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Exchange Rate and Total Export Performance of Sub-Sahara Africa: A Case of Nigeria and Ghana

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Abstract

This study examined the impact of Exchange rate and Total export performance of Sub-saharan Africa countries. The main objective of this article is to determine the effect of Exchange rate and total export performance of Sub-Saharan Africa, focused on the period of twenty-two (22) years, which ranged from 2000 to 2021. The non-linear panel ARDL/Monte Carlo simulation was a method adopted. The regression results showed that exchange rate originating from the zone to the rest of the world are influenced positively by export, import and inflation rate. The result is not universal as the Gambia, Guinea, Nigeria, Ghana and Sierra Leone Exchange rate function show that inflation rate policy agrees with exchange rate which is not contrary to the Sierra Leone, Gambia and Ghana case in which the coefficient estimate is significant. The study infers that these results are consistent with theoretical expectations given the ironically divergence in the dependent variable.

Keywords: Exchange Rate, Total Export Performance, Sub-Sahara, Nigeria , Ghana

Introduction

The speedy nature of globalization has made countries of the world to live independently on one another as there is no country that is an island of itself, since they relate with each other. It is of the opinion that globalization of trade has rendered the world borderless. In this view, trade becomes one of the most important sources of growth and development. This article focused on Exchange Rate and Total Export Performance of sub-Sahara Africa, which include Ghana and Nigeria. Exchange rate and Total Export Performance have been studied in a large number of articles globally, focusing on its regime, extent of its fluctuations and nominal/ real effects. While there seem to be no ambiguity about its general effects on export performance of developed economics, it is debatable when analysed from perspective of developing countries.

However, for developed economies riots convertible or traded currencies, the traditional view is that, an increase in exchange rate fluctuation increases the uncertainty of profits on contracts denominated in a foreign currency. This risk leads risk-averse and risk-neutral agents to redirect their activities from higher risk foreign markets to the lower risk home market (Egert, et al, 2005). Zagorsky (2018) notes that the assertion of Egert (2005) is not universal for developed countries as most studies showed that, there is no statistically significant link between exchange rate regimes and bilateral export flows.

According to Pabai (2021), evidence has shown that from 1992 to 2017, the sub saharan African countries under consideration have experienced a considerable level of exchange rate volatility. To this, if the exchange rate spreads within a larger value range in a short period of time, it therefore inters that the fluctuations or changes are great (Pabai, 2018).

Studies had shown that exchange rate fluctuations could depress or have negative effects on exports of developing countries, it is also debatable if such effects would be significant gives the fact that most of their currencies are un-traded but pegged to a basket of major traded currencies (Duane, 2006).

Nevertheless, the changes in exchange rate have a large influence on imports, exports, trade balance, inflation rates and investment. These variables have an impact on a country's Gross Domestic Product (GDP). The point here is that exchange rate fluctuation maximizes transaction costs and reduces the prospects of economic growth.

Objectives of Study

The objectives of this research work are to:

- Examine the influence of exchange rates on total export performance of sub-Sahara Africa
- Ascertain the relationship between the exchange rate and total export performance of sub-Sahara Africa.

Scope of the Study

This study focused on examination of the impact of exchange rates on total export performance of sub-Sahara Africa. It adopted the historical period of twenty one (21) years, which ranges from 2000 to 2021. The study used non-linear panel study ARDL method and monte Carlo simulations of Sub-Sahara Africa.

Literature Review

Conceptual Issues

Exchange rate could be explained as the rate at which one currency is exchange for another (Jhingan, 2006). The prominent issue in economic literature is the issue of exchange rate flexibility that should be permitted by any country. Exchange rate are either fixed or flexible (Chang, 2011). An exchange rate system is said to be fixed, if it permits small or deviation from officially declared currency values while flexible exchange rate are rates that are completely free to vary. A hybrid of the two is represented by the optimum currency Area (OCA), which for optimal balance of payment adjustment and effectiveness of domestic macroeconomic policy, has fixed exchange rates within the area but maintains flexible exchange rates with trading partners outside the area. Foreign exchange rates relate to determination of exchange rate under exchange rates regime (Barro, 2004).

Martin (2005) asserts that the physical characteristics of goods and geography can explain the puzzling persistence and the volatility in the deviations of the international relative prices and the real exchange rate (the ppp persistence puzzle).

Duane (2006) investigated the impact of currency unions on Irish trade patterns. In contrast to most of the multi-country panel studies, they did not find any impact on trade.

Theoretical Review

One of the major challenges consumers are facing and the world economy is the exchange rate volatility. This fluctuation can bring about inefficiency and distort world prices. The long term profitability of investment, export opportunities and other related issues that are embedded with it are all influenced by long-term exchange rate. When there is an increase in exchange rate, foreign goods become expensive in the domestic market which means that there is upward movement in the prices of the goods. The increase in the prices of domestic goods leads to decrease in the prices of domestic goods leads to decrease in foreigners' demand for domestic products (Fofanah, 2020a). To this, when there is increase in exchange rate, exports are said to reduce and the increase or upward movement of exchange rate will lead to reduction in the country's competitiveness in the global market (Tara walie et al, 2012; Jiang, 2014). When the currency of a country depreciates, it increases the domestic currency costs of servicing debt. In this perspective, the government can finance increased debt service payments by reducing its spending, raising taxes as well as domestic borrowing.

Keynesian and traditional views showed that depreciation has positive effects on output as well as economic growth (as raised in the work of Pabai, 2021). Moreso, at full employment, a decrease or reduction in domestic currency may lead to increase in consumption of domestic goods and reducing foreign goods' consumptions (Aizenman, 2005). The impact of exchange rate movement on economic growth cannot be left out in this heading, this can be discuss with respect to the standard Mundell – fleming model (Mundell 1963: Fleming 1962), under a flexible exchange rate system, fiscal policy has no effect on output. To juxtapose this, monetary policy is effective in affecting output when international market is integrated. The new structuralist views demand and supply sides channels by which depreciation would have adverse effect on output.

On the other perspective, the literature identifies the channels through which exchange rate fluctuations have effects on GDP. These channels include aggregate demand, aggregate supply and balance sheet channels (Karadam, 2014 & Tarawalie, 2010). In the aggregate demand channel, exchange rate devaluation has increased global competitiveness of domestic goods, increased net exports, balance of payments as well as increasing the GDP. The aggregate supply channels show the depreciation of the domestic currency would have a contraction effect on output.

Frankel (2005) stated the balance sheet effect of devaluation. According to Mendoza (2004), reserves are held for both transactional and precautionary motives. In principle, countries hold reserves in order to meet unexpected and temporary fluctuations in international payments. Gosselin and Parent (2005) posit that there is a relatively stable long run reserve demand function that depends on five categories of economic size, current account vulnerability, capital account vulnerability, exchange rate flexibility and the opportunity cost.

The Empirical Review

Several economists have studied the direct and indirect effects of exchange rates policies on export performance. Egert, et al (2005) analised the direct impact of exchange rate volatility on the export performance of ten central and Eastern European transition economies and direct impact through changes in exchange regimes. Klein (1990), Bini-Smaghi (1991) and McKenzie (1998), showed in their studies that differentiating between sectors gives more encouraging results, evidence from sectoral data suggests that the impact of volatility differs both in magnitude and direction across sectors.

Fontaigne and Frendenberg (1999) showed that exchange rate volatility has a negative impact on intra-industry trade. This last assertion seems to be supported by Doroodian (1999), Chou (2000), Achy and Sekkat (2001), Siregar and Rajan (2002), Arize et al, (2004) and Baak (2004), which showed that, less developed countries exchange rate volatility has negative effect on multilateral, bilateral and sectoral export data.

However, recent commodity price likes have allowed reserves accumulation among exporters, while draining reserves among importers. To this, macroeconomic stabilization remains at the forefront of national economic policy making and aid conditionality in Africa (see Lapavitsas, 2007; McKinley, (2007); Weeks, 2007). This induces countries to hold reserves and to allow monetary authorities to intervene in markets to influence the exchange rate and inflation. Adequate reserves may allow African countries to borrow abroad, attract foreign capital and promote domestic private investment as a result of strengthening external positions. Cushmar (1983) used a model similar to that of Hooper and Kohlhagen (1978) but extended the sample size and used real exchange rate as opposed nominal exchange rates of fourteen sets of bilateral trade flows between industrial countries, he found a negative and significant vulnerability as long as the current accounts is not out of line.

Frankel and Wei (1993), Wei (1999) and Tenreyro (2003) employed the gravity model and found significant evidence of a negative relationship between exchange rate variability and trade. Inam and Umobong (2015) analyzed the relationship between exchange rate movement and economic growth in Nigeria using annual data from 1970 to 2011. The ordinary least Square technique and Granger causality test, revealed the existence of a positive and insignificant relationship between exchange rate and economic growth in Nigeria. Anyanwu et al (2017) ascertain the impact of real exchange rate on Gross Domestic Product (GDP) and manufacturing capacity utilization of Nigeria from 1986 to 2015. Using the ordinary Least Square Estimation technique, the analysis revealed a long-run relationship between exchange rate and economic growth. The results revealed a positive, but insignificant relationship between the real exchange rate and real gross domestic product.

In the work of Sibaria, Newadi and Mlambo (2013) investigate the impact of real exchange rates on economic growth on South Africa using quarterly time series data from the period of 1994 to 2010. Johansen cointegration

and vector error correction model are used. The results revealed that the real exchange rate has a dampening long-run impact on economic growth in South African. It is noted from the result that under valuation of the currency significantly hampers growth in the long-run while it significantly enhances economic growth in the short run.

From the above review, it therefore follows test the relationship between exchange rate and economic growth remains challenging. According to the studies done by various researchers, they have shown mixed effects, negative effects, positive effects and insignificant effects. The difference in the literature revealed that most of the conclusions were influenced by the kind of data used in the empirical analysis, the estimation technique or methodology, the geographical region and the proxy for volatility

Theoretical Framework

The gravity model of the study by Rose (2000) is adopted, which examines the effect of exchange rate on countries' mutual trade links and forms the baseline model for achieving this study. Gravity model is a very popular econometric model in international trade.

The Model Specification

The model to be used for this study is specified below;

$ERT = f(XPT, M, INFR)$ (1)

And the econometric model is given as;

$ERT_t = a_0 + a_1XPT_t + a_2M_t + a_3INFR_t + U_t$ (2)

Where; ERT= Exchange Rate, XPT = Export, M = Import, and INFR = Inflation rate

Where $a=a_o$, a_1, a_2, a_3 and a_4 are parameters to be estimated.

The expected signs of coefficient or apriori expectations are: $a_1 > 0$ $a_2 > 0$, $a_3 > 0$ and $a_4 < 0$.

Presentation and Analysis of Results

Descriptive Statistics

The focus of this chapter is on empirical analysis. The study empirically investigates the impact of macroeconomic adjustment, exchange rate devaluation and investment volatility on growth of African countries. Against the backdrop of the elaborate and dynamic nature of the issue, a sequential approach is adopted in the empirical analysis.

Table 1: Descriptive Statistics

	EXR	INFR	XPT	M
Mean	-1416.911	21.25808	5.192692	60.40880
Median	8.759800	15.25000	4.650000	4.750410
Maximum	270.1233	72.80000	16.60000	42.21944
Minimum	- 72562.00	5.700000	0.105000	32.12385
Std. Dev.	18365.25	14.94381	5.673162	10.72900
Skewness	-7.001197	1.850450	0.311825	2.230870
Kurtosis	50.01775	5.762755	1.429093	4.083968
Jarque-Bera	5214.594	46.21387	6.189494	98.61885
Probability	0.000000	0.000000	0.045286	0.000000
Sum	-71600.52	1052.900	371.9400	42.53465
Sum Sq. Dev.	5.17E+09	11389.19	1641.423	11.05E+06
Observations	52	52	52	52

Source: Authors EVIEW Output

Table 1 presents summary statistics of the data on the variables used for the analysis in order to understand their characterization. Exchange rate has a mean value of -1416.9, showing abrupt devaluation of the naira during the period. The standard deviation of exchange rate is 18365.3. This high standard deviation, which exceeds the mean value, clearly showed instability in the exchange rate during the period, a reflection of exchange rate volatility. The mean value of inflation is 21.3; a high two-digit value indicating high inflation rate in the Nigerian economy. Export has an average value of 5.2, and a median value of 4.65 while import has a mean of 60.40880. Invariably, the Nigerian economy is characterised by noticeable macroeconomic instability during the period.

Ghana and Nigeria Regression Results of Exchange Rate Function

This paper analyses the relationship between Exchange Rate and Total Export Performance of sub Saharan Africa. Using the ARDL model. This against the backdrop of the fact that, in recent times, econometric analysis of the panel data has increasingly been granted to issues that show true reflections of the major differences in the structure of the exchange rate of the two countries.

The regression results of Ghana and Nigeria are presented in table 2 below. The discussion of the two countries' exchange rate functions is informed by the similarities of the econometric properties of the function when compared to others irrespective of signs of the elasticities.

Table 2: The Regression Results of Ghana and Nigeria Exchange Rate Functions

		Ghana	Nigeria	
Dep. Variable	**Exchange Rate (ER)**		**Exchange Rate (ERT)**	
Independent variable	**Coeff.**	**t-stat**	**Coeff.**	**t-stat**
Log (INFR)	2.29	4.7	0.07	3.1
Log (XPT)	-6.79	-0.7	3.39	25.4
Log (M)	-3.96	-7.1	0.65	2.5
Fixed Effects				
GHA – C	56.32			
NIG – C			-4.88	
Weighted Status				
R-squared	0.5642		0.8461	
Adjusted R-squared	0.5931		0.8384	
S.E. of regression	0.7228		0.1363	
Log Likelihood	-401.32		235.92	
DW-Stat	0.84		0.80	
Mean Dep. Var.		2.15		7.3
S.D. Dep. Var.		1.05		0.9
Sum Square Residual		141.31		6.3
F-stat		23.8		228.3
Prob (F-stat)		00		00

From the above table, it depicts that, a unit of inflation in Ghana yields about 2.29 units of exchange rate and a unit of export produces about -6.79 units of exchange rate while a unit of import yields -3.96 units of exchange rate of Ghana. More so, inflation rate has a

positive relationship with exchange rate in both countries which also shows the elastic case of Ghana, as it is inelastic in the case of Nigeria. It should also be noted that there are significant differences between the two countries' exchange rate function given the difference in the signs of the coefficients of the parameters of each country's export, import and inflation rates.

The export and import rates of Ghana have a negative relationship and are significant at 5%. While the export and import of Nigeria have positive relationships, only the export is significant.

However, it is noted in the case of Nigeria that, a unit of inflation yields about 0.07 units of exchange rate and a unit of export produces about 3.39 units of exchange rate while a unit of import yields 0.65 units of exchange rate of Nigeria.

Ghana

Unit Root Analysis

Unit root tests were performed on the series for each country to determine the level of stationarity. The results of the stationary test using the Augmented Dickey Fuller (ADF) test are reported in Table 3 for levels and first difference.

Table 3: Unit Root Stationarity Test for Variables in Levels and First Difference

Variables	ADF Statistic (in Levels)	ADF Test Statistic (in First Difference)	Order of Integration	Remark
ERT	-1.92	-5.98**	I(1)	Stationary
XPT	-1.23	-7.22**	I(1)	"
INFR	-2.55	-6.75**	I(1)	"
M	-2.44	-6.62**	I(1)	"

Source: Authors E VIEW Output

From the unit root test results, the null hypothesis of no unit root could not be rejected for all variables, ERT, XPT, INFR and M, an indication of their non-stationarity at levels. After the first differences, the variables became stationary i.e. attaining stationary after first difference. They are thus integrated of order one (i.e. I [1]).

Cointegration Test

Having established that the series in the analysis are all I(1) variables, the co-integration test is conducted on them. The Johansen Cointegration method is used for the cointegration test.

The test results are presented in Tables 4 and 5.

Table 4: Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.
None*	0.524	73.02	63.88	0.00
At most 1*	0.230	35.89	42.91	0.21
At most 2*	0.186	18.08	25.87	0.34
At most 3*	0.144	7.80	12.85	0.27

Source: Authors EVIEW Output

Table 5: Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.
None*	0.6007	37.12	32.12	0.01
At most 1*	0.4028	17.81	25.82	0.39
At most 2*	0.3416	10.28	19.39	0.58
At most 3*	0.0088	7.80	12.52	0.27

Source: Authors EVIEW Output

From table 4, both the Trace test and Maximum Eigen test indicate at least one significant cointegrating equation, since the hypothesis of no significant cointegrating vector is rejected. Apparently, the number of cointegrating vectors in both tests is one. The existence of significant cointegrating vectors imply evidence of a long-run equilibrium relationship between exchange rate and export in Ghana.

Nigeria

Unit Root Test

Consistent with the previous cases, the unit test results and other results for Ghana are presented and analyzed succinctly The results of the stationary test using the Augmented Dickey Fuller (ADF) test are reported in Table 6 for levels and first difference.

Table 6: Unit Root Stationarity Test for Variables in Levels and First Difference

Variables	ADF Statistic (in Levels)	ADF Test Statistic (in First Difference)	Order of Integration	Remark
ERT	-6.88**	-7.79**	I(1)	Stationary
XPT	-2.82	-5.70**	I(1)	"
INFR	-1.45	-3.22**	I(1)	"
M	-7.14**	-71.4**	I(1)	"

Source: Authors EVIEW Output

From the unit root test results, two variables, ERT and XPT are levels-stationary, while two M and INF are not stationary at levels. However, after the first differences, the variables became stationary i.e., attaining stationary after first difference. They are thus integrated of order one (i.e. I [1]).

Cointegration Test

The Johansen Cointegration test results are reported in Tables 7 and 8, respectively.

Table 7: Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.
None*	0.4755	69.48	63.88	0.02
At most 1*	0.2206	31.41	42.92	0.42
At most 2*	0.1964	16.71	25.87	0.44
At most 3*	0.0624	3.80	12.52	0.77

Source: Authors EVIEW Output

Table 8: Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.
None*	0.4755	38.07	32.12	0.00
At most 1*	0.2206	14.70	25.82	0.66
At most 2*	0.1964	12.90	19.39	0.34
At most 3*	0.0624	3.80	12.52	077

Source: Authors EVIEW Output

Both the Trace test and Maximum Eigen test indicate 1 significant cointegrating equation, since the hypothesis of no significant cointegrating vector is rejected. Apparently, the number of cointegrating vectors in both tests is one (1). A long-run equilibrium relationship therefore, exists among macroeconomic adjustment, exchange rate devaluation, investment volatility and economic growth in Nigeria.

Conclusion

The key findings of this study are that Exchange rate of sub-saharan African countries is influenced positively by inflation rate in line with the theoretical expectations. This result is adjudged to be consistent with expectations for Gambia, Nigeria, Guinea, and Ghana exchange rate functions.

It is concluded that, there is independence over the use of exchange rates policies as instruments of export stimulation have limited usefulness. This is to be expected due to the fact that all the countries involved in the sub-saharan African countries are individually small countries possessing non-convertible currencies. On the other perspective, an increase in inflation rate has a significant effect on exchange rate but a significant positive effect. From the empirical results in this study, it suggests that sub-Sahara African countries may want to reconsider their reserves management strategies within a broader economic development policy framework.

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