARCH) model is used to measure exchange rate volatility. The GARCH model is usually parsimonious and often a GARCH (1,1) model is sufficient. The general form of the model, denoted by GARCH(p,*q*) begins with the Autoregressive Model;

$$Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \alpha_2 Y_{t-1} + \alpha_3 Y_{t-1} + \cdots + \alpha_P Y_{t-P} + \epsilon_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i Y_{t-i} + \epsilon_t \quad (1)$$

Where Y_t is the exchange rate series, $\alpha_i$are parameters to estimate and $\epsilon_t$the error term. The lags of the dependent variables can be stack together as X_t and the $\alpha_i's$ as φ which is rewritten as;

$$Y_t = X_t\varphi + \epsilon_t \quad (2)$$

Where the error term is assumed to be normally distributed with 0 mean and constant variance h_t also written as;

$$\epsilon_t \sim N(O, h_t) \quad (3)$$

GARCH (*p,q*) implies the following form of the conditional variance:

$$h_t = \alpha_0 + \sum_{i=1}^{q} \alpha_i \epsilon_{t-1}^2 + \sum_{j=1}^{p} \beta_i h_{t-j} + V_{t_t} \quad (4)$$

Where h_t is the variance, $\alpha_0$is the constant term, $\epsilon_{t-1}^2$is the ARCH process, h_{t-j} is the GARCH term to ensure the conditional variance is positive, an inequality restriction must be imposed on the variance equation in (3.6):

$\alpha_0 > 0 \; and \; \alpha_i \geq 0, \beta_i \geq 0, \forall i$,j

The null hypothesis is that, in the absence of ARCH/GARCH components, we have

H_0: $\alpha_1 = 0 \quad ; \beta_1 = 0$ (5)

The alternative hypothesis is

H_1: $\alpha_1 \neq 0 \quad ; \beta_1 \neq 0$ (6)

We test the null hypothesis using the probability value of the Langrangian Multiplier (LM) statistics. We accept the null hypothesis if the probability falls outside the conventional levels of significance. That is, if p>0.05, it accepts the null hypothesis that there is no GARCH effect. Where the reverse is the case, it will reject the null hypothesis.

Multivariate Panel Model

The study adapts the model of Lawal, Paul and Aliyu (2020) to include inflation rate as part of the dependent variables as presented as follows;

$$INFR_{it} = \lambda_i + \gamma_t + \delta_1 EXCHV_{it} + \varepsilon_1 \quad (7)$$

$$GDPGR_{it} = \lambda_i + \gamma_t + \pi_1 EXCHV_{it} + \varepsilon_2 \quad (8)$$

$$BOP_{it} = \lambda_i + \gamma_t + \varphi_1 EXCHV_{it} + \varepsilon_3 \quad (9)$$

Where INFR is Inflation Rate, GDPGR is Gross Domestic Product Growth Rate, BOP is Balance of Payment; EXRV is Exchange Rate Volatility. From the above equations $\alpha, \beta, \gamma, \vartheta, and\ \pi$ are parameters to be estimated; λ_i is cross section specific term (time invariant term) while γ_t is time variant term. μ_{it} is the stochastic term that follows the two way error component such that:

$$\varepsilon_{it} = e_i + v_{it} \quad (10)$$

Where; e_i is time invariant error while v_{it} represent the time variant error term.

for i = Nigeria, Ghana, Kenya, Uganda, South Africa and Botswana

t = 2000-2021

Sources and Measurement of Data

Data collection technique for this research will be of panel data in nature, a.nd in the secondary form. The data will be sourced mainly from the World Economic Outlook (WEO) (2021), World Development Index (WDI) (2021), International Financial Statistics (IFS) (2021) and World Trade Data Base (2021). The data to be collected are annual data on the variables stated in the model above.

Figures on Inflation rate was obtained from International Financial Statistics (IFS). Gross Domestic product growth rate was obtained from World Development Index (2021) for a period of twenty years (2000-2021), Balance of Payment was obtained from World Trade Data Base (2021) and for the African countries Nigeria, Ghana, Kenya, Uganda, South Africa and Botswana.

Method of Data Analysis

Panel regression model will be used to explore the impact of exchange rate volatility on macroeconomic performance. The technique will be used to critically analyze the interaction between the macroeconomic variables in this study.

The panel equations specified in equations 7 and 8 are macro panel since T>N (ie time interval greater than cross sections). The model can be estimated using the Pool Regression (PR), Fixed Effect (FE) or Random Effect (RE). It is essential to determine which (pool, fixed or random effect) method is more consistent and efficient.

The Hausman's test will be applied to determine the appropriate method of estimation which can be either fixed or random effect. The Hausman test is used to differentiate between fixed effects model and the random effects model in panel data. In the null hypothesis, Random effects (RE) is preferred due to higher efficiency, while for the alternative hypothesis, Fixed effects (FE) will be preferred.

Table 1. Summary of Hausman's Test

	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

ANALYSES AND INTERPRETATION

The data analysis began with descriptive statistics which shows the statistical properties of the variables, afterwards the trend analysis was done to show the graphical flow lines of the variables.

Table 2. Descriptive Statistics

	EXCH	GDPGR	INFL	BOP
Mean	164.4558	4.487816	8.712394	-6.92E+08
Median	22.33250	4.878792	7.199000	-1.05E+09
Maximum	1329.940	15.32916	32.93200	3.65E+10
Minimum	0.134000	-14.14423	-0.300000	-2.14E+10
Std. Dev.	340.1140	3.755507	5.257717	8.86E+09
Skewness	2.371776	-1.176881	1.403238	1.524586
Kurtosis	7.409221	8.269556	6.286544	8.294903
Jarque-Bera	230.6839	183.1962	102.7272	205.3340
Probability	0.000000	0.000000	0.000000	0.000000
Sum	21708.17	592.3918	1150.036	-9.14E+10
Sum Sq. Dev.	15153752	1847.602	3621.310	1.03E+22
Observations	132	132	132	132

Source: Author's Computation Using E-views Software

The descriptive statistics showed that all the variables have equal number of observations (balance Panel) of 132 each. The result also indicates the statistical properties of the variables such as mean, median, maximum, minimum etc. as well as the pattern of distribution of the variables.

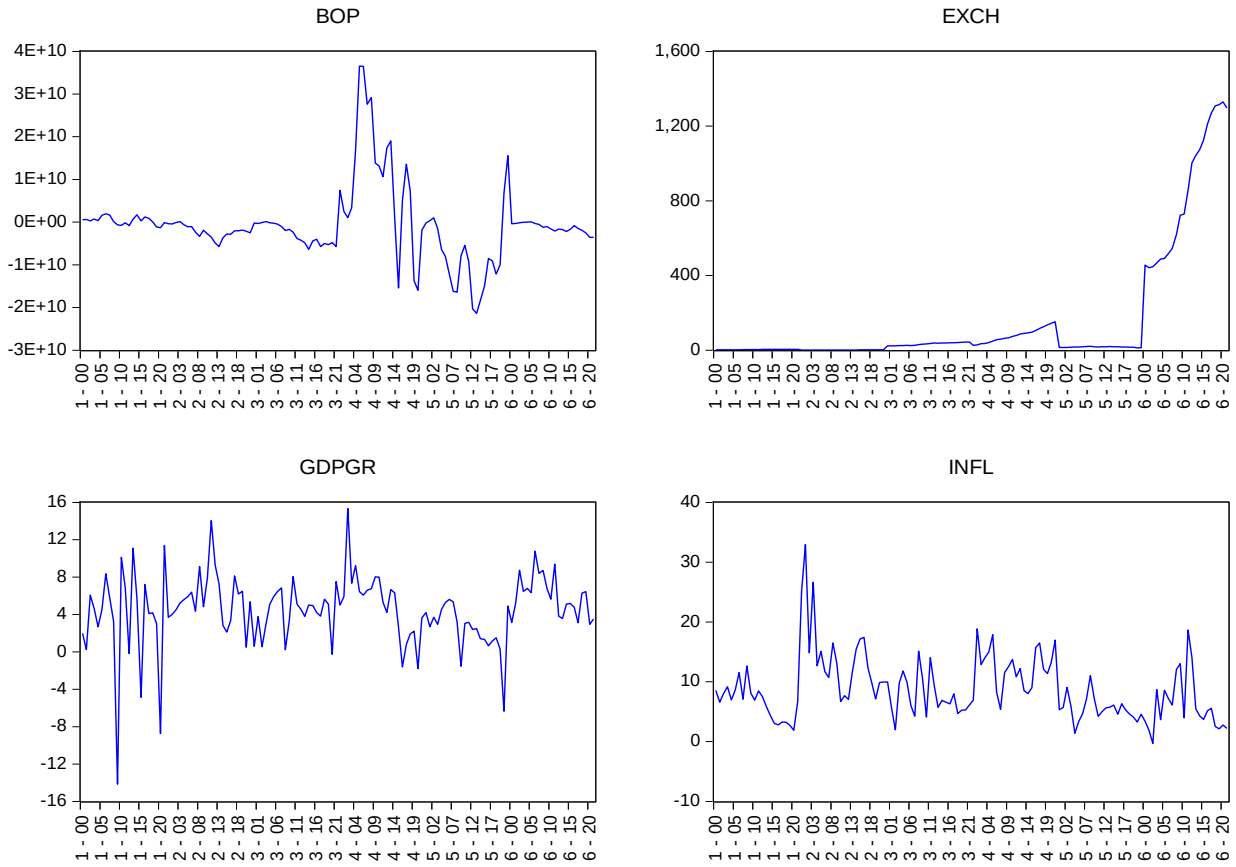

Figure 1. Trend Analysis

Graphically, the trend analyses showed that there was volatility in all the variables under study at one point or the other during the period under review. This was attributed to the effects of exchange rate movement in the open economy that would have had attendant effects on some of the variables.

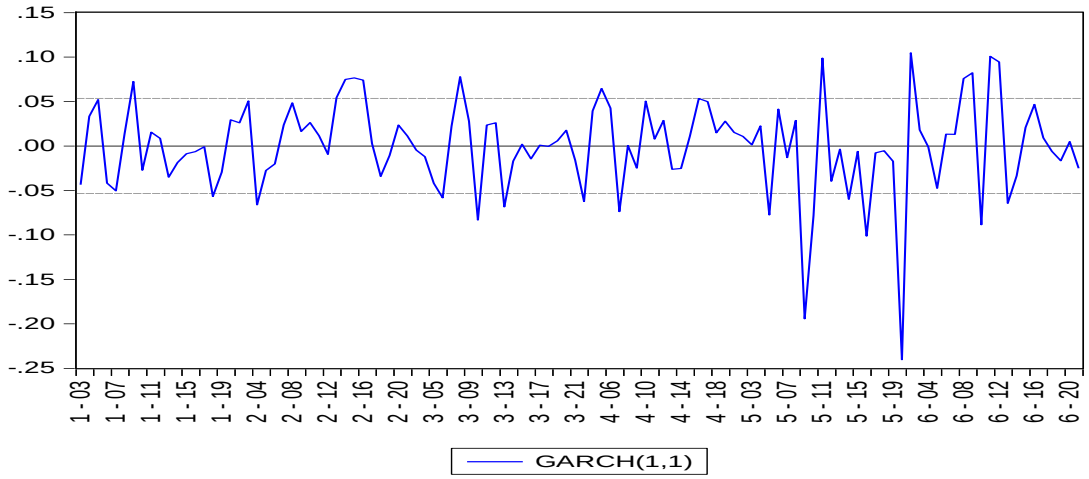

Figure 2. Exchange Rate Volatility

Note: 1= Botswana; 2= Ghana, 3= Kenya, 4= Nigeria, 5= South-Africa, 6= Uganda

Figure 2 above indicates exchange rate volatility from (2003-2021) for Botswana, Ghana, Kenya, South Africa and Uganda. In total exchange rate volatility ranges from -0.10 to -0.25 over the reference period indicating a wide oscillation in volatility. The excessive exchange rate volatility is expected to have impacted macroeconomic performance over the period under review.

Table 3. Levin, Lin & Chu (LLC) Panel unit root test

Variable	LLC Statistic	Prob	Decision
EXCHV	-3.57816	0.0002	Stationary at Level
GDPGR	-2.75873	0.0029	Stationary at Level
INFL	-4.35921	0.0000	Stationary at Level
BOP	-4.74891	0.0000	Stationary at Level

Source: Computed using E-Views Software

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

Panel Regression Model – Hausman Test on Fixed and Random Effect

Inflation

The impact of exchange rate volatility on inflation rate begins with selecting the appropriate panel model using the Hausman Test. The hypothesis of the Hausman's test is specified as: H_0: Random effect is consistent H_1: Fixed effect is consistent

The decision rule is that if the probability value of the Hausman statistic is higher than 0.05 (5 percent level of significance) the null hypothesis is accepted implying that random effect is the appropriate model.

Table 4. Model Selection

Hausman's Test				
Test Summary	Chi-Sq Statistic	Chi-Sq. d.f	Prob.	Decision
Cross-section random	0.000357	1	0.9849	Random Effect

* Cross-section test variance is valid. Hausman statistic set to zero.

Source: Computed using E-Views 11 Software Package

From table 4, with the Hausman's test statistic of 0.000357 and the probability of 0.9849 we accept the null hypothesis since the probability is higher than 0.05 (5 percent level of significant), therefore, the random effect model is the correct model.

Having established that the Random Effect model is superior to the fixed effect on estimating the impact of exchange volatility on inflation rate, the result of random effect model is presented in this section.

Table 5. Random Effect (RE) Model - INFLATION

Model: $INF_{i,t} = \alpha_i + b_0 EXCHV_{it} + \epsilon_{i,t}$

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Decision
C	8.345128	0.305055	27.35615	0.0000	Significant
EXCHV	68.02970	35.02058	1.942564	0.0547	Significant (at 10%)
Diagnostics					
F-statistic		15.47249			
Prob(F-statistic)		0.000000			

Source: Computed using E-Views Software Package

From table 5, the coefficient of exchange volatility has a positive sign which conform to the apriori expectations. The implication is that an upward swing in exchange rate volatility should have a positive impact on inflation. The result is statistically significant at 10% level of significance as indicated by the probability value of 0.0547 which is lower than 0.1. From model diagnostic, The F-statistic also indicated that the model is significant.

Economic Growth

Table 6. Model Selection

Hausman's Test				
Test Summary	Chi-Sq Statistic	Chi-Sq. d.f	Prob.	Decision
Cross-section random	0.979692	1	0.3223	Random Effect

* Cross-section test variance is valid. Hausman statistic set to zero.

Source: Computed using E-Views 11 Software Package

From the above, the Hausman's test statistic indicates a value of 0.9779692 and the probability of 0.3223. Thus, we accept the null hypothesis since the probability is higher than 0.05 (5 percent level of significant), therefore, the random effect model is the correct model.

Table 7. Random Effect Model - GDPGR

Model: $GDPGR_{i,t} = \alpha_i + b_0 EXCHV_{it} + \epsilon_{i,t}$

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Decision
C	4.898136	0.361062	13.56591	0.0000	Significant
EXCHV	-145.2740	52.75474	-2.753762	0.0069	Significant
Diagnostics					
F-statistic		4.127951			
Prob(F-statistic)		0.000909			

Source: Computed using E-Views Software Package

From table 7, the result conforms with apriori expectations as the coefficient of exchange rate volatility is negative. The result showed that a unit change in exchange rate volatility will result in 145.2740 decrease in GDPGR. The result is statistically significant. From model diagnostic, the F-statistic also indicated that the model is significant at 5 percent given the probability of F statistic as 0.000909 (less than 0.05).

Balance of Payment

Table 8. 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-section test variance is valid. Hausman statistic set to zero.

Source: Computed using E-Views 11 Software Package

From table 8, with the Hausman's test statistic of 0.000001 and the probability of 0.9999 we accept the null hypothesis since the probability is higher than 0.05 (5 percent level of significant). Therefore, the random effect model is the correct model.

Having established that the Random Effect model is superior to the fixed effect on estimating the impact of exchange volatility on Balance of Payment, the result of random effect model is presented in this section.

Table 9. Random Effect (RE) Model - BOP

Model: $BOP_{i,t} = \alpha_i + b_0 EXCHV_{it} + \epsilon_{i,t}$

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Decision
C	-0.017161	0.023112	-0.742504	0.4593	Significant
EXCHV	2.981799	0.922119	3.233638	0.0016	Significant
Diagnostics					
F-statistic		7.463271			
Prob(F-statistic)		0.007318			

Source: Computed using E-Views Software Package

From table 9, the coefficient of exchange volatility has a positive sign which conform to the apriori expectations. The implication is that an upward swing in exchange rate volatility should have a positive impact on balance of payment, where exchange rate depreciation will make import more expensive thereby discouraging excessive importation, improving BOP position. The result is statistically significant at 5% level of significance as indicated by the probability value of 0.0016 which is lower than 0.05. From model diagnostic, The F-statistic also indicated that the model is significant.

CONCLUSION

The empirical results show that exchange rate volatility has a significant impact on macroeconomic performance in selected countries in SSA. This result indicated that exchange rate volatility has a positive impact of inflation rate which further implies that upward swings in exchange rate volatility resulting in currency depreciation will induce domestic prices of goods and services leading to inflation. The findings agree with the earlier studies of Tarawalie (2012), Mirchandani (2013) who also observed a positive effect of exchange rate volatility on inflation rate. However, as regards to economic growth, the result clearly showed that exchange rate volatility has a negative impact on growth, in other words exchange rate volatility discourages economic growth in the SSA. This finding is supported by some earlier studies of Iyeli & Utting (2017), Yakubu et.al, (2017); Victoria (2019). However other studies such as Omorokunwa and Ikponmwosa (2014); Dickson (2012) have observed a positive relationship between exchange rate volatility and economic growth. This finding also suggests that the volatility of exchange rate has played an important role in the fluctuations of macroeconomic performance in the SSA region over the years.

In conclusion, it is pertinent to note that defective exchange rate management is one of the major macroeconomic problems that confront the SSA economy today. In this study, it was

discovered that the macroeconomic uncertainties that are associated with exchange rate volatility in the SSA have serious effects on macroeconomic performance such as inflation rate and economic growth.

RECOMMENDATIONS

From the findings, the study thus recommended that in order to mitigate the menace of exchange fluctuations against inflation rate, sound macroeconomic and exchange rate policies will help put these shocks under effective control and dampen exchange rate fluctuation. Viable exchange rate regime should be adopted to reduce risk associated with exchange rate volatility within the SSA.

Individual SSA governments should deepen the reform of diversification to reduce the mono-economic nature of the economies of the various SSA countries at least alleviate if not eradicate over-reliance on a particular sector. For instance, manufacturing and industry can be boasted by empowering and encouraging entrepreneurs to go into manufacturing and processing through the provision of technical assistance, easy access and non-interest loan to existing manufacturers and those willing to go into it. Diversifying the economy from its monotonicity will ease her vulnerability towards adverse and persistence external shocks.

Also, from the findings, in order to reduce the effect of exchange rate volatility on economic growth, the indigenous government should strive to encourage foreign remittance by creating the right atmosphere and ensure a stable exchange rate which reduces uncertainties for producers especially in the importing of raw materials and which may affect productive activities

The study has examined the impact on exchange rate volatility and Macroeconomic Performance in Sub Sahara Africa. For Macroeconomic variables only GDP Growth Rate, Balance of Payment and Inflation were considered as Macroeconomic variables. It is suggested that other variables like, Net Export, Interest rate and Foreign Direct Investment, etc can be applied to check the effect of Exchange Rate Volatility. The scope can be increase to include the entire African states. Also, the effect of exchange rate volatility on financial stability and external sector stability using higher frequency data to address the degree of freedom issues in model estimation if more variables are to be included.

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