

Determinants of Exchange Rate in African Sub-Sahara Countries

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Abstract

The study examines empirically exchange rate determinants in African sub-Sahara countries specifically Anglophone West African countries like The Gambia, Ghana, Liberia, Nigeria, and Sierra Leone between 1981 and 2019. In order to achieve this objective, both descriptive statistics and the Panel Least Square (PLS) estimation methods were employed to analyze the data. The result of the analysis reveals that INFL has a negative relationship with EXCR but it does impact significantly on it at 5 percent level; INTR has negative and an insignificant impact on EXCR at 5 percent level; CABL has negative relationship with EXCR and it also impacts significantly on it at 5 percent level; TMTR has negative relationship with EXCR and it also impact significantly on it at 5 percent level. The study therefore concludes that inflation rate (INFL), interest rate (INTR), current account balance (CABL) and terms of trade (TMTR) depreciates exchange rate (EXCR) in African sub-Sahara countries specifically Anglophone West African countries. Based on the findings of the research work, the following are recommended: The government should encourage export diversification especially the non-oil sector exports. This can be achieved through value addition to both the agriculture and manufacturing sub-sectors output. There should be stable exchange rate management policy that avoids over-valuation or excessive depreciation of their currencies and ensures international competitiveness of tradable goods, relative price stability as well as avoiding inconsistent fiscal policies.

Keywords: Exchange Rate, Inflation rate, Interest Rate, Current Account balance and Terms of Trade.

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1. INTRODUCTION

The management of exchange rate remains a vital international macroeconomic concern and has been investigated theoretically and empirically. The foreign exchange rate market is, without doubt, one of the largest financial markets in a globalized world, where countries compete with each other to sustain growth and development. Indeed, many researchers have highlighted the importance of exchange rate (Cottani *et al.*, 1990; Ghura and Grennes, 1993; Elbadawi *et al.*, 2012). It is generally agreed that the main objective of any exchange rate policy should be to correct the real exchange rate misalignment. Misalignment in the real exchange rate occurs when the actual (observed) exchange rate deviates from exchange rate equilibrium (Edwards, 1989).

In fact, most countries care about the equilibrium of the real rate of exchange of their

currency since this is directly proportional to the appreciation and depreciation of their home country's currency. For example, an increase in the real rate of exchange favours imports, since foreign goods are cheaper than domestic goods. But, likewise, this rise represents a problem for exporters, whose goods become less competitive in the global markets. Misalignment of Real exchange rate is also a crucial challenge in many developing countries. Ghura and Grennes (1993) obtained empirical evidence of the negative impact of misalignment of real exchange rate on economic growth in some Sub-Saharan African countries. Moreover, Elbadawi *et al.*, (2012) found that growth rate is decreased when the actual rate of exchange is overvalued. Furthermore, Greenaway and Bleaney (2001) observed to a logical conclusion that instability in real exchange rate affects investment negatively. Thus, it is crucial to comprehend the factors that cause developments in the exchange rate.

Leading to the calculation of the misalignment that occurs in the real exchange rate, policy makers use different models to evaluate the equilibrium exchange rate. In literature, two distinct approaches have been used to analyze the developments in the exchange rate. The first approach is based on conventional structural models such as the Purchasing Power Parity (PPP) model, Covered Interest Rate Parity (CIP), Uncovered Interest Rate Parity (UCIP) model, monetary models (flexible monetary models, sticky-price monetary models, Mundell-Fleming models) and portfolio balance models. The second one is based on equilibrium exchange rate models in which the equilibrium exchange rate is considered to be driven by a set of variables. Among these include: the Permanent Equilibrium Exchange Rate (PEER) model, the Natural Real Exchange Rate (NATREX) model, the Capital Enhanced Equilibrium (CHEER) model, the Fundamental Equilibrium Exchange Rate (FEER) model and the Behavioural Equilibrium Exchange Rate (BEER) model.

The models were used according to the different time horizons: short-term, medium-term and long-term. For instance, the Uncovered Interest Rate Parity (UIP) model, the Capital Enhanced Equilibrium Exchange Rates (CHEERs) model, the Behavioural Equilibrium Exchange Rates (BEERs) model and monetary models are mostly appropriate for estimating the short run equilibrium exchange rates while other models, such as Purchasing Power Parity (PPP) model, Balassa-Samuelson (BS) model, the Permanent Equilibrium Exchange Rates (PEERs) model, better estimate the latter in the long run. Moreover, other models that take into account both the internal and external balance of a country have also been developed to measure the equilibrium exchange rates at different time horizons. For example, the Fundamental Equilibrium Exchange Rates (FEERs) model can be used to measure the equilibrium exchange rate in the medium run whereas the Natural Real Exchange Rates (NATREX) model can be employed to model the long run equilibrium exchange rate. Edwards (1988) was the first one to model the equilibrium real exchange of some developing countries using a set of fundamentals which take into account both the internal and external equilibrium of a country. Following Edwards' pioneering work, empirical studies have used different set of variables to evaluate the equilibrium real exchange rate. Single country and panel investigations have both been done.

Both approaches have shown that there are different factors that cause fluctuations in the exchange rate. Many studies have concluded that both real and nominal shocks affect the behaviour of the exchange rate over time, causing its fluctuations. Among these factors are the monetary factors, productivity shocks, changes in government spending and consumption, terms of trade shocks, changes in exchange and capital

controls, labour supply shocks, changes in interest rates, changes in inflation, changes in debt services, changes in investment amongst others. Moreover, owing to the unavailability of data on the real exchange rate, different measures have also been used to model this series. Among these measures are: nominal effective exchange rate, nominal exchange rate, real exchange rate, real effective exchange rate and bilateral exchange rate.

Although rate of exchange is very vital in sustaining economic growth and development, especially in Sub-Saharan African countries, empirical analyses in these countries are quite sparse. Hence, this work examines the exchange rate determinants in these countries. The long-term and short-term exchange rate determinants in SSA countries were only investigated within a panel data setting. Additionally, the price level is not yet included in these models. Thus, this study somehow demarcates from previous empirical studies on the topic in that it attempts to examine the determinants of exchange rate in selected SSA countries by focusing on each one of them instead of employing a panel data framework for analysis. Moreover, the price level effect on exchange rate is taken into cognizance in our analysis.

It is against this background that this study aims at investigating the determinants of exchange rate in African sub-Sahara countries specifically Anglophone West African countries such as The Gambia, Ghana, Liberia, Nigeria, and Sierra Leone. This work is arranged into sections as follows: section one is the introduction, section two reviews the empirical literature on balance of payments and economic growth; section three the model and methodology used for the work, section four provides data and empirical evidence and finally, section five provides the summary and conclusion of the study.

2 LITERATURE REVIEW

2.1 Conceptual Literature Review

2.1.1 Exchange Rate

This is the rate at which a local currency exchanges for a foreign currency; it is otherwise regarded as foreign exchange rate and usually stated as the amount of a local currency that will exchange for a unit of foreign currency. Once the exchange rate of a currency has been fixed, the rate will be maintained all over the world through arbitrage. An exchange rate of N100 to one Euro in Nigeria is equivalent to 0.01Euro to one naira in Germany. If the exchange rate is N150 to a Euro in Nigeria and 0.01Euro to the Naira in Germany, arbitrageurs will buy Euro in Germany to sell in Nigeria and realize N50 on every Euro sold, the increased supply of Euro in Nigeria will cause Naira to appreciate and the equality will be restored. The reduction of exchange rate of Naira to the Euro refers to appreciation of the Naira and depreciation of the Euro while increase in the foreign exchange rate of naira to

the Euro means depreciation of the naira and appreciation of the Euro.

2.1.2 Exchange Rate Volatility

Exchange rate volatility is the stability or explosiveness of an exchange rate series, Kilicarslan (2018), observes that users of the underlying currency are only exposed to a good measure of risk. A strained exchange rate series implies high risk. Volatility indicates a large or wide and consistent swings in a series. Volatility clustering is said to have occurred when the series of exchange rate exhibits wide swings for a certain time frame and consequently balances or calms for a period, Gujarati (2013). Exchange rate movements or changes and volatility are not one and the same. A floating exchange rate may or may not be volatile but a fixed exchange rate cannot be volatile. Volatility is the short term fluctuations within the long term trends of the rate of exchange or it is a big fluctuation around the exchange rates core value (Aigheyisi and Oaikhenan 2015, Papadopoulus and Giannellis 2011).

2.1.3 Exchange Rate Regime

Rate of exchange of Nigeria's currency (Naira) for example, to a foreign currency like the 'Dollar', can be allowed to swing and change according to the tunes of the supply and demand for the international currency or can be defended by the government and allowed to be stable. The rate is flexible or floating when it moves according to the changes the foreign currencies supply and demand structure, and it is described to be fixed when the rate it is defended by the government and maintained at a stable rate even if the demand and supply structure changes. Policy makers tried the managed float and adjustable pegs as an intermediate position due to the extreme positions of the fixed and floating rate which effects are highly undesirable. The following paragraphs discuss these concepts in details.

2.1.4 Floating Exchange Rates

Under the Floating exchange rate system, the exchange rate is being determined by the forces of demand and supply without any intervention from the monetary authority. If there is excess supply of foreign currency due to a rate higher than the equilibrium (supply greater than demand), bidders will bid the price lower and lower until equilibrium is restored that is appreciation of the local currency. Alternatively, an equilibrium exchange rate that is lower, will increase the bid rate consistently until there is a restoration in equilibrium and can also culminate in excess demand, a case of depreciation of the local currency. Shifts in demand or supply of foreign exchange leads to new market determined equilibrium rate without the government intervening to keep the old rate.

2.1.5 Fixed Exchange Rate System

In this case, the authority/government fixes a particular exchange rate by legislation, this is the rate at

which all exchange transactions are carried out and the government has to sell and equally buy foreign reserves, in order to maintain and defend this rate. A shift to the right in demands for foreign exchange as a result of increased importation with a consistent supply curve for instance will make the local currency depreciate, to maintain the former rate therefore, the monetary authority will have to make a rightward supply shift by selling reserves. When the demand for foreign exchange reduces for example, foreign currencies are in reverse, bought by the monetary authority.

2.1.6 Adjustable Peg

With the establishment of the International Monetary Fund after the World War II, countries rate of exchange were pegged in terms of gold or the US Dollar at \$35 per ounce of gold, at a band of 1% below or above the fixed rate, the fixed exchange rates were allowed to fluctuate if the country in question has a fundamental disequilibrium in its balance of payment and it is equally able to convince the International Monetary Fund in that regard. That is, the fixed exchange rate is allowed to float within some agreed upon specified limits. In 1971, the system collapsed due to its many flaws.

2.1.7 Managed Float

At the Smithsonian Institution in Washington 10 industrial countries met and agreed to new stable rates but with wider bands after the collapse of the adjustable peg system. The bands were initially 2.25 percent above or below the parities, and it was further expanded to 4.5 percent in 1973. The European countries agreed in 1972 to a term called 'Snake in the Tunnel', which indicates that the European currencies could fluctuate within the European countries in relation to one another in smaller bands and can as well fluctuate in relation to nations outside of Europe within the agreed Smithsonian bands.

Plenty countries reverted to the floating exchange rate system in 1973, when the Smithsonian agreement collapsed, the European countries entered an agreement and were persistent that there are no more limits within which the European countries' currencies could fluctuate relative to other currencies and the name was changed from 'Snake in the Tunnel' to 'Snake in the Lake', and that subsequently, gave birth to the European Currency unit (ECU) in 1979, the ECU was a unit of currency of account comprising the main European currencies and member European country which fixes a rate of exchange pegged with the ECU. Within time frame of six(6) between 1973 and 1979 the system of floating exchange rate has become very popular in member countries of the International Monetary Fund, who adopted the system, simply because of the large short term capital movement among countries, and the monetary authorities were unable to stop speculative activities during the regime

of adjustable pegs. The high prices in oil and the resultant recession of the industrialized countries in the 70s was also a factor. But the floating system is that of a managed float as it is without some level of intervention by the government which is also referred to as a 'Clean Float' and regarded as a 'Filthy Float' when government interference is very heavy, the International Monetary Fund member countries were allowed to control the fluctuations in their exchange rates around some "normal limits", of which International Monetary Fund is tight-lipped on what they view as 'Normal Limits'.

2.2 Review of Theoretical Literature

2.2.1 The Elasticity Approach to Exchange rate

The elasticity approach to exchange rate tries to predict the outcome policy changes will have on the balance of trade and in turn balance of payments. For example, this method illustrates how the balance of payments is affected by the rates of exchange. Furthermore, the elasticity approach to exchange rate assumes that devaluation can enhance the balance of payments if actually the balance of payments is rightly in equilibrium. However, the price elasticity of local and international demand for imports has to rise for devaluation to function maximally. Under an ideal situation or condition also referred to as the 'Marshall-Lerner condition', when a country devalues a currency, it tends to improve the balance of payments.

It studied the responsiveness of the variables in the trade and services account, comprising of imports and exports of merchandise and services relative price changes induced by devaluation. Marshall-Lerner condition is the foundation on which balance of payment elasticity approach is built on (Oladipupo and Onotaniyohuwo, 2011). The Marshall-Lerner condition states that, for a devaluation to affect balance of payment of a country positively, the countries degree of the elasticity of demand for imports and exports must be greater than unity. The country can undergo the process of revaluation if the total elasticities are smaller than unity, so that its balance of trade to improve. This is mathematically shown as follows:

$$\Delta B = KXf(e_{1m} + e_{2m-1})$$

Where:

ΔB = change in the trade balance

K = The devaluation in percentage

Xf = The value of exports expressed in foreign currency

e_{1m} = The first (devaluing) country's demand elasticity for imports.

e_{2m} = The second country's demand elasticity for exports from the devaluing country.

Thus, $e_{1m} + e_{2m} > 1$ for Marshall-Lerner condition to be fulfilled.

This method basically reveals the condition which restores balance of payments (BOP) equilibrium with changes in the exchange rate. Its focal point is on

the balance of payments current account and behooves that the elasticity of demand be determined, thereby, establishing the conditions that will enhance the balance of payments with the application of devaluation (Oladipupo and Onotaniyohuwo, 2011). This therefore recognizes the importance of exchange rate in external trade; hence its inclusion in the model as one of the variables becomes apt.

2.2 Theories of Exchange Rate Determination

2.2.2 The Monetary Approach Model

Differences in the monetary model abound but they all share the view that rate of exchange movements between two currencies can be attributed to the changes in the supply and demand of money in the countries involved. The lapses and flaws of the portfolio balance theory led to the development of the monetary approach model. This approach is based on the importance of money as a unit of exchange, thus, it visualizes exchange rate as a function of relative shift in money stock, inflation rate and domestic output, between a country and a trading partner economy. Frankel (1978) posits that this model of exchange rate determination attains equilibrium when existing stocks of money in the two countries are willingly held. The monetary approach, under the flexible exchange rate can be presented in two forms the monetary approach or the asset market approach, and it emphasized on the role of money and other assets in determining the exchange. Obioma (2000) is of the opinion that the monetary approach attributes changes in exchange rate basically to expected rates of return, income, and other factors that impact the supplies of and demands for the diverse national monies. Thus, because the level of income determines the supply and demand for monies, the monetary model postulates three basic determinants of rate of exchange which includes: Interest rate differentials, relative income and relative money supplies.

2.2.3 Traditional Flow Model

This model posits that the market flow of demand and the market flow of supply of foreign exchange is determined by exchange rate. Hence, the supply equals the demand for foreign exchange when there is equilibrium. The interaction of the two essential variables, determine the rate of exchange or rather, the exchange rate assumed by the model. The variables are: rate of interest differential and relative income. It is justified because domestic demand for foreign goods is a function of domestic income and vice versa, and also asset demand depends on the difference between foreign and domestic interest rates.

2.2.4 Purchasing Power Parity

Cassel (1918) is the brain child of this theory, and it continues to be a vital and dominant way of viewing exchange rate, it postulates that exchange rates in comparison of two countries will be equivalent to the level of general pricing, the theory also known as the

law of one price, states that the rate of exchange between paired currencies and countries should be equivalent with the general price level ratios in the compared countries, furthermore, it suggests that exchange rates conform to requisite for difference in pricing levels among countries. This implies that if a biscuit is sold for a Euro in Ukraine and the same biscuit is sold for 160 Cedis in Ghana, therefore, the exchange rate should be 160cedis to a Euro. It remains valid explanatory determinant of exchange rate approach despite the criticisms of this theory.

2.2.5 Balance of Payment Approach

This approach of exchange rate determinants shows that internal and external equilibrium exist. The internal equilibrium assumes full employment: in it there is natural rate of unemployment. Nevertheless, there are no strains to alter actual wages in unemployment. Balance of payments equilibrium is also known as external equilibrium. The approach explains permanent deviations of PPP. The core challenge with this method is that in general it is extremely difficult to determine what is the exact natural rate of unemployment, or the exchange rate that is consistent with equilibrium of the external accounts. However, the rate of exchange convergence will be determined by the model; it provides very little guidance to the short term fluctuations (Hoontrakul 1999).

2.3 Review of Empirical Literature

Adeyemi, Ijaiya, and Raheem (2009) examined the determinants of exchange rate in Sub-Saharan Africa using a set of cross-country data drawn from 48 countries. It adopts a multiple regression analysis. The outcome of the results obtained shows some factors that increases the poverty rate in the sub-region, some of these factors includes- lack of safe water, increase in the population, inflation and external debt servicing, religious crisis, low economic activities, gender discrimination, and HIV/AIDS. These results, suggests that, stable exchange rate volatility, stable and controlled inflation, debt forgiveness, good governance, and use of family planning devices, are recommended possible measures at reducing poverty rate in SSA.

Mordi (2006) observed that fiscal viability, inflation, export competitiveness, balance of payments equilibrium, price incentives, resource allocation efficiency, and overall international confidence are macroeconomic variables impacted by exchange rate movements.

Atif, Sauytbekova and Macdonald (2013) evaluated the determinants of the bilateral exchange rate AUD\$/US\$ from the period 1975 to 2012 using six indicators: Gross Domestic Product (GDP), interest rate, capital account balance, money supply, inflation and net exports. Trade integrals and liquidity and output which are macroeconomic indicators relative to the US

proved to be significant in determining the exchange rate AUD\$/US\$ while interest rates and inflation were insignificant.

Ajao (2014) examined the determinants of volatility of real exchange rate in Nigeria between 1981 and 2008. By applying the GARCH (1,1) techniques, the exchange rate volatility was obtained. The ECM was employed to evaluate the various exchange rate volatility determinants in Nigeria, while the co-integration analysis reveals the presence of a long-term equilibrium relationship between REXRVOL and its various determinant. The empirical analysis shows that interest rate movements, openness of the economy, lagged exchange rate, government expenditures, are the core variables of significant value that influence REXRVOL during this period. This study suggests that the Central Bank of Nigeria should enact policies that will reduce the magnitude of the volatility of exchange rate, the government as well should exercise control of viable variables of the macroeconomy which have direct influence on exchange rate fluctuation.

Raheem and Asongu (2016) studied the convenient way some economic bourgeoisie easily access foreign earnings would make the extent of dollarization increase in the economy. The three sources of earnings in foreign currency includes natural resource rent, trade openness and financial integration. In this regard, the determinants of dollarization were protracted to capture these variables. The data for this work was built on 26 countries in sub-Saharan Africa (SSA) from the period 2001 – 2012. It was observed using Tobit regression, that the foreign currency earning proxies, excluding natural resources rent, are major contributors to the rate at which dollarization is rising. Specifically, it was observed that the positive determinants of dollarization are financial liberalization and trade openness, while the nudnik to dollarization is natural resource rent. The obtained results remain valid to three robustness tests. Policy implications and suggestions for future research were proposed.

Chineze Obi (2017) In his paper, examined the impact of volatility of the foreign exchange on FDI in Nigeria from 1999- to 2016. Expos facto research design was used in this work involving retrieving relevant data from statistical bulletins in respect of the variables in the study. To estimate the partial coefficients of the independent variables, the Ordinary Least Square method was adopted. The findings of this research suggests private foreign investment in Nigeria is significantly and positively impacted by the fluctuations in exchange rate which agrees with the statement that FDI investment in Nigeria is determined by entrepreneurial skills, technology, source of capital, exchange rate. This may be associated with the competing levels of the foreign exchange market in Nigeria, leading to the avoidance of excessive volatility.

Krueger, (1983) maintains that exchange rate would freely fluctuate in a free exchange rate market because of the changing demand for the different currencies; with fluctuating demand for currencies. Huge savings in foreign exchange rate could be expected especially since capital movement affect exchange rate as directly as do merchandise export and imports. On the other hand, as long as supply and demand for various currencies remains responsibly in balance, stable exchange rate would prevail under free exchange markets. In addition, Krueger, (1983) argues that how the exchange is decided depends on the fact that if the exchange rate is actually floating or fixed. A fixed rate of exchange is intervention or decree set by government within a small range of variation. A floating rate of exchange is determined freely by the interaction of demand or supply.

Chineze (2017) examined the relationship between foreign exchange volatility and FDI in Nigeria between 1999 to 2016. The result shows that fluctuation in exchange rate has a significant and positive impact on FDI in Nigeria.

Mbanasor and Obioma (2017) examined the impact fluctuations in exchange rate had on Nigerias foreign private investment. The work employed the research designed called ex-post facto. Secondary data from the CBN Statistical Bulletin were sourced, and used for the period. The model of regression was specified in detail with the roles of the variables explained. The findings shows that exchange rate fluctuations have negative and non-significant impact on Nigeria's foreign private investment. The study recommended that the transmission mechanism of exchange rate on major macro-economic variables in Nigeria should be examined as well as the inclusion of the parallel exchange rate market on major macro-economic variables in Nigeria.

Zerrin Kiliçarslan (2018) in his work on the relationship between Exchange Rate Volatility and Foreign Direct Investment in Turkey using Toda and Yamamoto Causality Analysis observed that many countries have embraced the floating exchange rate system after the end of the Bretton Woods system. The volatility in rate of exchange rises uncertainty for investors as their expected benefit of FDI is affected. Nonetheless, the flow of investment has been affected by FDI which is a crucial factor. The study, examine the interrelationship between FDI and exchange rate volatility from 2005 Q4 to 2018 Q1 in Turkey, it was evaluated using Toda-Yamamoto causality test. The volatility of Real effective exchange rate is predicted using the model of generalized autoregressive conditional heteroscedasticity. The result visualized, a relationship that is a one-way causality from FDI to exchange rate volatility.

Oriavwote and Ukawe (2018) investigated the empirical evidence of Real Effective Exchange Rate Volatility and FDI inflow into Nigeria. The research covered the period, 1981 to 2016. The Ordinary Least Squares method was adopted to analyze the data. Specifically, the ECM and the co-integration models were used. The results indicates that the one period lagged FDI has a significant and positive impact on the current FDI. The REERV has a negative and significant impact on the FDI. REER is positively and significantly impacted by Openness of the economy The research work, suggests a devaluation that is production-based of the Nigerian REER.

Taylor, (1995) stated in his work, what became known as purchasing power parity theory that the value of a foreign currency in terms of another depends mainly on the relative purchasing power of the two currencies in their countries. That is to say, exchange rates settles at the level which make purchasing power of a given unit of currency the same in whatever country it is spent. He argues further that the theory fails in some areas like a change in the exchange rate may originate in factor independent of price level. Therefore the purchasing power parity is not a complete explanation of what determines exchange rate but this does not mean that the theory has no value.

Akintunde, Oyegoke, Gylych, and Haruna (2019) opined that, the exchange rate determinant in Nigeria applying the quarterly time series data to make comparison between the official rate of exchange and parallel market rates from the period 1986 to 2017, the post Structural Adjustment Programme(SAP) era. The potential non oil export, interest rate, inflation, reserves, GDP, imports are the existing literature upon which exchange rate determinants were identified. Auto-regressive Distributed Lag Model (ARDL) was employed to test the variables for co-integration and the Augmented Dickey-Fuller (ADF) unit roots test of stationarity was used to test the time series properties. The result suggests that the core determinants of official rate of exchange in Nigeria includes the following variables, interest rates, reserves, GDP, oil exports, inflation, and non- oil exports and the major determinants of parallel exchanges rates, includes the variables, GDP, inflation, and non-oil exports.

Chowdhury, (1999) opined that technological advancement may be useful in discussing the movement of exchange rate because technological advancement improves efficiency in production, through reduction in prices and costs of production that will in turn increase demand, while exchange rate will depreciate, on the contrary, the technological advancement, increases income, helps in appreciating the exchange rate and raises the demand for items not traded internationally.

Ghura and Grennes (1993), Chudik and Mongardini (2007), Ouattara and Strobl (2008),

Gnimassoun (2012), Elbadawi *et al.*, (2012) and Couharde *et al.*, (2012). Ghura and Grennes (1993) found that terms of trade, closeness, capital inflow, excess domestic credit and nominal devaluation were the major factors that caused fluctuations in the real rate of exchange for a sample of 33 Sub-Saharan Africa (SSA) countries. Similarly, Chudik and Mongardini (2007), who estimated the equilibrium real exchange rates making use of panel estimation method and single-country technique for a sample of 36 Sub-Saharan African countries, concluded that, the equilibrium level of real exchange rate in these countries were affected by changes in GDP, openness, terms of trade and government consumption. Moreover, the findings from Ouattara and Strobl (2008) indicated that official development assistance, terms of trade and government consumption led to the appreciation of the effective real rate of exchange while trade openness and investment to its depreciation. The same was found by Gnimassoun (2012). The empirical results of Couharde *et al.*, (2012) also indicated that terms of trade, productivity, government consumption and net foreign assets, positively impacted the real exchange rate. The findings from Elbadawi *et al.*, (2012) shows that the real exchange rates of 29 SSA countries were positively influenced by terms of trade, productivity and foreign aid, and negatively by trade openness.

3. METHOD OF STUDY

The data used essentially for this study is mainly annual time series collected from secondary sources covering from 1981 to 2019 (38years). Some of these sources include publications of World Development Indicators (WDI). This is carried out in Sub-Saharan African Countries specifically the Anglophone ECOWAS countries such as, Gambia, Ghana, Liberia, Nigeria and Sierra Leone.

From all these sources, data was gathered on the following, viz – Exchange rate (EXCR), Inflation rate (INFL), Interest Rate (INTR), Current Account Balance (CABL) and Terms of trade (TMTR) from 1981 to 2019. Panel Ordinary Least Square (OLS) technique of multiple regression analysis and descriptive statistics are employed to estimate the model parameters.

The analytical framework for this study anchored on works of Akintunde, Oyegoke, Gylych, and Haruna, (2019) with a slight modification. Akintunde, Oyegoke, Gylych, and Haruna, (2019) examined the exchange rate determinants in Nigeria by comparing of the parallel market rate and official market rates and modeled thus:

$$OER = f(GDP, INFR, INTR, IMP, NOEXP, OILEXP, RES, \dots) \dots \dots \dots (3.1)$$

$$AER = f(GDP, INFR, INTR, IMP, NOEXP, OILEXP, RES, \dots) \dots \dots \dots (3.2)$$

- Where;
- GDP = Gross domestic product.
 - AER = Alternate exchange rate.
 - OER = Official exchange rate.
 - CPI = Proxy for inflation rate.
 - INTR = Interest rate.
 - RES = Reserves
 - IMP = Imports.
 - NOE = Non-Oil export.
 - OE = Oil export.

To this end, the present study deviates from these scholars by examining the exchange rate determinants in African sub-Sahara countries specifically Anglophone West African countries. by using official exchange rate as the dependent variable while inflation rate, interest rate, current account balance and terms of trade were used as the explanatory variables. Aside the choice of these variables the study also extended the period 1981 to 2019. Thus, the model is specified as:

$$EXCR = f(INFL, INTR, CABL, TMTR) \dots \dots \dots (3.3)$$

- Where;
- EXCR = Exchange Rate
 - INFL = Inflation Rate
 - INTR = Interest Rate
 - CABL = Current Account Balance
 - TMTR = Terms of Trade

Based on equations (3.1) the explicit econometric forms of the models are stated as:

$$EXCR = \beta_0 + \beta_1 INFL + \beta_2 INTR + \beta_3 CABL + \beta_4 TMTR + U_1 \dots \dots \dots (3.4)$$

- Where;
- β_0 is the Intercepts
 - $\beta_1 - \beta_4$ are the coefficients of independent variables
 - U_1 is the Error terms
 - EXCR, INFL, INTR, CABL and TMTR as earlier defined
 - Thus, a priori expectations are $\beta_1, \beta_2, \beta_3, \beta_4 < 0$

4.1 THE RESULTS AND DISCUSSION

The empirical analysis of data in this paper was conducted in three phases. It starts with the descriptive statistics analysis of the data and thereafter it will examine model by model on the panel OLS estimation technique was conducted.

Descriptive Statistics

Table 1 presents the summaries of the descriptive statistics for the variables used in this work. It shows the mean, medium, maximum, minimum and standard deviation values etc.

Table 1: Descriptive Statistics Results

	EXCR	INFL	INTR	CABL	TMTR
Mean	507.0562	16.45267	12.15233	-5.973598	64.64334
Median	35.95759	10.89923	11.15417	-4.707445	51.93715
Maximum	9010.221	122.8745	54.66667	28.71245	311.3541
Minimum	0.000275	0.844970	3.033333	-65.02893	6.320343
Std. Dev.	1415.382	17.70113	7.347354	11.78187	46.07831
Skewness	3.665596	3.426667	2.536695	-1.815002	2.746754
Kurtosis	17.28857	17.91330	12.36557	10.34892	13.58520
Jarque-Bera	2095.516	1661.144	898.1703	467.4858	1042.984
Probability	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	98875.95	2434.995	2308.944	-997.5909	11377.23
Sum Sq. Dev.	3.89E+08	46059.53	10202.90	23042.86	371561.8
Observations	195	148	190	167	176

Source: Extracts from E-views 10.0 Output

The result of the descriptive statistics as presented in the table above shows that the mean for the variables EXCR, INFL, INTR, CABL and TMTR are – 507.05, 16.45, 12.15, -5.97 and 64.64, respectively. The standard deviation shows that EXCR was the most volatile in the series with a value of 1415.38 while INTR was the least volatile variable with a value of 7.34. The calculated values for the skewness statistic for the variables – EXCR, INFL, and INTR - were positively skewed, suggesting that their distributions have a long right tail while CABL and TMTR were

negatively skewed, suggesting that their distributions have a long-left tail. Again, the kurtosis statistics visualized that the variables – EXCR, INFL, INTR, CABL and TMTR were leptokurtic, suggesting that their distributions were peaked relative to normal distribution.

Panel Regression Results

Here, we present the panel regression results for the model is presented in Tables 2 below.

Table 2: Regression Results for the Model

Dependent Variable: EXCR				
Method: Panel Least Squares				
Sample: 1981 2019				
Periods included: 39				
Cross-sections included: 5				
Total panel (unbalanced) observations: 138				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1248.200	372.5604	3.350328	0.0011
INFL	-6.552664	7.197266	-0.910438	0.3642
INTR	-38.46466	21.92466	-1.754402	0.0817
CABL	-50.94229	11.27843	-4.516790	0.0000
TMTR	-6.602568	2.724374	-2.423517	0.0167
R-squared	0.189281	Mean dependent var		523.8258
Adjusted R-squared	0.164899	S.D. dependent var		1596.258
S.E. of regression	1458.723	Akaike info criterion		17.44407
Sum squared resid	2.83E+08	Schwarz criterion		17.55013
Log likelihood	-1198.641	Hannan-Quinn criter.		17.48717
F-statistic	7.762989	Durbin-Watson stat		0.107419
Prob(F-statistic)	0.000012			

Source: Extracts from E-views 10.0 Output

The results in table 2 above shows that the calculated R^2 is 0.189281, this implies that about 19% of the total variations in EXCR are caused by the regressors INFL, INTR, CABL and TMTR. Thus, the remaining 81 percent of variations are caused by exogenous factors to the model but covered by the error term. Also, the F-statistic calculated of 17.48717 with a

probability of 0.000012 suggests that the model is significant at 5 percent level.

Tables 2 also reveal that INFL is negative (-6.552664), meaning that a raise in INFL depreciates EXCR by about 6.55 but it does impact significantly on it at 5 percent level. INTR is negative (-38.46466), meaning that a raise in INTR depreciates EXCR by

about 38.46 and it doesn't impact significantly on it at 5 percent level. CABL is negative (-50.94229), meaning that a raise in CABL depreciates EXCR by about 50.94 and it impacts significantly on it at 5 percent level. While TMTR is negative (-6.602568), meaning that a raise in TMTR depreciates EXCR by about 6.60 and it impacts significantly on it at 5 percent level.

4.2 FINDINGS

- Government do not encourage export diversification especially on non-oil sector exports. There are no value addition to the agriculture and manufacturing sub-sectors output
- There is an unstable exchange rate management policy which encourages over-valuation or excessive depreciation of their currencies and there is an absence of international competitiveness of tradable goods, relative stability in price as well as encouraging inconsistent fiscal policies.
- The high interest rate and rate of inflation is increased which reduces money supply rate in Africa sub-saharan countries specifically the Anglophone West African countries

5.1 CONCLUSION

The study surveys empirically the exchange rate determinants in African sub-Sahara countries specifically Anglophone West African countries like The Gambia, Ghana, Liberia, Nigeria, and Sierra Leone between 1981 and 2019. To achieve this objective, both descriptive statistics, i the Panel Least Square (PLS) estimation methods were employed to analyze the data.

The analysis results reveals that INFL has a relationship that is negative with EXCR but it does impact significantly on it at 5 percent level; INTR has negative and an insignificant impact on EXCR at 5 percent level; CABL has negative relationship with EXCR and it also impacts significantly on it at 5 percent level; TMTR has a relationship negative with EXCR and it also impact significantly on it at 5 percent level.

The study therefore concludes that inflation rate (INFL), interest rate (INTR), the current account balance (CABL) and trade terms (TMTR) depreciates exchange rate (EXCR) in African sub-Sahara countries specifically Anglophone West African countries.

5.2 RECOMMENDATIONS

Based on the research work findings, the following are recommended:

1. Export diversification, like the non-oil sector exports should be encouraged by the government. It can be achieved through value addition to both the agriculture and manufacturing sub-sectors output.
2. There should be stable management of exchange rate policy that avoids over-valuation or excessive

depreciation of their currencies and ensures international competitiveness of tradable goods, relative stability in pricing as well as avoiding inconsistent fiscal policies.

3. Additionally, inflation and interest rate should be reduced by the government to barest minimum so as to increase money supply rate in African sub-Sahara countries specifically Anglophone West African countries

REFERENCES

- Adeyemi, S. L., Ijaiya, G. T., & Raheem, U. A. (2009). Determinants of exchange rate in Sub-Saharan Africa. *African Research Review*, 3(2), 162-177.
- Ajao, M. G. (2014). The determinants of real exchange rate volatility in Nigeria. *Czech Journal of Economics and Finance*, 57(10), 44-62.
- Ajao, M. G. (2015). The determinants of real exchange rate volatility in Nigeria. *Ethiopian Journal of Economics*, 24(2), 43-62.
- Akintunde, Y. W., Oyegoke, E. O., Gylych, J., & Haruna, T. M. (2019). Determinants of exchange rate in Nigeria: A comparison of the official and parallel market rates. *The Economics and Finance Letters*, 6(2), 178-188.
- Andersen, T. G. & Bollerslev, T. (1998). Answering the skeptics: Yes standard volatility models do provide accurate Forecasts. *International Economic Reviews*, 39, 885-905
- Atif, S. M., Sauybekova, M., & Macdonald, J. (2013). The determinants of Australian exchange rate: A time series analysis. *EconStor Discussion and Working Papers*, 1-18.
- Cassel, G. (1918). Abnormal deviations in international exchanges. *The Economic Journal*, 28(112), 413-415. <https://doi.org/10.2307/2223329>.
- CBN. (1998). *Nigeria's exchange rate policy*. A CBN Research Department Series.
- Chowdhury, M. B. (1999). The determinants real exchange rate: Theory and evidence from Papua, New Guinea, *Asia Pacific School of Economics and Management Working Papers*, SP99-2, Asia Pacific Press.
- Dornbusch, R. (1988). *Purchasing power parity, in the new palgrave: A dictionary of economics*. Stockton Press.
- Edwards, S. (1989). Exchange rate misalignment in developing countries. *The World Bank Research Observer*, 4(1), 3-21.
- Elbadawi, I. A., Kaltani, L., & Soto, R. (2012). Aid, real exchange rate misalignment, and economic growth in Sub-Saharan Africa. *World Development*, 40(4), 681-700.
- Frankel, J. A. (1979). On the mark: A theory of floating exchange rates based on real interest differentials. *The American Economic Review*, 69(4), 610-622. [https://doi.org/10.1016/sOSO4-3932\(02\)00102-2](https://doi.org/10.1016/sOSO4-3932(02)00102-2)

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- Hoontrakul, P. (1999). *Exchange rate theory: A review*. Chulalongkorn University Press.
 - Khan, M., & Qayyum, A. (2011). Exchange rate determination in Pakistan: Role of monetary fundamentals. *Journal of Economic Cooperation and Development*, 32(2), 67-96.
 - Kilicarslan, Z. (2018). Determinants of exchange rate volatility: Empirical evidence from Turkey. *Journal of Economics, Finance and Accounting (JEFA)*, 5(2), 204-213.
 - Krueger, A. O. (1983). *Exchange rate determination*, Cambridge Press.
 - Laakonen, H. (2007). Impact of macroeconomic news on exchange rate volatility. *Finnish Economic Paper*, 20, 23-40.
 - Lipsey, R. G. (2007). *An introduction to positive economics*. English Language Book Society.
 - Lothian, J. R., & Taylor, M. P. (1996). Real exchange rate behavior: The recent float from the perspective of the past two centuries. *Journal of Political Economy*, 104(3):488-509. <https://doi.org/10.86/262031>.
 - Mordi, C. N. O. (2006). Challenges of exchange rate volatility in economic management in Nigeria. *CBN Library*, 30(3), 17-25.
 - Obioma, N. E. (2000). *Elements of International Economics*. Impresses Publishers.
 - Oke, M. O., & Adetan, T. T. (2018). An empirical analysis of the determinants of exchange rate in Nigeria. *Int J Sci Res Manag*, 6(5), 412-423.
 - Oriavwote, V. E., & Oyovwi, D. O. (2012). The determinants of real exchange rate in Nigeria. *International Journal of Economics and Finance*, 4(8), 150-160.
 - Raheem, I. D., & Asongu, S. A. (2016). Extending the determinants of dollarization in sub-Saharan Africa: The role of easy access to foreign exchange earnings. *A G D I Working Paper WP/16/033*, 1-35.
 - Udoye, R. A. (2009). *Determinants of Exchange Rate*. MSc Thesis (Unpublished), Department of Economics, University of Nigeria, Nsukka.
 - Watson, D., & Head, A. (2007). *Corporate finance: Principles and practice*. Pearson Education, Inc.
 - Were, M., Kamau, A., & Kisinguh, K. (2013). An empirical investigation of exchange rate determination in Kenya: Does current account imbalance play a role? *Advances in Management & Applied Economics*, 3(2), 165-178.