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An Empirical Analysis of the Determinants of Real Exchange Rate in Nigeria (1981-2012)

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ABSTRACT

Over the past ten years, the exchange rate of Nigeria on domestic currency to other foreign currencies, especially the US dollars has been on the depreciating front. The real exchange rate has been erratic, fluctuating and highly volatile over the years. The unabated problems of high unemployment, inflation and overall economic hardships have been attributed to the unstable real exchange rate. This is what necessitated the researcher to seek and find out the determinants of real exchange rate in Nigeria. Adopting the Ballassa-Samuelson Hypothesis, the study employed the Error Correction model (ECM) technique to perform the data analysis while using time series data ranging from 1981 through 2012. Findings revealed that the interest rate differential and oil revenues are major determinants of real exchange rate in Nigeria. Productivity differential was not a determinant in influencing real exchange rate, thus Ballassa-Samuelson technique could not be confirmed. The study calls for diversifying of the Nigerian economy away from the oil sectors so as to reduce the shocks arising from the oil sector.

Keywords: *Rate, Productivity Empirical analysis, Determinants, Real exchange rate, Long run relationship, Interest differential, Oil revenue, Nigeria*

1. INTRODUCTION

The real exchange rate is one of those macroeconomic variables which policy makers and researchers have identified as being relevant for economic planning and control. Thus, an understanding of both the fundamental and short run factors that determine the real exchange rate is crucial to the attainment of the equilibrium Real Exchange Rate, which ensures both internal and external balance in the economy. The role of exchange rate and its effects on macroeconomic performance has continued to generate interest among economists. It is argued by many economists that exchange rate stability facilitates production activities and economic growth. They are also of the view that misalignment in real exchange rate could distort production activities and consequently hinder exports growth and generate macroeconomic instability.

Exchange rate policy guides investors on the best way they can strike a balance between their trading partners, and investing at home or abroad [1]. In [2],and [3] stated that exchange rate fluctuations can influence on the prices of goods, services and other economic activities in both local and international market.

International trade permits the use and application of exchange rate. Exchange rate refers to the rate at which one currency exchanges for another [4]. It is said to depreciate if the amount of domestic currency require buying a foreign currency increases, while the exchange rate appreciates if the amount of domestic currency require to buying a foreign currency reduces. An appreciation in the real exchange rate may create current account problems because it leads to overvaluation.

Overvaluation in turn makes imports artificially cheaper while exports relatively expensive, thus reducing the international competitiveness of a country [5].

Unstable exchange rate prevents the economy from achieving its potentials. Exchange rate volatility refers to the swings or fluctuations in the exchange rates over a period of time or the deviations from a benchmark or equilibrium exchange rate [3]. The existence of many parallel markets side-by-side the officially recognized foreign exchange market gives rise to exchange rate misalignment [3].

1.1 Statement of the Problem

Today, the nation's foreign reserves have declined drastically since the onset of the 2007 recession, followed by the collapse of the Nigerian stock exchange market [6]. Some economics watchers have attributed the persistent depreciation of the naira to the decline in the nation's foreign exchange reserves. Others argued that the activities of some market operators (speculators) and banks are responsible for the recent decline in the value of the naira. It has been argued that the quest for higher profits in the face of the global economic meltdown is forcing some banks to engaging in 'round-tripping', a situation in which banks buy foreign exchange from the Central Bank of Nigeria (CBN) and sell to parallel market operators at prices other than the official prices. These practices lead to exchange rate fluctuations and misalignment. These practices continue to negatively affect the economy of Nigeria.

[7] Stated that the factors that brought about the depreciation of the Nigerian exchange rate are many e.g. weak production base, import-dépendent production structure, fragile export base etc.

A realistic and sustainable foreign exchange rate is, therefore, the backbone of international trade and plays a central role in the economic upliftment of nations [8]. This explains why much effort have been made by nations, in theoretical and empirical forms, in designing and developing appropriate exchange rate system which

hitherto has defiled any generalized method of determination because of the differences and peculiarities of different economic climates [9]. It also an account for why researchers on the determination of appropriate exchange rate for the Naira would not give up the task until serious effort is made to achieve equilibrium in the exchange rate determination [10].

[11] Indicates that the effort to achieve equilibrium real exchange rate that will guarantee internal and external balance, the Nigeria economy has been exposed to the fixed and floating exchange rate regimes since 1970s to date. The achievement of the objectives below is impeded by problems which include:

a. Price distortion and resource misallocation
b. Depletion of foreign reserves
c. Increasing external debts
d. Overdependence on foreign products
e. Frequent change of monetary and fiscal policies etc.

1.2 Research Questions

From the foregoing discussion, the questions that are raised include:

a. What are the determinants of the real exchange rate in Nigeria?
b. Is there a long run relationship between real exchange rate and these determinants?

1.3 Statement of Objectives

The main objective in this research is to investigate the determinants of real exchange rate in Nigeria.

Specifically, this study intends to:

a. Identify the determinants of real exchange rate in Nigeria
b. Establish a long run relationship between the real exchange rate and its determinants.

1.4 Statement of Hypotheses

H_o: Real exchange rate has no significant relationship with productivity differentials, interest rate differentials and ratio of oil revenue to GDP.

H_1: Real exchange rate has significant relationship with productivity differentials, interest rate differentials and ratio of oil revenue to GDP. To academicians, scholars, research students, this work will assist them in their further research work on this or other related topics.

To students and scholars, this study will avail them with modern knowledge on the issues that should be considered in policy formulations for the economic growth of the country.

Finally, this work will assist policy makers and government in making rational and feasible policies involving exchange rate and the factors that influences it in Nigeria, since it provides a sound analysis and information that are vital for the growth of the economy.

1.5 Scope of the Study

For empirical analysis, the data (1981-2012) used are drawn from the Central bank of Nigeria Statistical Bulletin and the World Bank database. These data will be analyzed econometrically to see how they fit the Nigeria environment.

1.6 Review of Related Studies

The literature is subdivided into two parts, the Empirical literature and summary of theoretical literature.

Summary of Empirical Literature

Study	Methodology					Conclusion
	Data Set	Dependent Variable	Explanatory Variables	Econometric Technique	Other Variables	
Shehu 2004	Monthly Data Set (1987 - 2001) Nigeria`	Real Exchange Rate	Index of National Outputs, imports, imports	OLS, ARDL and generalized least signature	Money supply, domestic price level	Monetary policy approach to exchange rate fits the Nigerian case
Jimoh 2004	Annual time (1960 - 2000) series Nigeria	Real Exchange rate	Terms of trade, net capital flows openness	Johansen Cointegration	Trade liberalization	The study found the decisive trade liberalization policies of 1986-1987 led to about 13% depreciation in the Nigerian real exchange rate and made the real exchange rate more responsive to the changes in its term of trade by about 17%
Ans of ie 2005	Panel Data	Real Exchange	Interest rate, money supply,		Inflation differential	The variable interest rate differential constitute a

	1995 – 2004 (Sweden, UK and Japan)	rate	industrial production			significant explanatory variable for exchange variable for exchange rate movement regarding the three countries
Ans Of ie 2005	Time series 1995 – 2006 South Africa	Manufacturing equilibrium real exchange rate	Unit labour cost, productivity government expenditure	Ordinary least square	Openness	All the explanatory variables are the main drivers of the manufacturing exchange rate.
Auwal and Hamzat 2010	Monthly data 2000 – 2008 Nigeria	Marginal rate of exchange (for DAS), IFEM rate of exchange	Demand	Autoregressive distributed lagged model (ARDL)		The findings show that the exchange rate under DAS converges to long run equilibrium while it does not under IFEM.
Bakare and Olubokun 2011	Time series data (1970 - 2008)	Nominal exchange rate	(domestic prices and the foreign price level)	OLS and Cointegration on Analysis		The multiple regressions results confirmed the validity of purchasing power parity (PPP) the better option for the determination of exchange rate and the realistic value of naira.
Ajaoh and Igbekoyi 2013	Annual time series 1981 – 2008 Nigeria	Real exchange rate	Openness of the economy, government expenditure, interest rates movement as well as lagged value of exchange rate are	GARCH (1,1)	Productivity nominal exchange rate	Openness of the economy government expenditures, interest rates movement as well as lagged value of exchange rate are major determinants of exchange rate volatility
Shehu 2011	Quarterly time series (1986Q1 to 2006Q4) Nigeria	Real exchange rate	Net foreign asset, terms of trade shocks, index of crude oil price volatility	VAR, and Cointegration on analysis	Government's fiscal spending, index of openness index of monetary policy performance and index of productivity	Regression of results show that most of the long – run behavior of the real exchange rate could be explained by terms of trade index of crude oil volatility, index of monetary policy performance and government fiscal stance
Ekong and Onye 2013	Annual time series 1986-2010	Real exchange rate	Money supply differential, output differential interest, differential and inflation differential	FM-OLS, DOLS, and Johansen Cointegration		The result indicates that exchanges rate and relative prices (inflation differential) will apparently drift apart without bounds in the long run

2. SUMMARY OF THEORITICAL LITERATURE

Here, the researcher provides a brief review of exchange rate determination theories and their policy implications.

Purchasing power parity (PPP) theory, which is classified into two types (absolute PPP and relative PPP), is covered in this review as a starting point for understanding how exchange rates are determined in the goods market. It builds linkage between the exchange rate and prices of goods in two economies. This is why it is called the "inflation theory of exchange rates." Since it deals only with the goods market, and not the assets market, it is a partial equilibrium theory. The concept of purchasing power parity allows one to estimate what the exchange rate between two currencies would have to be in order for the exchange to be on par with the purchasing power of the two countries' currencies.

Another popular partial equilibrium exchange rate theory, interest rate parity, examines how the exchange rates are determined in financial markets. Since interest rates change frequently in the short run, interest rate parity is thought of as "short run exchange rate theory." Interest rate parity also has two types, covered interest rate parity (CIRP) and uncovered interest rate parity (UCIRP), both of which are based on the assumption that asset markets are frictional and that there is no arbitrage. A lot of evidence supports CIRP as a forward exchange rate pricing model. However, changes in the financial guidelines, risk aversions and movement of financial instruments may continue to bring changes in the exchange rate applications. The work of UCIRP and the Fisher are also studied in this work, but the lack empirical evidence to support their views. Some models are used to show impacts and absorption of shocks on the exchange rate applications. One of the model, that is used for setting of flexible prices, forecasting of price level changes with' current and future macro-economic related variables, eg .money supply, foreign interest rate, and income level etc.

The second model, the Mundell-Fleming model, is extended from a closed IS-LM model. Unlike the simple monetary model, in which prices are viewed as flexible, it assumes that prices are preset in the short run. In addition to the internal monetary market equilibrium, goods market equilibrium, and external equilibrium condition, the balance of payments is also considered in the Mundell- Fleming model. Thus, it can be viewed as a general equilibrium model. One of the most important forecasts of the model is the so called trilemma, which states that perfect capital mobility, monetary policy, independence and a fixed exchange rate regime cannot be achieved simultaneously. In the long run, the exchange rate level is perfectly correlated with the level of monetary supply, and payment monetary policy may only play a trivial role in economic growth. And continuo's devaluation may course problems in the management of balance of payment which may be spurious in the economy.

Finally the Dornbusch model indicated that prices could be reviewed therefore recommended for price gradual adjustments. This indicate that there could be overshooting in prices in determining long-run equilibrium when there is shock in money. At this point fixed rate could be for merit which indicates that whenever there is economic dislocation business transactions could move towards equilibrium which may be achieved through flexible market or price adjustment. The difference between the two is mainly that in the latter, adjustment May consume more time and be less risky than in the former. If prices are relatively flexible and inflation can be controlled in a moderate range, a fixed exchange rate regime is desirable.

The models lack basic tools, and could not clarify equilibrium for exchange rate determination, but could assist policy makers for policy formulation. The Ballasa - Samulson model addressed the issue of the basic foundation which was lacking in DOMBUSH MODEL by involving production activities or technology differences in a one-factor production technology model, which was then extended to a two-factor model. This model built a linkage between the major items, the productivity, Output and the real exchange rate within the production possibilities. However, they fail to recognize the demand side that is important in the exchange rate determination.

The latest important development in exchange rate studies is the pioneering work in 1995 of Obstfeld and Rogoff, whose model incorporates the demand side. However, this' model still relied on PPP and price presetting. Though it allows the welfare effects of different shocks to be compared, it merely seems to be a Dornbusch model based on maximization behavior. There are still many deficiencies in the model. First, it does not consider investment and producer' behavior; second, it regards absolute PPP as a precondition, but it has not been supported by empirical studies.

This review demonstrates that each theory holds in a particular setting and explains some macroeconomic phenomena. No single theory contains all the factors that may have an impact on foreign exchange rates. In this study, the researcher considered certain variable that are peculiar to Nigeria alone, for example oil revenue, to see if it contributes to exchange rate movement. This present study presents a country-specific and up to date study while using current time series data. Most of the studies discussed above were not conducted in an environment like Nigeria where the major determinant of most economic activity is the oil sector. The current researcher tried to put this notion into effect in this study.

3. PROPOSED DESIGN

3.1 Theoretical Framework

The basic theoretical framework guiding this study is the Ballasa-.Samuelson thesis which states that increases in productivity differentials lead to exchange rate appreciation. For example, if productivity in the tradable sector of the economy grows faster than productivity in the non-tradable sector, it push-up wages in the economy, including the non-traceable sector [12].

The increase in wages in turn raises both domestic demand and prices of traceable and non-traceable, thereby leading to exchange rate appreciation. Thus, increases in productivity differentials results to an exchange rate appreciation. This methodology was used in the work of [11], and [6] while studying the determinants of exchange rate movement of Nigeria. The previous and current publications on the determinants of the real exchange rate have shed light on the linkage between the real exchange rate and its, potential determinants. Among other determinants used in this study is the interest rate differential, and oil revenue or its prices. The essence of using oil revenue instead of net export is to reflect the oil-dependent nature of the Nigeria economy, since most of the country's earning come from oil export.

Another reason for the choice of these models is the availability of data, though proxies were used to represent the variables owing to the dearth of true and quality data in a developing country like Nigeria.

3.2 Model Specification

Thus theoretical framework of study, being the Ballasa-Samuelson hypotheses express the real exchange rate (EXCR) as a function of productivity differentials (PROD) in traceable compared with nontradeables.

Thus, the model is represented as:

$$EXCR = \beta_0+\beta_1PROD \quad \ldots \quad (4.1)$$

Where PROD = $(\delta\phi - \phi^*)$. (ϕ) is the productivity in traceable sector, while (δ^*) is the productivity in the nontradeable sector.

To capture the effect of interest rate differential according to the Interest Rate Parity theory, we introduce the variable interest rate differential:

$$INTD= (\phi - \phi^*) \quad \ldots. \quad (4.2)$$

Where (ϕ) is the domestic interest rate, while (ϕ^*) is the world interest rate. Inserting equation 4.2 into equation 4.1, our hybrid model becomes:

$$EXCR = \beta_0+\beta_1PROD + INTD \ldots \quad (4.3)$$

Where: EXCR = real exchange rate

PROD = (GEX/GDP) (proxy for productivity differential)

INTD = the difference between the Nigerian interest rate and the world interest rate (captured by the United States interest rate)

The above model has been used by [11] and [13] in the study of the determinants of real exchange rate in Nigeria and Angola respectively. This study is country specific. In order to reflect the peculiarity of Nigeria as an exporting economy, the present researcher decided to amend the above model by incorporating oil price (Nigeria, being an oil producing and underdeveloped economy). This approach was also taken by Gelbard and agayasu (2004) in Angola:

$$EXCR = \beta_0+\beta_1PROD + \beta_2INTD + \beta_3OILR + \mu \ldots.. \quad (4.4)$$

Where OILR =- Oil revenue/GDP

Instead of net export is to reflect the oil-dependent nature of the Nigeria economy, since most of the country's earning come from oil export.

Another reason for choice of these models is availability of data, though proxies were used to represent the variables owing to the dearth of true and quality data in developing country like Nigeria.

The theoretical framework of study, being the Ballasa-Samuelson hypothesis expresses the real exchange rate (EXCR) as a function of productivity differentials (PROD) in tradable compared with nontradeables

Thus, the model is represented as

$$EXCR = \beta O_+ \beta_1PROD \quad ----- \quad (4.5)$$

Where PROD = $(\phi - \phi^*)$. (ϕ) Is the productivity in tradables sector, while (ϕ^*)

Is the productivity in the non-tradable sector?

To capture the effect of interest rate differential according to the interest parity theory, we introduce the variable interest rate differential:

$$INTD = (\phi-\phi^*) \quad ----- \quad (4.6)$$

Apriori Expectation

$$(\beta_1) < 1, (\beta_2) < 1, (\beta_3) < 1$$

3.3 Method of Data Analysis

In the first order test, the researcher will also regress the dependent variable against the explanatory' variables to obtain the parametric coefficients of t-ratio, F-ratio and the coefficient of determination.

The researcher employed the Engle Granger and Johansen co- integration approaches to establish the long-run relationship among the variables used in this study.

This process usually starts with the testing of the time series data for stationary. The Augmented Dickey Fuller test for unit root will be employed for this purpose.

After the co-integration relationship has been established, the error correction model will be estimated to tie the short run to the long run equilibrium. This is to show how far the variables return back to equilibrium when a shock arises. This speed is represented by the error correction term. The coefficient of this error correction term is expected to be negative.

3.3.1 First Order Test

First Order Test

The T-test: The 'T-test is a test for the statistical significance of the individual regression coefficient. When the value of the test statistic lies in the critical region, the null hypothesis is rejected as the test is said to be statistically significant. The null hypothesis is said to be statistically significance when the value of the test statistics does not lie in the critical region.

The t-test is calculated by dividing the estimated t by its standard error

$$t = \beta_0/\beta_1$$

Where:

β_1= parameter estimate = Standard error

Using a 5percent level of significance, the degree of freedom, (N - K). The tabulated t-ratio (to. 025) is compared with the computed value

Decision Rule

If the computed t-ratio (t*) is greater than (t a/2) or ($t_{o.250}$) we rejected the null hypothesis. If otherwise, we accepted H_0

The F-test

This is a test of the joint influence of the explanatory variable on the dependent variables. It tests for the statistical significance of the entire regression plane it is computed by

$$F = \frac{/K-1}{e^2/n-k} \quad \text{or} \quad \frac{R^2/K-1}{(1-R^2)/N-K}$$

The computed F - ration, F* is compared with the theoretical F (0.05)

V_1 = K - 1 and V_2 = n - k degree of-freedom

Where

V_1 = degree of freedom for numerator
V_2 = degree of freedom for denominator
K = No of Bs
n = Sample size
$F_{0.05}$ =(V_1, V_2, d.f)

Decision

If computed F* is greater than $F_{0.05}$, we rejected the null hypothesis. If otherwise, we accept Ho

1. Coefficient of Détermination R^2

This is a test of the goodness of fit of the regression model. It. Measures the percentage of variations in the dependent variables attributes to the independent variable. It lies between 0 and 1. The closer it is to 1, the better the fit otherwise, the worst the fit.

3.3.2 Second Order Test

1. Test Of Stationary

Unit Root Test

The Stochastic properties of the time series was checked using the Augmented Dickey - Fuller (ADF) unit root test and Person tests.

$$\vartheta Y_t = t_0 + t1y_{t-1}t_a\text{trend} + \sum P_{j=1}\,\partial y_{t-i} + y_t \ldots\ldots \quad 4.7$$

Where, y indicates the first difference of yt and P is the lag length of the augmented terms for Yt. The equation above allows the researcher to test whether the variable Yt is a satisfactory series. The null hypothesis in the ADF test is that Yt is a satisfactory

2. Cointegration

One of the objectives of this work is to assess the long run dynamic relationship/impact between the independent variable and the dependent variable. The Engle-Granger test is procedure that involves an OLS estimation of a pre-specified co-integrating regression between the variables. The Engle- Granger two-step procedure is applied by estimating the equation below using OLS and then testing the level of stationarity of the residual terms.

The null hypothesis of no co-integration is rejected if it is found that the, regression residuals are stationery at level.

$$\Delta Y_t = a_0 ECM_{t-1} + \sum_{}^{t} J = 1aj\ \Delta Y_{t-j} + \sum_{}^{t} J = 1aj\ \Delta Y_t - j + v_t \quad \ldots\ldots 4.8$$

Where: denotes first difference operator; ECM_{t-1} is the error correction term t is the number of lags necessary to obtain "white noise" and vt is the random disturbance term.

3.4 Data Required and Sources

The data used in this research work consist mainly of secondary data. In order to implement the fundamentals of the study, the time series data for the period 1981 to 2012 was selected and used. The data are

accessed from the Central Bank of Nigeria Statistical Bulletin Various issues, www.cenbank.orgistatistical bulletin.

3.5 Computer Software

The researcher employed the use of e-views 3.1 econometric software for data analysis. This software will be used to conduct the OLS estimation for the registration coefficients, the unit root tests, different co-integration tests and the error correction modeling.

4. RESULTS AND DISCUSSION

In this section, the researcher presents the result of the regression analysis using tables which summarizes the result of the regression analysis and the coefficients obtained. After this, the results are evaluated in the light of economic, statistical and econometric criteria. A summary of these findings will be made and evaluated at the end. So, we start by presenting the result of the ordinary least square estimates in table 1

4.1 Empirical result

Dependent Variable log (EXR)
Method: Least Square"
Date: 0'1/24/14 Time 20:07
Sample (adjusted): 1985 - 2012
Included observations: 13

Excluded observations: 15 after adjusting endpoints

Table 1: Result of OLS Analysis

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	0.706787	0.786411	0.898751	0.3922
LOG(PROD)	-0.061787	0.190786	-0.323856	0.7534
LOG(INTD)	0.989692	0.376185	2.630865	0.0273
LOG(OILR)	0.274336	0.129569	-2.117298	0.0633

R-Squared	0.445861	Mean dependent var	2.446992
Adjusted R Squared	0.261147	S.D dependent var	0.533122
S.E of registration	0.458253	Akaike info criterion	1.524868
Sum squared resid	1.889961	Scwarz criterion	1.698699
Log likelihood	-5.911644	F Static	2.413800
Durbin – Watson stat	4.229064	Prob (F. Statistic)	0.133877

The result above shows that jointly, all the explanatory variables are not significant in determining real exchange rate in Nigeria over the period under study, since the probability of the F-ratio (0.13>0.05). However, on individual level, the regression coefficient for Interest rate differential (INTD = 0.989692) and Oil revenue (OILR - 0.2743) were significant at 5%. The regression coefficient for productivity differential was not statistically significant since its probability value (0.7534) exceeds 5% level of significance (0.05).

Again, the adequacy of the model was found not to be of good fit with the coefficient of determination computed at 0.4488. In other words, 44.88% of the changes in real exchange rate are attributed to changes in the explanatory variables, interest rate differential, productivity differential, and oil revenue.

This result obtained above could be "spurious" or "nonsensical" if the time series data were not checked for stationary. So the result of the Augmented Dickey-Fuller Unit Root test is presented in table 3.

Table 2: Augmented Dickey Fuller Unit Root Test

Variables	Intercept and trend	5% critical Value	Order
EXR	-3.430289	-2.9627	I(0)
PROD	-4.772976	-2.9665	I(1)
INTD	-5.942230	-2.9665	I(1)
OILR	-2.971964	-2.9627	(0)

The table 2 above shows that only they were integrated at first and second differences. While exchange Rate (EXR) and the ratio of oil revenue to GDP (OILR) ere 1(0), productivity differential (PROD) and interest rate differential (INTO) were 1(1).

The study went further to conduct the test for co-integration. This is based on the principle that individual time series may not be stationary at levels, but a linear combination of them may produce stationary result at levels.

Table 3: Engle – Granger Co-integration Result

Variables	Intercept and trend	5% critical Value	Order
ECM	-4.18859	-1.9526	I(0)

The table 3 above shows the result of the Engle-Granger co-integration test. The OLS residual (ECM) was

tested for unit root. It was stationary when integrated at levels (integrated at order zero), no intercept, no trend. This implies presence of co-integration among exchange rate and its determinants. To confirm this, we go on to do a multivariate co-integration analysis.

Table 4: Result of Johansen Co-integration Test
Series: EXR, PROD, INTO, OILR

Eigen value	Likelihood ratio	5 percent critical value	1 percent critical value	Hypothesized No. of CE (s)
0.592152	4809755	47.21	54.46	None *
0.327382	21.19175	29.68	35.65	At most 1
0.247399	9.294400	15.41	20.04	At most 2
0.025268	0767778	3.76	6.65	At most 3

L.R. indicates 1 co-integrating equation(s) at 5% level of significance

The result above shows the result of Johansen co-integration test. The' long run test indicates one co-integrating equation, when we compare the value of the likelihood ratio and, the value of the 5% critical level. Co-integration exists when the LL value exceeds the 5% critical value.

Table 5: Parsimonious Error Correction Model

Variable	Coefficient	t-statistic	Probability
C	-0.291620	-0.127051	0.8999
INTD	-1.212200	-2.044736	0.0515
OILR	-2.289276	2.194742	0.0377
PROD	0.315339	0.567142	0.5757
ECM	-0.781800	-4.038339	0.004
R^2	0.61157		
Durbi - Watson	1. 999		

The mechanism of disequilibrium in the short run from the long-run equilibrium as a result of random shock effect is expressed in the Error Correction Mechanism (ECM) regression model result presented in table 5 above. The estimated ECM model reveals that exchange rate (EXR) is, restored back to its equilibrium with a speed of adjustment of 78.1% whenever there is a shock to its equilibrium. The error correction term is correctly signed (negative). This implies whenever there is any shock to the economy, the speed of adjustment of the equilibrium exchange rate is very fast as implied by the significance of the coefficient at 5% level of significance from the table above, oil revenue and interest rate differential are significant in determining equilibrium exchange rate in Nigeria over the period under study. Their coefficients also meet apriori expectations, being negatively related to exchange rate. However, the outcome of this study did not confirm the Ballasa- Samuelson hypothesis since the coefficient of the productivity differential was not significant. It also did not meet apriori expectation, by having a positive sign. The models was adequate with the coefficient of determination (R^2) being 61.15%. Also, the Durbin Watson value was very close to 2.0 indicating the absence of autocorrelation. With all these, the findings of the ECM modeling reveal that a robust and reliable result for the investigation so far.

4.2 Evaluation of Working Hypotheses

In the introduction, the researcher formulated the following null hypotheses to guide the study" The result obtained from the data investigation is now used to evaluate the working hypotheses.

4.2.1 Null Hypothesis I

Real exchange rate has no significant relationship with productivity differential. Interest rate differential and oil prices

We evaluate this hypothesis using the result of the error correction model. From table 5 above, oil revenue (01LR) and interest rate differential (INTD) are significant in determining equilibrium exchange rate in Nigeria over the period under study. Their P values of their coefficients are less than 0.05. Their coefficients also meet apriori expectations, being negatively related to exchange rate. However, the outcome of this study did not confirm the Ballasa- Samuelson hypothesis since the coefficient of the productivity differential was not significant. It also did not meet apriori expectation, by having a positive sign.

Overall, the F-statistic was found to be statistically significant with the probability of F-ratio (0.0004) being less than 0.05 level of significant. The implication is that all the explanatory variables were significant in determining real exchange rate over the period under study.
The models were adequate with the coefficient of determination (R^2), being 61.15%. Also, the Durbin Watson value was very close to 2.0 indicating the absence of autocorrelation

4.2.2 Hypothesis II

There is no long run relationship between real exchange rate, productivity differentials interest rate differentials and oil revenue.

The result in Table 3 presents the result of the Augmented Dickey- Fuller unit root test for stationarity of the time series data. The times series were integrated at first and second differences. The co-integration test using a univariate test of the OLS residual (Engle-Granger Co integration analysis) indicates the presence of a long run relationship. This was also confirmed by the result of a

multivariate co-integration analysis (Johansen co-integration), this implies the rejection of the null hypothesis and acceptance of the alternative that there is a long run relationship between real exchange rate and its determinants in the study.

4.3 Implication of the Result

From the above analysis, the "results of the statistic and econometric tests have revealed some interesting findings. Based on statistical criteria, it was observed that interest rate differential and oil revenue are the major determinants of real exchange rate in Nigeria. Therefore, monetary policy variables (interest rate differential), a reflection of economic activities between Nigeria and the rest of the world is a major determinant of real exchange rate. Also, real exchange rate is majorly determined by oil Revenue in Nigeria. Jointly, all the explanatory variables were significant in determining real exchange rate in Nigeria over the period under study, based on the result of the F-ratio statistic.

The policy implication is that monetary policy variables, especially interest rates' could be monitored by policy makers and monetary authorities since they are most influential in determining exchange rate movement in Nigeria. This also implies that real exchange rate fluctuation in Nigeria is result of improper monetary policy with regards to interest rate management.

The Engle-Granger and Johansen co-integration analyses have shown that there is long run relationship between real exchange rate and its determinants. This implies that in the long run, all these variables have the potency of affecting the movement of real exchange rate. Therefore, any policy making about the real exchange rate in the Nigeria's economy should take the impact and influence of each of these determinants into consideration.

5. CONCLUSION AND RECOMMENDATION

It was earlier stated in this work that exchange rate determinants are macroeconomic variables which policy makers and researchers have identified as been relevant for economic planning and control. Unstable exchange rate prevents the economy from achieving its potentials. Over the past ten years, the exchange rate of Nigeria's domestic currency to other foreign currencies, especially USA dollar has been on the depreciating front for Nigeria.

The real exchange rate has been erratic, fluctuating and highly volatile over the years. The unabated problems of high unemployment, inflation and overall economic hardships have been attributed to the unstable real exchange rate. This is what precipitated this research work by the researcher. The researcher sought to find out the determinants of real empirical value of exchange rate within the economy for long period of time. To conduct this research some methods are involved which centered on identifying the nature of the relationship between real exchange rate and its determinants (interest rate differential, productivity differential and oil revenue) in Nigeria over the period under study. The time series covered in this study was 1981-2012. The long run study involved the use of Error Correction model (ECM) through unit root test and co-integration analysis.

a. Interest rate differential and oil revenue are major determinants of real exchange rate in Nigeria.
b. There is a long run relationship between real exchange rate and these determinants (interest rate differential, productivity differential and oil revenue).
c. The speed of ajustement of short run equilibrium to the long run is 78.18% and is significant.

6. RECOMMENDATION

Based on the results and conclusion, the researcher makes the following recommendations

a. Having observed that interest rate differential is principal factor influencing real exchange rate, it has become very important for policy makers to consider the effective management and control of interest rate in order to achieve and maintain a stable real exchange rate.

b. Revenue from oil was significant in determining real exchange rate in this study. This calls for those in authority to consider the effects of activities in oil sector as it affects economic stability. Since, oil revenue determines what happens to the real exchange rate, something should be done to diversify the economy so that whenever there is a shock in the oil sector, the shock will be less felt by the economy.

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