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Sub-Saharan African Countries' Exchange Rate Determinants 1988–2024

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A B S T R A C T

With an emphasis on the Anglophone ECOWAS member states of Ghana, Liberia, Nigeria, Sierra Leone, and the Gambia, this paper examines the macroeconomic factors that influence exchange rate changes in Sub-Saharan African nations between 1988 and 2024. The study examines how the GDP, interest rates, inflation rate, and trade openness affect the real exchange rate using panel Ordinary Least Squares (OLS) regression and descriptive statistics. The low of one price (LOP) and purchasing power parity (PPP) theories served as the study's compass. The results indicate that while trade openness significantly boosts the exchange rate, inflation and interest rates significantly hurt it. GDP exhibits an insignificant negative correlation. These findings are partially consistent with previous empirical studies, most notably Dung and Jude (2022) and Moses (2021). The findings imply that macroeconomic stability, particularly inflation and interest rate management, is critical for exchange rate stabilisation. To promote long-term exchange rate regimes in the region, the study suggests increased monetary coordination, inflation control, and economic structural reforms

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INTRODUCTION

Exchange rate management continues to be a critical international macroeconomic concern, with both theoretical and practical studies being carried out. In a globalized world where nations vie for growth and development, the foreign exchange rate market is without a doubt one of the biggest financial marketplaces. Many researchers have emphasised the importance of exchange rates (Cottani et al., 1990, Elbadawi et al., 2012). Correcting the actual exchange rate mismatch should be the main objective of any exchange rate policy, according to consensus. When the apparent exchange rate differs from the equilibrium exchange rate, the real exchange rate is said to be misaligned (Edwards, 1989).

In every economy that engages in international commerce, the exchange rate is a crucial factor. An increase or decrease in the value of the domestic currency in relation to a foreign currency is indicated by a rise or fall in the exchange rate. Speculators keep a careful eye on the exchange rate's fluctuations in order to decide which foreign investments to make, as exchange rate fluctuations can have a significant impact on the future value of a current investment (Teall, 2018; Melvin & Norrbin, 2013). Furthermore, fluctuations in exchange rates can have significant implications for international capital flows and economic growth (Karimo, 2020). It is therefore critical to comprehend the factors that influence exchange rate movement.

Since the actual rate of exchange has a direct impact on the growth and decline of their own currency, the majority of nations give it top priority. For instance, imports gain from an increase in the real exchange rate as imported items are less expensive than local ones. For exporters, this rise poses a problem since it reduces the competitiveness of their goods on international marketplaces. Improper alignment of In addition, many developing countries face significant challenges with their real exchange rates. According to Elbadawi et al. (2012), when the actual rate of exchange is overvalued, the growth rate decreases. Furthermore, Greenaway and Bleaney (2001) logically concluded that investment is negatively impacted by actual exchange rate volatility. Understanding the causes of exchange rate volatility is so essential.

There is a dearth of empirical study on exchange rates, despite the fact that they are essential to economic growth and development, especially in Sub-Saharan African nations. This study thus looks at the variables that affect exchange rates in these nations. Only panel data was used to analyze the short- and long-term factors influencing exchange rates in SSA nations. Moreover, these models do not yet account for the price level. This study is therefore different from other empirical research on the subject in that it looks at the factors that influence exchange rates in a few SSA nations by concentrating on each one separately rather than analyzing the data using a panel data approach. Furthermore, our analysis takes into account the effect of the price level on the exchange rate. (Dung and Jude, 2022)

In light of this context, this study examines the factors that influence exchange rates in African sub-Saharan nations, particularly Anglophone West African nations like Ghana, Liberia, Nigeria, Sierra Leone, and The Gambia.

Descriptive statistics and the Panel Ordinary Least Square (OLS) multiple regression analysis approach are used to estimate the model parameters.

The rest of the paper is divided into four sections to achieve the aforementioned goals. Following a review of the literature in section two, the paper turns to methodology in section three. Section four contains the results and discussion, while Section five includes some concluding remarks.

LITERATURE REVIEW

Overview of Ecowas

The organisation currently has fifteen member countries. Benin (BEN), Burkina Faso (BFA), Cote d'Ivoire (CIV), Guinea Bissau (GNB), Mali (MLI), Niger (NER), Senegal (SEN), Togo (TGO), Gambia (GMB), Ghana (GHA), Guinea (GUI), Nigeria (NGA), Sierra Leone (SLE), Cabo Verde (CPV), and Liberia (LBR) are among them (Masson and Pattillo, 2001). In light of this context, this study examines the factors that influence exchange rates in African sub-Saharan nations, particularly Anglophone West African nations like Ghana, Liberia, Nigeria, Sierra Leone, and The Gambia. Descriptive statistics and the Panel Ordinary Least Square (OLS) multiple regression analysis approach are used to estimate the model parameters. These criteria were modified by Supplementary Act A/SA/4/06/12 of June 29, 2012, on convergence agreement and macroeconomic stability between ecowas Member States (Ecowas, 2017).

There are two types of convergence criteria: main and secondary. According to the main requirements, gross external reserves must exceed three months' worth of imports, the annual average inflation rate must be below 10%, and the deficit-to-GDP ratio must be less than 3%. Compared to six member nations in 2015—Benin (6.2%), Gambia (9.5%), Ghana (10.9%), Niger (6.1%), Sierra Leone (6.4%), and Togo (8.5%)—only three member states—Guinea, Liberia, and Nigeria—met the first primary requirement. Only Ghana, Nigeria, and Sierra Leone experienced inflation rates more than 10% in 2016, according to the second main criteria. Except for Ghana, all Ecowas members experienced less than 10% inflation in 2015. The Anglophone countries experienced higher inflation rates. These members' currencies depreciated in 2015 and 2016, which could explain the higher inflation rates. Previously established at six months of imports, the third key requirement was lowered to three months in 2015. Only Guinea (1.4 months), Ghana (2.8 months), and the Gambia (2.4 months) failed to achieve this criterion in 2016. In 2015 and 2016, the countries with the highest import coverage were Nigeria (6.5 months) and Cabo Verde (6.4 months) (Ecowas, 2017).

Secondary requirements include nominal exchange rate volatility within a range of ±10%, central bank financing of the budget deficit not exceeding 10% of the previous year's tax receipts, and a debt-to-gdp ratio of less than 70%. Togo (79.4%), Gambia (117.3%), and Cabo Verde (128.6%) were the only countries that failed to achieve the first secondary requirement. Sierra Leone, Guinea, Nigeria, and the Gambia failed the second test. In 2016, three currencies had average variations outside the ±10% band, compared to two in 2015. Ecowas (2017) reports that the affected currencies are the Guinea franc (16.4%), Nigerian naira (23.5%), and Sierra Leone leone (19.1%).

Theoretical Model

The goal of the study is to combine and alter the Law of One Price (LOP) and Purchasing Power Parity (PPP) concepts. The purchasing power parity method of calculating exchange rates was and is still a useful way to think about the rate. The PPP makes the assumption that the relative pricing at the national level will be equal to the exchange rate between two currencies. The PPP is predicated on the idea that there is a "law of one price" in the globe. According to this legislation, the prices at which similar commodities are offered shall be the same. Keep in mind that this is a presumption rather than a law. According to the law of one price, exchange rates must alter to reflect variations in national prices (Hoontrakul 1999). To put it another way, if we live in a bread-world—where there is only bread—and a loaf of bread costs $1 in the US and 150 naira in Nigeria, then the exchange rate must be 150 naira to $1.

Empirical Literature

The determination of exchange rates has been the subject of much debate over the years, particularly since Meese and Rogoff's (1983) exchange rate disconnect puzzle. In recent years, the usefulness of macroeconomic theories in explaining short-term variations in exchange rates has been the subject of empirical discussion. A number of these empirical investigations are looked at.

Studies on exchange rate determination within the monetarist framework have shown that monetary policy is effective all over the world, with some caveats. For example, Salim and Shi (2019) demonstrated that monetary policy is effective at explaining exchange rate movements. Hoffman and Schlagenhauf (1983) confirmed the monetary theory and rational expectation hypothesis using Australian data, while Ogun (2012) confirmed the theory in less developed countries operating flexible exchange rate systems, with the caveat that the theory is effective in more advanced developing countries with a relatively more effective legal system, less corruption, and smaller parallel exchange rate markets.

Othman et al. (2015) use the panel co-integration method to investigate factors influencing currency convertibility in West Africa over an annual time series period from 1982 to 2008. The findings suggest that West African countries are strong candidates for a monetary union, even if convergence is conditional. The speed of convergence is tested and found to be homogenous. It further demonstrates that the countries chosen as samples are homogeneous enough to form a monetary union.

Mati et al. (2019). Using the BQ decomposition method. Using a sample period from 1988:01 to 2017:12, the Optimum Currency Area (oca) is operationalized to examine the readiness of members of the Economic Community of West African States (ECOWAS) to establish a Monetary Union (mu). The results indicate that a full-fledged pan- ECOWAS mu is not advised based on ecowas convergence criteria, impulse responses, variance decompositions, and shock correlations in these two models. Stated differently, the whole Ecowas membership is ill-equipped to fulfill the goal of establishing a unified currency. Furthermore, because each member country's unique shocks cannot be addressed by a unified monetary policy, the ECOWAS central banks are unable to collaborate.

Ndiaye (2021) used Granger causality tests to investigate the relationship between the exchange rate and inflation in ECOWAS countries. The findings showed that there was no Beta or Sigma convergence among ECOWAS countries between 1990 and 2020. WAMZ countries experienced higher inflation rates than WAEMU countries due to their flexible exchange rate regimes. Indeed, causality tests between inflation and exchange rates revealed that WAMZ countries, unlike WAEMU countries, were affected by the Exchange Rate Pass-Through to inflation.

Moses (2021) investigates the determination of exchange rates in Nigeria in order to test monetary theories. The study used the nonlinear autoregressive distributed lag (NARDL) method and monthly time series data from 2010:M1 to 2019:M12. The results demonstrate that whereas exchange rates only react to inflation in the near term, they asymmetrically respond to changes in the money supply, real income, and inflation over the long term. The Naira gains less than proportionally over the long run when the exchange rate is in equilibrium and the money supply of a trading partner increases more quickly; yet, the rate of appreciation is comparatively quicker than the rate of depreciation linked to a faster rising domestic money supply.

Dung and Jude (2022) used Panel Least Squares (PLS) estimation methods to investigate exchange rate determinants in five sub-Saharan African countries, specifically Anglophone West African countries such as The Gambia, Ghana, Liberia, Nigeria, and Sierra Leone, from 1981 to 2019. The analysis shows that inflation rate (INFL), interest rate (INTR), current account balance (CABL), and terms of trade (TMTR) all depreciate the exchange rate (EXCR) in African sub-Saharan countries, particularly Anglophone West African countries

METHODOLOGY

Data Source

Annual time series gathered from secondary sources between 1981 and 2019 serve as the main source of data for this study. These sources include publications from the World Development Indicators (WDI). This is carried out across Sub-Saharan Africa, namely in Anglophone ECOWAS nations including Nigeria, Ghana, Liberia, Gambia, and Sierra Leone.

Real exchange rate (REXCR), inflation rate (INFR), interest rate, GDP, and trade openness (TOPN) are the variables whose model parameters are evaluated using the Panel Ordinary Least Square (OLS) approach of multiple regression analysis and descriptive statistics.

Model Specification

The study's model is described in functional form as follows:

REXCRt = f (INFRt,INTRt LGDPtLTOPNt)……..…… (3.1)

Thus, the model's econometric specification can be expressed as follows:

REXCRt= $\beta 0 + \beta 1$INFRt+$\beta 2$ INTRt+ $\beta 3$ LGDPt+ $\beta 4$LTOPNt + μt …. (3.2)

Where;

REXCT = Real Exchange rate

INFR = Inflation rate

INTR= Interest rate

LGDP = Log of gross domestic product

LGDP = Log of trade opennes
β0, is the Intercepts
β1, β2, β3, β4 are Parameters of the independet variables captured in the model,
μ= Error Term and t represents Time Trend
Thus, a priori expectations are β1, β2, β3, β4< 0.

RESULT AND DISCUSSION

Discriptive Statistics

Table 1. Result of Discriptive Statistics.

	REXCR	LTOPN	LGDP	INTR	INFR
Mean	129.1565	51.86383	3.646425	13.10192	9.295822
Median	105.8688	49.11679	4.637168	15.23902	7.048325
Maximum	222.3210	131.4854	14.66332	33.46679	47.64287
Minimum	73.59850	21.25662	-8.130444	-45.94846	0.844970
Std. Dev.	44.41205	20.43793	4.058353	13.76923	7.926507
Skewness	0.900079	2.097181	-0.749522	-2.096361	2.686717
Kurtosis	2.197660	8.722226	4.745678	9.121033	12.41072
Jarque-Bera	8.416020	109.0625	11.47146	119.2663	254.4435
Probability	0.014876	0.000000	0.003229	0.000000	0.000000
Sum	6716.138	2696.919	189.6141	681.2998	483.3827
Sum Sq. Dev.	100593.9	21303.17	839.9819	9669.182	3204.305
Observations	52	52	52	52	52

Table 1 shows that REXCR has a higher mean, maximum, and minimum value than the other variables, as well as a higher standard deviation. LTOPN and INTR are ranked second and third, respectively. However, the negative skewness of LGDP and INTR, which also implies a long left tail, suggests that the distribution is left-skewed. The rightward skew in the distributions of the other variables causes a long right tail to be visible. In addition, all variables except REXCR have kurtosis greater than three, indicating that their distributions are more peaked than the normal distribution. INFR, on the other hand, exhibits distinctive kurtosis characteristics. The Jarque-Bera test results show that the series LTOPN, INTR, and INFR are not normally distributed, implying that they are significant at the 1% probability level. Additionally, REXCR and LGDP are significant at the 5% probability level, rejecting the null hypothesis for the distribution of LTOPN, INTR, INFR, REXCR, and LGDP. Thus, the variables cannot be described as normally distributed.

Ordinary Least Square (OLS) Regression

Table 2. Result of OLS Regression

Cross-section fixed effects test equation:				
Dependent Variable: REXCR				
Method: Panel Least Squares				
Date: 07/14/25 Time: 16:16				
Sample: 1988 2024				
Periods included: 37				
Cross-sections included: 2				
Total panel (unbalanced) observations: 52				
Variables	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
LTOPN	0.877	0.454	1.929	0.080***
LGDP	-0.707	0.903	-0.783	0.450
INTR	-2.031	0.527	-3.858	0.003**
INFR	-1.429	0.565	-2.530	0.028**
C	126.155	18.029	6.997	0.0000*
R-squared	0.98			
Adjusted R-squared	0.92			
F-statistic	17.937			0.000*
Durbin-Watson stat	1.676			

The result in table 2 above shows that the calculated R2 is 0.98, this implies that about 98 percent of the total variations in EXCR are caused by the regressors TOPN, GDP, INTR and INFL, while, the remaining 2 percent of variations are caused by exogenous factors to the model but covered by the error term. Also, the F-statistic calculated of 17.937 with a probability of (0.000) suggests that the model is significant at 1 percent level. It also reveals that that trade openness (LTOPN) has a statistically significant positive effect on the exchange rate at the 10% level. A 1% increase in trade openness correlates with a 0.877 increase in the real exchange rate. This finding contradicts Dung and Jude (2022), who discovered a depreciating effect. On the other hand, Gross Domestic Product (GDP) has an insignificant negative relationship with the exchange rate, consistent with Dung and Jude (2022), indicating that GDP growth does not strongly predict short-term exchange rate changes. Furthermore, At the 5% level, both the interest rate (INTR) and the inflation rate (INFR) have statistically significant negative effects on the exchange rate. A 1% increase in interest and inflation rates results in a 2.031 and 1.429 unit decrease in the exchange rate, respectively. These findings back up the monetary model findings of Moses (2021) and Dung & Jude (2022), which show that tight monetary conditions and rising prices depress local currency values. In essence, while some findings are consistent with previous empirical literature, others differ, particularly in terms of trade openness, indicating potential structural differences or unique regional characteristics.

CONCLUSION AND RECOMMENDATION

According to the study, inflation rate, interest rates, and trade openness are important determinants of exchange rate behaviour in Sub-Saharan African countries. The high explanatory power ($R^2 = 0.98$) indicates that these macroeconomic indicators significantly account for exchange rate fluctuations. The findings emphasise the vulnerability of exchange rates to inflationary pressures and interest rate shocks, reinforcing the importance of macroeconomic stability as a prerequisite for exchange rate equilibrium.

Based on the above findings the following recommendations were made

1. Inflation Management: To protect the value of the exchange rate, policymakers must focus on reducing inflation through price stabilisation measures such as prudent fiscal policy and inflation targeting.
2. Interest Rate Harmonisation: Central banks should coordinate their monetary policies to ensure competitive but stable interest rates that do not discourage investment or cause excessive currency appreciation or depreciation.
3. Improving Export Competitiveness: While trade openness is beneficial, attention must be paid to the quality of trade (exports versus imports) to ensure that exchange rate gains are not offset by trade imbalances.
4. Strengthening Economic Fundamentals: Structural reforms that boost GDP growth (for example, infrastructure, energy, and education) should be prioritised, even if they have a limited short-term impact on the exchange rate.
5. Regional Policy Coordination: ECOWAS member countries should step up monetary and fiscal convergence efforts to promote greater exchange rate stability and move closer to a long-term monetary union.

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